Market Forces in Academia: Returns to Education and Faculty Pay*

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February 12, 2026

Abstract

We examine long-term trends in faculty compensation and its underlying drivers in North America, using a comprehensive administrative dataset covering most research institutions. We document three primary stylized facts. First, wage dispersion across academic disciplines has widened significantly over the past 50 years, with economics, business, and especially finance exhibiting a large and growing premium. Second, faculty wages are strongly and positively correlated with their students' post-graduation earnings in both the cross-section and the time-series. Third, the relative supply of PhD students varies largely across fields, with high paying fields training relatively fewer PhD students. Using granular data on student earnings at the university-field-year level, we estimate the elasticity of faculty pay with respect to students' post-graduation earnings to be in the 0.4 to 0.7 range. This elasticity varies substantially across fields. Consistent with a simple supply-and-demand model of occupational choice, where high private returns to education simultaneously increase the demand for faculty and raise the opportunity cost of doctoral training, this elasticity is higher in fields where industry wages are high, potentially amplifying industry shocks. Overall, our findings suggest that the academic wages are increasingly shaped by industry labor market dynamics.

JEL classification: J31, I23

Keywords: Faculty Compensation, Labor Market Outcomes, Academic Fields, Universities

*We gratefully acknowledge helpful comments and suggestions from Ilona Babenko (EFA discussant), Alex Edmans, Vincent Glode (AFA discussant), Sabrina Howell, Marlene Koffi, Thomas Lemieux, Bill Schwert, Mila Sherman (discussant), and Elena Simintzi, as well as conference participants at the 2024 AFA, the FSU SunTrust Beach Virtual Conference, the EFA 2022 annual meeting and the 2022 Paris December Finance Meeting, and seminar audiences at Harvard Business School, University of Toronto-Rotman, Rice University, McGill University, University of Miami, Emory University, Vanderbilt University, Oxford Said, Toulouse School of Economics, Insead, Korea University, Queens University and Paris School of Economics. We thank Shishir Aravindan, James Blume, Akhil Choraria, Botir Kobilov, Amanda Lei, Nasha Lou, Shivesh Prakash, and Dolly Yu for excellent research assistance. Errors are ours only.

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1 Introduction

While the aggregate returns to postsecondary education have risen substantially since the late 1970s (Goldin and Katz 2008), these gains have been remarkably heterogeneous across fields of study. Substantial earning differentials persist even when accounting for institution type, selectivity, and peer quality (Kirkeboen et al. 2016), often surpassing the gap between high school and college graduates (Altonji et al. 2012). These inter-field disparities have widened over time (Altonji et al. 2014).[1] As a result, the choice of college major has become a crucial determinant of the level, trajectory, and risk of lifetime earnings.[2]

Although a growing literature investigates the influence of heterogeneous returns to education across fields on student educational, career and financial choices, little is known about its effects on the supply side of education, most notably, on the determination of faculty compensation.[3] Beyond their implications for tuition and university costs, faculty wages serve as a critical price signal that influences the allocation of talent across disciplines, the quality of instruction, and the frontier of innovation.[4] Although prior research provides suggestive evidence of a widening dispersion in faculty wages across academic fields (e.g., Courant and Turner (2019)), a comprehensive assessment is lacking. This paper addresses several key questions: How has the cross-sectional distribution of academic wages evolved over recent decades? To what extent does cross-field wage dispersion mirrors student labor market outcomes? If such a relationship exists, is it uniform across fields and what economic mechanism underlies it?

This paper documents a secular rise in faculty wage dispersion across fields since the 1970s and uncovers a fundamental link between academic compensation and student post-graduation earnings. Crucially, the growth in faculty wage heterogeneity is only partially attributable to the widening distribution of student earnings; a first-order role is played by substantial cross-field variation in the elasticity of faculty pay with respect to those

[1] See Altonji et al. (2016) and Lovenheim and Smith (2023) for a review of the literature on returns to college majors.

[2] The literature investigating the labor market outcomes of college major choices includes Arcidiacono (2004); Hamermesh and Donald (2008); Altonji et al. (2012); Hastings et al. (2013); Andrews et al. (2017); Andrews and Stange (2019); Hampole (2023); Andrews et al. (2024).

[3] Recent studies on the effects of earning differentials across majors on the supply side of education, such as Conzelmann et al. (2023) and Light (2024), explore impacts on course offerings and the number of degrees awarded.

[4] In 2022, faculty salaries accounted for an average of 62% of instructional expenditures at four-year postsecondary institutions, according to the Integrated Postsecondary Education Data System (IPEDS).

returns. We argue that high private returns to education operate through a dual channel –simultaneously bolstering student demand while raising the opportunity cost of doctoral training. This market tightening exerts upward pressure on wages, particularly in disciplines characterized by high labor intensity or those where institutional revenue models are more elastic to student demand. Our findings thus highlight how idiosyncratic field characteristics can amplify the transmission of labor market shocks to the academic wage structure.

To conduct our empirical investigation, we first assemble a longitudinal administrative dataset of individual-level faculty pay across most universities in the U.S. and Canada.[5] The final dataset includes over 330,000 faculty from 1,459 universities and 20 fields, spanning 1993–2023, and is augmented with historical survey data at the university–field level dating back to 1974. We collect faculty compensation data available through public record requests in accordance with the freedom of information laws for most U.S. and Canada public four-year institutions. To extend coverage to private universities and additional public universities, we supplement these records with green card and H1B application data, leveraging the significant share of non-U.S. citizens employed in academia. A key challenge is to precisely and consistently identify faculty academic fields. We address it by using textual analysis of department affiliations when available (60% of observations), results from Google searches using names and affiliations collected through an API (30%), and academic field directories (10%). Our faculty pay dataset includes over 1.4 million individual observations with information on academic field, rank, base salary and/or total compensation, and university affiliation over the 1974-2023 period.

We then merge this faculty pay dataset with a yearly panel of student post-graduation earnings constructed using the Post-Secondary Employment Outcomes (PSEO) data. Produced by the U.S. Census Bureau, the PSEO dataset links individual-level graduation records from post-secondary institutions with data from the Longitudinal Employer-Household Dynamics program to report earnings one, five, and ten years after graduation, along with their industry and geographical placement. Our faculty salary dataset covers 76% of the 488 four-year institutions included in the PSEO. The resulting merged panel includes 76,000 observations on faculty compensation and student post-graduation outcomes, spanning 366 universities and approximately 5,000 academic programs per year. Finally, we link faculty

[5]We define "universities" as post-secondary institutions that award four-year bachelor's degrees.

pay to additional institutional characteristics using data from the Integrated Postsecondary Education Data System (IPEDS), capturing information on the number of degrees awarded and tuition levels by field, university, and year.

We establish three primary stylized facts using this comprehensive dataset. First, we document a widening dispersion in faculty pay across fields since the 1970s, primarily driven by business, law, economics, and especially finance. Over the past five decades, the wage premium for finance professors relative to the average across all fields has increased from approximately 5% in the 1970s to over 60% in the 2020s. The current wage differential between finance and philosophy professors exceeds 100%, a gap comparable to that between humanities faculty and kindergarten teachers.[6] In economics and business, faculty wage premia have also risen, from less than 10% in the 1970s to around 30% and 40%, respectively, by the 2020s. By contrast, the premium in computer science and engineering emerges earlier, and peaks in the late 1990s and early 2000s, at 10 and 20%. At the lower end of the spectrum, humanities professors, who earned about 10% less than the average faculty member in the 1970s, now face a 20% wage discount. Similarly, while mathematics faculty once enjoyed a wage premium in the 1970s, they now earn approximately 5% less than the average in the 2020s. These trends are observed across all faculty ranks and institutional types, but the growing gaps are even more pronounced at research-intensive universities, and for assistant professors.

Our second stylized fact is that faculty pay is positively correlated with student post-graduation earnings, both in the aggregate and in the cross section of academic fields. Specifically, the average faculty wage premium by field, measured after controlling for rank, year, and affiliation, exhibits a robust relationship with the corresponding wage premium earned by students post-graduation across majors, adjusted for socio-demographic characteristics. Compensation in higher education is thus partially aligned with labor market outcomes for graduates, a linkage largely absent in secondary education. However, the ratio of faculty wage premia to student earnings premiums varies widely across disciplines, suggesting significant heterogeneity in the elasticity of faculty pay with respect to student labor market returns.

[6] Annual wages in May 2022: kindergarten teachers - \$60,490, elementary teachers - \$61,690, high school teachers - \$62,360. Data source: Bureau of Labor Statistics, U.S. Department of Labor, Occupational Outlook Handbook.

Our third stylized fact is that high paying academic fields tend to exhibit higher students-to-faculty ratios, and lower PhD candidates-to-faculty ratios. In top-paying fields, faculty compensation is positively associated with the number of undergraduate students per professor, and negatively associated with the number of PhD students per professor. This pattern may reflect discipline-specific imbalances between student demand and faculty supply, leading to variation in competitive pressures that shape wages.[7]

Having established these three stylized facts, we turn to precisely measuring the elasticity of faculty pay to post-graduation earnings and its heterogeneity across fields, to make progress towards a causal interpretation of this relationship and uncover the mechanism at play.

We begin by estimating a panel model at the university-field-year-rank level regressing faculty pay on student post-graduation earnings. The specification includes either university-by-year-by-rank fixed effects (when estimating within-university elasticities across fields) or field-by-year-by-rank fixed effects (when estimating within-field elasticities across universities). Across all specifications, we find that academic wages are strongly related to undergraduate student wages, with elasticities in the range of 0.4 to 0.6. The magnitude is remarkably consistent whether measured within universities across fields or within fields across universities. We validate these findings using Scorecard data on median student earnings one year after graduation, which confirms the robustness of our results.

We next develop an empirical setting akin to a shift-share instrument for student future earnings, based on persistent program placement patterns. Our identification strategy aims at addressing concerns over measurement error, which is plausible given IPEDS data characteristics, reverse causality –well paid academics might deliver higher value education that is recognized as so in the labor market– and more generally unobserved variable bias. We construct a synthetic wage index at the university times field level, based on the industries and geographical areas where the university has historically placed students from that field, combined with the wage evolution for those industries and areas. The intuition behind the instrument is that, all else being equal, universities that historically place students in regions and industries where wages increase more than in other areas and industries experience a rise in student wages plausibly exogenous to the quality of education they offer.

[7]An alternative hypothesis is that faculty wages are largely exogenous, and the number of students adjusts accordingly to fit institutional budget constraints Courant and Turner (2019).

We show that a plausibly exogenous increase in post-graduation wages of students from a given field at a given university leads to significantly higher wages for their faculty. Strikingly, the elasticity measured through this instrumental variable analysis is of a similar magnitude as the one from the OLS regressions, which mitigates concerns over the previously-mentioned potential sources of endogeneity. Hence, the widening dispersion over the past decades in student future earnings across industries contributes to the growing heterogeneity in faculty pay across disciplines.

However, the increasing dispersion of academic wages result primarily from a pronounced heterogeneity in the elasticity of faculty pay to their student future earnings, and to a lesser extent from the increasing dispersion of student future earnings. Measuring elasticities *within field* over time or across universities reveals for instance that the elasticity of faculty pay to student earnings in finance is two to three times higher than in the humanities. This higher elasticity, combined with the substantial increase in wages within the finance industry, thus explains the majority of the growth in the finance faculty wage premium over the same period.

We next investigate the drivers of the heterogeneity in faculty pay elasticity to student future earnings across fields and find that it relates to the number of students per faculty, a proxy for university revenues, and to the supply of PhD students into the academic field.

Higher student future earnings in a given field predict an increase in the number of students per faculty, particularly in fields that are more scalable. Conversely, the ratio of PhD students to faculty declines as undergraduate and master student future earnings rise, creating frictions in the faculty supply. Additionally, universities at the top of the revenue distribution capture a greater share of total revenues in high-earning fields through increased tuition and donations. Together, these factors shape competition forces that vary significantly across fields, contributing to the observed heterogeneity in faculty pay elasticity and the growing dispersion in academic wages.

Finally, we argue that this heterogeneity is unlikely to be primarily driven by professors outside options – such as joining the industry at the end of PhD or later transitions to industry –. First, fields with high academic wages and high elasticity to student future earnings exhibit a low share of non-academic placement for PhDs. Second, conditional on working in the industry, the returns to phd education (vs. having a master) are also lower

in these fields. Last, the fields exhibiting pronounced right tails in compensation for PhD working in the industry do not exhibit particularly high academic wages.

Our study contributes to the literature on the determinants of academic wages, such as publications (Katz 1973; Tuckman and Leahey 1975; Swidler and Goldreyer 1998; Garfinkel et al. 2024), citations (Katz 1973; Hamermesh 2018), department performance (De Fraja et al. 2020), seniority (Ransom 1993; Moore et al. 1998; Hilmer and Hilmer 2011), university monopsony power (Ransom 1993; Goolsbee and Syverson 2019), university rank (Kim et al. 2009) and attributes such as race or gender (Gordon et al. 1974; Hoffman 1976), including a more recent focus on finance within business schools (Sherman and Tookes 2022; Lowry et al. 2025). By documenting and rationalizing the widening field differentials, this paper brings a supply-and-demand perspective to this discussion. Our findings also uncover the growing connection between academia and broader labor maker dynamics.[8]

Second, our work relates to the literature on wage differentials across skills and majors and their broader implications. Several studies show how earnings levels (Arcidiacono 2004; Wiswall and Zafar 2014, 2015), trajectories (Hampole 2023), and risks (Nielsen and Vissing-Jorgensen 2006; Bonin et al. 2007; Dillon 2018; Saks and Shore 2005) affect occupational and education choices. Differences in wage returns to majors can also explain long-term changes in inequality and earnings differences across gender and race (Grogger and Eide 1995; Brown and Corcoran 1997; Weinberger 1998; Gemici and Wiswall 2014) and the "collegiate degressivity" documented in Bleemer and Quincy (2025). This paper illustrates how wage differentials across industries can have long-reaching effects by influencing the wages of academic faculty, which in turn act as a price signal that can affect talent allocation, learning, and innovation in the economy.

Third, we add to the growing literature on the production function of higher education by documenting heterogeneous labor costs across fields. Johnson (2009) and Middaugh et al. (2003) provide evidence that instructional costs vary substantially across fields and tend to be higher for STEM courses, as well as courses in education, art, and nursing. Altonji and Zimmerman (2019) estimate net returns to college majors by considering heterogeneous student earnings and costs. Our findings documents empirically which fields are associated with higher labor costs and which field characteristics drive this heterogeneity.

[8]Our findings also provide evidence consistent with the rationale behind the field differentials documented since the mid-1980s by studies such as Bowen and Schuster (1986), Hearn (1999), and Bellas (1997).

More generally, our study informs the ongoing debate on the role of universities and their relationship with markets and societies. The literature has documented a shift from the traditional model of public good knowledge production to a framework where universities compete in a market for knowledge through their research and instruction (Slaughter and Rhoades 2004). Our study provides evidence of the increasing interconnectedness of universities with broad labor market dynamics. This ties into a longstanding debate about whether universities should be insulated from market forces to produce knowledge‘ for its own sake or whether they should focus on producing marketable skills (Veblen 1918; Bloom 1987).

The paper is organized as follows. Section 5.1 provides institutional context on faculty pay. Section 2 describes the faculty and student wage data we collected across U.S. and Canadian universities over 50 years. Section 3 provides stylized facts on faculty pay. Section 4 investigates the causal relationship between student earnings and faculty pay. Section 5 explores the potential channels at play. Section 6.1 considers the potential role of industry outside options in the previous results. Section 7 concludes.

2 Data Sources and Methodology

This section describes the construction of the panel dataset of faculty pay across fields, universities, academic ranks, and years, and explains how we merge these individual-level faculty salaries with student post-graduation earnings. Throughout our analysis, we define "universities" as four-year post-secondary institutions that offer bachelor's or graduate degrees.[9]

2.1 Faculty Wages: Sources

We build a dataset of individual-level faculty salaries using data from two primary sources: Freedom of Information Acts (FOIA) requests and H-1B or green card applications. We extend this dataset back to 1974 using field-year-rank level data from historical archives.

Figure 1 summarizes the university coverage of our dataset over time in Panel A and by state if Panel B. In total, our individual-level faculty salary dataset covers 1,458 universities

[9] Accordingly, we exclude community colleges, which typically offer two-year programs.

across all U.S. states and Canada.[10] These institutions grant over 85% of the bachelor degrees conferred by four-year colleges in the U.S. as of 2019 and employ over 85% of tenure-track professors at such institutions in the same academic year.[11]

INSERT FIGURE 1 HERE

2.1.1 Public Record Requests

We collect faculty wages at public universities by submitting public record requests across U.S. states and Canadian provinces, or by extracting information directly from university or state agency websites when publicly available. In the U.S., state-level Freedom of Information laws guarantee access to records maintained by state agencies. We direct our requests to states where (1) postsecondary institutions are not exempt from disclosure requirements, and (2) access rights are granted to all individuals, not only state residents. Depending on the legal framework, we submit requests to state agencies, university systems, or individual universities and seek data over the longest available period.

While our dataset includes data from all 50 U.S states and the federal district, data coverage varies by state and institution, as described in Table A1 in the Internet Appendix. Some states or universities provide information on all university employees, including teaching-track faculty, while others restrict disclosure to research tenure-track faculty. Similarly, some report only base salary, while others include total compensation as well as the department affiliation. While the dataset covers the period 1993 to 2024, this is an unbalanced panel, with the coverage varying across universities from 5 to 30 years.

Our final dataset compiled from public record requests covers approximately 387 public universities across all U.S. states. These institutions, which represent 50% of all U.S. public four-year institutions, account for more than 90% of all bachelor's degrees granted by these institutions in 2019 .[12] The dataset also includes the 16 Canadian public universities located in Ontario, as well as the University of British Columbia.

[10] According to the U.S. Department of Education, there were 2,679 four-year post-secondary institutions in 2019-2020 in the U.S. `https://nces.ed.gov/programs/digest/d20/tables/dt20_317.10.asp?current=yes`

[11] We use data from the Integrated Postsecondary Education Data System (IPEDS) on enrolled students and professors across universities and degrees.

[12] There were 772 four-year public institutions in the U.S. in 2019-2020.`https://nces.ed.gov/programs/digest/d20/tables/dt20_317.10.asp?current=yes`.

For each university and year, we extract and standardize data on each individual's first and last name, base salary and/or total compensation, academic rank, and university affiliation. Base salary typically refers to the 9-month academic-year wage, while total compensation includes summer stipends, grant-funded salary supplements, and other variable payments. We retain only full time positions, teaching or research faculty, and identify academic rank (assistant, associate, or full professor) when available. Where reported, we also extract and standardize departmental affiliation. Finally, we exclude observations with base salary or total compensation below a minimum threshold.[13]

The resulting public records dataset includes over 2.5 million observations and 480,000 unique combinations of first name, last name, and university, which we classify across academic fields.

2.1.2 Green Card and H-1B Application Data

We complement our dataset from public record requests with data on green card and H-1B applications, enabling broader coverage across universities, including private institutions, and an extended time period. According to the National Study of Postsecondary Faculty, 17% of tenure track (but not yet tenured) faculty are not U.S. citizens. The U.S. Department of Labor provides public access to permanent residence and H-1B application data through its Employment and Training Administration.[14]

We use green card applications from 2005-2024 and H-1B applications from 2010-2024. These records include anonymized information on wages, employer, occupation, and position at the application level. We identify academic employees as those working at universities, based on employer names, and further classify faculty and their academic fields using job titles and U.S. Bureau of Labor Statistics occupation codes that identify postsecondary professors and their field of study.

We arrive at an anonymized wage dataset of around 82,000 faculty over the 2005-2024 period working across 1,460 universities, which we append to our public record request dataset.

[13] We exclude observations with annual earnings below $40,000 when the dataset does not specify whether the position is full time. This helps eliminate part-time or adjunct positions that may otherwise be misclassified.

[14] Data available at `https://www.flcdatacenter.com/`.

2.1.3 Faculty Survey Data from 1974

We extend the sample back to 1974 using data collected from a survey of public universities available in the Oklahoma State University historical archives. For over five decades, the National Association of State Universities and Land-Grant Colleges (NASULGC) has conducted yearly surveys on faculty pay across fields, compiled by the Office of Institutional Research at Oklahoma State University.[15] Each survey includes information on average salaries and the number of professors across faculty rank, fields, and university categories, covering an average of 80 public universities.

We digitize and analyze the surveys available in the Oklahoma State University archives to collect data on academic wages across fields for the 1974-2000 period. Using OCR and machine learning techniques, we convert the digitized PDF files into tables, extracting both average salaries and the number of professors by academic discipline, university categories, and faculty ranks.

2.2 Classifying Faculty into Academic Fields

2.2.1 Field Definition

To define academic field, we follow the Classification of Instructional Program (CIP) from the U.S. Department of Education's National Center for Education Statistics. Introduced in 1980 and periodically revised to reflect changes in academic disciplines, the CIP assigns a six-digit code to each instructional program. We use the first two digits to define broad *academic fields* and the first four digits to identify *departments*, which correspond to subgroups of programs with similar content and objectives.

We retain the 18 academic fields from the CIP classification that (i) offer graduate programs and (ii) represent more than 1% of our sample, with the exception of medicine. We exclude medicine because wage data in that field often reflect compensation for clinical practice, making it less comparable to other academic disciplines. Our 18 academic fields include Agriculture, Architecture, Biology, Business, Communication, Computer Science, Economics, Education, Engineering, English, Finance, History, Languages, Law, Maths, Philosophy, Physics, Psychology, Public Administration, and Social Sciences.

[15] See, for example, Scott and Bereman (1992)

In addition, we single out two departments whose average faculty wages are more than 20% above their parent field averages: (i) Accounting and finance, which we group in one department when they are separated, referred to as *Finance* (parent field is Business), and (ii) Economics (parent field is Social Sciences). These departments exhibit wage patterns that diverge significantly from those of their broader academic fields.

Table A2 in the Internet Appendix lists all retained academic fields, the departments they encompass, their CIP code, and the keyword strings used to classify faculty into fields and departments.[16]

2.2.2 Field Classification

A key challenge in our analysis is to accurately determine each faculty's academic fields. To do so, we proceed in three steps that we describe in more detail in Section I of the Internet Appendix.

First, 65% of observations in our dataset, corresponding to 72% of unique faculty, includes original department information. This is the case for all Green Card and H1-B application records, as well as for a subset of public records. We use this information to map faculty to academic fields, following the classification described in Table A2.

Second, we complement this mapping using existing field directories. Where necessary, we augment these directories with participant lists from major academic conferences to identify departments and associated academic fields.

Third, for faculty not yet classified, we implement automated Google search queries combined with a text-based classification algorithm. For each query, structured as "first name + last name + university + 'professor of"', we retrieve the top four search results and extract the first three lines of text from each result for classification.

Our final dataset includes all faculty (i) with an identified academic field and (ii) belonging to one of the 20 academic fields retained in our analysis.

[16]For example, the department "Electrical, Electronics and Communications Engineering," with CIP code 1410, included in the "Engineering" field, is described as "A program that prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of electrical and electronic systems and their components, including electrical power generation systems; and the analysis of problems such as superconductor, wave propagation, energy storage and retrieval, and reception and amplification." We map this department with the following strings of key words "Electrical Engineering," "Electronics," or "Communications Engineering," "Electronic Systems," "Power generation," "Superconductor," "Energy Storage."

2.2.3 Summary Statistics

Table 1 presents summary statistics for our final faculty salary dataset. The table reports faculty wages, both base salary and total compensation, by teaching or research stream, and for research faculty, further disaggregates by academic field, rank, university classification, and data source. The final dataset includes over 1.4 million faculty-year observations, representing approximately 331,500 unique professors employed at 1,459 universities, spanning 20 academic fields over the 1993-2023 period.

INSERT TABLE 1 HERE

2.3 Student Post-Graduation Earnings

We construct a panel dataset on student post-graduation earnings and placement by university, field, and year for the 2002-2022 period, which we match with our faculty salary dataset, using the U.S. Census Bureau's Post-Secondary Employment Outcomes (PSEO) dataset.

2.3.1 Data Description

The Longitudinal Employer-Household Dynamics program (LEHD) at the U.S. Census Bureau builds the PSEO dataset by matching individuals listed in the graduation records of participating universities to Census earnings data. Over our sample period, 480 four-year institutions across 31 states have partnered with the Census Bureau.

For each academic program, graduation records include information on student identity, degree level, field of study, and graduation year. The LEHD then links these records to post-graduation outcomes, including earnings as well as industry and geographic employment location. These outcomes are measured one, five, and ten years after graduation. Only graduates with earnings data for at least three quarters of the reference year and with annual earnings at or above the full-time federal minimum wage are retained.

For confidentiality reasons, the PSEO dataset reports the median annual earnings instead of individual data, along with the 25th and 75th percentiles, per university, academic program, and year. In addition, earnings are aggregated into three-year graduation cohorts for undergraduates and five-year cohorts for graduate students. For placement data, the

dataset reports the number of graduates in each industry and region, which we use to construct our instrument. Regions follow the nine Census divisions, and the university region is split between the university's state and the rest.

Figure 2 summarizes the coverage of the PSEO data across universities and fields and its overlap with our faculty salary data. The PSEO provides post-graduation earnings and employment outcomes for roughly 7,700 academic programs per year in the fields we study at the bachelor and master's levels across 480 four-year institutions, representing about 50% of major U.S. public institutions over the 2002-2022 period. Our faculty salary dataset matches a substantial portion of this sample, covering circa 70% of the academic programs included in the panel.

INSERT FIGURE 2 HERE

To assess the robustness of our results, we replicate our analysis using College Scorecard data. While the Scorecard covers a larger set of universities, it reports outcomes at the field level only starting in 2015, does not include the placement information required to construct our instrument, and provides earnings measures only one year after graduation. Moreover, it reports only median earnings and restricts the sample to students who received financial aid. We provide additional details on the Scorecard data and the corresponding methodology in the Internet Appendix.

2.3.2 Linking Methodology

To link our faculty pay dataset with the PSEO panel data we proceed in two steps.

First, we construct the PSEO panel as follows. We restrict the PSEO data to all undergraduate and graduate academic programs included in our 20 academic fields and offered by four-year institutions.[17] To obtain a yearly panel over the 2002-2022 period, we infer survey years and expand each cohort observation across the relevant survey windows, i.e. three years for undergraduate cohorts and five years for graduate cohorts, repeating identical earnings values within each window.[18] All earnings measures are converted to current

[17] We map each PSEO academic program to one of our 20 academic fields using its CIP code.

[18] We approximate annual enrollment using the number of graduates in each cell, dividing by cohort length and multiplying by program length (four years for undergraduate programs and two years for graduate programs). For example, if a three-year undergraduate cohort includes 300 graduates, we impute 100 graduates per year and, assuming a four-year program, approximate 400 enrolled students per year.

dollars to ensure consistency with our faculty salary data.

The resulting yearly panel contains approximately 160,000 academic program-year observations, averaging about 7,700 academic programs per year. Of these observations, 81% correspond to undergraduate (bachelor's) programs and 19% to graduate programs. Earnings information is available for approximately 90%, 60%, and 40% of observations one, five, and ten years after graduation, respectively.

Second, we aggregate our faculty pay dataset at the *rank X field X university X year* level using mean salaries, with each cell representing, on average, five individual observations. We restrict the sample to tenure-track research faculty for this analysis.

The final matched panel is structured at the *academic program X university X year X rank* level, as we expand the PSEO data to align with the faculty pay panel across the three academic ranks. All empirical specifications include academic rank fixed effects.

2.3.3 Summary Statistics

Table 2 provides summary statistics on student post-graduation earnings in our final merged dataset, when we keep only one observation per academic program, university, and year, i.e. we collapse all ranks. The resulting panel includes 76,000 observations across 366 universities, with around 5,000 academic programs per year over the 2002-2022 period.

INSERT TABLE 2 HERE

2.4 Additional Data

Yearly Panel of Student and PhD Count across Fields and Universities

We supplement our dataset with information on the number of degrees conferred across fields, universities, and years using data from IPEDS. The IPEDS dataset provides the annual numbers of bachelor's, master's, and PhD degrees awarded by each post-secondary institution across its academic programs starting from the 1983-1984 academic year.

We build a yearly panel dataset of the number of students across fields and universities by multiplying the number of degrees granted in a field and university as a major by the normal completion time in years for this degree.[19] Table A4 in the Internet Appendix

[19]The median normal completion time is four-year for a bachelor degree and 2 years for a master degree.

provides summary statistics on the yearly number of students across fields, universities and periods.

Second, we proxy for new entry flows of professors across fields by using the counts of conferred PhD degrees across universities and fields.

Donations across Fields

We obtain data on donations from the *Chronicle of Philanthropy*'s database, which lists all donations to non-profit organizations in the U.S. exceeding 1 million dollars. This database provides detailed information on each donation, including the donation amount and a textual description of its intended purpose. Our focus is on donations made to U.S. postsecondary institutions during 2005-2018. Table A4 in the Internet Appendix provides summary statistics on all donations above $1 million received by universities over the 2005-2018 period.

Faculty Research Output

Finally, we exploit measures of research impact from the bibliographic database Scopus linked with our public university database, as described in Section 3. Scopus provides information on academic publications, including articles published in academic journals and books from over 30 major publishers. This ensures that our analysis includes research output across all fields, including those where faculty research is predominantly focused on book writing. This merged database includes more than 83,000 faculty-year observations, representing 30,902 professors across 267 public universities.

Table A8 in the Internet Appendiz presents summary statistics on the h-index, number of citations, and publication counts across fields. In Finance, the average number of citations, h-index, and publications are 275, 5, and 11, respectively. In contrast, these figures are significantly higher in Physics, reaching 2,936 for citations, 21 for the h-index, and 106 for publications, and lower in Humanities, where the average number of citations is 33. This disparity highlights the heterogeneity in the research production function across different academic fields.

3 Three Stylized Facts

This section documents three primary stylized facts on academic labor markets: (i) large and growing wage differentials across fields (ii) a positive and non-linear relationship between faculty pay and students' post-graduation earnings in the cross-section of fields; and (iii) significant heterogeneity in the ratio of PhD graduates to total students across fields.

3.1 Large and Growing Differentials in Faculty Pay

Faculty Pay Heterogeneity across Fields

Table 1 provides summary statistics of faculty wages by field, position, rank, and university classification across various time periods. Unconditionally, faculty pay is higher on average in Finance, Law, Business and Economics, as well as in universities with high and very high research activity. These patterns are particularly clear during the most recent period, i.e. from 2015 to 2024.

To robustly identify wage differentials across fields while accounting for observable characteristics and potential composition effects, we estimate the following specification over the 2015-2024 period, using Languages as the reference field:

$$\ln(w_{i,t}) = \sum_{f=1}^{n} \beta_{field_f} \mu_{field_f} + \mu_{u,t} + \mu_{rank_i,t} + \mu_{tc,t} + \mu_{source,t} + \epsilon_{i,t}, \tag{1}$$

where $w_{i,t}$ is the salary of faculty i in year t, μ_{field_f} are field dummies for all fields except Languages. $\mu_{u,t}$ are university $\times$ year fixed effects and $\mu_{rank_i,t}$ are academic rank $\times$ year fixed effects, i.e., assistant, associate, or full professor.[20] Finally, $\mu_{tc,t}$ and $\mu_{source,t}$ are fixed effects for pay format, i.e. base salary versus total compensation, and data source, i.e. public records vs. H1B/green card applications, interacted with year fixed effects. Standard errors are clustered at the university level.

Figure 3 plots the estimated β_{field} coefficients in percentage points and their 95% confidence intervals for research tenure-track faculty in Panel A and teaching faculty in Panel B.

[20] accounting respectively for 32%, 27% and 37% of our observations after 2015, 3% of observations lack information on academic rank after 2015.

Both research tenure-track and teaching faculty exhibit significant wage heterogeneity across fields. Among research tenure track faculty, Finance stands out as the highest-paying field, with a 73% wage premium relative to Languages, the lowest-paying field in the sample. Other fields with relatively high wages include Business, with a 57% premium, as well as Law, Economics and Computer Science, with premiums of 45%, 42% and 37% respectively. Wage premiums for teaching faculty are similar in rank, though slightly smaller in magnitude, to those observed for tenure-track faculty.

INSERT FIGURE 3

These pay differentials across employees within a same institution, holding constant education, experience, and job task content, appear particularly large.

Dispersion Patterns across Ranks, University Classification, and Field Classification

Table 3 reports the regression coefficients obtained when estimating equation (1) while splitting the sample by faculty rank, by university type and research intensity.

By faculty rank, wages differentials are most pronounced at the assistant level (Column 2), followed by the associate (Column 3) and full professor levels (Column 4).

Across universities, while inter-field wage differentials are consistent across private and public institutions (Columns 5 and 6), they are significantly larger among R1 institutions, those with 'very high research activity' under the Carnegie Classification (Column 7), than among other universities (Column 8). In these institutions, the wage premium for Finance relative to Languages stands at 92%, to compare to 56% for the rest of the sample. This wage premium at R1 universities is comparable in magnitude to the one between Language faculty and kindergarten teachers.[21] It is also more than 20 percentage point larger in R1 versus other universities in Business, Law, Economics, at 68%, 51%, and 51%, respectively.

In Column 10, we show that the wage differentials still hold among top scholars. We exploit data extracted from the website `Research.com` to identify researchers that ranked among the top 2,000 of their fields in terms of citations and publications.[22] We merge this

[21] We obtain data on kindergarten teacher wages from the Bureau of Labor Statistics, U.S. Department of Labor. In May 2022, the average wage of a kindergarten teacher amounts to $60,490.

[22] We extracted the data in September 2025.

sample with our dataset on faculty pay. Among these top scholars, the Finance, Business, Law, and Economics fields still pay significantly more than other fields.

Last, to check the robustness of our data, we examine wage differentials across our three field classification methods: using administrative department information (Column 10), field and conference directories programs (Column 11), and Google searches (Column 12). Measured differentials are robust across classification methods. The premiums in top-paying fields are higher for faculty listed in professional directories, consistent with them being more likely to be at universities with high research intensity.

INSERT TABLE 3

Growing Wage Differentials across Fields

To investigate the long-term trends in wage differentials across fields, we first leverage the data extracted from the archives of the Oklahoma State University faculty survey. For nearly all years during the 1974-2023 period, we have information on salaries and faculty count by university research designation × field × faculty rank cell.

We estimate the following model separately for each year :

$$\ln(w) = \beta_f \mu_f + \mu_{ud} + \mu_{rank} + \epsilon, \tag{2}$$

where w denotes the yearly wage, and μ_f is a field indicator. We include Carnegie research designation and academic rank fixed effects, $\mu_u d$ and μ_{rank}, respectively. The coefficient β_f captures the wage premium for field f relative to the average across all fields in that year. Regressions are weighted by the number of faculty in each university researcg designation × field × faculty rank cell.

Panel A of Figure 4 illustrates the significant widening dispersion of pay across academic fields. The figure displays the evolution of the pay premiums across fields, some being grouped for readability: *Humanities*, comprising Philosophy, English, Communication, History and Languages, *Social Sciences*, *Natural Sciences*, including Biology, Agriculture, and Physics, *Mathematics*, *Economics*, *Computer Sciences and Engineering*, *Business*, and *Finance*. The cross-field pay range expands fivefold over the sample period, increasing from approximately 15 percentage points in 1975 to more than 80 percentage points by 2023. This expansion is steady from the late 1970s until 2015, when the trend begins to moderate.

INSERT FIGURE 4

We repeat a similar exercise using our individual-level panel dataset over the 1996-2023 period and estimate equation (2) at the individual level. Panel B of Figure 4 presents the results, which evidence a similar widening dispersion of pay across fields.

Finally, Figure 5 illustrates the widening dispersion in faculty wages across the full set of academic fields, grouped into three panels for readability: Social Sciences (Panel A), Formal and Natural Sciences (Panel B), and Humanities (Panel C).

INSERT FIGURE 5

3.2 Positive and Non-linear Relationship Between Faculty Pay and Student Post-Graduation Earnings

We report summary statistics for post-graduation earnings by field in Table 2. Unconditionally, field-level faculty pay is strongly aligned with student earnings, as evidenced by a substantial rank correlation of 0.65. While some discrepancies exist, for example, Computer Science leads in student earnings but is not the highest-paying field for faculty, the cross-field patterns are consistent.

To further investigate the relationship between faculty pay and student earnings, Panel A in Figure 6 plots faculty wage premiums as estimated using equation (1) over the 2015-2024 period, against post-graduation earnings premiums across fields. We estimate these post-graduation earning premiums using our PSEO panel data of post-graduation earnings one year after graduation over the 2016-2021 period. Regressions are weighted by the number of graduate students in each academic program.

Two key patterns emerge: (i) faculty and student earnings premiums are strongly correlated, with a correlation coefficient of 0.70; and (ii) the ratio of faculty to student earnings premiums varies substantially across fields. Hence, in some fields, such as Business, Finance, and Economics, faculty enjoy higher relative premiums than their students, while in others, such as Mathematics, Computer Science, and Engineering, the reverse holds. This latter fact suggests the existence of a latent variable that affects the relationship.

Panel B in Figure 6 shows similars patterns when estimating the industry wage premiums across fields using lifetime earnings. One concern would be that the earning differentials

are driven only by early career compensation. To address this concern, we use data from the American Community Survey over the period 2009-2019 to build a dataset of life-time earnings across fields.[23,24]

INSERT FIGURE 6

3.3 Large Heterogeneity in the Relative Supply of PhD Graduates

To proxy for the relative supply of PhD graduates, we compute the ratio of research doctoral degrees conferred in a field to the student count in the same field by combining our yearly panels on student count and PhD degrees across universities and years.

Panel A in Figure 7 plots the average of this ratio over the 2015-2022 period for each field. The relative supply of PhDs exhibits a large inter-field heterogeneity, with the ratio of graduates to total students varying by a factor of fifty across fields. The relative supply is the lowest in Finance and Business, with the ratio being around 0.1% and the highest in Physics, Biology and Engineering, where it amounts to more than 4.65%.

Panel B of Figure 7 plots the evolution of this ratio across years. It illustrates how persistent the heterogeneity is across fields.

INSERT FIGURE 7

When hiring faculty, some fields therefore face a relatively scarce supply of potential candidates, as the pool of PhD candidates is smaller. In contrast, other fields have a relatively large pool to draw from compared to the size of their student body.

[23]Conducted by the U.S. Census Bureau, this survey reaches around 3.5 million households in the U.S. every year, gathering information on education, employment, family situations, and demographic characteristics. In addition to information on the highest level of education, yearly income, and demographics, the survey provides key information on the undergraduate field of study.To build our sample, we utilize the multi-year file covering 2009-2019, which encompasses approximately 35 million observations. We refine this dataset by including only workers who possess at least one undergraduate degree, are aged between 23 and 65 and are all residents from the 50 states or the District of Columbia. This process results in a final sample of about 6 million U.S. individuals.

[24]We compute work-life earnings across education fields for graduate students using the following simple formula:

$$\text{Total Work-life Earnings}_f = \sum_{\tau=23}^{67} \beta_\tau \omega_{\tau,f}$$

where $\omega_{\tau,f}$ is the yearly income of a worker of age τ who graduated from field f. We assume $\beta = 1/(1+3\%)$, accounting for a 3% yearly discount rate. We obtain the wage values $\omega_{\tau,f}$ from the average residuals of a wage regression that includes a large set of controls such as gender, race, ethnicity and survey-year fixed effects within each field f and age τ cell.

4 Measuring the Elasticity of Faculty Pay to Post-Graduation Earnings

We turn to measuring the elasticity of faculty pay to student post-graduation earnings, using our university-academic program yearly panel on student post graduation earnings and faculty pay. We estimate the elasticity with both OLS and an instrumental variable based on graduates' industry and geographic placements. This elasticity is large and robust across estimation methodologies. In addition, the elasticity varies substantially across fields, and has increased over time.

4.1 OLS

We first estimate the elasticity of faculty pay to post-graduation earnings with the following OLS specification:

$$\ln(w_{f,u,t,r}) = \beta \ln(\omega_{f,u,t}) + Rank_{r,t} + Type_{d,t} + \mu_{f/u,t,r} + \epsilon_{f,u,t,r}, \tag{3}$$

where $w_{f,u,t,r}$ denotes the average salary of tenure-track faculty in the academic program field f, university u, year t, and rank r (assistant, associate, or full professor), and $\omega_{f,u,t}$ stands for the median student earnings one or five years after graduation in the academic program of field f, in university u, and year t.[25] The terms $Rank_{r,t}$ and $Type_{d,t}$ are fixed effects interacted with years for academic rank and degree level (bachelor or master), respectively.

The sample consists in our annual panel of post-graduation earnings and faculty pay at the university- academic program-faculty rank level.

Table 4 reports the estimated coefficients β in equation 3. Across all specifications, we find that academic wages are strongly related to student wages, with elasticities in the range of 0.4 to 0.6. The magnitude is strikingly consistent whether measured within universities across fields (Columns 1-6) or within fields across universities (Columns 7-12). Estimates are robust to alternative measures of student earnings, including the median, 25th, and 75th percentiles, and are larger when based on student earnings five years after graduation relative to one year. Finally, we validate these findings using Scorecard data on median

[25] We estimate the same specifications at the 25th and 75th percentile in Table XX and XX in the Internet Appendix.

student earnings one year after graduation (Table A4 in the Internet Appendix), which confirms the robustness of our results.

INSERT TABLE 4

4.2 Identification and Instrumentation

A natural question is the extent to which the elasticity estimated in the OLS specification reflects a causal relationship. The estimates could be affected by omitted variable bias if latent factors such as university prestige or broad labor market trends simultaneously influence faculty pay and student earnings. Reverse causality is also a concern: higher faculty compensation could attract or motivate better instructors, thereby improving teaching quality and, ultimately, enhancing student skills and post-graduation earnings. Finally, measurement error in the PSEO data may affect our estimates, as coverage and representativeness vary across years and academic programs, with response rates sometimes falling below 50%.

To address these concerns, we construct a synthetic post–graduation earnings index at the university × field × year level that serves as an instrument for observed post–graduation earnings in our structural equation (3). The intuition follows the Bartik approach (Bartik 1991): all else equal, institutions that historically place students in industries and regions experiencing faster wage growth will exhibit higher growth in their graduates' earnings. The instrument exploits the persistence of university placement patterns across regions and industries, driven by reputation and network effects. Formally, we compute:

$$Z_{f,u,t} = \sum_{g} \sum_{n} s_{f,u,g,n} \ln \varpi_{g,n,t}, \tag{4}$$

where $s_{f,u,g,n}$ is the average share of graduates from field f and university u employed in Census division g and 2–digit NAICS industry n over the PSEO sample, and $\varpi_{g,n,t}$ is the average wage of workers in region g and industry n in year t, measured using the American Community Survey.

We then instrument post–graduation earnings in Equation (3). The first stage is given by:

$$\ln(\omega_{d,f,u,t}) = \ln(Z_{f,u,t}) + FE_i + \epsilon_{f,u,t,r}, \tag{5}$$

and the second stage by:

$$\ln(w_{f,u,t,r}) = \beta \widehat{\ln(\omega_{d,f,u,t})} + FE_i + \epsilon_{f,u,t,r}, \tag{6}$$

where $w_{f,u,t,r}$ denotes the average salary of tenure–track faculty in field f, university u, year t, and rank r (assistant, associate, or full professor). The variable $\omega_{d,f,u,t}$ measures student earnings one or five years after graduation by academic program characterized by its field f, university u, and year t, at the 25^{th}, 50^{th}, or 75^{th} percentiles. FE_i denotes a set of fixed effects.

We begin by setting $FE_i = Rank_{r,t} + Level_{d,t} + \mu_{f/u,t}$, where $Rank_{r,t}$ and $Level_{d,t}$ are fixed effects for rank–by–field and degree type (bachelor or master)–by–year, and $\mu_{f/u,t}$ are field $\times$ year or university $\times$ year fixed effects. These specifications identify variation primarily across programs while absorbing general trends at the rank, degree type, field, or university level.

To strengthen the causal interpretation of β, we include in FE_i the fixed effects $\mu_{f,u}$ and μ_t, which absorb both cross–sectional university–field variation and aggregate time trends. Identification then arises from university–field–specific shocks in the instrument. The identifying assumption is that wage growth in regions and industries where a program historically places graduates affects faculty wages only through its impact on student post–graduation earnings. Given the local nature of these shocks, they are unlikely to be confounded by faculty outside options, which are typically determined at the national level given high geographic mobility.

This methodology also mitigates key limitations of the PSEO data, reducing potential measurement error. First, by averaging placement patterns over a decade, we improve representativeness and reduce sampling noise from small PSEO cells. Second, it enables the construction of a complete time series for all universities and fields with at least one year of coverage, facilitating within–field–university estimation of elasticities over time. Third, because the variation arises from industry–region wage shocks external to institutions, the instrument plausibly isolates exogenous changes in predicted graduate earnings.

Our approach also has limitations, which we address in robustness checks. Placement information is available only at the 2-digit industry level (around 4,500 university-field ob-

servations), while student post-graduation earnings are observed at the more granular 4-digit CIP level (roughly 10,000 degrees). The PSEO also lacks placement data for Finance and Economics; we therefore proxy Finance placements with Business at both undergraduate and graduate levels, and Economics placements with Social Sciences at the undergraduate level. Finally, the index does not capture within-industry wage heterogeneity across the earnings distribution, and the geographic and sectoral aggregation (nine Census divisions and 20 industries) limits data granularity. These limitations should bias downward our first stage, and we can therefore assess how acute they are by comparing our first stage coefficient to 1.

Results of the instrumental analysis are displayed in Table 6. We first confirm that our instrument is strong, with F-Statistic clearly above the usual thresholds for determining such instruments. The coefficient for the first stage is close to one in all specifications, which is reassuring regarding the previously mentioned limitations of our methodology. Turning to the second stage, the elasticity of faculty wages to students post-graduation earnings is strikingly robust to this instrumental variable approach, including for the tightest specification identifying from university-field idiosyncratic shocks. Overall, this analysis allows us to address concerns over measurement errors, and strengthens the causal interpretation of the relationship we uncover. We also note that the elasticity is particularly pronounced for assistant professors, i.e. closer to the hiring decision, where wage setting is likely more flexible.

INSERT TABLE 5 AND 6

4.3 Heterogeneity across Fields

We now investigate whether the elasticity of faculty wage to students post graduation earnings varies across fields. For this purpose, we estimate Equation (3) separately within each field with rank times year, wage format times year, and degree type times year fixed effects, therefore identifying from the university cross-section and time-series variation at the university-field level. Figure 8 plots the estimated coefficients. We find that while on average faculty pay elasticity to student post-graduation earnings is high, it varies significantly across fields. This elasticity amounts to 120% in Finance and 80% in Economics, while it is close to zero for fields such as Languages or Education. Within high-paying fields, the

heterogeneity is still pronounced, as with 120% it is more than three times higher in finance than it is in Computer Science or Engineering (around 40%).

INSERT FIGURE 8

This large heterogeneity suggests the existence of important drivers of faculty wage beyond students post graduation earnings.

4.4 Time trend

Last, we investigate whether the elasticity of faculty wage to students post graduation earnings varies over time. Figure 9 plots the coefficient estimates when we measure within-field across-universities elasticities (as in columns 7 to 11 of Table 4) over five time periods. The elasticity of faculty pay to student earnings has more than doubled from the 2000's to the 2020's, from around 20% to 50%. This dramatic evolution suggest that the economic phenomenon linking faculty wages to returns to education has been strengthening over the recent decades.

INSERT FIGURE 9

5 Economic Mechanism

This section investigates the mechanism underlying the relationship between faculty pay and their students' post-graduation earnings, its growth over the recent decades, and its heterogeneity across fields. We identify a set of field-specific characteristics that result in a higher elasticity of faculty wage to post-graduation earnings.

5.1 Institutional Context

Until the 1970s, three core principles of academia supported relatively uniform compensation across fields in the U.S.: collegiality, academic freedom, and vocation. Collegiality arose from the conception of the university as a unified intellectual community, a conception the etymology of "university" reflects, organized around the collective pursuit of knowledge that characterized the foundations of the first universities in the Middle Ages. Faculty

members, regardless of discipline, were regarded as equal contributors to the institution's academic mission.[26] Understood as the protection of intellectual autonomy, the concept of academic freedom was reinforced by the de-commodification of scholarly labor. Salaries were not intended to reflect the market value of disciplinary outputs, but instead to support independent inquiry, shielded from political, social, or economic pressures. Finally, the notion of academic vocation framed professors not merely as employees, but as members of a profession defined by intrinsic motivations: a commitment to knowledge, mentorship, and public service. This vocational ethos downplayed financial incentives and fostered solidarity across disciplinary lines.

Starting in the late 1970s, a series of social and institutional shifts led U.S. universities to place less emphasis on these traditional academic principles, often revising their charter to allow for differentiated compensation across fields.[27] The spread of progressivist ideals, framing education as a vehicle for personal empowerment, technical innovation, and social advancement, promoted a turn toward skilled learning, job-readiness and the expansion of applied programs. Rising student interest in fields such as business, engineering, and computer science placed pressure on universities to recruit competitively in these domains. At the same time, the evolution of American universities into research-intensive institutions, following the Humboldtian model, segmented academic life into specialized departments. This disciplinary segmentation encouraged internal competition over resources and hiring authority, weakening uniform compensation norms. Simultaneously, universities became increasingly reliant on targeted funding streams, including earmarked grants, contracts, and donations directed at specific departments or schools. The rise of empiricism in higher education and public policy in general, with a growing emphasis on measurement, accountability, and evidence-based management encouraged the use of economic incentives to attract faculty and boost productivity, aligning academic work more closely with quantifiable outputs.

Adding to these institutional changes, the decrease in public funding and the resulting steep rise in tuition fees in recent decades has reshaped the social contract of higher educa-

[26] Dean Henry Rosovsky explains in 1982: "We have the view that we are one Faculty. A Harvard professor of English is as valuable as a professor of Biochemistry." He adds: "Our differentials between salaries in the sciences, humanities, and social sciences are smaller than they are at almost any other university in the country. This has an important impact on the morale of the entire Faculty: we're all engaged in a common intellectual enterprise." `https://www.thecrimson.com/article/1982/6/10/faculty-salaries-a-red-letter-year-pwhen/`

[27] For example, UCLA in the 1980s.

tion. Students and families now more often view college as a private investment in human capital rather than a public or intellectual good. This perspective has heightened demand for measurable returns on education, pushing universities to allocate resources toward disciplines resulting in high future earnings. Recently, the adoption of decentralized budget systems, such as Responsibility-Centered Management (RCM), further intensifies competition for tuition revenue, endowment funding, and faculty lines. Finally, antitrust reforms and labor market liberalization in the 1980s and 1990s curtailed informal agreements among universities that had previously limited labor market competition.

5.2 Conceptual Framework

These institutional details motivate a framework for faculty wage determination *within fields*, grounded in market forces, with the goal of understanding the cross-field heterogeneity in faculty pay elasticity to student earnings. We build on the model of labor market for skilled professionals by Ryoo and Rosen (2004), where occupational wages respond to market demand with possible amplification by imperfect supply adjustments. In their framework, supply frictions stem primarily from high entry costs, due to the additional years of education or specialized credentials required to enter a skilled profession, and from shifting career prospects in alternative occupations.

In the academic labor market, these supply frictions are particularly pronounced due to the length of PhD training and institutional constraints on doctoral program size. These frictions are compounded by a distinctive feature of academia: the same economic force that drives the demand for professors also tends to restrict their supply.

Specifically, an increase in industry wages raises the private returns to education, fostering student demand for courses and degrees in that discipline. Universities typically respond to this enrollment growth by expanding faculty positions, thus raising demand for faculty. At the same time, however, higher industry wages also increase the opportunity cost of pursuing an academic career for prospective PhD students, effectively shrinking the pipeline of future professors.

The existence of this dual relationship can amplify demand-supply mismatches and lead to large and persistent wage responses. Institutional features that differ across academic fields, such as the extent to which increased student demand translates into higher univer-

sity revenues, or the flexibility of PhD program expansion, further shape these dynamics. Together, these factors can explain the observed cross-field variation in the responsiveness of faculty wages to student earnings.

Demand and Supply Equations

To formalize this intuition, we derive a simple demand and supply model of occupational choices applied to the academic setting.

The demand N_f for research professors in a field f increases with returns to education in this field X_f, measured by industry wages, and decreases with academic wages w_f in this field:

$$wage_f = -\alpha_f N_f + \beta_f X_f$$

where α_f is the inverse of the slope of the demand functions, and β_f is positive, reflecting how industry wages translate into university demand for faculty.

Assuming the academic production function incorporates both capital and labor, fields with higher capital intensity, such as the physical sciences, likely exhibit a lower α_f. In fields with high faculty-labor intensity, heightened demand for enrollment may result in greater marginal faculty productivity, as larger class sizes translate into higher revenue per faculty member.

The extent to which industry wages translate into university demand for faculty, β_f, also varies across fields. Fields with a higher share of graduate studies can charge higher tuitions, which incentivizes universities to expand such programs, or fields with a higher share of donating alumni, for instance because of a skew in the distribution of student labor market outcomes, have a higher β_f.

Turning to the supply, we consider that the stock of professors N_f in a field f depends on the relative returns to PhD education in this field, i.e. the difference between academic and industry wages. Therefore, N_f increases with $wage_f$ and decrease with X_f and we have:

$$N_f = \eta_f wage_f - \gamma_f X_f$$

η_f is positive and decreases with institutional frictions affecting the number of PhD positions offered relative to faculty positions, which can vary for instance with the importance of PhD

students in the research and teaching production function.

γ_f varies with how industry wages affect the supply of PhD students: for instance, it is lower if the non pecuniary benefits of an academic career is high in the field or if a PhD education is not particularly valued for industry jobs. In some fields, master graduates command as high salaries as PhDs in the industry. In addition, compensating differentials for work attributes–such as autonomy, intellectual freedom or vocational aspect–may also vary by discipline.

Both the supply and demand equation specifications are informed by the empirical facts we previously present.

Elasticity

We combine the demand and supply equations to derive faculty wages as a function of industry wages X_f:

$$wage_f = \frac{\alpha_f \gamma_f + \beta_f}{1 + \alpha_f \eta_f} X_f$$

This expression implies a positive relationship between faculty wage and private returns to education, as we previously document. As future earnings are discounted when students make occupational career choices, and because universities may exercise monopsony power for faculty as their personal and professional switching costs increase, this relationship is likely to be more pronounced for assistant professors.

Across fields, our equilibrium expression predicts that the elasticity of faculty pay to industry wages should be higher under the following conditions:

- *Demand-Side Drivers*
  - High Labor Intensity (α_f): In fields where the production of education is labor-intensive rather than capital-intensive (i.e., requiring low capital investment in labs or equipment), the inverse slope of the demand function, α_f, is higher. This increases the sensitivity of faculty wages to shifts in student demand, which translates into a higher elasticity of faculty wage to students' post graduation earnings.
  - Low Tuition Rigidity (β_f): The pass-through from market returns to university demand is stronger in fields where universities can more easily capture student

surplus. This is proxied by a high share of Master's students, as these programs typically feature more flexible tuition structures compared to undergraduate studies.

- *Supply-Side Drivers*
  - High Sensitivity to Opportunity Costs (γ_f): Elasticity is higher in fields where the supply of PhD applicants is highly responsive to private-sector alternatives. This can occur when the PhD wage premium relative to a Master's or Bachelor's degree is low, and therefore the opportunity cost of doing a PhD is high, or when private non-pecuniary benefits of academia are low, leading to a larger γ_f.
  - High Institutional Supply Frictions (η_f): The wage response is amplified when the academic labor supply is inelastic. This occurs when the field's production function does not require a large volume of PhD students (reducing their role as a labor input), or where institutional constraints limit doctoral expansion, resulting in a lower η_f that shrinks the denominator of the wage expression.

5.3 Test of Empirical Predictions

We now leverage our framework to characterize the heterogeneity in elasticity of academic wages to returns to education across fields.

A practical challenge is that the number of distinct academic fields is limited, and the characteristics we model are often correlated. For instance, fields with high returns to education also often have more tuition flexibility. Given these power constraints, we do not attempt to estimate a single "horse race" regression or estimate the role of each parameter.

Instead, we test the comparative statics individually, using sample splits. This parsimonious approach allows us to establish the sign and order of magnitude of each channel while avoiding the risk of over-fitting a few large disciplines. We interpret this exercise as a check for the framework validity, rather than mutually exclusive tests.

The model's validity further rests on whether these field-level frictions also shift equilibrium quantities in a consistent manner. Specifically, the framework implies that the same forces driving high wage elasticities should also produce observable scarcity in the labor market and higher surplus for the university. To empirically assess these implications, we

examine two additional endogenous variables. We thus repeat a similar exercise looking at PhD graduates scarcity and university revenue per faculty member. Fields where in fields where institutional supply is inelastic (η_f), the inability to expand the faculty stock should result in higher revenue-to-faculty ratios as universities accommodate student demand through larger class sizes.Finding that these quantities move in tandem with wages provides stronger evidence for the structural mechanisms of the model than wage data alone.

6 Discussion

6.1 "On-the-Job" Outside Options

One alternative rationale for the large and growing pay differentials in academia is talent retention. Under this view, universities set higher pay to retain professors who might otherwise leave academia for higher-paying industry jobs. While this mechanism still recognizes the central role of industry wages, it operates through exit from academia rather than entry into academic careers.

Although we do not dismiss the relevance of this channel, the available evidence suggests its influence is likely second order. First, the share of PhD graduates moving to industry is lower in business, finance, and economics than in computer science and engineering. Second, outside options appear more attractive for engineering and physics PhDs, where industry wages often exceed academic compensation. In contrast, for finance and business PhDs, academic wages are often comparable to or higher than industry alternatives. Finally, the highest industry wages in finance and consulting tend to accrue to mathematics PhDs rather than economics or finance PhDs, while the latter typically earn higher salaries in academia than mathematicians.

6.2 Returns to Research Productivity

Our model predicts that demand-supply gaps contribute to a higher elasticity to student earnings in some fields, resulting in higher faculty pay. These demand-supply gaps result in universities competing for a limited set of talents.

We employ two complementary measures of research impact: total career citation counts

and the h-index. For each measure, we compute quintiles within each field and academic rank. The objective is to control for heterogeneity in the research production function across fields and positions. Next, we run the following specification:

$$\ln(w_{i,t}) = \sum_{i=1}^{5} \beta_i q_i + \sum_{i=1}^{5} \beta_{i,Finance} q_i \times \mathbb{1}_{Finance} + \mu_f + \mu_u + \mu_t + \mu_p + \epsilon_{h,t} \tag{7}$$

where q_i corresponds to the citation, h-index or i-10 quintile i within a given field. $w_{i,t}$ is the yearly gross wage of faculty i in year t. μ_f, μ_u, μ_t and μ_p are field, university, year and position fixed effects, respectively. Standard errors are double clustered at the university and year levels.

Figure 11 illustrates the higher returns to research impact in Finance compared to other academic fields. The Figure plots the coefficients $1 + \beta$ and $1 + \beta + \beta_{Finance}$ across quintile i for citation counts (Panel A) and h-index (Panel B).

INSERT FIGURE 11

We confirm this result by running the following specification:

$$\ln(w_{i,t}) = \beta \text{Quintiles}_i + \beta_{Field} \text{Quintiles}_i \times \mathbb{1}_{Field} + \mu_f + \mu_u + \mu_t + \mu_p + \epsilon_{i,t} \tag{8}$$

where $Quintiles_i$ represents the within field research output quintiles of faculty i. $\mathbb{1}_{Field}$ denotes an indicator variable for each field.

Results in Table 8 suggest higher returns to research impact in higher paying fields, across our two measures of research productivity.

INSERT TABLE 8

These results are consistent with universities competing for a limited pool of research active professors in Finance, and that this competition is more intense than in other academic fields.

7 Conclusion

This paper provides new evidence on the growing disparities in faculty wages across academic fields, investigating the role of student future earnings. Using a comprehensive dataset on over 330,000 professors and student wages across U.S. and Canadian universities, we establish a high elasticity of faculty pay to student earnings, which varies across fields. These findings highlight the role of market forces in shaping academic compensation

Our results suggest that wage differentials across industries can have long-lasting effects by spilling over into academia, thereby influencing the supply of education and the allocation of talent in the economy.

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8 Figures

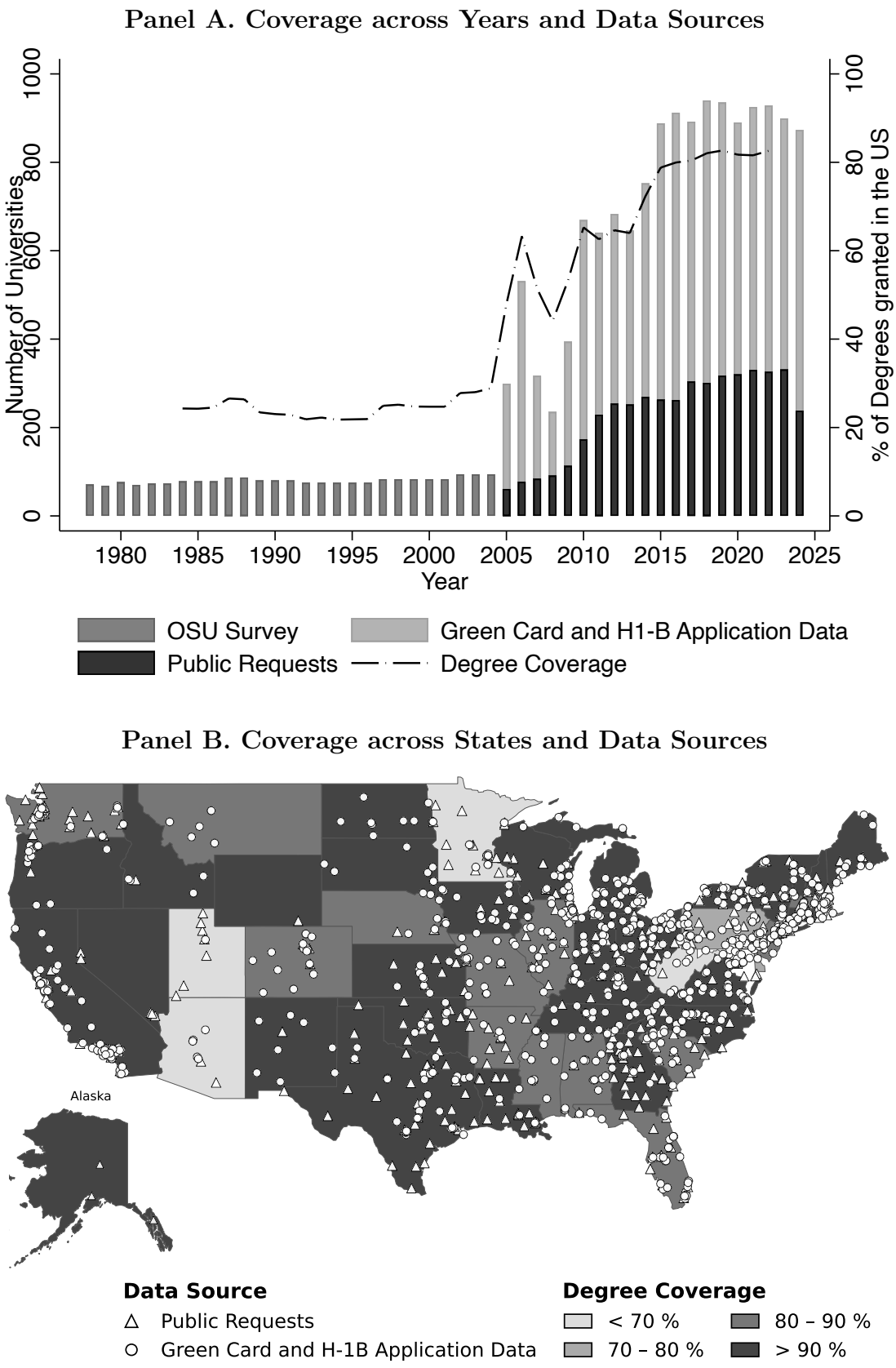


Figure 1. Faculty Salary Data Coverage and Sources

This figure illustrates the university and degree coverage of our faculty salary dataset, by data source over time in Panel A and by state in Panel B. Degree coverage is defined as the ratio of all bachelor's degrees conferred by the universities in our sample to the total number of bachelor's degrees. Data on degrees conferred comes from the Integrated Postsecondary Education Data System (IPEDS).

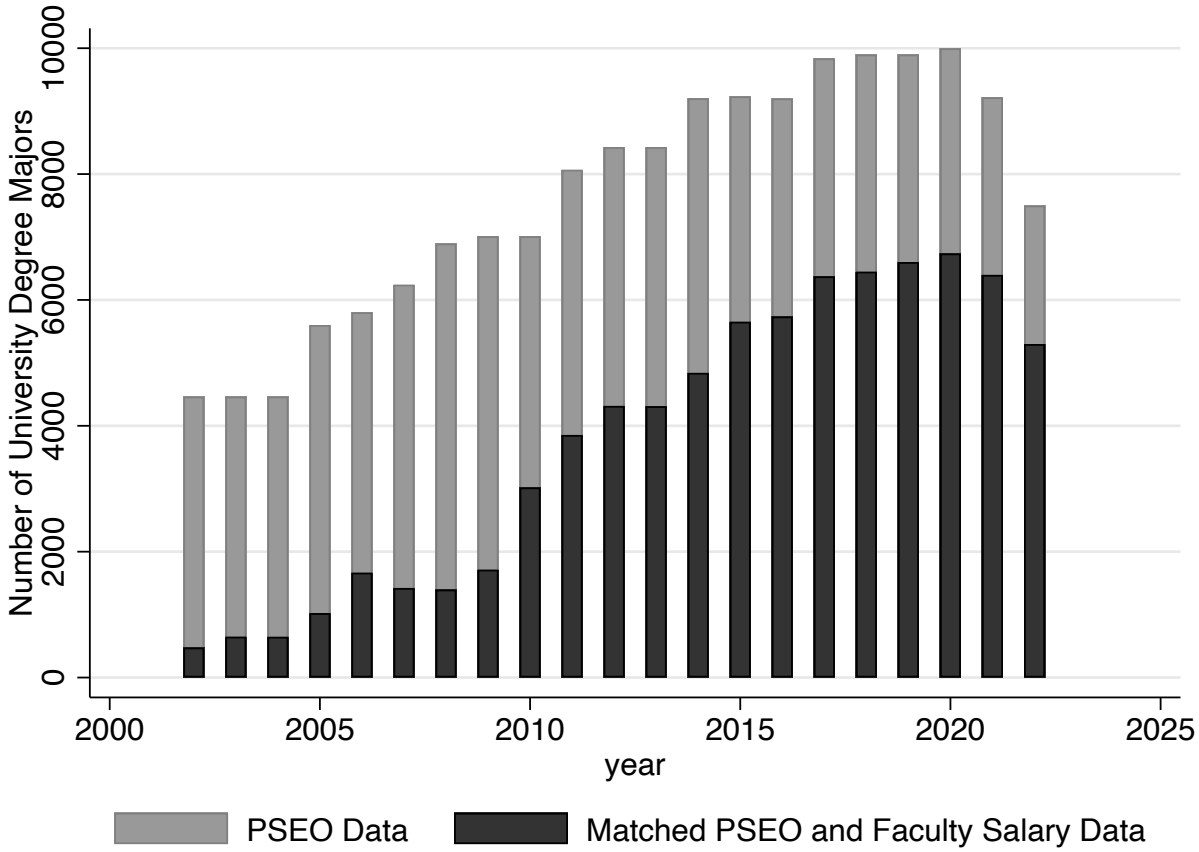


Figure 2. Student Post-Graduation Earnings Data Coverage

This figure summarizes the coverage of the PSEO data across university-field cells for both undergraduate and graduate students, as well as its overlap with our faculty salary dataset. The universities are four-year institutions, and the fields correspond to the 20 academic fields used in our analysis, each typically encompassing multiple academic programs. The PSEO reports post-graduation earnings and employment outcomes for up to 10,000 university-field combinations across roughly 480 four-year institutions from 2002 to 2022. Our faculty salary dataset matches up to 70% of these university-field combinations after 2015.

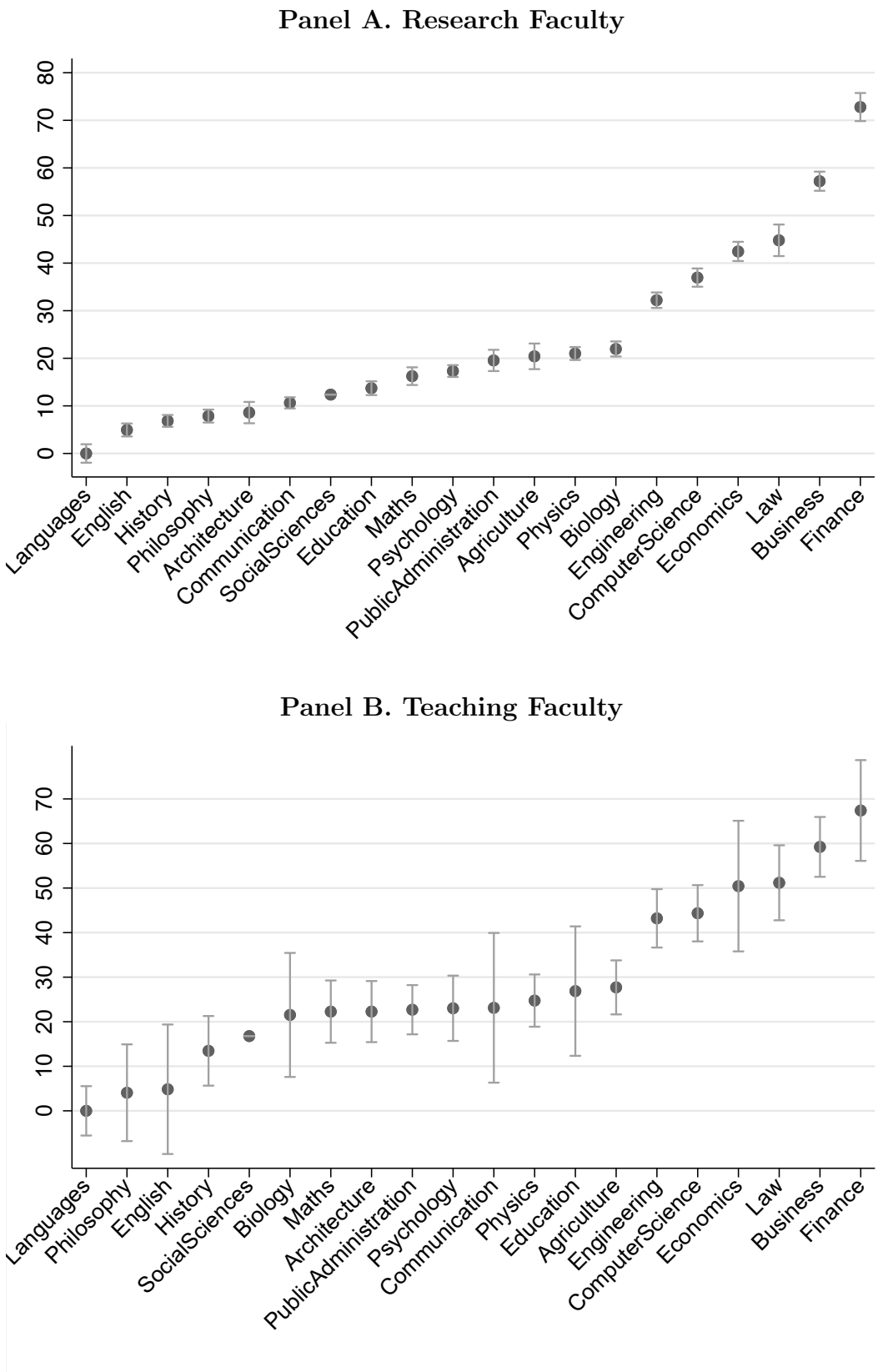
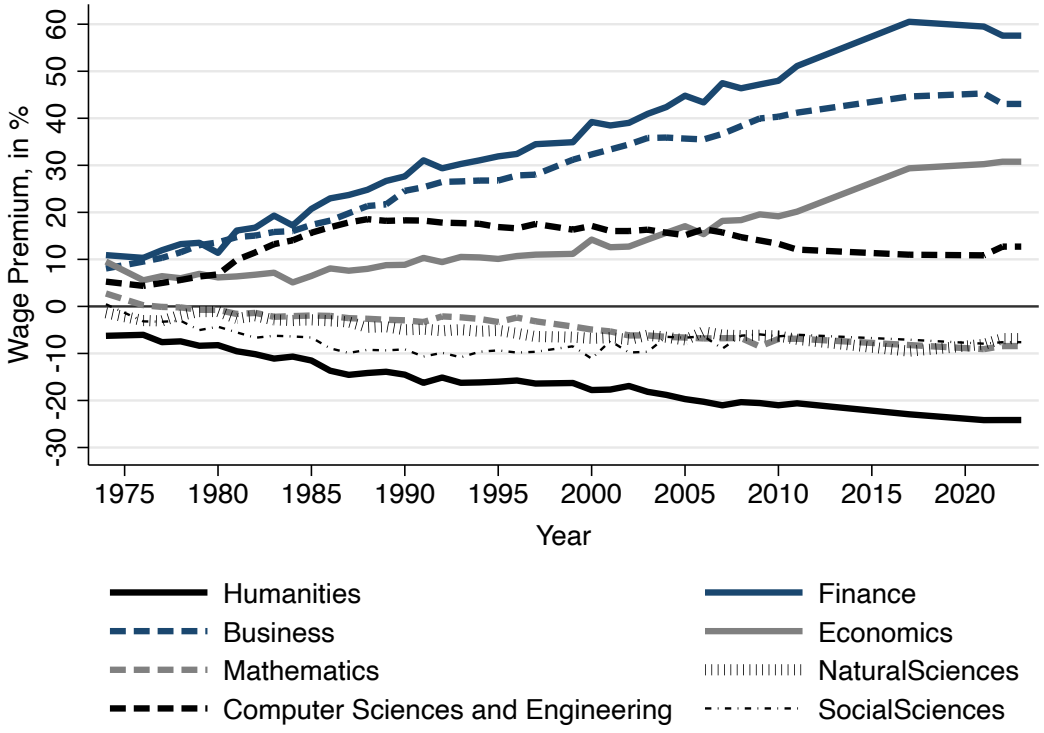


Figure 3. Faculty Pay Differentials across Fields (2015-2024)

This figure displays wage premiums by academic field relative to Languages for the 2015-2024 period. Panel A displays results for research tenure-track faculty only; Panel B for teaching faculty. The dots represent coefficients from OLS regressions of the log of annual gross wage on field dummies, with Languages as the reference category. All regressions include fixed effects for university × year, academic rank × year, wage format × year (base salary versus total compensation), and data source × year. Coefficients are reported in percentage terms. Error bars indicate 95% confidence intervals, with standard errors clustered at the university level.

Panel A. OSU Faculty Survey Data (1974-2023)



Panel B. Individual-Level Faculty Salary Dataset (1996-2023)

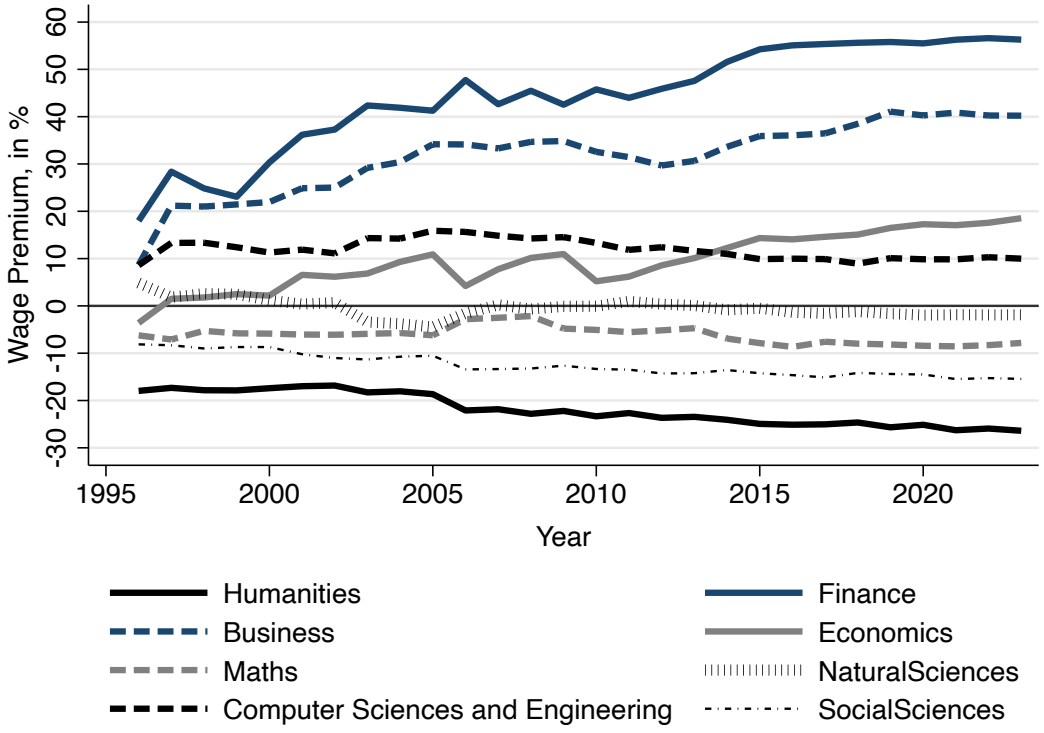


Figure 4. Evolution of Academic Pay across Fields

This figure plots the evolution of wage premia across academic fields from 1974 to 2023 in Panel A using the Oklahoma State University faculty survey data and from 1996 to 2023 in Panel B using our individual-level data faculty salary dataset. The lines plots the coefficient of field dummies in wage regression estimated every year, the reference being the sample mean, in percent. See Section 3.1 for more information on the specifications and samples.

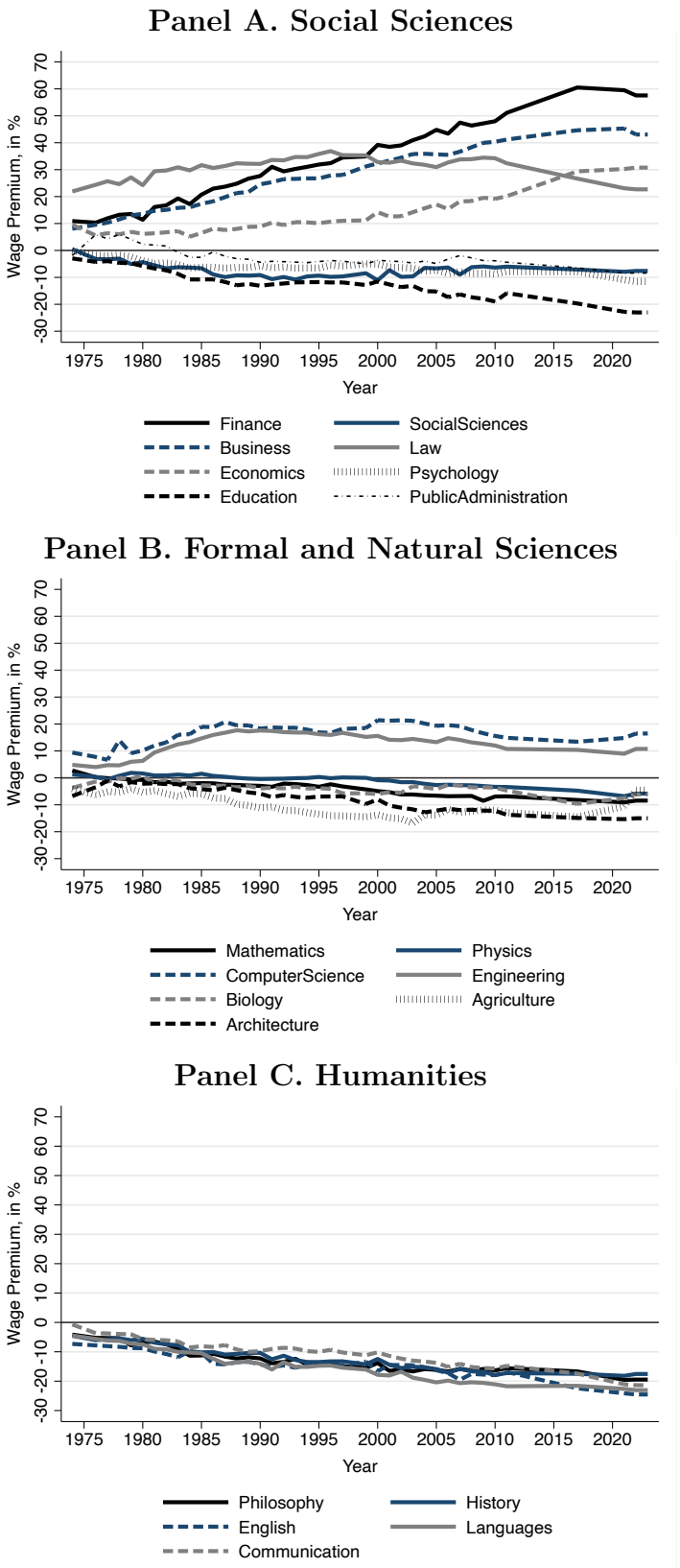
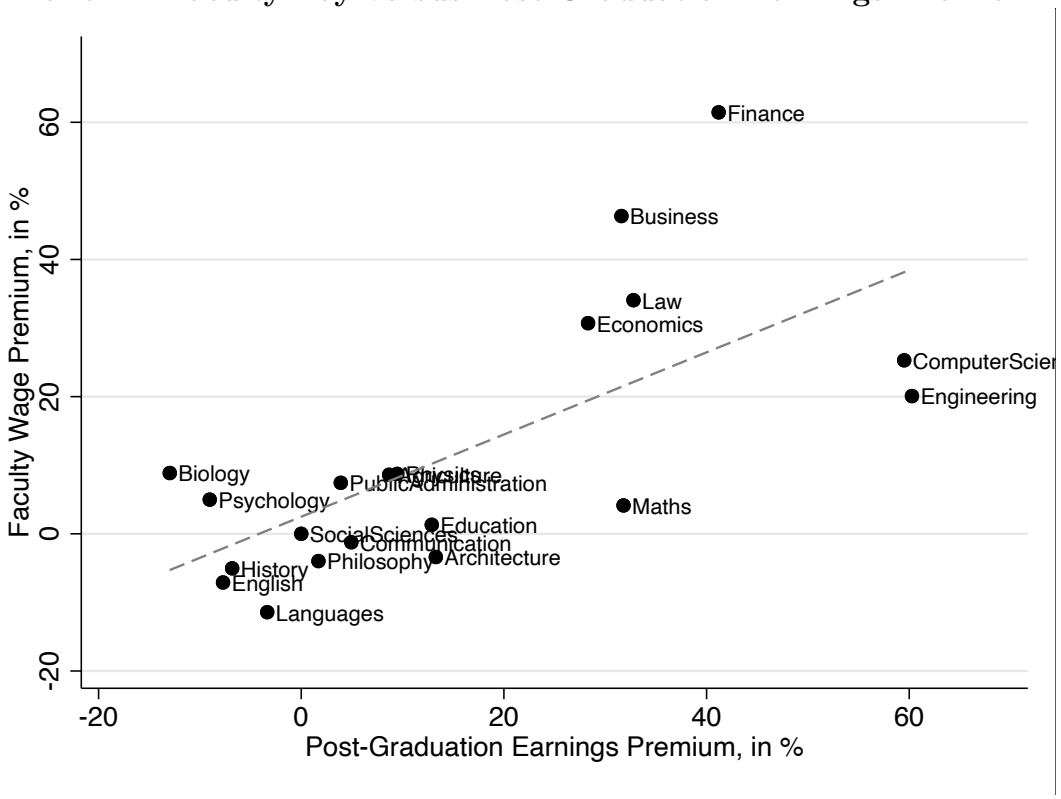


Figure 5. Evolution of Academic Pay across Fields: All Fields

This figure plots the evolution of wage premia across the 20 academic fields from 1974 to 2023 using the Oklahoma State University faculty survey data. The fields are grouped in Social Sciences (Panel A), Formal and Natural Sciences (Panel B), and Humanities (Panel C). The lines plots the coefficient of field dummies in wage regression estimated every year, the reference being the sample mean, in percent. See Section 3.1 for more information on the specifications and samples.

Panel A. Faculty Pay versus Post-Graduation Earnings Premia



Panel B. Faculty Pay versus Lifetime Earnings Premia

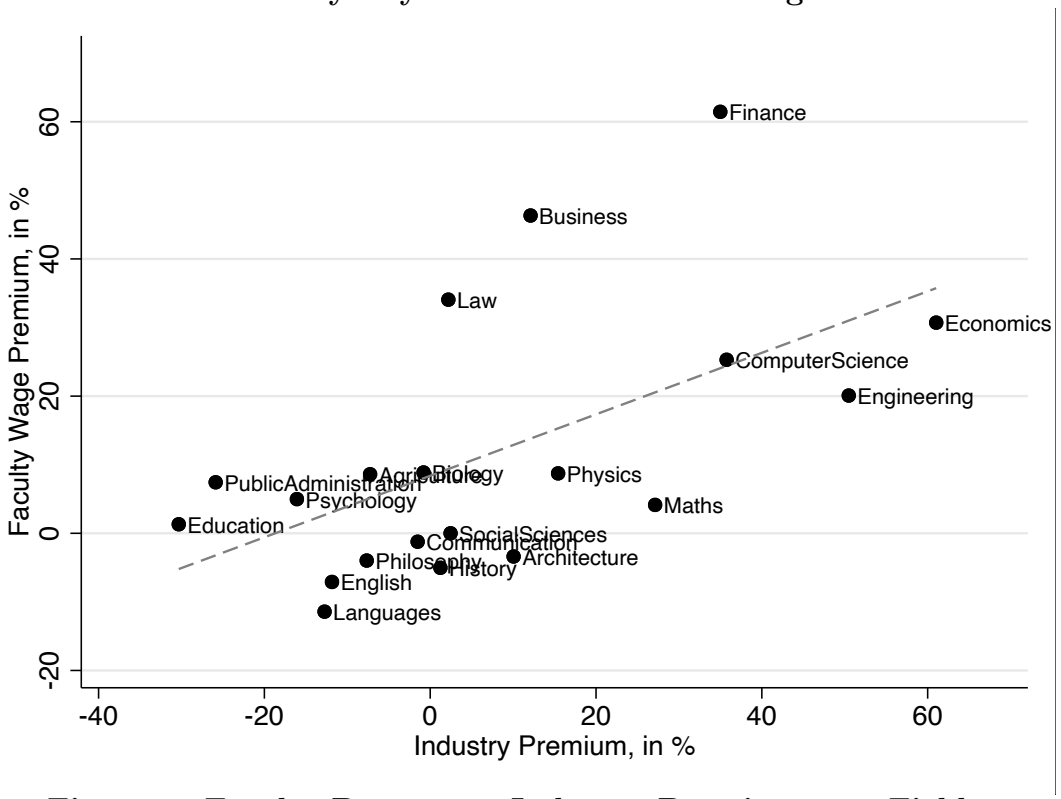
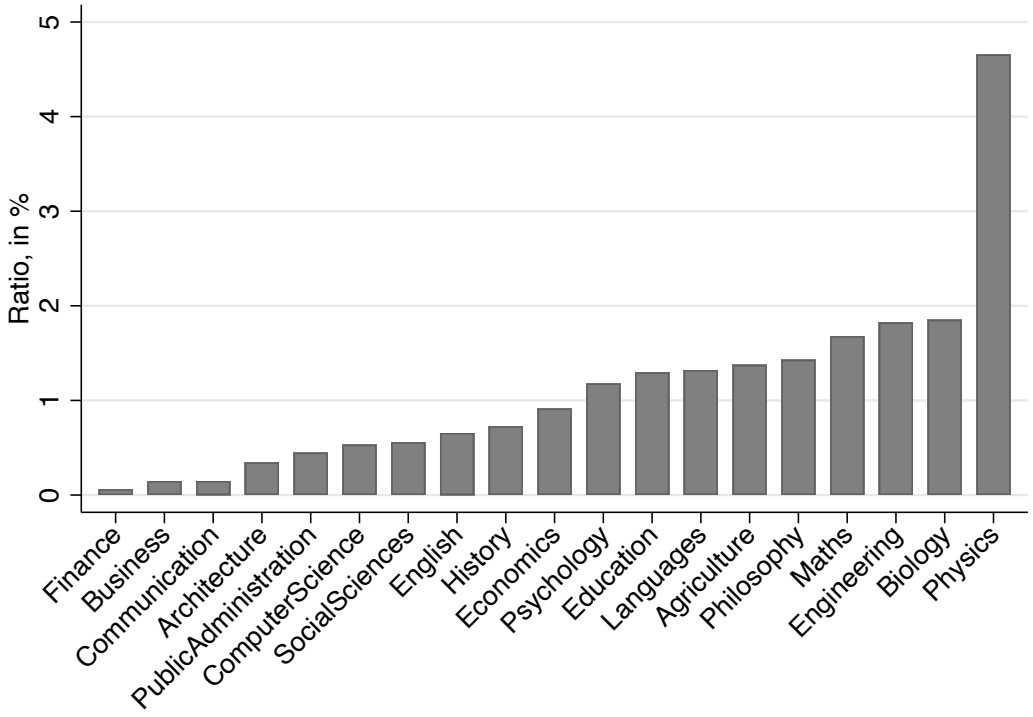


Figure 6. Faculty Pay versus Industry Premia across Fields

This figure illustrates the relationship between wage premia across academic fields in faculty pay and industry premia, measured using post-graduation earnings in Panel A and lifetime earnings in Panel B. The dots represent coefficients from OLS regressions of the log of annual gross wage on field dummies. Student post-graduation earnings data in Panel A is from the PSEO. Student life time earnnings across fields are measured using the 2009-2019 American Community Survey data.

Panel A. Ratio of PhD Graduates to Total Students across All Fields (2015-2022)



Panel B. Evolution of the Ratio of PhD Degrees to Total Students across Grouped Fields

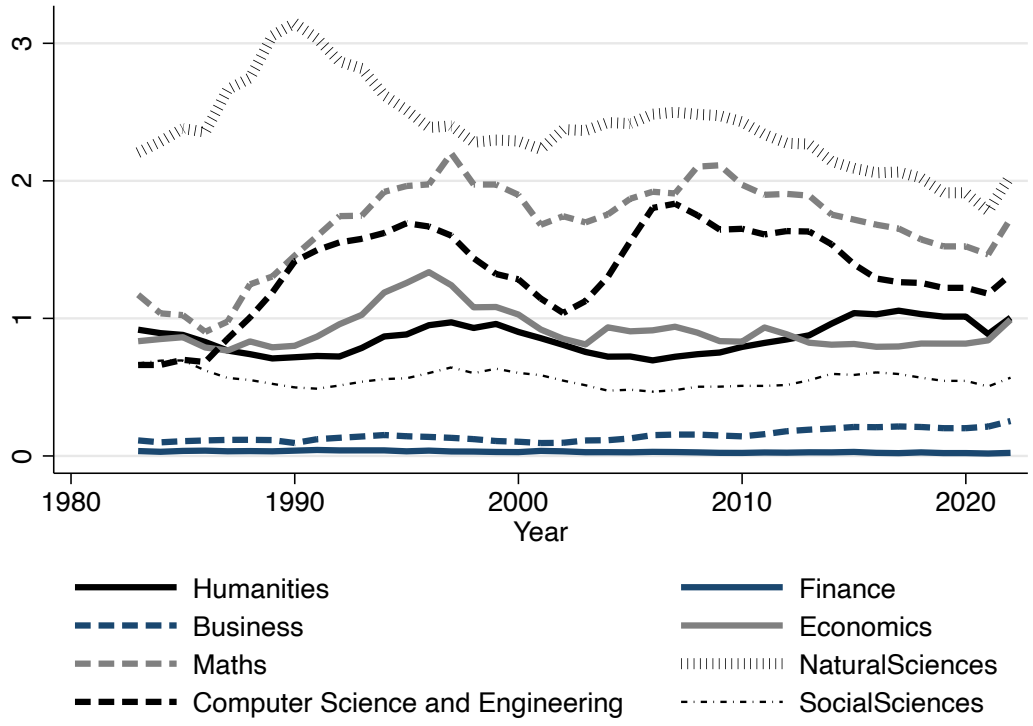


Figure 7. Evolution of the Ratio of PhD Degrees to Total Students across Fields (1990-2024)

This figure plots the ratios of the count of PhD graduates in each field to the total count of students in the same field. Panel A displays the average ratio over the 2015-2022 period across all fields, while Panel B plots the evolution since 1983 for grouped fields. Degree counts by field comes from IPEDS as explained in Section 2.4.

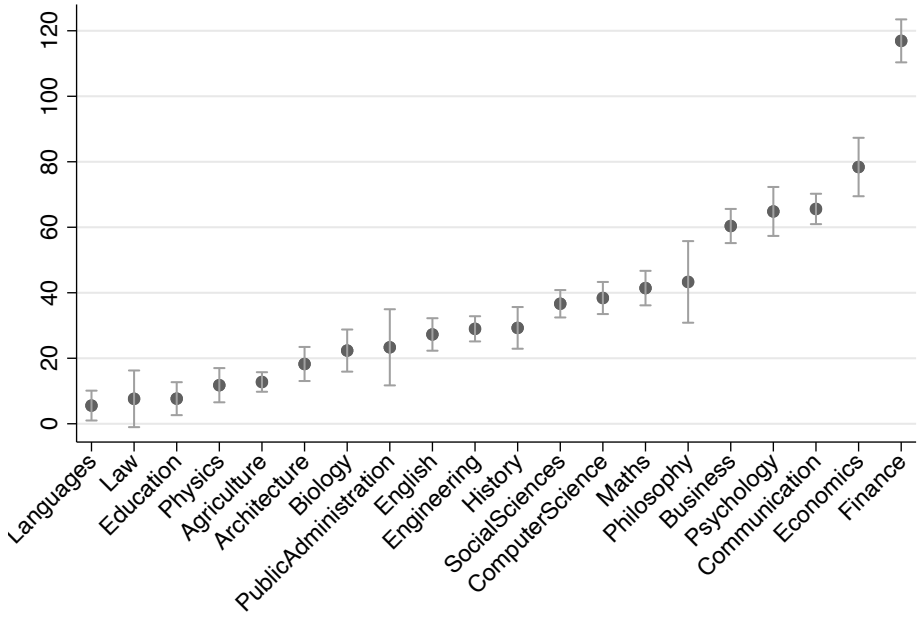


Figure 8. Elasticities of Faculty Pay to Post-Graduation Earnings.

This figure plots within-field elasticities of faculty wages to student wages across universities. Each elasticity is obtained from the within-field regression of the log of the yearly faculty pay on the log of the median undergraduate student wage one year after graduation in the same university and field. The regression includes academic rank times year, wage format times year, and degree level times year fixed effects. The data on student wages one year after graduation is derived from the US Census Bureau's Post-Secondary Employment Outcomes dataset, which covers the years 2001 to 2019. The median undergraduate student wage one year after graduation is matched with the average academic wages by academic field, year, and rank. Error bars indicate 95% confidence intervals, with standard errors clustered at the university level.

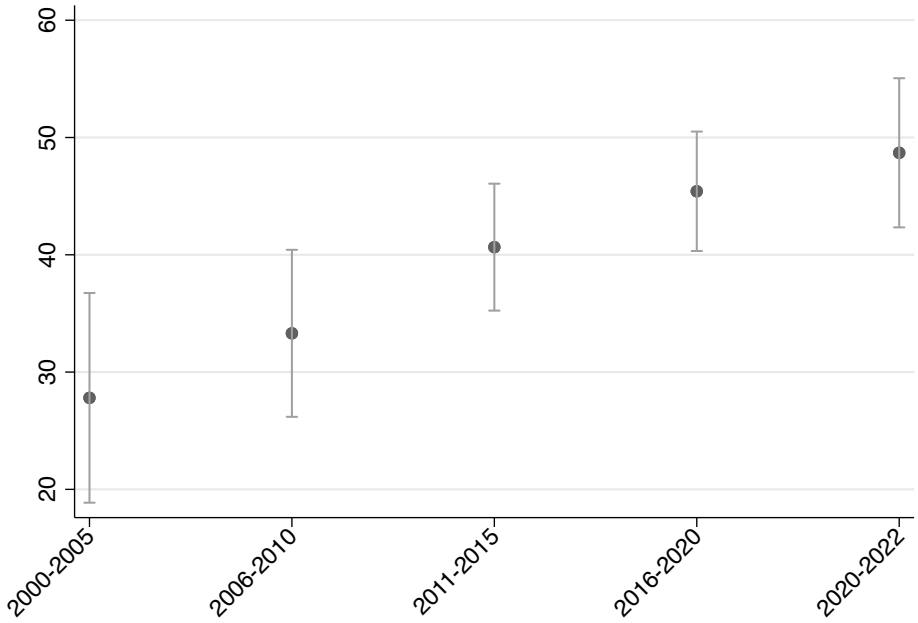


Figure 9. Growing Elasticity of Faculty Pay to Post-Graduation Earnings.

This figure plots elasticities of faculty wages to post-graduation earnings across time periods. Each elasticity is obtained from the regression of the log of the yearly faculty pay on the log of median post-graduation earnings in the same university, field, and year, with year times field fixed effects and academic rank, wage format, and degree level interacted with year fixed effects. Error bars indicate 95% confidence intervals, with standard errors clustered at the university level.

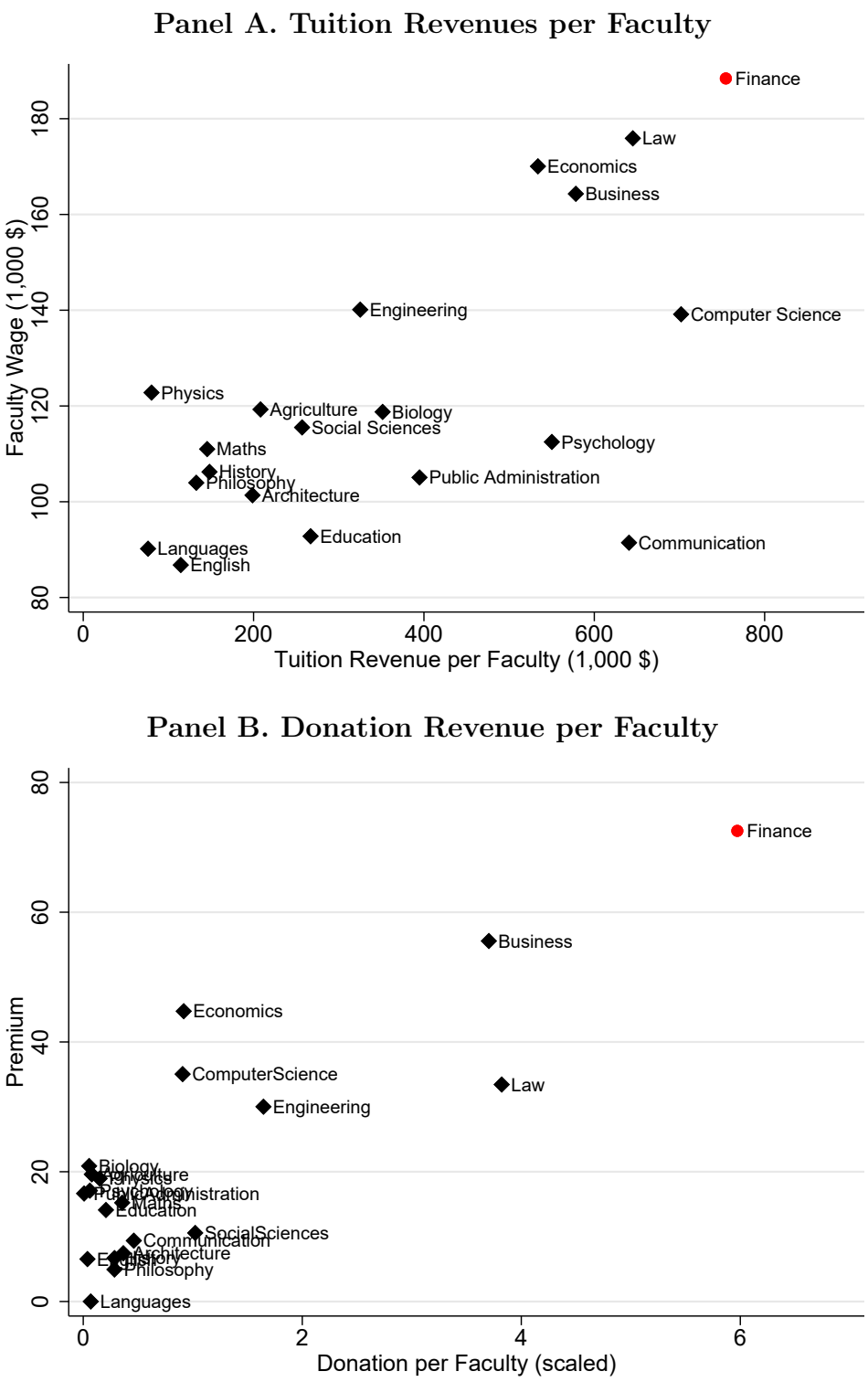


Figure 10. Revenue per Faculty

The figure illustrates the relationship between faculty pay and revenue per faculty across fields. We single out tuition revenues(Panel A) and donation revenue (Panel B). We calculate the tuition revenue per professor by dividing the combined undergraduate and graduate tuition revenues across all sample institutions in each academic field by the total number of faculty employed in that field for 2022. For undergraduate tuition revenue, we multiply three factors for each institution and field: (1) the number of bachelor's degrees conferred, (2) the average duration of bachelor's programs in that field, and (3) a weighted average tuition rate that accounts for the proportions of in-state and out-of-state students. Similarly, graduate tuition revenue is calculated by multiplying: (1) the number of master's degrees conferred, (2) the average length of master's programs in that field, and (3) the published average tuition rates for graduate programs.

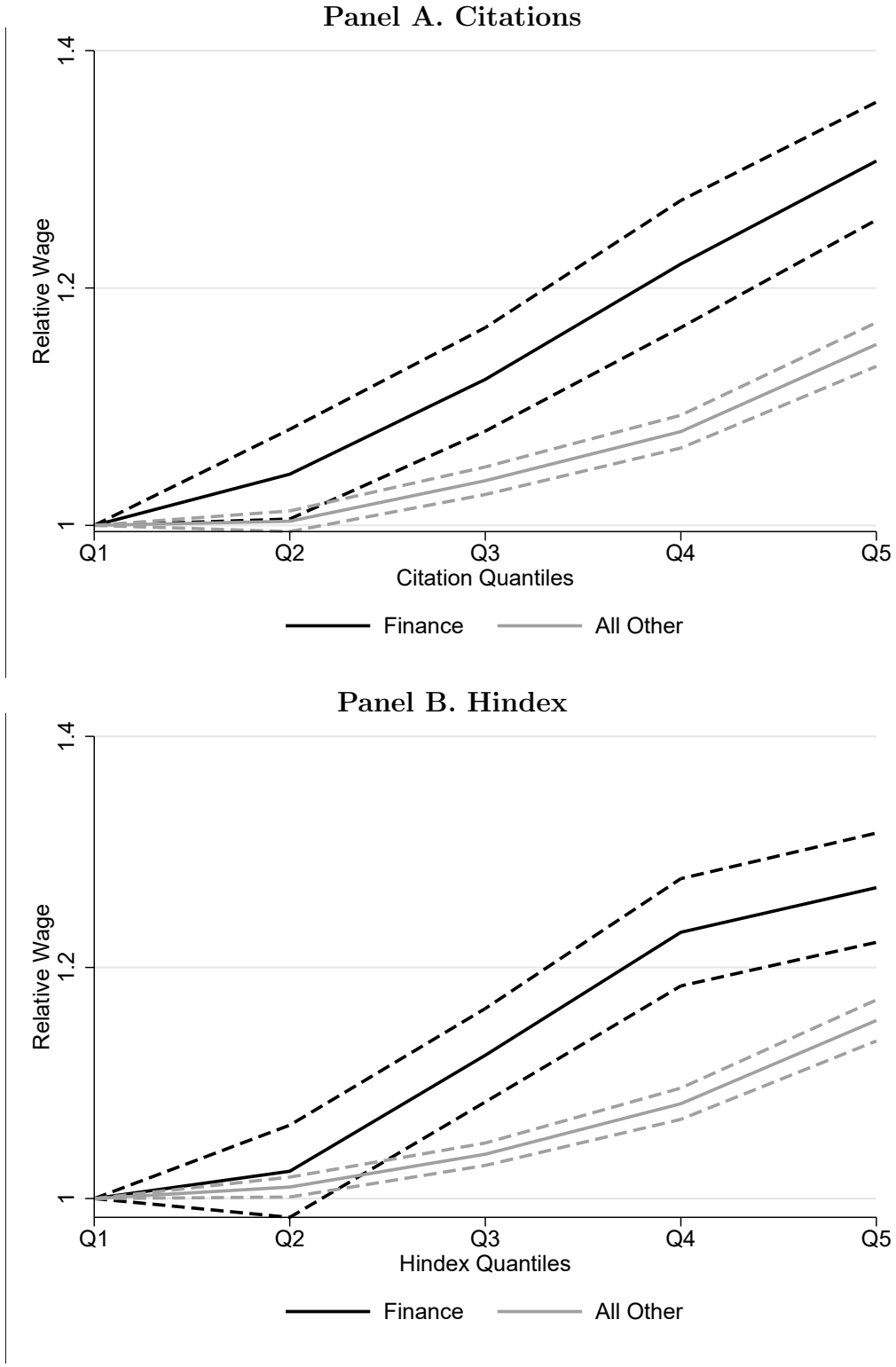


Figure 11. Wage Returns to Research Output

Panel A and B compare returns to research output in finance versus other fields. Research output is measured using citation and Hindex quintiles, in Panels A and B, respectively. Quintiles are defined within fields and positions. The graphs plot the coefficients $1+\beta_i+\beta_{i,f}$ in black and $1+\beta_i$ in grey in the regression $\ln(w_{h,t}) = \sum_{i=1}^{5} \beta_i q_i + \sum_{i=1}^{5} \beta_{i,f} \mathbb{1}_f q_i + \mu_u + \mu_{p,f} + \mu_t + \epsilon_{h,t}$. The dependent variable $\ln(w_{h,t})$ is the log of the yearly base salary. The model includes university, field$\times$ position, and year fixed effects. Dashed lines indicate 95% confidence bounds based on standard errors clustered at the university level.

9 Tables

Table 1. Summary Statistics: Faculty Wages

	Total Compensation						Base Salary			Counts	
	2015-2024				2005-2014	1995-2004	2015-2024	2005-2014	1995-2004	Total	
	Mean	**Median**	**P95**	**SD**	**Mean**	**Mean**	**Mean**	**Mean**	**Mean**	**# Obs**	**# Profs**
Total Sample	126.9	110.6	251.3	65.1	114.6	99.4	115.3	93.6	69.2	1,449,534	331,500
All Research Faculty	131.8	115.1	257.0	65.3	117.6	99.7	120.0	96.2	70.0	1,331,812	292,682
By Academic Field											
Finance	192.1	168.7	368.3	90.7	163.2	116.7	182.7	134.7	91.5	50,880	10,709
Law	184.4	167.5	359.9	86.7	170.4	124.1	196.9	159.7	111.2	28,707	5,947
Business	169.0	149.2	332.1	83.7	149.0	114.3	149.7	116.3	86.3	89,478	26,320
Economics	160.1	139.0	318.8	80.4	135.7	103.3	151.6	119.5	86.3	47,098	11,657
Engineering	150.2	134.9	273.9	64.4	133.8	108.0	127.5	107.5	84.1	150,080	34,231
Computer Science	148.7	132.7	273.5	64.9	130.7	106.0	126.3	103.7	78.6	66,905	18,386
Physics	133.6	118.5	254.5	62.0	120.6	100.8	120.7	100.3	72.6	133,174	26,071
Biology	130.6	116.0	245.0	61.0	116.9	102.9	116.5	94.6	67.0	113,647	21,937
Agriculture	121.4	112.4	209.5	45.5	104.9	84.0	110.5	96.8	74.4	31,786	7,369
Maths	120.1	107.5	219.9	52.1	109.8	92.5	105.9	88.4	66.3	81,958	18,437
Public Administration	119.3	103.0	229.2	57.7	106.2	94.3	110.1	89.6	60.9	28,819	6,408
Psychology	119.3	105.8	220.7	53.5	110.2	97.3	108.5	90.1	62.5	56,757	10,911
Social Sciences	116.7	103.1	216.1	51.6	105.3	96.6	105.7	86.2	61.9	118,396	24,787
Architecture	114.2	100.3	208.4	48.0	100.4	84.5	101.6	84.9	62.2	18,750	4,426
Philosophy	113.9	102.0	208.7	51.0	102.4	98.0	102.9	85.2	62.3	22,769	4,690
Education	107.2	96.3	186.7	42.6	98.3	92.7	88.5	72.9	59.7	66,022	14,478
History	106.0	94.6	190.6	44.8	96.5	90.5	102.9	84.7	62.4	48,568	9,073
Languages	103.2	91.8	188.9	44.1	94.5	86.4	96.2	79.8	57.3	55,480	11,289
English	101.6	91.0	182.7	42.4	92.1	86.2	96.4	80.8	58.5	77,867	15,512
Communication	101.5	90.9	178.6	41.2	91.7	68.5	93.7	77.7	59.6	44,671	10,044
By Rank											
Full Professor	157.4	141.2	298.3	73.5	138.9	109.7	153.7	117.3	83.6	601,783	95,583
Associate Professor	112.1	102.5	191.8	43.5	100.8	84.5	102.0	81.1	61.3	367,995	60,529
Assistant Professor	100.1	89.8	183.4	42.4	85.0	68.8	94.2	71.4	53.2	329,282	130,656
By University Classification											
Very High Research Intensity	150.8	131.6	295.5	74.8	131.2	101.6	141.2	111.3	81.9	667,066	143,927
High Research Intensity	121.1	108.2	218.6	51.8	107.7	93.0	102.4	81.9	67.1	239,057	52,552
Doctoral Universities	100.9	91.4	170.8	38.4	89.5	66.3	90.9	71.0	57.5	53,874	13,743
Other	109.6	100.3	191.5	44.4	100.4	96.6	87.3	74.8	56.3	371,815	82,460
By Data Source											
Public Requests Data	131.8	115.1	257.0	65.3	117.6	99.7	124.2	97.4	70.0	1,259,499	220,369
Green Card/H1B Applications							98.1	74.7		72,313	72,313
All Teaching Faculty	76.9	67.7	142.5	34.1	66.8	76.1	68.4	49.2	36.4	117,722	29,143

This table reports summary statistics on faculty wages across faculty type (research- or teaching-track), wage measure (total compensation or base salary), and time period. Summary statistics for research-track faculty are further disaggregated by academic field, academic rank, university classification, and data source. The base salary represents the 9-month base salary, excluding summer stipends and bonuses, while the total compensation includes all components of faculty pay. The dataset is an unbalanced panel consisting of over 1.49 million faculty-year observations from more than 331,000 professors at 1,459 North American 4-year institutions, covering the period from 1993 to 2024. We gather faculty wage data through public record requests under freedom of information laws. We identified academic fields from department affiliations, and, if not available, a textual analysis of automated Google search, as well as available field and conference directories. We supplement this sample with data from the U.S. Department of Labor's green card and H1B application records. All wage figures are reported in current U.S. dollars.

Table 2. Summary Statistics: Student Post-Graduation Earnings

Post-Graduation Earnings	1 Year After Graduation					5 Years After Graduation					Instrument		
	2016-2021 *N=33,537*				2010-2016 *N=23,593*	2016-2021 *N=26,095*				2010-2016 *N=19,559*	2016-2021	2010-2015	2000-2009
	P50		P25	P75	P50	P50		P25	P75	P50	Mean	Mean	Mean
	Mean	SD	Mean	Mean	Mean	Mean	SD	Mean	Mean	Mean			
Total Sample	42.9	15.1	32.2	54.5	36.1	59.1	17.2	45.4	76.0	51.2	75.8	66.6	57.5
By Academic Field													
Computer Science	65.7	19.6	49.1	84.8	56.4	91.8	25.4	70.4	121.8	74.8	91.3	79.4	68.1
Engineering	63.7	9.4	50.0	76.7	59.3	85.4	12.9	70.0	104.8	77.6	93.1	82.4	70.4
Law	60.3	17.5	37.6	97.9	60.7	88.1	16.7	58.7	132.8	97.0	99.7	87.6	75.8
Finance	48.7	7.6	37.3	60.3	40.9	70.3	12.1	53.8	91.4	59.8	84.5	73.9	64.2
Maths	48.5	11.4	33.2	65.3	40.3	68.2	16.1	50.3	92.0	56.5	79.5	69.5	60.0
Economics	44.7	7.2	32.2	57.9	37.5	68.5	10.4	50.4	91.3	56.8	77.8	67.8	58.5
Business	43.7	8.8	32.7	55.4	37.5	62.3	12.3	47.7	80.6	53.8	82.6	72.3	62.7
Architecture	41.5	8.3	32.2	50.6	34.5	57.4	6.6	46.7	69.5	48.5	88.1	76.5	66.2
Education	41.3	10.5	32.9	49.5	35.5	50.1	9.0	41.6	59.3	46.1	56.4	50.4	43.4
Public Administration	39.0	9.5	30.4	48.7	34.7	51.3	9.6	40.5	64.2	45.6	70.8	62.9	53.2
Physics	37.4	9.1	26.0	51.5	35.6	59.1	11.1	42.7	80.1	54.8	78.1	69.0	59.3
Agriculture	37.1	9.0	27.5	47.9	33.8	53.4	9.8	40.1	71.0	48.0	76.1	67.2	57.8
Communication	33.8	5.5	24.8	43.6	29.2	50.6	7.4	38.0	66.2	43.5	76.1	66.2	57.8
Social Sciences	32.8	5.9	23.4	43.8	28.4	49.9	8.5	36.7	66.2	43.4	74.9	65.6	56.8
Languages	32.1	6.2	22.5	43.8	28.6	47.7	6.2	35.0	63.4	42.6	67.5	59.3	51.3
Philosophy	30.9	5.1	21.2	43.8	26.7	47.8	8.0	32.6	68.1	41.6	69.8	60.9	53.0
English	29.8	5.0	21.1	40.4	26.7	44.8	5.9	32.6	58.0	40.3	68.9	60.5	52.6
History	29.8	5.2	21.1	40.9	26.6	46.4	6.0	33.9	60.5	41.3	67.5	59.3	51.7
Psychology	29.4	5.0	21.4	38.7	26.3	45.5	6.1	33.7	59.2	40.2	66.9	59.1	50.9
Biology	28.7	5.3	20.6	38.7	26.2	52.0	6.6	37.1	68.9	46.8	67.4	59.6	51.3
By Degree Level													
Graduate	57.9	17.8	44.9	72.9	49.9	70.3	22.3	56.1	89.1	61.5	83.3	73.6	63.3
Undergraduate	41.0	13.6	30.6	52.2	34.4	57.8	15.9	44.1	74.4	50.0	74.8	65.7	56.7
By University Classification													
Very High Research Intensity	46.2	17.3	34.8	58.7	38.7	64.1	19.2	49.0	83.2	55.0	78.6	68.9	59.4
High Research Intensity	42.5	13.6	32.0	53.8	36.1	58.0	16.0	44.9	73.8	50.3	74.6	65.7	56.6
Doctoral Universities	40.2	11.4	30.8	50.2	35.1	54.0	12.4	42.5	67.5	47.8	73.0	64.5	56.1
Other	38.2	10.9	28.4	48.9	32.5	52.9	12.0	40.5	67.3	46.7	73.7	64.8	55.8

This table presents summary statistics for our yearly panel of post-graduation earnings and the constructed instrument variable. Post-graduation earnings are sourced from the U.S. Census Bureau's Post-Secondary Employment Outcomes (PSEO) dataset. From this dataset, we obtain the 25th, 50th, and 75th percentiles of student earnings at the university-academic program-cohort level that we match with our faculty salary dataset. The resulting panel includes 76,000 observations across 366 universities, with around 5,000 academic programs per year over the 2002-2022 period. We construct the instrument variable by combining the student placement data from the PSEO with salary data from the American Community Survey with. Specifically, we calculate mean salaries from the American Community Survey at the 2-digit NAICS industry, Census division, and year level. We then weight these industry-region-year wages by the share of graduates from each university-field combination employed in the corresponding industry-region-year cell, as reported in the PSEO. All earnings figures are expressed in thousands of current U.S. dollars.

Table 3. Faculty Pay Premiums across Fields (2015-2024)

Sample	All Research	Academic Rank			University Type		University Classification		Top Scholars	Field Classification Method		
		Assistant	Associate	Full	Private	Public	R1	Other		Department Information	Directories	Google Searches
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
𝟙.Finance	0.73***	0.84***	0.70***	0.65***	0.77***	0.73***	0.92***	0.56***	0.55***	0.77***	0.93***	0.51***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.02)	(0.04)	(0.03)	(0.08)	(0.03)
𝟙.Business	0.57***	0.64***	0.54***	0.51***	0.66***	0.57***	0.68***	0.45***	0.34***	0.59***	0.79***	0.45***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.03)	(0.02)	(0.02)	(0.01)	(0.03)	(0.02)	(0.08)	(0.02)
𝟙.Law	0.45***	0.44***	0.40***	0.43***	0.48***	0.45***	0.51***	0.31***	0.24***	0.51***	0.58***	0.37***
	(0.02)	(0.03)	(0.02)	(0.02)	(0.04)	(0.02)	(0.02)	(0.02)	(0.07)	(0.03)	(0.08)	(0.03)
𝟙.Economics	0.42***	0.46***	0.40***	0.41***	0.46***	0.42***	0.51***	0.30***	0.24***	0.43***	0.62***	0.31***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)	(0.02)	(0.08)	(0.02)
𝟙.Computer Science	0.37***	0.40***	0.37***	0.33***	0.32***	0.37***	0.40***	0.31***	0.06*	0.38***	0.51***	0.31***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.02)	(0.01)	(0.03)	(0.02)	(0.08)	(0.02)
𝟙.Engineering	0.32***	0.32***	0.31***	0.32***	0.24***	0.32***	0.35***	0.28***	0.07***	0.35***	0.51***	0.28***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)	(0.09)	(0.01)
𝟙.Physics	0.21***	0.20***	0.18***	0.21***	0.13***	0.21***	0.26***	0.13***	-0.03	0.22***	0.49***	0.18***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.08)	(0.01)
𝟙.Biology	0.22***	0.21***	0.20***	0.22***	0.21***	0.22***	0.26***	0.14***	-0.04	0.23***	0.19**	0.19***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)	(0.01)	(0.01)	(0.03)	(0.02)	(0.09)	(0.01)
𝟙.Agriculture	0.20***	0.20***	0.20***	0.19***	0.20***	0.20***	0.22***	0.17***	-0.04	0.21***	0.32***	0.18***
	(0.01)	(0.01)	(0.02)	(0.02)	(0.04)	(0.01)	(0.02)	(0.02)	(0.05)	(0.02)	(0.08)	(0.02)
𝟙.Public Administration	0.19***	0.16***	0.18***	0.20***	0.13***	0.20***	0.27***	0.10***	0.04	0.22***	0.27***	0.16***
	(0.02)	(0.01)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.01)	(0.04)	(0.03)	(0.10)	(0.01)
𝟙.Psychology	0.17***	0.15***	0.15***	0.18***	0.16***	0.17***	0.22***	0.10***	0.02	0.19***	0.38***	0.14***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.02)	(0.01)	(0.03)	(0.02)	(0.09)	(0.01)
𝟙.Maths	0.16***	0.17***	0.15***	0.16***	0.14***	0.16***	0.20***	0.09***	-0.03	0.18***	0.45***	0.12***
	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	(0.02)	(0.01)	(0.03)	(0.02)	(0.08)	(0.01)
𝟙.Education	0.14***	0.13***	0.12***	0.14***	0.11**	0.14***	0.14***	0.09***	0.06	0.15***	0.25***	0.12***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.05)	(0.01)	(0.01)	(0.01)	(0.07)	(0.01)	(0.08)	(0.01)
𝟙.Social Sciences	0.12***	0.11***	0.11***	0.13***	0.11***	0.12***	0.15***	0.07***	-0.04	0.14***	0.26***	0.09***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.03)	(0.01)	(0.08)	(0.01)
𝟙.Communication	0.11***	0.09***	0.10***	0.12***	0.08***	0.11***	0.12***	0.05***	-0.09	0.12***	0.24***	0.08***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.06)	(0.01)	(0.08)	(0.01)
𝟙.Architecture	0.08***	0.07***	0.08***	0.09***	0.09***	0.08***	0.10***	0.08***	-0.33***	0.10***	0.17*	0.07***
	(0.01)	(0.01)	(0.01)	(0.02)	(0.03)	(0.01)	(0.01)	(0.01)	(0.05)	(0.02)	(0.09)	(0.01)
𝟙.Philosophy	0.08***	0.05***	0.06***	0.09***	0.03	0.08***	0.10***	0.02***	-0.07	0.10***	0.19*	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.12)	(0.01)	(0.10)	(0.01)
𝟙.History	0.07***	0.05***	0.05***	0.08***	0.04	0.07***	0.07***	0.03***	0.18*	0.08***	0.26***	0.04***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)	(0.01)	(0.01)	(0.09)	(0.01)	(0.08)	(0.01)
𝟙.English	0.05***	0.04***	0.04***	0.05***	-0.00	0.05***	0.03***	0.02***	-0.20**	0.06***	0.16**	0.03***
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.09)	(0.01)	(0.08)	(0.01)
Fixed Effects												
University × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Position × Year	Yes	Yes	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wage Format × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Data Source × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-
Observations	859,703	224,420	239,214	370,703	17,213	842,389	430,094	429,609	17,490	452,360	43,207	304,426
R^2	0.64	0.67	0.66	0.53	0.77	0.64	0.58	0.65	0.44	0.67	0.64	0.59

This table presents wage premiums by academic field relative to Languages for the 2015-2024 period. The sample is restricted to research faculty only. We estimate OLS regressions of the log of annual gross wage on field dummies, with Languages as the reference category. Column 1 presents wage premiums for the full sample of research tenure-track faculty. Columns 2-4 show premiums by academic rank: assistant, associate, and full professors. Columns 5-6 compare premiums across private and public universities. Columns 7-8 display premiums by university classification: R1 universities (doctoral universities with very high research activity) and all others. Column 9 restricts the sample to top scholars ranked in the top 2000 in their field. Columns 10-12 examine premiums by field classification methodology: department information, field directories, and Google automated searches. The baseline specification in Column 1 includes fixed effects for university × year, academic rank × year, wage format × year (base salary versus total compensation), and data source × year (public record requests versus H1B or green card application data). Standard errors are clustered at the university level and reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 4. Elasticity of Faculty Pay to Post-Graduation Earnings: OLS

	Log(Faculty Pay)$_{f,u,y}$									
	Student Earnings in Year Y					**In year Y+5**				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Log(Post-Graduation Earnings)$_{u,f,y}$	0.56***	0.52***	0.44***	0.42***	0.02***	0.71***	0.69***	0.62***	0.55***	0.01***
	(0.04)	(0.04)	(0.04)	(0.05)	(0.00)	(0.05)	(0.05)	(0.06)	(0.05)	(0.00)
Fixed Effects:										
University x Field	-	-	-	-	Yes	-	-	-	-	Yes
Field x Year	-	-	-	Yes	-	-	-	-	Yes	-
University x Year	-	-	Yes	-	-	-	-	Yes	-	-
Year	-	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes
Wage Format	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Degree Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	172,826	172,441	172,826	172,665	172,665	56,193	56,008	56,193	56,032	56,032
R^2	0.48	0.68	0.67	0.86	0.89	0.53	0.70	0.69	0.87	0.89

This table reports regression coefficients from estimating the log of the average annual faculty salary at the university, degree level, academic field, academic rank level on the log of student post-graduation earnings in the corresponding university, field, and degree. Student earnings are sourced from the U.S. Census Bureau's Post-Secondary Employment Outcomes (PSEO) dataset. We match the 25th percentile, median, and 75th percentile of post-graduation earnings to the average annual faculty salary by academic rank in the same university, degree level, and year. All specifications include academic rank × year, wage format × year, and degree level × year fixed effects. Columns 1-6 estimate within-university, across-field elasticities by including university × year and university × rank fixed effects. Columns 7-12 estimate within-field, across-university elasticities by including field × year and field × rank fixed effects. Standard errors are clustered at the university level and at the field × year level, and are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 5. Elasticity of Faculty Pay to Post-Graduation Earnings: First Stage

	Log(Student Earnings)$_{f,u,y}$									
	Student Earnings in Year Y					**In year Y+5**				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Instrument	1.15***	1.15***	1.28***	0.62***	0.37***	1.09***	1.06***	1.07***	0.85***	0.49***
	(0.08)	(0.12)	(0.13)	(0.10)	(0.10)	(0.07)	(0.08)	(0.09)	(0.08)	(0.09)
Fixed Effects:										
University x Field	-	-	-	-	Yes	-	-	-	-	Yes
Field x Year	-	-	-	Yes	-	-	-	-	Yes	-
University x Year	-	-	Yes	-	-	-	-	Yes	-	-
Year	-	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes
Wage Format	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Degree Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	138,794	138,794	138,404	138,794	138,225	90,562	90,562	90,274	90,562	90,115
R^2	0.51	0.51	0.64	0.80	0.91	0.56	0.57	0.68	0.78	0.90
$F-Statistics$	191	100	93	42	15	218	165	138	120	33

This table reports regression coefficients from estimating the log of the average annual faculty salary at the university, degree level, academic field, academic rank level on the log of student post-graduation earnings in the corresponding university, field, and degree. Student earnings are sourced from the U.S. Census Bureau's Post-Secondary Employment Outcomes (PSEO) dataset. We match the 25th percentile, median, and 75th percentile of post-graduation earnings to the average annual faculty salary by academic rank in the same university, degree level, and year. All specifications include academic rank × year, wage format × year, and degree level × year fixed effects. Columns 1-6 estimate within-university, across-field elasticities by including university × year and university × rank fixed effects. Columns 7-12 estimate within-field, across-university elasticities by including field × year and field × rank fixed effects. Standard errors are clustered at the university level and at the field × year level, and are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 6. Elasticity of Faculty Pay to Post-Graduation Earnings: 2SLS

	Log(Faculty Pay)$_{f,u,y}$									
	Student Earnings in Year Y					**In year Y+5**				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\widehat{PostGraduationEarnings}$	0.79***	0.82***	0.74***	0.85***	**0.56*** **	0.85***	0.89***	0.90***	0.59***	**0.34** **
	(0.03)	(0.04)	(0.04)	(0.17)	(0.19)	(0.03)	(0.04)	(0.04)	(0.13)	(0.16)
Fixed Effects:										
Fixed Effects:										
University x Field	-	-	-	-	Yes	-	-	-	-	Yes
Field x Year	-	-	-	Yes	-	-	-	-	Yes	-
University x Year	-	-	Yes	-	-	-	-	Yes	-	-
Year	-	Yes	Yes	Yes	Yes	-	Yes	Yes	Yes	Yes
Wage Format	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rank	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Degree Level	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	138,794	138,794	138,404	138,794	138,225	90,562	90,562	90,274	90,562	90,115
R^2	0.27	0.18	0.14	0.02	-0.19	0.34	0.30	0.21	0.15	-0.05

This table reports regression coefficients from estimating the log of the average annual faculty salary at the university, degree level, academic field, academic rank level on the log of student post-graduation earnings in the corresponding university, field, and degree. Student earnings are sourced from the U.S. Census Bureau's Post-Secondary Employment Outcomes (PSEO) dataset. We match the 25th percentile, median, and 75th percentile of post-graduation earnings to the average annual faculty salary by academic rank in the same university, degree level, and year. All specifications include academic rank × year, wage format × year, and degree level × year fixed effects. Columns 1-6 estimate within-university, across-field elasticities by including university × year and university × rank fixed effects. Columns 7-12 estimate within-field, across-university elasticities by including field × year and field × rank fixed effects. Standard errors are clustered at the university level and at the field × year level, and are reported in parentheses. The symbols *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 7. Mechanism: Elasticity, Scalability, and Scarcity

	Log(Faculty Pay)					
	Undegraduate			Grad + Undegrad		
	All	High Scal.	Scarcity	All	High Scal.	Scarcity
	(1)	(2)	(3)	(4)	(5)	(6)
Log(Student Earnings)	0.21***	0.34***	0.57***	0.32***	0.42***	0.69***
	(0.08)	(0.10)	(0.15)	(0.08)	(0.11)	(0.19)
University X Field	Yes	Yes	Yes	Yes	Yes	Yes
Observations	454,813	133,612	55,051	454,813	133,612	55,051
R^2	0.58	0.57	0.49	0.58	0.57	0.49

This table investigates how the elasticity varies depending on scalability, defined as a higher number of students per faculty, and scarcity, defined as a low number of PhD candidates per faculty. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

Table 8. Elasticity of Faculty Pay to Research Output

	Log(Faculty Pay)							
	Total Citation Quintiles				H-Index Quintiles			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Quintiles	0.08***	0.05***	0.04***	0.02**	0.08***	0.05***	0.03***	0.01
	(0.00)	(0.00)	(0.01)	(0.01)	(0.00)	(0.00)	(0.01)	(0.01)
Quintiles × 𝟙.Finance			0.10***	0.08***			0.09***	0.07***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Business			0.09***	0.06***			0.09***	0.06***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Economics			0.07***	0.06***			0.08***	0.07***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Biology			0.06***	0.04***			0.07***	0.05***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Psychology			0.05***	0.03***			0.07***	0.04***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Maths			0.05***	0.04***			0.06***	0.05***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Physics			0.05***	0.04***			0.06***	0.05***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.ComputerScience			0.05***	0.02			0.05***	0.03*
			(0.02)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Philosophy			0.04**	0.03			0.04***	0.03**
			(0.02)	(0.02)			(0.02)	(0.02)
Quintiles × 𝟙.PublicAdministration			0.04***	0.02*			0.05***	0.03**
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.SocialSciences			0.03***	0.02**			0.04***	0.03***
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Engineering			0.03**	0.02			0.03***	0.02**
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.History			0.02	0.01			0.03*	0.02*
			(0.01)	(0.01)			(0.02)	(0.01)
Quintiles × 𝟙.Communication			0.02	0.01			0.03*	0.02
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Education			0.01	0.00			0.02**	0.01
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.English			0.01	0.00			0.01	0.01
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Law			-0.00	-0.00			0.01	0.01
			(0.02)	(0.02)			(0.02)	(0.02)
Quintiles × 𝟙.Agriculture			-0.01	0.00			0.00	0.01
			(0.01)	(0.01)			(0.01)	(0.01)
Quintiles × 𝟙.Architecture			-0.01	-0.00			-0.01	-0.00
			(0.01)	(0.01)			(0.01)	(0.02)
Fixed Effects								
University × Year	-	Yes	-	Yes	-	Yes	-	Yes
Field	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Rank × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Experience Quintiles	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wage Format × Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	83,604	83,557	83,604	83,557	83,604	83,557	83,604	83,557
R^2	0.53	0.61	0.54	0.61	0.53	0.61	0.53	0.61

This table reports coefficients from OLS regressions where the dependent variable is log annual gross wage. The independent variables are quintiles of research output measured by total citations (Columns 1-4) and H-index (Columns 5-8). Columns 3-4 and 7-8 additionally include interactions between research output quintiles and field dummies, with Languages as the reference category. All specifications include fixed effects for wage format × year (base salary versus total compensation), academic rank × year, field, and experience quintiles, where experience is measured as years since first publication. Columns 2, 4, 6, and 8 include university × year fixed effects. Data are from the merge of our academic wage database with Scopus and include 83,609 faculty year observations representing 18,479 professors across 192 public universities. Standard errors are clustered at the university level and reported in parentheses. The symbols *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively.