Proceedings of the 5th International Conference on Financial Technology and Business Analysis
DOI: 10.54254/2754-1169/2026.38846

Field of Study, Skill Specificity and Early-Career Labor-Market Returns among Chinese University Graduates

Haoxuan Fang

Nanjing foreign language school Xianlin Campus, Nanjing, China
3172980592@qq.com

Abstract. Against the backdrop of the massification of higher education, the supply of college graduates in the labor market has been steadily increasing. Wage disparities among graduates in different fields during the early stages of their careers have gradually become more pronounced, and the relationship between academic discipline and income has emerged as a key focus of research on human capital. This study examines how fields of study are associated with early-career wages among Chinese university graduates. It also examines skill specificity, major–job matching, and labor demand. This paper employs a structured literature review and a relatively comprehensive analytical approach based on published empirical studies to compare research findings on wage differentials, job-specific skills, and major job-skill mismatches. The existing evidence suggests that graduates from occupationally specific majors can receive higher starting wages if their jobs are related to their studies. Major–job mismatch is often associated with lower wages, although the size and direction of this relationship vary across studies and groups. It further discusses how the supply of graduates and demand for particular skills may shape these wage differences. The study concludes that early-career wage returns reflect the interaction of field-specific human capital, job matching and market conditions, with implications for students' educational choices and university curricula.

Keywords: Field of Study, Skill Specificity, Early-Career Wages, Major–Job Matching, Labor Demand

1. Introduction

China's expansion of higher education has increased graduate supply and raised questions about returns to human capital investment. The Ministry of Education reported 1.88 million graduates from regular higher education institutions in 2003, an increase of 40.39% over 2002 [1]. Research links the expansion to lower relative wages among new graduates [2]. However, evidence from the China Family Panel Studies shows that returns differ across fields and university tiers [3]. In a regional graduate sample, Hang and Zhou report average wages for software engineering graduates nearly twice those of gardening graduates [4]. This descriptive contrast illustrates variation within the graduate labor market; it is not a nationwide or causal estimate of the return to choosing either major. Existing research also suggests that the wage premium associated with major specificity varies with the relevance of graduates' jobs to their studies [4]. This emphasizes the conditions under

© 2026 The Authors. This is an open access article distributed under the terms of the Creative Commons Attribution License 4.0 (https://creativecommons.org/licenses/by/4.0/).

DOI: 10.54254/2754-1169/2026.38846

which specialized skills are rewarded. Their market value may also vary with employers' demand and the supply of graduates possessing these skills.

Building on these studies, this review connects evidence on skill specificity and major–job matching with graduate supply and skill demand. Its contribution is to compare the conditions under which specialized training is associated with higher early-career wages, while examining how differences in study populations and labor-market settings affect the interpretation of published findings. The study uses a structured literature review and comparative synthesis, prioritizing empirical studies of Chinese graduates on wages, skill specificity and major–job mismatch. Earlier theories and international evidence provide a framework for interpreting the Chinese findings. The synthesis can help students assess potential wage advantages and mismatch risks when choosing degree programs, while informing universities' efforts to connect specialized training with labor-market needs.

2. Theoretical framework

Human capital theory views education as an investment that can increase productivity and future earnings [4]. Applied to fields of study, this perspective focuses on the knowledge and skills developed through different degree programs. Skill specificity concerns how readily these skills retain their value across occupations. General skills have applications across many jobs, while more specific skills are especially valuable within a narrower range of tasks. Using United States data, Leighton and Speer measure major specificity through variation in a major's earnings premium across occupations and find higher early-career earnings for more specific majors [5]. In China, Hang and Zhou identify an interaction between major specificity and education–job relevance in explaining starting wages [3]. Together, these findings suggest that understanding the wage returns to specialized training requires attention to both the skills graduates acquire and the opportunities to apply them in employment.

Signaling theory explains how education can convey information about workers' abilities when employers cannot observe productivity directly [6]. Applied to graduate recruitment, the field of study and university tier may influence employers' expectations and initial wage offers. Observed wage differences may therefore reflect acquired skills, employers' beliefs and differences in students' abilities or preferences before university.

Major–job matching concerns the relationship between graduates' fields of study and the knowledge or tasks required in their jobs. It differs from overeducation, which concerns whether a worker's qualification level exceeds job requirements. Matching can support wage returns by enabling graduates to use acquired skills. Hu and Jiang find a positive association between matching and starting wages in a 2015 survey covering several qualification levels and employment sectors [7]. Zhu reports an average mismatch penalty alongside substantial variation [8]. Jiang and Guo distinguish mismatch arising from skill constraints, unavailable related jobs or personal interests [9]. These categories suggest that unused specialized skills, transferable abilities and opportunities outside the field can produce different outcomes. Section 3 examines the evidence and its measurement limits.

These perspectives provide a framework linking field-specific human capital, employers' assessments and job matching to early-career wages. Labor supply and demand form the market context within which these relationships operate. University tier, employment sector and regional conditions are also considered when comparing studies because they may shape employment opportunities and wage outcomes. The framework therefore directs attention to the conditions under

DOI: 10.54254/2754-1169/2026.38846

which specialized skills receive higher returns and guides the comparison of published findings in the next section.

3. Evidence on early-career wage returns

Evidence from China indicates that field differences should be examined alongside university tiers. Using the China Family Panel Studies, Kang, Peng and Zhu find that the decline in educational returns associated with higher education expansion does not extend to graduates in law, economics and management (LEM), or other non-STEM subjects, from the most prestigious universities [10].

Kang, Peng and Zhu examine whether higher education expansion changed returns across subjects and institutional tiers, using the 2010, 2012 and 2014 China Family Panel Studies. Their analysis covers adults aged 20–60 and distinguishes STEM, law, economics and management (LEM), and other non-STEM subjects [3]. The expansion-related decline in returns does not extend to LEM and other non-STEM graduates from the most prestigious universities. This suggests that broad field labels can conceal variation across institutions. Because the sample spans different career stages, these findings provide context rather than direct estimates of starting-wage differences.

Employment prospects and wages also need to be assessed separately. In a Beijing-area sample, Kong finds that engineering and business graduates find jobs more readily than law and science graduates, while liberal arts and social science graduates have favorable wage outcomes [11]. These results concern job-search outcomes and initial wages; they do not establish a common ranking of majors on both measures. A comparison of pay among employed graduates therefore needs to acknowledge that access to employment also varies across fields.

Hang and Zhou examine bachelor's graduates from six Nanjing universities in 2016–2018. They measure major specificity through the concentration of graduates in particular occupations or industries and find that its relationship with starting wages varies with job relevance [4]. This offers a possible interpretation of the wage contrast in the Introduction in terms of skill use. However, their initial survey contains 45,661 respondents, whereas only about 13,750 completed the employment follow-up. Regional coverage and substantial nonresponse limit generalization; the initial sample size should not be read as the number of observed wages.

Evidence of skill specificity connects these comparisons to the use of human capital. Hang and Zhou examine graduates from six Nanjing universities in 2016–2018 and demonstrate that the wage premium associated with major specificity depends on education–job relevance [3]. This is consistent with specialized training receiving higher rewards when graduates can apply it in suitable positions. However, the regional sample and missing wage responses limit representativeness. Considered alongside the CFPS evidence, this finding suggests that field labels alone are insufficient: the institution attended and the job obtained matter when interpreting wage differences.

Comparisons between matched and mismatched graduates provide further evidence on the wage value of specialized training. Using a 2015 national graduate survey, Hu and Jiang report a starting-wage premium of approximately 5% for matched graduates after applying propensity score matching [12]. This method compares graduates with similar observed characteristics, reducing differences in measured background factors. The estimate is consistent with a payoff to applying field-specific skills, although unobserved ability and job preferences may still influence both matching and wages. It describes a wage differential associated with matching; assessing the net return to a degree would additionally require information on education costs and earnings over time.

Average estimates nevertheless conceal variation. Zhu finds an average earnings penalty but reports that about one-third of mismatched graduates earn more than matched graduates [8]. An economic interpretation is that mismatch can reduce the use of specialized skills while allowing

DOI: 10.54254/2754-1169/2026.38846

transferable skills to earn rewards in better-paying occupations. Differences in available jobs and whether graduates move voluntarily may therefore help explain the heterogeneous outcomes. These are mechanisms used in this review to interpret the result, not separately identified causal explanations from Zhu's estimate.

Jiang and Guo define major–job mismatch as employment unrelated to the field studied. Using survey and administrative evidence on the 2019 graduating class in a central Chinese province, they distinguish insufficient skills, unavailable related jobs and personal interests as reasons for mismatch [9]. Interest-related mismatch is associated with better promotion and training prospects than other mismatch types and matched employment. Skill- and demand-related mismatches are associated with poorer satisfaction, promotion and job stability. These findings support separating constrained from voluntary moves. They concern career conditions and do not themselves quantify a wage penalty for each mismatch type.

The comparison links wage returns to both skill use and the circumstances of job choice. In particular, Hu and Jiang's broader mismatch definition includes partially related work, so its prevalence cannot be directly compared with measures limited to wholly unrelated jobs. Differences in samples and estimation methods also prevent the reported findings from being combined into one common wage penalty.

Labor supply and demand provide the market context in which field-specific skills are rewarded. Higher education expansion increases graduate supply, while the wage response depends on employers' demand for those skills. Knight, Deng and Li find that China's expansion reduced relative wages and increased unemployment among graduates entering the labor market, with established graduates largely protected from these effects [2]. This difference between entry cohorts and incumbent workers makes the timing of labor-market entry relevant to the interpretation of early-career wage returns.

Applied to individual fields, a supply-and-demand interpretation suggests two channels. If the number of suitably trained graduates grows faster than that of relevant job opportunities, competition may restrain wages within related occupations. Graduates who cannot obtain such positions may also move into jobs that make less use of their specialized skills. The first channel changes the reward within matched employment, while the second changes access to that employment. Among employed graduates, a field's average wage can therefore change through both the wages attached to different jobs and the distribution of graduates across them.

Skill specificity may strengthen this dependence on market conditions. A narrow occupational skill set can attract higher pay when it is scarce and sought by employers, but may offer fewer alternatives when demand weakens. Because degree programs take several years to complete, students make investment decisions before knowing the demand they will face at graduation. Within this framework, current wage premiums are informative but uncertain guides to future returns.

4. Factors moderating discipline-based wage & employment gaps

Wage differences across fields also reflect university tier, employment destinations and graduates' demographic characteristics. These factors can influence wage estimates and should be considered when attributing observed differences to the major itself.

The University tier may shape access to employers as well as the assessment of graduates' skills. Hang and Zhou identify an interaction between university tier and major specificity in explaining starting wages [3]. One possible interpretation is that institutional reputation and recruitment opportunities influence whether specialized training reaches employers willing to reward it. The

DOI: 10.54254/2754-1169/2026.38846

same field of study may consequently be associated with different wage outcomes across institutions.

The employment sector can also connect the field of study to earnings. Li and colleagues, using the 2010–2015 Chinese College Student Survey, report higher average wage offers and more benefits in the state sector than in the private sector [11]. If fields differ in sector destinations, their wage gaps may partly reflect this allocation. Accordingly, estimates controlling for sector describe differences within comparable employment settings; estimates without such controls may also include wage differences associated with access to particular sectors.

Gender and hukou are also relevant to the composition of graduate samples. Kong reports that women in the Beijing sample found jobs faster but earned less than men [9]. Using the 2010–2015 Chinese College Student Survey, Wang and colleagues find a positive rural-hukou wage differential after adjusting for family background [13]. The latter result concerns people who reached higher education and should therefore be interpreted within this selected population.

These findings motivate accounting for individual characteristics without assuming a fixed wage hierarchy. Differences between majors may partly reflect who studies them, while differences in the return to the same major require comparisons across groups. In this review, demographic factors help assess the comparability of published estimates; the main economic explanation remains how specialized skills, job opportunities and market conditions combine to shape wages.

5. Discussion and implications

The review suggests interpreting the field of study as an investment in skills whose wage value depends on where they are used. The interaction between major specificity and job relevance supports this interpretation [3]. From an investment perspective, a high wage in a related occupation must be considered alongside the probability of obtaining that occupation and the earnings available in alternative jobs. This connects specialized training to both potential rewards and employment risk.

Early-career wages capture the initial earnings component of this investment. A fuller financial assessment would compare expected earnings across educational alternatives over time with tuition, other study costs and earnings forgone during education. It would also account for periods without paid work and the costs of changing occupations. The present review therefore informs an assessment of early-career wage advantages and risks, while estimating lifetime returns would require additional evidence on costs and subsequent earnings.

For students, the framework encourages the evaluation of specific programs and their employment pathways. Since returns vary across subjects and university tiers, information about the particular institution is relevant [3]. Useful comparisons include occupational destinations, the proportion obtaining related work and wage dispersion within the program. However, past average wages may poorly predict future demand or individual outcomes; decisions should also consider aptitude and occupational preferences.

Students can develop transferable abilities alongside specialized knowledge. Quantitative reasoning, communication and problem-solving may support work across occupations, while internships and applied projects can clarify how academic learning relates to workplace tasks. These activities should be selected for their learning value: their time and financial costs can otherwise displace essential study without improving employment options.

For universities, the analysis supports connecting subject knowledge with occupational tasks while maintaining skills useful across jobs. Employer involvement in projects and curriculum discussions could identify relevant entry-level skills. However, short-term recruitment needs should

DOI: 10.54254/2754-1169/2026.38846

not displace long-term educational goals, especially when requirements may change between enrollment and graduation.

Universities could publish program-level employment rates, median wages and occupational destinations, with observation dates, sample sizes and response rates. Policymakers could support consistent reporting standards. Such data would help students assess whether reported outcomes fit their circumstances. However, nonresponse and small samples can distort comparisons, and reporting must protect graduates' privacy.

When reviewing program capacity, policymakers and universities should consider several graduate cohorts and evidence of changing skill demand. However, expanding places solely in response to current wage premiums risks creating excess supply by the time those students graduate.

Given heterogeneous mismatch outcomes [9], program evaluation should examine wages and skill use in both related and unrelated employment [8]. Evaluation must avoid treating every departure from a degree's conventional career path as failure: voluntary moves can reflect better opportunities, and matching rates alone cannot measure the value of a program.

6. Conclusion

This study synthesized published evidence on the field of study and early-career wages among Chinese university graduates. Higher skill specificity is associated with stronger initial wage outcomes, particularly when graduates can apply their training in related jobs. Major–job mismatch is frequently associated with lower earnings, although outcomes vary across groups and studies. University tier and employment sector also matter when comparing wage returns. The economic framework further emphasizes graduate supply and skill demand as conditions shaping opportunities to apply specialized skills and receive rewards for them. The conclusions are limited by differences in data periods, samples, measures of matching and approaches to selection. Several studies cover regional samples or earlier cohorts, limiting their relevance to current nationwide conditions. Observed wage differences also cannot fully separate training effects from prior ability and preferences. Starting wages capture only one stage of educational returns. Future research should use recent graduate panel data with consistent measures of skills, job tasks and wages, while addressing selection into majors and employment. Tracking occupational changes and earnings growth would clarify whether initial advantages persist. For students and universities, the review highlights the importance of combining specialized training, transferable abilities and reliable information about employment opportunities.

References

[1] Ministry of Education of the People's Republic of China. (2004, May 27). Statistical bulletin on national education development in 2003. (In Chinese)

[2] Knight, J., Deng, Q., & Li, S. (2017). China's expansion of higher education: The labour market consequences of a supply shock. *China Economic Review, 43*, 127–141.

[3] Hang, T., & Zhou, Y. (2025). Chinese university major decision and its effect on wages: Modeling interaction between major specificity and education-job relevancy using machine learning approaches. *Journal of Chinese Political Science, 30*, 475–500.

[4] Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy, 70*(5, Part 2), 9–49.

[5] Leighton, M., & Speer, J. D. (2020). Labor market returns to college major specificity. *European Economic Review, 128*, Article 103489.

[6] Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics, 87*(3), 355–374.

DOI: 10.54254/2754-1169/2026.38846

[7] Zhu, R. (2014). The impact of major-job mismatch on college graduates' early career earnings: Evidence from China. *Education Economics, 22*(5), 511–528.
[8] Jiang, S., & Guo, Y. (2022). Reasons for college major-job mismatch and labor market outcomes: Evidence from China. *China Economic Review, 74*, Article 101822.
[9] Kong, J. (2017). Determinants of graduates' job opportunities and initial wages in China. *International Labour Review, 156*(1), 99–112.
[10] Kang, L., Peng, F., & Zhu, Y. (2021). Returns to higher education subjects and tiers in China: Evidence from the China Family Panel Studies. *Studies in Higher Education, 46*(8), 1682–1695.
[11] Li, H., Meng, L., Xiong, Y., & Cook, S. L. (2024). Job preferences and outcomes for China's college graduates. *The China Quarterly, 258*, 529–547.
[12] Hu, Y., & Jiang, C. (2021). The effect of major matching on the starting salary of college graduates: An empirical research based on propensity score matching method. *Journal of East China Normal University (Educational Sciences), 39*(4), 53–63. (In Chinese)
[13] Wang, H., Cousineau, C., Boswell, M., & Li, H. (2024). Estimating the impact of rural hukou status on earnings for college graduates in China. *The China Quarterly, 259*, 677–695.