The Market for Accountants

Bong-Geun Choi[1], Jung Ho Choi[2], Maureen McNichols[3], and Frank Zhou[*4]

[1]Yonsei University

[2,3]Stanford Graduate School of Business

[4]The Wharton School, University of Pennsylvania

April 4, 2025

Abstract

Given the essential role accountants play in the economy, the dynamics of accountant supply and demand have significant consequences for businesses, their stakeholders, and the functioning of capital markets. This paper analyzes the employment patterns, career trajectories, and earnings of college graduates in business fields to understand these dynamics while overcoming empirical challenges: unobservable factors, sectoral movements, and equilibrium outcomes. Utilizing a large dataset of resume information, we specify and estimate a dynamic labor market equilibrium model that jointly characterizes (i) individuals' choices among six sectors: Big 4, Non-Big 4, Internal Accountants, Finance & Consulting, Technology, and Others, considering current and future wage and non-wage attributes; and (ii) employers' within- and across-sector oligopsonistic competition for labor. Our estimates uncover the magnitude of entry barriers, switching costs, wage markdowns, and marginal product of labor across sectors, which are essential hidden factors influencing accountants' career choices. Using these estimated parameters, we conduct counterfactual analyses to understand factors affecting the equilibrium employment in accounting sectors. This is important given the recent decline in the number of accountants in the economy. Reducing the entry barrier into accounting firms for non-accounting majors and the market power of Big 4 through market regulations can increase the employment of accountants. Introducing a productivity improvement to Non-Big 4 such as through private equity investments has a nuanced effect on internal accountant employment. A policy equalizing the gender (partner) promotion gap in accounting firms has a small effect on the employment of accountants.

Keywords: Accountant, Job Mobility, Wage, Non-wage Benefit, Occupation Choice, Dynamic Discrete Choice, Labor Market Equilibrium

JEL Classification Numbers: D63, D83, J16, J62, J64, M12, M21, M41

1 Introduction

Accountants play an essential role in the capital markets and the broader economy (Ball, 2024). By interpreting and applying accounting principles, they produce information that influences resource allocation, production decisions, and overall welfare (Breuer, 2021; Choi, 2021; Geng et al., 2023; Huber and McClure, 2023; McClure and Zakolyukina, 2024). Given their importance, it is crucial to understand the factors driving the employment of accountants. This issue has received significant attention recently, as reports indicate a decline in the number of accountants in the economy (Dawkins, 2023; Maurer, 2023). However, the literature lacks an equilibrium model characterizing the labor market for accountants and explaining changes in their employment.

This paper estimates a finite-horizon dynamic model of the multi-sector labor market for accountants (Keane et al., 2011) to explore two broad research questions. First, what economic factors influence workers' career choices between accounting and other jobs (on the supply side) and wage offers (on the demand-side)? We are particularly interested in (i) quantifying the importance of forward-looking incentives, non-wage benefits/costs, and partner promotion structures for the supply of accountants and (ii) examining the role of sector-specific labor productivity and employers' market power in the wages received by accountants (i.e., the demand for accountants). Second, using the estimated parameter values, we analyze several supply and demand forces that may limit the employment of accountants. Specifically, we examine entry barriers for non-accounting majors, potential wage markdowns and relatively low productivity levels (e.g., due to sluggish technological advancement) that may reduce the salaries for accountants, and gender disparities in partner promotions.

Using a quantitative labor market equilibrium model allows us to address several empirical challenges in answering our research questions. First, labor market outcomes are influenced by unobservable characteristics, such as non-monetary benefits and entry barriers, complicating the attribution of observable labor market decisions exclusively to demand or supply factors. Our approach addresses this challenge by delineating individuals' returns from employment, including both observable and unobservable characteristics, and estimating these features from the data using the model structure. The method complements evidence from surveys and analysis of regulatory changes in specific institutional settings (Barrios, 2022).

3

Second, individuals anticipate both potential career growth and outside opportunities when selecting jobs. These intertemporal considerations require specifying dynamic decision-making processes, an area where a structural estimation approach provides a relative advantage (Bertomeu et al., 2023; Breuer et al., 2024). Specifically, while partners at accounting firms enjoy higher wages, partner promotions are highly competitive (i.e., less than 5% of initial accountants become partners), and gender disparities are notable, which may discourage labor supply. However, workers may choose accounting jobs to accumulate human capital (i.e., value of work experience) that facilitates transitions to a different sector later in their career, encouraging labor supply. This possibility is consistent with the evidence that a notable proportion of workers who started in accounting sectors later transitions to non-accounting sectors. Such career trajectories also underscore the value of a multi-sector model.

Third, an equilibrium model is essential for characterizing labor demand. Although sectoral productivity and potential wage-markdowns are important determinants of sectoral labor demands (Friedman et al., 2024), they are not observable by the econometrician, which a structural model can estimate. Furthermore, the industrial structure of accounting firms is characterized as a concentrated labor market with only four large accounting firms since 2002. A high concentration may lead to labor market power, depressing wages (Aobdia et al., 2024). However, the degree of concentration, as measured by the Herfindahl-Hirschman index, is comparable to that of other occupations including finance jobs. As such, competition for labor between accounting and other (e.g., finance) sectors can increase wages. A multi-sector labor demand model captures these effects.

Finally, an equilibrium model characterizes the interactions between supply and demand factors. According to CPS data, the percentage of U.S. employees working as accountants increased from 0.4% in 1968 to 1.3% in 2013 and then declined to approximately 1% in 2023. The average educational level of accountants has increased over time to 16 years, but real wages have been relatively stable over the period, suggesting the interplay between demand and supply factors. An equilibrium model is useful for separating supply and demand factors. For example, a perceived shortage of accountants might reflect demand factors such as employers' market power or skill-biased technology adoption, as well as supply factors such as entry barriers or workers' preferences (i.e., the shortage of accountants) (Aobdia et al., 2024; Friedman et al., 2024; Madsen and Piao, 2021). It also provides quantitative insights into how the interplay between demand and supply

factors shapes the employment of accountants and factors that may counteract its recent decline.

Our structural equilibrium model of the accounting labor market, based on the discrete choice dynamic programming (DCDP) framework, addresses these empirical issues in a unified framework. DCDP is a standard approach in labor economics for studying career decisions over time (Keane et al., 2011). This model builds on dynamic life-cycle frameworks (Hotz and Miller, 1993; Keane and Wolpin, 1997; Sauer, 1998) and allows us to examine occupational mobility, career progression, and the effects of counterfactual policy experiments. We define the labor market equilibrium following Heckman and Sedlacek (1985) and Lee and Wolpin (2006), which involves labor market clearing and oligopsonistic competition within and across sectors.

In our model, individuals are forward-looking and consider the impact of their occupational choice on their expected future returns. Each period individuals (i.e., college graduates with business majors) choose one of six mutually exclusive job sectors: Accounting in Big 4 firms, Accounting in Non-Big 4 firms, Internal Accountants in Other Industries, Finance & Consulting, Technology, or Non-Accounting in Other Industries. The annual return to a given occupational choice depends on its wage, and non-wage factors and random shocks that are unobserved by the econometrician. Our model accounts for rich heterogeneity in non-wage factors, including (i) job-specific preferences (e.g., prestige and the extent to which the job has non-monetary benefits like stability, work-life balance, etc.); (ii) costs of switching jobs (e.g., search and moving costs) and structural state dependence (e.g., due to learning about workers' matching value with their sectors); (iii) heterogeneity in worker types, (e.g., whether the individual is a female and holds an accounting degree); and(iv) partner promotion in external accounting firms and potential forced turnover (i.e., up or out).

On the demand side, employers in each sector maximize profits by choosing wage offers to attract talent in an oligosponistic labor market. In particular, each sector may have a different marginal product of labor. This is likely due to the different levels of technological progress or the possibility of offshoring (Goos et al., 2014; Deming and Noray, 2020), which affects workers' wages. Employers' wage offers also account for the dynamics of labor supply and heterogeneity in individual characteristics, affecting employers' market power in these sectors (Lee and Wolpin, 2006). As firms internalize the impact of a marginal wage increase on their labor cost, equilibrium wage offers are below their competitive levels (i.e., wage markdowns). For example, employers in the accounting sector might offer lower wages for entry-level workers, anticipating that potential entry-level job

seekers would prefer to work in the accounting sector (e.g., to gain valuable experiences that could increase job opportunities and wages in the future). The concentration of firms within a sector increases their oligopsony power. At the same time, competition from other job sectors generally increases equilibrium wages, offsetting employers' market power.

We use the model to analyze the career paths of business graduates, including those in accounting, using a large dataset of resumes from Revelio and wage data from CPS (2014–2022). Estimating the model with the maximum likelihood method reveals that employees with an accounting degree receive non-monetary benefits by choosing accounting jobs. The results suggest a selection effect: individuals who like accounting more than others prefer to work as an accountant, other things equal. In contrast, employees without an accounting degree face a non-monetary cost equivalent to $1,504 every year. This cost could reflect an entry barrier (e.g., the 150-hour rule) or a distaste for accounting jobs due to the restrictiveness of the tasks (Le, 2023). Our model also considers partner promotion, a distinctive feature of external accounting careers. The estimated probability of forced turnover is equal to 81% and 89% for Big 4 and Non-Big 4 firms, respectively, providing large-sample evidence of the up-or-out promotion policy of the audit industry (Ghosh and Waldman, 2010). The slightly lower forced turnover at Big 4 firms may reflect the cost of firing an accountant with firm-specific human capital. We also find that the probability of promotion to partner is substantially lower for female accountants than for their male counterparts, highlighting a gender promotion gap in accounting firms that is distinct from the gender wage gap (Madsen, 2015; Chen et al., 2023).

We find that career switching entails a one-time cost of approximately $6k for workers, which helps sustain wage markdowns across sectors. In addition, external accounting jobs exhibit structural state dependence: individuals are more likely to choose the sector if they worked in it during the prior year, holding constant their wage offers and other non-wage benefits (Hyslop, 1999). The results are consistent with career life-cycle models in which workers learn about their matching value with their jobs, and the reduced uncertainty increases the value of staying in the same job (Gorry et al., 2019). The results are also consistent with the notion that accountants accumulate human capital as their careers progress (Yang, 2024). The marginal product of labor in accounting sectors varies such that Big 4 firms exhibit the highest marginal product of labor. The marginal product of labor in the Finance & Consulting sector is the highest among all six sectors. Employers

in the accounting sectors offer wages 1.4 to 1.7% lower than their marginal product of labor. The lower wages are driven by the labor market size of the sector, the industrial structure of the sector, and the sensitivity of the sector-specific wages.

Using the estimated parameters of our structural model, we conduct four counterfactual thought experiments. These experiments are based on all individuals in our sample, and they change one condition while holding the other parameters constant.

In the first thought experiment, we reduce by 50% the entry barriers non-accounting business majors face in seeking *external* accounting jobs. The change can be interpreted as eliminating accounting credit requirements for external accounting jobs (e.g., Ohio's move to 120-hour requirements) or making an accounting job more appealing to non-accounting business majors (e.g., accounting programs' marketing campaigns). This analysis reveals an economically significant 9.5% increase in the likelihood of workers accepting employment in external accounting. Although the analysis only reduces frictions of entering external accounting jobs, the likelihood of workers choosing internal accounting jobs increases by 1.3% because those who start their career at accounting firms tend to move to internal accounting jobs.

The second thought experiment reduces the market power Big 4 accounting firms derive from their concentrated control over a large share of the accounting labor market. For example, in Europe, introducing another big accounting firm has been actively discussed. We reduce the wage markdown of Big 4 accounting firms by its inter-quartile range. The analysis reveals that external accounting jobs increase by 12%, and internal accounting jobs increase by 3%.

In our third experiment, we increase the marginal product of labor of Non-Big 4 accounting firms. This analysis is driven by our finding that Non-Big 4 accounting firms experience a decline in marginal product of labor over our sample period relative to that of Finance & Consulting. This analysis can offer insights on the consequences of productivity improvements such as those arising from private equity firms' interests in multiple Non-Big 4 accounting firms to make unified operational investments. The analysis reveals a 45% increase in external accounting jobs, which comes from a 1% decrease in Internal Accounting jobs and a 0.5% decrease in Other jobs. These analyses reveal a complementary relation between Internal Accounting and Big 4 accounting jobs, but a substitutive relation between Internal Accounting and Non-Big 4 accounting jobs.

In our final thought experiment, we equalize the probability of promotion to partner for men

7

and women, thereby eliminating the gender promotion gap at accounting firms and increasing comparability with promotion probabilities in other sectors. We find that the higher likelihood of promotion for women in accounting firms influences individuals' choices throughout their careers and increases the number of women who are external accountants by 1.6%. There is little impact on the number of women in Internal Accounting jobs, most likely because transitions to such jobs happen infrequently at the higher management levels where it is most likely that partner promotion matters.

The importance of accounting labor market frictions in determining financial reporting quality has received fresh attention in recent years.[1] The literature provides important insights about factors influencing individual decisions to enter the accounting labor market as well (Shorrock and Kibler, 1923; Bloomfield et al., 2017; Cascino et al., 2021; Carnes et al., 2023). Madsen (2015) analyzes the individual characteristics, such as academic ability, of students choosing accounting majors versus non-accounting business majors. Barrios (2022) establishes that the 150-hour rule decreased entry to the public accounting profession.[2] Friedman et al. (2024) show that the enrollment of undergraduate accounting majors decreases relative to that of finance majors because greater technology investment in finance has led to higher wage growth and employment for finance majors than for accounting majors. Frecka et al. (2022), who survey one university's accounting alumni, find that although accounting graduates begin their careers in accounting firms, they typically transition to finance and manufacturing industries within five years. Better salary and opportunities are major considerations. Female accounting graduates' current salaries are significantly less than those of their male classmates after controlling for variables such as experience and employer. Le (2023) finds that strictness of accounting rules reduces the supply of accounting majors and accountants.

Our paper complements these studies by providing a coherent characterization of the labor market for accountants, offering four contributions to the literature. First, the dynamic choice equilibrium model of the accountants' labor market developed here provides a unified framework

---

[1]Hann et al. (2024) document that accounting positions are taking longer to fill and that public companies with a shortage in accounting talent are more likely to experience internal control weaknesses and late financial statement filings. Lee et al. (2022) examine the relation between accounting quality and barriers to accessing talented accounting graduates, as measured by the distance between an auditor's office and a "feeder" school. Hoopes et al. (2018) examine the relation between external auditors' salaries and the accounting quality of their clients.

[2]Sutherland et al. (2024) document that this effect is disproportionately greater for minority CPA candidates.

for analyzing demand and supply factors affecting business majors' forward-looking career decisions. Second, estimating the model allows us to uncover otherwise unobservable theoretical constructs shaping the market for accountants with considerable generality. Specifically, we estimate key factors influencing workers' career choices, including preferences, human capital accumulation, switching costs, non-wage amenities, and dynamic considerations, along with important drivers of labor demand, including within- and across-sector labor market competition and differences in productivity and wage markdowns.

Third, our paper contributes to the literature by estimating how labor market outcomes (e.g., employment) might change in response to variation in frictions that limit the supply of accountants, including entry barriers for external accounting jobs, the industry structure of accounting sectors, and the probability of partner promotion for men and women in the accounting sectors. We show that these factors play important roles in explaining the equilibrium supply and demand of accountants in the economy and that the magnitudes and mechanisms vary.[3] The findings are useful for understanding factors driving changes in the supply of accountants.

Lastly, guided by our equilibrium framework, we extend prior literature by documenting key features of accounting labor markets and how these features have recently evolved, including the demographics, education, and wage profiles of accountants along with the industrial and organizational structure of accounting firms. For this analysis, we explicitly consider how internal and external accounting jobs (as well as other outside options) enter into the career decisions of business school students. We document that these options are an important component of the value of an accounting career. We also describe the oligopsonistic accounting labor market and the adoption of technology across sectors.

The rest of the paper is organized as follows. Section 2 provides contextual descriptive evidence. Section 3 presents the accounting labor market equilibrium model and motivates its key assumptions. Section 4 discusses the identification and estimation method. Section 5 contains the estimation results and discusses an evaluation of model fit and counterfactual analyses. Section 6 presents conclusions.

---

[3]We can also point out the theoretical similarities and differences between prior studies and our study. The literature on the labor market for lawyers has several theoretical frameworks. One of them is Sauer (1998), who describes the market for lawyers in terms of job mobility. Sauer (1998) calls for future research that embraces demand factors, promotion policies, and gender differences. As we expand this model to the labor market for accountants, we incorporate these three additional theoretical features into our model.

2 Descriptive Evidence on the Market for Accountants

In this section, we provide descriptive evidence of key attributes of the accounting labor market in the 21st century to provide context for the structure of our model and the parameters we estimate. These attributes include the declining employment of accountants and enrollment in accounting majors, the concentrated industry structure and high-stakes promotion policy of accounting firms, and the competing wage profiles of neighboring sectors.

2.1 Demographics of Accountants

We begin with an overview of the demographic characteristics of "Accountants and Auditors" using Current Population Survey (CPS) data for the years from 1968 to 2023. The CPS is a monthly survey of 65,000 households conducted by the US Bureau of the Census. It is a large representative public data source that is widely used in labor economics and accounting (Acemoglu and Autor, 2011; Madsen, 2013). These data contain rich information on demographics and employment. Given the focus of our paper, we limit our analysis to accountants and auditors. Within the CPS occupation classification, the category of accountants and auditors is distinct from that of "Bookkeepers and Accounting and Auditing Clerks," who might have different characteristics.[4]

The data in Table 1 indicate that approximately 1% of the workforce currently holds an accounting position. This proportion increased from 0.4% in 1968 to a high of 1.2%, in the 2010s, followed by a sizable decline in the most recent years (e.g., 2013 to 2023). Over the same period, real wages remain stable. There has also been a notable rise in the representation of women within the accounting field, from 24% in 1968 to 59% in 2023. These increases in entries initially corresponded to a decline in the average level of experience among accountants in the economy, which then reverted around 1993. The trend also aligns with a persistent and nearly monotonic increase in educational attainment within the profession. Note that by the year 2023, the average educational level for accountants was a college degree (i.e., 16 years), and a meaningful portion

---

[4]The CPS occupation code for "Accountants and Auditors" is 023. Table 1 starts with 1968 because 1968 is the first year in IPUMS-CPS to use the full set of occupation and industry codes. We use the CPS 3-digit occupation codes (occ1990) for consistency in Table 1. Four occupations are classified as "Financial Records Processing Occupations" (e.g., Cost and Rate Clerks). The employment and wage patterns for this alternative definition of accountants are largely consistent with those shown in Table 1, although educational attainment and wage are lower for "Financial Records Processing Occupations." ACS provides another alternative dataset. We find the same pattern when we use alternative data and when we use sample weight. Refer to https://cps.ipums.org/cps/ and https://usa.ipums.org/usa/.

of the accounting profession held a master's degree in accounting. This observation shapes our sample selection criteria. Note also that only about 20% of accountants are employed in the accounting service industry. Consequently, an understanding of internal accountants' and auditors' labor market dynamics is critical to understanding the accounting labor market.

We compare these observations with the market for lawyers to further understand the distinctive features of accountants' labor markets. The market for lawyers is a relevant comparison to the market for accountants given its professional nature and high compensation (Rosen, 1992). The high compensation of lawyers is tied to their high educational attainment. The online appendix Table OA1 indicates that the education level and experience are around 18 to 19 years, and the wage of lawyers has recently increased. Lawyers account for a smaller portion of the workforce, representing 0.1% in 1968 and rising to 0.8% in 2023. The proportion of women lawyers increased from 3% in 1968 to 46% in 2023. In contrast to accountants, lawyers are more inclined to remain within the legal service industry rather than transitioning to roles like general counsel in organizations outside law firms (Sauer, 1998).

2.2 Education for Accountants

We turn next to descriptive evidence concerning students majoring in business, including accounting, and their initial job choices. Table 2 shows the descriptive statistics based on data from IPEDS. Post-secondary education is a crucial factor in the supply of accountants. To ensure consistency across a longer time span, we initially analyze the number of bachelor's and master's degrees awarded in accounting by all universities from 1980 to 2020.

We first examine time-series patterns of accounting majors. As observed in the demographic data in Section 2.1, there was a notable influx of accounting majors into the labor force during the 1980s and 1990s. As a result, average experience levels were lower during the same period. The number of degrees awarded started at 46,793 in 1980. This figure remained relatively stable, fluctuating between 45,000 and 55,000, until 1996. Following a dip in 2000, the number of master's degrees in accounting continued to rise until reaching a peak in 2016. Barrios (2022) documents how the increase in educational requirements for CPA certification contributed to this pattern. The peak of accounting graduates occurred in 2016, reaching 70,156. Subsequently, there has been a

consistent decline since 2015, sparking discussions about a potential shortage of accountants.[5]

Regarding the career choices of accounting majors, we find that many do not choose to work for accounting service firms according to the IPEDS and AICPA data, which contain hires by accounting service firms. About 50% of accounting graduates find a job in accounting sectors, which implies that the other half find a job in non-accounting sectors.[6] Given this finding, our empirical analysis focuses on workers' choices among accounting job sectors. We differentiate between external accounting, internal accounting, and non-accounting job sectors.

Next, we broaden the sample to include business college and graduate students majoring in business. We focus on these students because resume data collected by Revelio indicate that accounting and business majors account for 70% of accountants working at large accounting companies. In Online Appendix Table OA5, we list the most frequent majors. In terms of schools sending the greatest number of students to accounting firms, multiple universities famous for their Master of Accounting programs (e.g., University of Illinois Urbana-Champaign) feature prominently, as Online Appendix Table OA6 shows.[7] In terms of initial job choices, accounting firms are popular, but a meaningful number of students take their first job in the Finance & Consulting and Technology industries, as Figure 1 shows.

2.3 Industrial and Organizational Structure of Accounting Firms

Considering that a majority of accounting graduates start their careers at accounting firms, we describe the industrial structure of accounting firms to understand the employment and wages of accountants. The accounting industry is dominated by a few large accounting firms: Deloitte, E&Y, KPMG, and PwC. This product market concentration is well documented in the literature (GAO, 2003; Eshleman and Lawson, 2017; Abramova, 2024). From 1988 to 2002, the Big 8 became the Big 4 through multiple mergers and the demise of Arthur Andersen (GAO, 2003). Table 3 documents that from 2010 to 2024, the proportion of revenues generated by Big 4 firms relative to the top 100

---

[5]Figure OA1 shows the declining proportion of undergraduates choosing accounting as a major. Technical advancements and the repetitiveness of accounting tasks have been proposed as factors contributing to lower enrollments in accounting majors and lower wages for accountants (Baksy, 2023; Friedman et al., 2024). Interestingly, Madsen and Piao (2021) find that accounting jobs are not more miserable than other jobs, where a miserable job is defined as repetitive, rules-bound, sedentary, rigid, and uncreative.

[6]The results are similar when we use the AIPCA dataset. This dataset is based on a 2018 survey of 907 universities with a response rate of 12%. In the US, there were about 160 million employed workers in 2023. Table 1 indicates that 1% represents 1.6 million accountants over about 40 years of their careers (i.e., 40,000 per each experience cohort).

[7]See Online Appendix Table OA6.

accounting firms is 73%. The recent literature emphasizes that this industry concentration results in monopsony power in the input market (Berger et al., 2022). Aobdia et al. (2024) document that the labor market power in the audit industry has two opposite effects: lower wages and higher audit quality. Using Burning Glass Technology (BGT) job posting data (Sran, 2021), we estimate that the average Herfindahl-Hirschman Index (HHI) of accountants is slightly less than 5,000 in recent years. This is similar to the HHI of other occupations including finance jobs, although the nationwide HHI may be different. In general, the DOJ defines a high market concentration as an HHI higher than 2,500 at the commuting zone level (Azar et al., 2022). However, we calculate HHI at the county level, which is comparable to half of that at the commuting zone level.[8] The average number of employers for accountants in a county-year is 20. Online Appendix Figure OA2 describes the trends of HHI in the labor market for four occupation categories: accounting, finance, technology, and other jobs.

Table 3 describes the organizational structure of the top 100 accounting firms based on Accounting Today's survey data from 2010 to 2024. Employment at the top accounting firms has increased over time. However, the proportion of partners at Big 4 and Non-Big 4 firms is small, at 6% and 10%, respectively. Becoming a partner is an important milestone in a career path at accounting firms (Carter and Spence, 2014). Using the Revelio data, we examine the probabilities of becoming a partner for male and female accountants. To calculate a comparable promotion probability, we identify a cohort of junior accountants in each year and calculate how many of them become a partner in our sample period. For the 2005 cohort, the likelihood of a male (female) accountant becoming a partner is 2.1%(1.2%). Our results are consistent with the promotion gap documented in prior studies, although this gap has narrowed recently (Chen et al., 2023). Finally, Online Appendix Figure OA3 indicates that technology investments have increased from 2005 to 2020 in the accounting sectors, though they have lagged other sectors such as Technology and Finance & Consulting.

2.4   Earnings Structure of Accountants

We next examine the wage structure for accountants with a regression analysis using the CPS data in Table 4. Building on prior studies, we use the log of annual wage as a dependent variable and

---

[8]Azar et al. (2022) define the local labor market at the commuting zone level.

include individual and firm characteristics such as education, experience, occupation, and industries as explanatory variables. The coefficient on Accounting Sector indicates that in comparison to other occupations, the accounting profession offers higher wages. In an untabulated result, the coefficient on External Accountant is significantly positive, indicating that even higher wages are offered to those employed in external accounting firms.[9] Since the accounting major leads to high-paying jobs, we must consider non-wage benefits to understand how individuals choose between accounting and non-accounting positions. For example, flexible working hours (and possibly remote work) could be an important factor, because employees care about non-monetary benefits (Mas and Pallais, 2017).[10] Finance & Consulting and Technology jobs also pay higher wages relative to the average wage of college graduates, which suggests that industries compete for talented undergraduate students.

The coefficients of other variables in the analysis are also in line with findings from prior studies. For instance, there is a positive correlation between experience, measured as age minus years of education, and wages. Similarly, education exhibits a positive correlation with wages. This finding is consistent with the expectations of a Mincer (1958) regression model, where individuals consider the returns on education when making decisions regarding their education level. The other common determinants for wages are occupation, industry, location, and gender. The negative coefficient on Female is consistent with evidence from many industries that women on average earn lower wages. Gender differences in employment and wages in the accounting professions have received attention for many years. Table 4 indicates that gender wage differences in accounting sectors persist even in recent years (Wescott and Seiler, 1986; Hammond, 2003; Madsen, 2013). These differences are reflected in our model through wages and promotions.[11]

3 Accounting Labor Market Equilibrium Model

This section introduces a finite horizon dynamic equilibrium model to explain the interaction between individuals' decisions to pursue accounting careers and companies' evolving demand for

---

[9]These results align with the earlier finding of Altonji et al. (2016) that accounting graduates typically earn higher wages than the average college graduate. In fact, accounting majors are the second most highly compensated majors (Altonji et al., 2016) according to the ACS data.

[10]Poor work-life balance in public accounting is considered to be a significant factor in attracting and retaining talent to the profession (CAQ, 2023). https://www.cpajournal.com/2024/02/12/the-conflict-surrounding-work-life-balance-in-public-accounting-firms/.

[11]Although the accounting profession, like pharmacy, is governed by licensing regulation, promotions may be more important in accounting (Goldin and Katz, 2016).

workers. The model assumes a steady-state oligopsonistic labor market in which forward-looking workers make dynamic choices between accounting and alternative job sectors, while firms from different sectors compete for labor.

3.1 Supply of Accountants

We begin by discussing the supply of accountants. We model an individual i who chooses their job sector k among $K = 6$ mutually exclusive alternatives in year t.[12] These alternatives include Accounting in Big 4 (k =1), Accounting in Non-Big 4 (k =2), Internal Accountants in Other Industries (k =3), Finance & Consulting (k =4), Technology (k =5), and Non-Accounting in Other Industries or "Others" (k =6). Since we are interested in individuals' choices of job sectors, we posit that employers within a sector are homogeneous.[13] We will therefore use the terms "jobs" and "job sectors" interchangeably hereafter.

Individuals initially differ in two dimensions. The first is education, represented by non_acc_i, an indicator equal to one if individual i does *not* hold an accounting degree, and zero otherwise. Education reflects an individual's initial endowment of human capital and professional inclination towards accounting, which can impact their career choices. For instance, those without an accounting degree face barriers to entering accounting jobs, such as meeting CPA credit requirements (e.g., the 150-hour rule). Moreover, choosing an accounting degree may indicate a preference for the characteristics of accounting jobs, for example, their stability. Those with an accounting degree may inherently like the nature of accounting jobs. The second distinction is gender, denoted by $female_i$, an indicator equal to one for females and zero otherwise. Females might face different costs of switching careers or different probabilities of being promoted to partners in accounting firms.

---

[12] However, year t refers not to a "calendar year" or "fiscal year"; rather, it denotes a particular year interval in an individual's career used to assess performance, accomplishments, or milestones during that duration.

[13] We abstract away from the heterogeneity of employers within a sector because we are primarily interested in understanding workers' job sector choices rather than the specific jobs they choose, which might depend on search frictions, employment opportunities, etc. We also note that our assumption of six sectors already builds in some heterogeneity within the broad accounting sector as well as within the non-accounting sector.

3.1.1 Current-Period Return

The current-period return from choosing job k for individual i with total experience t (i.e., the number of years the individual has worked since their first job, with $t = 0$ indicating no prior work experience) equals:

$$U_k(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t}) = w_k(\mathbf{s}_{i,t}) + b_k(\mathbf{s}_{i,t}) + \xi_{i,j,k,t} + \epsilon_{i,k,t}. \tag{1}$$

We describe each element of the return function below.

The State Vector: The state variables are those that individuals take as given when making job choices. These variables include (i) the individual's sector-specific work experience, $x_{i,k,t} \in \{0, ..., X\} \; \forall k$, where X is the largest possible experience; (ii) the individual's existing job, $j_{i,t} \in \{0, ..., K\}$, where $j_{i,t} = 0$ indicates that the individual does not have any prior work experience; (iii) whether the individual is currently a partner at a Big 4 accounting firm $(m_{i,t}^b)$ or a partner at a Non-Big 4 accounting firm $(m_{i,t}^{nb})$; (iv) the individual's total work experience t; (v) whether an individual was not promoted to partner at a Big 4 (Non-Big 4) accounting firm in the prior year and faces forced turnover in the current year, denoted by f_{it}^b (f_{it}^{nb}); and (vi) job-specific shocks $\boldsymbol{\epsilon}_{i,t} \equiv (\epsilon_{i,1,t}, ..., \epsilon_{i,K,t})'$. The researcher does not observe (v) and (vi). We use $\mathbf{s}_{i,t}$ to denote the vector of individual time-invariant characteristics plus the individual-level state variables:

$$\mathbf{s}_{i,t} \equiv \left(non\_acc_i, female_i, x_{i,t}, j_{i,t}, m_{i,t}^b, m_{i,t}^{nb}, f_{it}^b, f_{it}^{nb}, t \right)'. \tag{2}$$

Wages: Individual i with total experience t receives a wage offer $w_{i,k,t}$ when seeking a job from sector k. Section 3.2 endogenizes wages using an oligopsonistic competition model, implying that

$$w_{i,k,t} = w_k(\mathbf{s}_{i,t}) \tag{3}$$

Non-Wage Benefits and Costs: In addition to wages, individuals also derive non-wage benefits and costs from job k, which take the form below:

$$b_k(\mathbf{s}_{i,t}) = (\alpha_0 + \alpha_1 non\_acc_i)\mathbb{1}\{k \leq 2\} + \alpha_2 \mathbb{1}\{k = 3\} + \alpha_3 \mathbb{1}\{k = 4\} + \alpha_4 \mathbb{1}\{k = 5\}$$
$$+ \delta_b m_{i,t}^b \mathbb{1}\{k = 1\} + \delta_{nb} m_{i,t}^{nb} \mathbb{1}\{k = 2\} + \Delta\theta_k w_{i,k,t}. \tag{4}$$

First, non-wage returns depend on individuals' preferences for job sectors. The preference for external accounting is denoted by α_0, while that for internal accounting is represented by α_2. For example, people might prefer accounting jobs due to risk aversion ($\alpha_0 > 0, \alpha_2 > 0$) or dislike them due to lack of interest ($\alpha_0 < 0, \alpha_2 < 0$). We similarly use α_3 and α_4 to capture preferences for Finance & Consulting and Technology, respectively. Although we interpret these parameters as preferences, they can capture any time-invariant factor that influences individuals' incremental tendency to work for a particular sector, relative to working for sector six, as they are effectively the intercepts of a regression model.

We allow individuals' preferences for external accounting jobs to depend on education (non_acc_i), differentiating between accounting and non-accounting degrees. The cost of non-accounting majors to enter the accounting profession might exceed that of accounting majors. For example, obtaining a CPA requires a minimum amount of accounting education, which can be costly to obtain for non-accounting majors. Alternatively, not choosing an accounting degree could reflect an individual's innate preference to work in other sectors. In these cases, we expect $\alpha_1 < 0$. We do not further differentiate the effect of accounting degrees on internal accounting jobs, which do not necessarily require CPAs or even accounting degrees.

Second, we account for non-wage returns of being partners at both Big 4 and Non-Big 4 firms. These benefits may include prestige or reputation associated with the position. Since data on partner wages are limited, incorporating these variables also helps capture additional monetary benefits not reflected in reported wages, such as travel benefits. Conversely, it is possible that the non-wage returns of being partners are negative, for example, because of the stress of working as a partner.

Finally, we introduce a sector-specific element of non-wage returns as a proportion of wages (Sockin, 2022). This serves three key purposes. First, it allows the same wage to yield different returns across jobs due to non-wage compensation or overtime costs. For instance, Finance & Consulting jobs may offer higher non-wage benefits as a fraction of wages (i.e., $\Delta\theta_4 > 0$), while external accounting jobs may require sacrificing leisure time and dealing with increased pressure without sufficient compensation (i.e., $\Delta\theta_1 < 0, \Delta\theta_2 < 0$). Second, this approach captures sector-specific differences in how individuals respond to wages, leading to variations in labor supply elasticities across sectors. As discussed in Section 3.2, this variation contributes to wage markdown

differences across sectors, which are likely reflected in the data. Lastly, from a technical perspective, including this heterogeneity mitigates concerns that the independence of irrelevant alternatives assumption in multinomial logit models could produce unrealistic substitution patterns across job sectors.

Return from Job Switching and Continuation: Individuals' utility of choosing job $k_{i,t}$ can also depend on their prior job choices.

$$
\begin{aligned}
\xi_{i,j,k,t} = &-(\xi_0 + \xi_1 female_i) \cdot \mathbb{1}\{k_{i,t} \neq j_{i,t}\} \times \mathbb{1}\{j_{i,t} \neq 0\} \\
&+ \underbrace{\gamma_1 \bigg(\mathbb{1}\{j_{i,t} = 1,\ k_{i,t} = 1\} + \mathbb{1}\{j_{i,t} = 2,\ k_{i,t} = 2\} \bigg) + \gamma_2 \mathbb{1}\{j_{i,t} = 3,\ k_{i,t} = 3\}}_{\substack{\text{Value from continuing} \\ \text{to work in accounting jobs}}}.
\end{aligned}
\tag{5}
$$

The first element captures switching costs. Switching jobs requires conducting a job search. Prior research finds that job switching is costly because of moving, the need to acquire new knowledge, and the potentially limited availability of job opportunities, which implies a longer period of costly search (Keane and Wolpin, 2001; Fox, 2010). We capture this effect in reduced form using ξ_0 and expect $\xi_0 > 0$, capturing the net cost of switching jobs. We also allow the utility of switching jobs to vary with gender. For example, the partners of many female workers also have their own jobs. This dual-career problem can increase or decrease the difficulty of changing jobs depending on their family situations (i.e., $\xi_1 \neq 0$).

We also allow for the value of continuing to work in the accounting sectors. Studies on labor life cycle show that individuals learn more about the matching value with their current jobs over time (Jovanovic, 1979). This reduction in uncertainty then incentivizes them to remain in their current job (Gorry et al., 2019). Persistence in preferences can also broadly capture structural state dependence in labor supply in that workers' past employment influences their current choice (Hyslop, 1999). The parameters γ_1 and γ_2 capture these effects in reduced form. We expect them to be positive.

3.1.2 Objective Function

Individual i with total experience t chooses from the six job sectors to maximize the sum of the expected present value of their remaining lifetime return from year t to year T with T being the

horizon of the career.

Let $V_t(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t})$ be this maximum value, given the individual's state vector $(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t})'$ and the discount factor $\beta \in (0,1)$. Given a policy function $d_k(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t})$, which represents an indicator for choosing job k in year t, and collecting the policy functions corresponding to all six job choices into a vector, denoted by $\mathbf{d}_{i,t} \equiv (d_1(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t}), ..., d_K(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t}))'$, we have

$$V_t(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t}) = \max_{\mathbf{d}_{i,t},...,\mathbf{d}_{i,T}} \left\{ \mathbb{E}\left[\sum_{\tau=t}^{T} \beta^{\tau-t} \left(\sum_{k=1}^{K} d_k(\mathbf{s}_{i,\tau}, \boldsymbol{\epsilon}_{i,\tau}) U_k(\mathbf{s}_{i,\tau}, \boldsymbol{\epsilon}_{i,\tau}) \right) \right] \right\}. \tag{6}$$

Let $V_{k,t}(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t})$ be the choice-specific value function for choosing job k. For $t < T$, we can specify the choice-specific value function in a recursive form:

$$V_{k,t}(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t})$$
$$= U_k(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t}) + \beta \mathbb{E}\left[\max_{\mathbf{d}_{i,t+1}} \left\{ \left(\sum_{k=1}^{K} d_k(\mathbf{s}_{i,t+1}, \boldsymbol{\epsilon}_{i,t+1}) V_{k,t+1}(\mathbf{s}_{i,t+1}, \boldsymbol{\epsilon}_{i,t+1}) \right) \right\} \middle| \mathbf{s}_{i,t}, k \right]. \tag{7}$$

In the terminal year T, the choice-specific value function is reduced to:

$$V_{k,T}(\mathbf{s}_{i,T}, \boldsymbol{\epsilon}_{i,T}) = U_k(\mathbf{s}_{i,T}, \boldsymbol{\epsilon}_{i,T}). \tag{8}$$

3.1.3 Law of Motion

To complete the model of accounting labor supply, we need to specify the law of motion of the state vector.

The first element of the state vector is an individual's experience in job k with total experience t, denoted as $x_{i,k,t}$. This variable increases by one year when the individual remains in the same job sector for another year. However, if they switch job sectors, where $k_{i,t} \neq j_{i,t}$ and $k_{i,t}$ represents the job choice of worker i with total experience t, we assume $x_{i,k,t+1} = 1$, and for all other jobs $k' \neq k_{i,t}$, $x_{i,k',t+1} = 0$. This assumption reflects the idea that a worker's continuous experience in their present employment sector may be more relevant to their productivity than any previous work experience prior to switching to another sector. In our labor demand model, we allow workers' productivity to depend on both sector-specific experience $x_{i,k,t}$ and total experience t. The law of

motion for $x_{i,k,t}$ can be summarized as follows:

$$x_{i,k,t+1} = \begin{cases} 1 + x_{i,k,t} & \text{if } k_{i,t} = j_{i,t}; \\ 0 & \text{if } k_{i,t} \neq j_{i,t}. \end{cases} \tag{9}$$

The law of motion for the second element of the state vector, namely the individual's existing job at $t+1$ or $j_{i,t+1}$, equals their job choice at t, that is, $j_{i,t+1} = k_{i,t}$.

The law of motion for whether the individual is a partner at a Big 4 accounting firm, denoted as m_{it}^b, depends on $\mathbf{s}_{it}$ and the characteristics of individual i. Specifically, an individual can become a partner in the following year with probability $\Phi_i(\mathbf{s}_{it})$ only if they have greater than or equal to nine years of total experience. Otherwise, they are not eligible to become a Big 4 partner. We non-parametrically estimate these probabilities from the data.

$$m_{i,t+1}^b = \begin{cases} \Phi_i^b(\mathbf{s}_{it}) & \text{if } t \geq 9; \\ 0 & \text{if } t < 9. \end{cases} \tag{10}$$

Similarly, the law of motion for $m_{i,t}^{nb}$ also depends on $\mathbf{s}_{it}$ and the characteristics of individual i:

$$m_{i,t+1}^{nb} = \begin{cases} \Phi_i^{nb}(\mathbf{s}_{it}) & \text{if } t \geq 9; \\ 0 & \text{if } t < 9. \end{cases} \tag{11}$$

Individuals may face forced turnover if they were not promoted to partner in the previous year. We use the indicators f_{it}^b and f_{it}^{nb} to represent instances of forced turnover, which occur with probabilities ζ_b and ζ_{nb}, respectively. Specifically, individuals who were not promoted to Big 4 (Non-Big 4) partners in the prior year may have to move to one of the five remaining sectors (e.g., Internal Accounting) with probability ζ^b (ζ^{nb}). They may also have the option of remaining with the Big 4 (Non-Big 4) with probability $1 - \zeta^b$ (1-ζ^{nb}). Since we focus on job sector choices, our model and estimation only capture the likelihood of being forced to transition to *other job sectors*, for example, leaving Big 4 accounting firms to join Non-Big 4 firms.

Finally, the choice-specific random shocks, $\epsilon_{i,k,t}$, are cross-sectionally and intertemporally independent and are independent across alternatives. This assumption is conventional in dynamic

discrete choice models and is essential for the viability of estimating our model, which accommodates both structural state dependency and dynamics.

3.2 Demand for Accountants

There are $M_{i,k,t}$ number of identical firms in sector $k \in \{1, ..., K\}$, competing for workers with characteristics $\mathbf{s}_{it}$. Firm l in sector k maximizes the profits by offering a wage $w_{i,t,l}$ to individuals with characteristics $\mathbf{s}_{it}$, taking into account (i) potential job seekers' supply of labor (i.e., how their labor supply varies with wages), and (ii) wage offers by firms within the same sector and those from the other sectors competing for the same labor pool ($w_{i,-l,t}$).

$$max_{(w_{i,l,t}, \forall i,t)'} \int \left\{ \underbrace{\nu_k \left(\iota_k(w_{i,l,t}; \mathbf{s}_{it}, w_{i,-l,t}^*) \right)}_{\text{Revenue}} - \underbrace{w_{i,l,t} * \iota_k \left(w_{i,l,t}; \mathbf{s}_{it}, w_{i,-l,t}^* \right)}_{\text{Cost}} \right\} d\Gamma(\mathbf{s}_{it}), \qquad (12)$$

where $\iota_k(w_{i,l,t}; \mathbf{s}_{it}, w_{i,-l,t}^*)$ is the number of workers with characteristics $\mathbf{s}_{it}$ choosing to work for firm l, given the equilibrium wages offered by competing firms ($w_{i,-l,t}^*$); $\nu_k(\iota_k)$ is the revenue generated from hiring these workers. As wage offers of one firm take as given those of competing firms, we effectively model an oligopsonistic labor market (that is, Cournot rather than Bertrand competition).[14]

The number of workers choosing to work for firm l is specified as follows:

$$\iota_k(w_{i,l,t}; \mathbf{s}_{it}, w_{i,-l,t}^*) \equiv N(\mathbf{s}_{it}) \hat{\eta}_k(w_{i,l,t}; \mathbf{s}_{it}, w_{i,-l,t}^*) \rho_k(w_{i,l,t}; \mathbf{s}_{it}, w_{i,-l,t}^*), \qquad (13)$$

where $N(\mathbf{s}_{it})$ is the total number of workers in the labor market with characteristic $\mathbf{s}_{it}$, $\hat{\eta}_k(.)$ represents the share of workers with characteristics $\mathbf{s}_{it}$ choosing to work in sector k to which firm l belongs, and $\rho_k(.)$ captures the probability that workers end up being matched to firm l conditional on choosing to work in the sector of firm l.

Firms in our model engage in labor market competition, taking as given their labor supply

---

[14]We would get the same solution if employers of each sector maximized the sum of discounted future profits taking as given a steady state distribution of employee characteristics. Such a steady state distribution can arise if we combine our model of labor supply with exogenous entries and exits of workers of each type. We assume the existence of this distribution and abstract away from explicitly modeling these forces, as they further complicate the estimation. We also abstract away from interactions among workers for the same employer, such as complementarities in their productivity.

curve and competing wage offers. The specification of the labor supply in equation (13) implies two effects associated with a marginal wage increase by firm l. First, it increases the likelihood of workers choosing sector k by $\frac{\partial \eta_k}{\partial w_{i,l,t}}$, moderated by a factor $\Delta^b_{i,k,t} \leq 1$, that is,

$$\frac{\partial \hat{\eta}_k(w_{i,l,t}; \mathbf{s}_{it}; w^*_{i,-l,t})}{\partial w_{i,l,t}} \approx \frac{\partial \hat{\eta}(w^*_{i,k,t}; \mathbf{s}_{it})}{\partial w^*_{i,k,t}} \Delta^b_{i,k,t}. \tag{14}$$

The derivative $\frac{\partial \hat{\eta}(w^*_{i,k,t}; \mathbf{s}_{it})}{\partial w^*_{i,k,t}}$ captures the effect of wage increases by *all* firms in the sector on workers' sector choice.[15] We assume that this moderating effect varies with the number of firms, that is,

$$\Delta^b_{i,k,t} = e^{-\chi_1(M_{i,k,t}-1)}, \tag{15}$$

where $M_{i,k,t}$ is the number of firms in sector k faced by individuals with characteristic $\mathbf{s}_{it}$. In the extreme, when there is only one firm, $\Delta^b_{i,k,t} = 1$, implying that changes in the wage offer by the only firm in a sector are equivalent to changes in the wage offer of that sector.

Second, a marginal wage increase by firm l increases the likelihood that employees are matched to firm l given that they have chosen sector k. We assume that this marginal impact equals

$$\frac{\partial \rho_k(w_{i,l,t}; \mathbf{s}_{it}, w^*_{i,-l,t})}{\partial w_{i,l,t}} \approx \Delta^w_{i,k,t} \equiv \frac{1}{M_{i,k,t}} \frac{M_{i,k,t} - 1}{M_{i,k,t}} * \chi_2, \tag{16}$$

where $\chi_2 > 0$. Under the assumption that the matching technology between employers and workers follows a simple logit specification, the impact of a marginal wage increase by one employer who competes with $M_{i,k,t} - 1$ other identical employers would equal $\frac{1}{M_{i,k,t}} \frac{M_{i,k,t}-1}{M_{i,k,t}}$. We use parameter χ_2 to capture possible deviations from this restrictive assumption and estimate this parameter. For example, it is possible that not all employers are hiring in a year, or that some employers differ from others (e.g., they are more visible to workers than others).

Given the specification of labor demand above, workers in our model face non-competitive labor markets (Berger et al., 2022; Yeh et al., 2022). On the one hand, employers have market power because individuals have heterogeneous tastes in occupational choices. This heterogeneity implies

---

[15]In reality, it is possible that a marginal wage increase by one of the firms in the sector generates a smaller effect. For instance, suppose one of the Non-Big 4 accounting firms increases its wage offer. The likelihood that this increase will attract workers into the Non-Big 4 sector is plausibly smaller than the case in which all Non-Big 4 accounting firms increase their wage offers, all else equal.

an upward sloping labor supply curve that employers internalize when offering wages, which leads to wage markdowns. For example, knowing that certain individuals prefer to work in accounting jobs and are willing to accept a lower wage, employers will reduce the wage offer. On the other hand, employers compete for the same labor pool with other employers in the same sector as well as with employers in other sectors, in the spirit of Berger et al. (2022). Such competition generally increases wages because it gives workers the option to switch to other jobs. The labor market competition nests the two extreme cases of labor monopsony (when $M_{i,k,t} = 1$) and perfectly competitive labor markets (when employees do not have taste heterogeneity and labor supply is perfectly elastic).

Firm l faces standard labor market trade-offs. A higher wage offer attracts new workers to the firm, increasing its revenue, $\nu_k'(\iota_{i,k,t}) > 0$, but it is costly because all workers with the same characteristics receive higher wages, driving up labor costs. For tractability, we assume that $\nu_k(\hat{\eta}_{i,k,t})$ can be approximated by a linear function:

$$\nu_k\left(\iota_k(w_{i,k,t}; \mathbf{s}_{it}, w_{i,-k,t})\right) = \nu_0 + \nu_k(x_{i,k,t}, t)N(\mathbf{s}_{it})\hat{\eta}_k(w_{i,k,t}; \mathbf{s}_{it}, w_{i,-k,t})\rho_k(w_{i,k,t}; \mathbf{s}_{it}, w_{i,-k,t}). \quad (17)$$

We further assume that the marginal revenue product of labor in sector k, denoted as $\nu_{i,k,t} \equiv \nu_k(x_{i,k,t}, t)$, varies with an individual's total experience (t) and their experience in sector k ($x_{i,k,t}$). Workers with more overall and sector-specific experience are expected to be more productive than younger, less experienced workers. Additionally, we assume that both firms and employees observe the current $\nu_{i,k,t}$ and form rational expectations about future $\nu_{i,k,t}$ before making their decisions.

The first order condition of firm l gives rise to the labor demand curve:

$$\frac{\nu_{i,k,t}\hat{\eta}_{i,k,t}(1-\hat{\eta}_{i,k,t})\theta_k\Delta^b_{i,k,t} - \hat{\eta}_{i,k,t} - w_{i,k,t}\hat{\eta}_{i,k,t}(1-\hat{\eta}_{i,k,t})\theta_k\Delta^b_{i,k,t}}{M_{i,k,t}}$$

$$+ (v_{i,k,t}\hat{\eta}_{i,k,t} - w_{i,k,t}\hat{\eta}_{i,k,t})\Delta^w_{i,k,t} = 0$$

$$\Longrightarrow w_{i,k,t} = \nu_{i,k,t} - \underbrace{\frac{1}{(1-\hat{\eta}_{i,k,t})\theta_k e^{-\chi_1(M_{i,k,t}-1)} + \frac{M_{i,k,t}-1}{M_{i,k,t}}*\chi_2}}_{\equiv \mu_{i,k,t}}, \quad (18)$$

where $\theta_k \equiv \theta - \Delta\theta_k$ captures the sensitivity of workers' utility to the wages of jobs in sector k. The derivation utilizes the fact that, due to the Type I extreme value model, the derivative of labor

supply at the sector level with respect to wage equals $\theta_k \hat{\eta}_{i,k,t}(\mathbf{s}_{i,t})(1 - \hat{\eta}_{i,k,t}(\mathbf{s}_{i,t}))$.[16]

Equation (18) shows that labor demand is driven by three factors. First, a greater marginal revenue product of labor increases labor demand, pushing up wages (holding labor supply constant). In a competitive labor market, wages equal the marginal product of labor, which we will use as a benchmark to compute employers' market power.

Second, employees may be paid less than their marginal revenue product of labor, in which case the labor market is not perfectly competitive. The degree of this markdown, or the employer's monopsony power, increases with the market share of the sector and decreases with $\theta_{k,t}$, the sensitivity of job seekers' utility to wages. Intuitively, holding everything else equal, a greater market share of a sector implies higher costs of switching from that sector to others, giving employers greater bargaining power over wages. Holding constant employees' willingness to supply labor, employees who are more sensitive to wages are more likely to switch to other sectors when they are offered a lower wage in their current sector, reducing the ability of firms to offer lower wages.

Finally, competition across employers reduces their monopsony power by giving employees the option to switch to other firms. This effect is moderated by the number of employers in the sector. The presence of more employers in a sector increases competition among each other for labor, reducing the equilibrium wage markdown. The intensity of this effect is captured by $\frac{M_{i,k,t}-1}{M_{i,k,t}} *$ χ_2. The presence of more employers in a sector also implies that each employer is less likely to internalize the impact of its own wage decreases on the sector-level employment, which increases wage markdowns. The intensity of this effect is captured by $e^{-\chi_1(M_{i,k,t}-1)}$.

3.3 Equilibrium and Discussion

We focus on a symmetric steady state rational expectations equilibrium of the labor market. In this equilibrium, all companies look for workers simultaneously. Given the wage offers by the employers, all graduates with business majors make a labor market decision at the same time. We define the labor market equilibrium as follows:

Definition 1. Steady State Rational Expectations Equilibrium

The labor market equilibrium satisfies five conditions:

---

[16]The derivation also utilizes the fact that conditional on the state vector $\mathbf{s}_{i,t}$ and the individual's job choice k, the expected future utility for the individual conditional on choosing k is independent of $w_{i,k,t}$. Thus, the derivative of $\hat{\eta}_{i,k,t}(\mathbf{s}_{i,t})$ with respect to $w_{i,k,t}$ only needs to account for $U_{i,k,t}$.

(i) *Dynamic labor supply*:

   Employees with characteristics $\mathbf{s}_{it}$ choose which sector to work in to maximize (6), given their state vector $(\mathbf{s}'_{it}, \boldsymbol{\epsilon}'_{it})'$, the discount factor $\beta \in (0,1)$, and the wage offers from employers of different sectors $\mathbf{w}_{it}$. The resulting labor market supply share of sector k, integrated over the choice-specific shocks $\boldsymbol{\epsilon}_{it}$, is denoted by $\eta^*_k(\mathbf{s}_{it}, \mathbf{w}_{it})$.

(ii) *Labor market demand*:

   Firm l in sector k maximizes its profit in (12) by choosing a wage offer for employees with characteristics $\mathbf{s}_{it}$, taking as given the labor supply curve implied by (i), that is, $\eta^*_k(\mathbf{s}_{it}, \mathbf{w}_{it})$, and the equilibrium wage offers from competing employers within and across sectors.

(iii) *Market clearing*:

   The wage offers of employers to workers with characteristics $\mathbf{s}_{it}$, $\mathbf{w}_{it}$ induce the labor supply of that sector $\eta^*_k(\mathbf{s}_{it}, \mathbf{w}_{it})$, as defined in (i). The total employment across sectors equals the total number of workers in the economy.

(iv) *Symmetric equilibrium*:

   Employers in the same sector offer the same wage to workers with characteristics $\mathbf{s}_{it}$.

(v) *Rational expectation for the steady state*:

   All employees monitor the prevailing labor market conditions for all $\mathbf{s}_{it}$'s and form rational expectations about $\mathbf{s}_{it}$, the laws of motion.

In equilibrium, five conditions must hold. First, employees optimally choose job sectors given wage offers from employers. Second, the wage offers by a sector must be consistent with those offered by other sectors. A necessary condition is therefore that the equilibrium wage offers satisfy the labor demand function in equation (18). As there are six sectors, we have six equations corresponding to the wage offers for each of the six sectors. These six equations characterize the oligopsonistic competition for labor. Third, labor supply and demand must equal each other. In addition, the wage offers chosen by firms in each sector must induce the same labor supply that is used as the input to determining the wage offers of that sector. Fourth, we focus on symmetric equilibrium within firms in a sector, as these firms are assumed to be ex-ante identical and to behave in the

same way. Finally, all employees observe the current labor market conditions for all $\mathbf{s}_{it}$'s and form rational expectations about their future evolution. In sum, the equilibrium of the model is characterized by 12 functional equations: (i) the market clearing condition for wage offers equating labor supply and demand for each of the six sectors and (ii) the first order conditions for wage offers in each of the six sectors.

Our equilibrium allows for oligopsonistic labor markets in which employers make non-zero profits. A snapshot of this market equilibrium is illustrated in Figure 3. The figure showcases a monopsony equilibrium (W_M, L_M) in the labor market. With monopsony, a firm has the power to set wages in the labor market and adjust wages in order to affect equilibrium labor inputs. The marginal factor cost of acquiring one more unit of labor is higher than the wage at which the unit is acquired because the firm needs to pay higher wages for all employees given an upward sloping labor supply curve. A monopsony firm hires the amount of a labor input such that the marginal revenue product is equal to the marginal factor cost of labor, internalizing an upward sloping labor supply curve. The corresponding higher marginal cost associated with a unit increase of labor implies that firms that maximize their profits set wages below the competitive wage level. Compared to competitive markets, monopsony markets end up with lower wages, i.e., $W_M < W_C$, and less labor hiring, i.e., $L_M < L_C$, and the latter can lead to market perceptions of "a supply shortage." The wage markdown $\mu_{i,k,t} = \nu_{k,t} - W_M$ measures firms' labor market power in sector k.

4   Identification and Estimation

Heckman (1979) and Heckman and Singer (1984) first described the general approach for including multinomial types in longitudinal models. Keane and Wolpin (1997) initially applied the estimation approach to discrete choice dynamic programming (DCDP) models with fixed types. Because the model has a finite horizon, it is possible to identify some of the model parameters using the last time period. Wages are estimated to supplement the resume data. We assume that individuals choose sectors before the wage shocks are realized (or that our estimated wage is an offered wage). As a result of this timing assumption, there is no issue with selection in estimating the wage equation.

As shown in Section 3.1.2, in the last period, the decision problem is reduced to a static discrete choice model. Horowitz (1981) discusses how to identify such models. The observed choices allow

us to deduce relative but not absolute utilities. Therefore, identification requires normalizing one of the utility values. Given our objective of comparing accounting jobs with non-accounting ones, we normalize the non-monetary reward of non-accounting sectors to be zero.

The nonpecuniary benefits from occupational choices are identified from differences in the choice probabilities conditional on the same wage. When two jobs offer identical wages but Job A is deemed preferable to Job B, the estimated non-wage benefits for Job A surpass those for Job B. Specifically, how individuals choose accounting jobs identifies α_0. Differences in conditional choice probabilities by type (i.e., non_acc_i and $female_i$) and partner status (i.e., $m_{i,t}^b$ and $m_{i,t}^{nb}$) reveal the type- and manager status-specific components of the current-period utility. Individuals' job-switching patterns along their career paths identify the parameters characterizing job-switching utilities, while the parameters for sector-specific preferences are identified from initial job choices, which don't incur job-switching costs.

The coefficients on wages (i.e., θ_k) are identified from the sensitivity of job choices to wages in labor supply in (1) as well as the sensitivity of wages to labor demand in (18). The presence of labor demand is important for identification. Observed differences in wages across jobs might be small due to competition across sectors. Thus, employment decisions may appear to be insensitive to wages, creating a downward bias in θ_k. The labor demand model corrects for the bias because a low wage sensitivity implies lower wage levels, as shown in (18). The estimated θ_k balances its impact on wage levels with the sensitivity of labor supply to wages. Finally, marginal product of labor is identified from sector-experience variation in wages. The parameters that affect the degree of oligopsony, χ_1 and χ_2, are identified from the sensitivity of wages to the number of employers of each sector. Forced turnover rates are identified from switching patterns when employee tenure at the external accounting firms exceeds nine years, the year in which partner promotion becomes possible given our model assumption.

Our model parameters are estimated by maximizing the likelihood of observed career choices:

$$\max_{\Theta} \left\{ \left(\prod_{i,t} \Pr\{d_k(\Theta; \mathbf{s}_{i,t}, w_{i,k,t} \forall k) = 1\} \right) \left(\prod_{i,k,t} f(w_{i,k,t}(\Theta)) | \mathbf{s}_{i,t} \right) \right\},$$

where Θ represents the vector of parameters to estimate; k is the choice made by individual i in year t; and $f(w_{i,k,t}(\Theta))$ is the likelihood function of wages faced by the individual in year t.

Computing the likelihood of job choices, $\Pr\{d_k(\Theta; \mathbf{s}_{i,t}, w_{i,k,t} \forall k) = 1\}$, takes two steps. The first step is to derive the current-period utility and value functions before the individual observes the job-specific shocks, $\boldsymbol{\epsilon}_{i,t}$. We add upper bars to differentiate these functions from the functions after the individual observes the job-specific shocks as defined above. Specifically, for $t < T$, we have

$$V_k(\mathbf{s}_{i,t}, \boldsymbol{\epsilon}_{i,t}) = \bar{V}_k(\mathbf{s}_{i,t}) + \epsilon_{i,k,t} \tag{19}$$
$$= \bar{U}_k(\mathbf{s}_{i,t}) + \epsilon_{i,k,t} + \beta \mathbb{E}\left[\max_{\mathbf{d}_{i,t+1}} \left\{ \left(\sum_{k'=1}^{K} d_{k'}(\mathbf{s}_{i,t+1}, \boldsymbol{\epsilon}_{i,t+1}) \left(\bar{V}_{k'}(\mathbf{s}_{i,t+1}) + \epsilon_{i,k',t+1} \right) \right) \right\} \bigg| \mathbf{s}_{i,t}, k \right].$$

Assuming that $\epsilon_{i,k,t}$ follows a Type 1 extreme value distribution, the choice-specific value function for $t < T$ can be re-expressed using

$$\bar{V}_k(\mathbf{s}_{i,t}) = \bar{U}_k(\mathbf{s}_{i,t}) + \beta \mathbb{E}\left[log\left(\sum_{l=1}^{K} e^{\bar{V}_l(\mathbf{s}_{i,t+1})} \right) + \gamma \bigg| \mathbf{s}_{i,t}, k \right], \tag{20}$$

where γ represents the Euler's constant.

For a given set of model parameters, Θ, all choice-specific value functions can then be derived using backward induction. Equation (8) directly produces the choice-specific value functions for $t = T$. Moving back one year to year $T - 1$, we have

$$\bar{V}_k(\mathbf{s}_{i,T-1}) = \bar{U}_k(\mathbf{s}_{i,T-1}) + \beta \mathbb{E}\left[log\left(\sum_{l=1}^{K} e^{\bar{U}_l(\mathbf{s}_{i,T})} \right) + \gamma \bigg| \mathbf{s}_{i,T-1}, k \right]. \tag{21}$$

With $\bar{V}_k(\mathbf{s}_{i,T-1})$, we can derive $\bar{V}_k(\mathbf{s}_{i,T-2})$ and so on through further backward inductions.

In the second step, we can derive the probability of choosing job k in year t using the choice-specific value functions:

$$\eta_k(\mathbf{s}_{it}) \equiv \Pr\{d_k(\mathbf{s}_{i,t}) = 1\} = \frac{e^{\bar{V}_k(\mathbf{s}_{i,t})}}{\sum_{l=1}^{K} e^{\bar{V}_l(\mathbf{s}_{i,t})}}. \tag{22}$$

Given the dynamic nature of job choices, model estimation is computationally demanding. This problem is known as the curse of dimensionality. To illustrate, consider an individual who is expected to work for 30 years. Ex ante, there are $6^{30} \approx 2.2 \times 10^{11}$ *trillion* possible future paths to consider and evaluate. Solving a dynamic model of such a scale is not only computationally

infeasible but also unlikely to approximate actual human behavior well. Adding more determinants will exponentially increase the computation burden. For example, accounting for differences in individual types (e.g., whether they obtain their accounting degree) requires separate evaluations of future career paths for each type, which will increase the computational burden from 6^{30} to $2 * 6^{30}$, or 4.4×10^{11} *trillion*.

Addressing the curse of dimensionality necessitates a simple model. In our setting, individuals choose their current job sector anticipating its effects on their accumulation of sector-specific experiences. Thus, sector-specific experiences are the minimal element needed to answer our research question. We further simplify the model by differentiating individuals only by gender and whether they have an accounting degree; we also limit their horizon to 20 years after the start of their career (i.e., 21 years in total). Switching job sectors happens relatively infrequently after 20 years, and many of the partner promotions have already happened by this point (e.g., it takes an average of 12 years to be promoted to partner in an external accounting firm (Hairston et al., 2019)). Thus, the 20-year limit allows us to capture meaningful variation in sector switching and partner promotion.

However, even with the restriction on time horizon, individuals have about $6^{21} \approx 2.2 \times 10^4$ *trillion* possible career choices over a 21-year horizon. Therefore, it would not be feasible to keep track of sector-specific experiences for all six sectors. Doing so which would require a $6^{21} \times 6$ dimensional matrix even before accounting for heterogeneity across individuals. We deal with this problem by resetting individuals' job-specific experience to zero once they switch to a different *sector*. By doing so, we only need to keep track of experience in the current sector, which takes a maximum of 21 levels. To capture labor productivity of prior experience, we allow both job-specific experience and total experience to influence the marginal product of labor, but we do not differentiate where prior experience comes from. While somewhat restrictive, the specification captures the first order determinant of job sector choices and makes it feasible to estimate the model and include heterogeneity in individual characteristics, which are important factors for individuals' labor supply decisions.

To further alleviate the the curse of dimensionality problem, we eliminate states that never appear in the data. For example, the prior job of a Big 4 partner with a 20-year total experience is never from Non-Accounting Other Industry ($k = 6$). We thus eliminate this state from the computation, implicitly assuming that the sector was not an option for that individual. This

restriction is in a similar spirit to the zero offer probability restriction imposed by Sauer (1998), who studies the market for lawyers.

5 The Labor Market for Accountants

5.1 Data

We use the Revelio data as the primary dataset for estimating our dynamic career choice model of business graduates including accounting graduates. The labor market data utilize tens of millions of LinkedIn profiles to construct four main components: job profiles, education, individual characteristics, and employer profiles. The data vendor uses machine learning to classify job titles and industries into the Standard Occupation Classification (SOC) and North American Industry Classification System (NAICS), which is a part of the employer profile. When the data vendor infers occupation, it uses individual-level information such as the description of the job. We identify partners at accounting firms based on their job titles. The education variables include school, major, and starting and ending years. The individual characteristics include inferred gender, race, and ethnicity. The inference is based on the name and location using a method that has been validated in prior studies (Choi et al., 2023; Sutherland et al., 2024; Baker et al., 2024).

Our sample selection criteria are as follows. We focus on college students majoring in business, including accounting as a subfield, at the bachelor's or master's level, as our analysis in Section 2.2 indicates that accounting firms often hire non-accounting majors. Our data include individuals who began their careers in or after 1994. As we track everyone over a 21-year period, workers appearing earlier in the sample period are generally younger. For instance, individuals in 1995 would have at most one year of experience. To mitigate this bias in our sample composition, we limit our sample to career choices made between calendar years 2014 and 2022 (the last year for which we have complete data), ensuring that individuals with up to 20 years of total experience at the start of each year are represented throughout our sample period. This allows us to empirically study the steady state distribution of accounting labor supply.

Then, for each year following the start of an individual's career, we classify their prior job sector and current job sector using the resume data. We define sectors based on the combination of occupation and industry information. As external accounting firms often have both accounting and

consulting/advisory arms, we classify only individuals who perform auditing or assurance work for external accounting firms into the external accounting sectors. Based on their sector choices, we compute their sector-specific work experience $(x_{i,k,t})$, their overall work experience (t), and the job sector of the position held in the previous year $(j_{i,t})$. We also collect data on whether individuals are partners of Big 4 accounting firms $(m_{i,t}^{b})$ or Non-Big 4 accounting firms $(m_{i,t}^{nb})$. We obtain wage data from the Current Population Survey (CPS) and merge the data with Revelio to obtain average individual characteristics missing from CPS. To reduce noise in the wage data and be consistent with our model, our empirical analysis uses the average wage for a given combination of sector and individual characteristics. We infer these average wages using Random Forest, a machine learning model that allows for interactions and non-linear relations.

5.2 Summary Statistics

Table 5 displays summary statistics for the variables used in our empirical analyses. Regarding job sector choices, approximately 2% choose to work for public accounting firms, 6% pursue Internal Accounting jobs, 19% go into Finance & Consulting, and 10% opt for Technology. The remaining 63% work in other industries.[17]

Regarding worker characteristics, Revelio identifies approximately 44% of workers (i.e., business graduates) as female. About 92% of workers do not hold an accounting degree. The average worker earns approximately $90k per year with about 8.2 years of total work experience and 6.8 years of sector-specific work experience. These data suggest that sector switching is uncommon.

Next, we investigate workers' wage profiles across sectors in Figure 4, documenting significant wage heterogeneity across sectors. The Finance & Consulting sector typically offers the highest wages, followed by those offered by the Big 4 and Technology sectors. Internal Accounting and Non-Big 4 positions have lower wages than these three sectors, but they still offer higher wages than non-accounting jobs in other industries. This wage disparity persists throughout workers' careers, with two key exceptions: wages in Big 4 firms surpass those in Technology after 10 years of experience, and wages in Non-Big 4 positions exceed those in Internal Accounting after six years

---

[17]The labor market share statistics are similar when we use data from the American Community Survey. Restricting the sample period to 2014 to 2022, we find that 3.4% of workers with business degrees choose to work for public accounting firms, 8.3% pursue Internal Accounting jobs, 16% go into Finance & Consulting, and 8% opt for Technology. The remaining 65% work in other industries.

of experience. These results highlight the potential for forward-looking career decisions based on future wage dynamics.

5.3 Parameter Estimates

5.3.1 Labor Supply

Table 6 presents the parameter estimates of our dynamic career choice model described in Section 3. Panel A presents the parameter estimates for non-wage returns, revealing a general positive preference for accounting jobs ($\alpha_0 > 0$, $\alpha_2 > 0$). This general positive preference might reflect the nature of accounting jobs, such as their stability. However, the preference for accounting jobs is weaker among workers without an accounting degree ($\alpha_1 < 0$), which may reflect their distaste for accounting jobs due to the restrictive nature of accounting tasks (Le, 2023), consistent with their endogenous choice of a non-accounting degree. This result might also capture institutional entry barriers to accounting jobs for those without an accounting degree. For instance, the 150-hour rule could deter some individuals from pursuing employment at external accounting firms that require the CPA qualification. Being a partner in an external accounting firm generates negative non-wage benefits, relative to working in other sectors ($\delta_b < 0$, $\delta_{nb} < 0$). This parameter captures the non-monetary *net* costs of being a partner in addition to wages. Although being a partner might largely reflect the reward for effort (Rosen and Lazear, 1981; Carter and Spence, 2014), the cost of being a partner (e.g., balancing commercialization and professionalism) is also discussed (Gendron, 2001). The comparable non-monetary net costs between Big 4 and Non-Big 4 could reflect this trade-off. Finally, there is a positive preference for Finance & Consulting jobs ($\alpha_3 > 0$) but a negative one for Technology jobs ($\alpha_4 < 0$).

Panel B reports parameter estimates regarding the cost of job switching and structural state dependence associated accounting jobs. In general, switching costs are positive ($\xi_0 > 0$) but less so for females ($\xi_1 < 0$). In our paper, switching means moving to another sector. One explanation for a smaller switching cost for females is that family issues might increase their willingness to switch to other sectors if switching allows them to move to different locations with their families (Mincer, 1978). Working in external accounting in the prior year increases the non-wage benefits associated with working in external accounting in the current year. The result is consistent with life-

cycle models in which workers learn about their matching value with their jobs, and the decrease in uncertainty increases the value of staying in the same job (Gorry et al., 2019). One related interpretation of this estimated parameter is that workers have an incentive to accumulate human capital that increases their future job prospects (Yang, 2024). However, despite an initial positive preference for working in Internal Accounting ($\alpha_2 > 0$), the current-period utility for choosing Internal Accounting in the following year becomes slightly negative ($\alpha_2 + \gamma_2 < 0$). This result suggests that subsequent experience in Internal Accounting is less valuable, holding constant other factors (e.g., wages).

Panel B also presents the amenity benefits of each sector, relative to those of non-accounting other industries. Finance & Consulting and Big 4 accounting offer the lowest amount of amenities as a proportion of wages (e.g., they under-compensate overtime hours the most).[18] Our finding extends Sockin (2022) such that the positive correlation between salaries and amenities varies across industries, influencing workers' sector decisions.

5.3.2 Labor Demand

Table 7 Panel A reports the parameter estimates for labor demand. Both oligopsony parameters are positive and statistically significant. On the one hand, employers of sectors with many firms are less likely to internalize competition with other employers outside the sector, which increases employers' market power ($\chi_1 > 0$). On the other hand, more firms in a sector increase competition for labor within that sector, reducing employers' market power ($\chi_2 > 0$). Panel A also reports the rates of forced turnover, conditional on not making partner at Big 4 and Non-Big 4 accounting firms, which stand at 81% and 89%, respectively. The slightly lower forced turnover at Big 4 firms may reflect the cost of firing an accountant with firm-specific human capital.

Table 7 Panel B reports the sample average of $\nu_{i,k,t}$, the marginal product of labor, conditional on workers' realized job choices. On average, the Finance & Consulting sector exhibits the highest marginal product of labor, amounting to about $128k. Technology firms' marginal product of labor takes second place with an average of $116k. Big 4 accounting firms take third place with an average

---

[18]Glassdoor offers a number of rating categories that shed light on employees' assessments of their work experience: Culture & Value, Diversity & Inclusion, Work-Life Balance, Senior Management, Compensation and Benefits, and Career Opportunities. The data for Deloitte as of January 10, 2024 show that Work-Life Balance is the lowest (3.2) and Career Opportunities is highest (4.2).

of \$98k, and Non-Big 4 Accounting and Internal Accounting jobs have the lowest marginal product of labor, at \$90k and \$95k, respectively. The estimated marginal product of labor for accounting firms is comparable to the estimate in Banker et al. (2003).

Figure 5 plots the marginal product of labor for each sector over calendar years, *relative to that of Finance & Consulting*. The rankings of the marginal product of labor are stable over time, with Finance & Consulting workers having the highest marginal product of labor. The marginal product of labor of workers in Big 4 accounting firms increased relative to Finance & Consulting from 2014 to 2021, but declined slightly afterward. Despite the overall increasing trend, the levels of marginal product of labor remain lower than those of Finance & Consulting. In contrast, the marginal product of labor of workers in Technology and Non-Big 4 generally decreased relative to Finance & Consulting, with Internal Accounting remaining relatively stable.

Table 7 Panel C reports the sample average of wage markdowns, $\mu_{i,k,t}$, divided by the average marginal product of labor. Finance & Consulting jobs have the highest percentage of markdowns at 2.6% of their marginal product of labor, followed by Technology jobs with an average markdown equal to 2.0% of their average marginal product of labor. The wage markdowns of accounting jobs are similar to each other, less than 2%.

5.4 The Importance of Dynamic Incentives and Model Fit

Table 8 Panel A decomposes the variance of choice-specific value functions into current-period return to labor and expected future return. We find that current-period return accounts for 3.4% of the variation in the choice-specific value function and that expected future return is responsible for the remaining 96.6%. The results suggest that it is important to consider forward-looking incentives when modeling workers' sector choices.

Table 8 Panel B decomposes the variance of the current-period return function into different components. Wages account for most of the variation in current-period return at 88%, followed by non-wage amenities at 11.5%. Other factors matter less.

Table 8 Panel C examines the model fit. Overall, the model preserves the ordering of individuals' choices of the six job sectors. It also slightly overestimates the market shares for non-accounting jobs in other industries and underestimates those for the other sectors. One possibility is that measurement errors in wages bias the coefficients on wages downward. This downward bias does

not apply to non-accounting other industries, as the coefficient on wage, θ_6, is normalized to one. Thus, the predicted market share of non-accounting other industries is biased upward. Our counterfactual analyses will benchmark against the model-predicted market shares to ensure a fair comparison.

5.5   Counterfactual Analyses

This section examines four counterfactual analyses to further understand the factors influencing the equilibrium of the accounting labor market. To illustrate the effects of these factors, we carefully choose changes in model parameter or economic values that are both economically meaningful and realistic. We simulate how the market share of accounting jobs responds to exogenous changes in these factors.

In the first quantitative exercise, reported in Table 9, we reduce the entry barriers for external accounting jobs for non-accounting business major students by setting α_1 to 50% of its estimated value. The change can be interpreted as reducing accounting credit requirements for external accounting jobs or making an accounting job more appealing to non-accounting business major students. This analysis reveals an economically significant 9.5% increase in the likelihood of workers accepting employment in external accounting firms. The likelihood of workers choosing Internal Accounting jobs increases by 1.3% because those who started their careers at external accounting firms tend to move to internal accounting jobs. Collectively, employment by the accounting sector increases by 2.9%.

The second quantitative exercise reduces the market power of Big 4 accounting firms. The analysis is motivated by recent empirical evidence that Big 4 accounting firms possess some degree of wage setting power (Aobdia et al., 2024), as well as by the significant consolidation of audit firms over the few decades prior to our sample period (Geng et al., 2023). To induce a meaningful change in the market power of Big 4 accounting firms, we reduce their wage markdowns by their inter-quartile range (about $1.5k). The analysis, reported in Table 11, reveals that the share of external accounting workers increases by 11.8%, whereas the increase in Internal Accounting jobs is about 3%. Notably, an increase in Big 4 accounting employment has a larger spillover effect on Internal Accounting jobs.

Our third quantitative exercise attempts to improve the marginal product of labor for external

accounting jobs. We focus only on Non-Big 4 external accountants because Figure 5 shows an overall decline in the marginal product of labor for Non-Big 4 workers relative to workers in Finance & Consulting. In contrast, we observe a relative increase in the marginal product of labor for Big 4 workers and similar levels for Internal Accounting workers. The analysis, reported in Table 11, shows that the share of external accounting workers increases by 45%, whereas Internal Accounting jobs experience a slight decline of 1%. The results suggest that workers either leave Internal Accounting for Non-Big 4 accounting jobs or remain longer at public accounting firms due to increased productivity and, consequently, higher wages.

Our final quantitative exercise is to eliminate the gender promotion gap at accounting firms. In our data, men are more likely to be promoted to partners than women (Madsen, 2013; Chen et al., 2023). We equalize the partner promotion probability for men and women. Table 12 shows that this change in the future prospect of working for accounting firms influences female workers' career choices throughout their careers. The number of female external accountants increases by 1.6%, whereas the number of internal accountants does not experience a meaningful change. The increase in the number of female external accountants comes from non-accounting sectors, resulting in a 0.04% decrease in the number of female workers choosing non-accounting sectors.

6   Conclusion

This paper develops and estimates an equilibrium model of the accounting labor market, integrating both demand and supply factors in the analysis. In developing what we believe is the first such model, our theoretical approach incorporates and expands on the work of Keane and Wolpin (1997) and Sauer (1998) by incorporating accountants' forward-looking job choice decisions across six sectors. It also builds on the work of Lee and Wolpin (2006) and Berger et al. (2022) by considering those six sectors' productivity shocks and oligopsonistic employment decisions. Most importantly, our equilibrium model embraces the institutional features of accounting labor markets such as entry barriers (e.g., CPA certification and the 150-hour rule), partner promotion, (possible) technology shocks, and the oligoposony power of Big 4 firms (Barrios, 2022; Frecka et al., 2022; Maurer, 2023; Aobdia et al., 2024). Using individual-level data collected from multiple sources, we estimate the model to study business majors' dynamic occupation choices and their employers' oligopsonistic

employment decisions.

Our quantitative model allows us to estimate unobservable parameters related to these specific features of the accounting labor market. The estimation results reveal that it is important to explicitly account for dynamic considerations when modeling workers' occupational choices, because dynamic considerations account for 97% of the variation in workers' returns from their occupational choices. On the labor supply side, although business majors generally prefer accounting jobs over non-accounting jobs in other industries, non-accounting business majors face barriers to working for external accounting firms. Sector switching is costly, which disincentivizes sector switching. On the labor demand side, forced turnover due to the up-or-out partner promotion tradition is pervasive in both Big 4 and Non-Big 4 firms. Although the wages of the Big 4 accounting sector are competitive relative to non-accounting jobs in other industries, they are lower than wages in the Finance & Consulting sector. Improvement in external accounting firms' marginal product of labor has lagged behind that of the Finance & Consulting sector since 2020, reducing the competitive wage levels of external accounting firms.

Our counterfactual analyses quantitatively evaluate and compare the potential effects of market interventions by considering dynamic career choices as well as demand-side oligopsonistic competition within and across sectors. The positive impact of reducing entry barriers to external accounting provides some support for the recent movements in California to move from 150-hour to 120-hour requirements for CPA licensure (CBA, 2024). Reducing the oligopsony power in Big 4 accounting firms also produces an economically meaningful increase in the supply of accountants, suggesting that the consolidation of external accounting firms has implications for the labor market in addition to the product market. Narrowing the gap in the marginal product of labor between accounting and non-accounting sectors is another means of increasing accounting employment. Finally, the partner promotion gap in the accounting industry has a meaningful effect on employment in the external accounting industry.

In closing, we want to offer some caveats concerning the application of our model and findings. First, while the counterfactual analyses help us understand economic forces that limit the supply of accountants to the economy, any concrete policy suggestions would require the modeling of specific policy frictions as well (e.g., frictions that give rise to the entry barriers faced by non-accounting majors). Policy makers should interpret our results in the context of our model assumptions and

the findings in the literature. Second, although we incorporate several salient features of accounting labor markets, relying on prior studies and regulatory discussions (Schmalz, 2023), our focus and the curse of dimensionality force a trade-off on the features we include. This limitation naturally points to directions for future research. One such direction concerns the implications of STEM-designated accounting master's programs for international students (Barrios et al., 2024). A second direction for future research is the various origins of the difference in the marginal product of labor across sectors (Goos et al., 2014; Friedman et al., 2024). A third direction could examine additional performance measures, as key performance measures are likely to vary across sectors. For example, a focus on audit quality, while limiting the focus to auditor labor markets, could yield additional insights about the auditor labor market (Breuer et al., 2023).

References

Abramova, I. (2024). Labor supply and M&A in the audit market. *Journal of Accounting & Economics, Forthcoming*.

Acemoglu, D. and D. Autor (2011). Skills, tasks and technologies: Implications for employment and earnings. In *Handbook of Labor Economics*, Volume 4, pp. 1043–1171. Elsevier.

Altonji, J. G., P. Arcidiacono, and A. Maurel (2016). The analysis of field choice in college and graduate school: Determinants and wage effects. In *Handbook of the Economics of Education*, Volume 5, pp. 305–396. Elsevier.

Aobdia, D., Q. Li, K. Na, and H. Wu (2024). The influence of labor market power in the audit profession. *The Accounting Review 99*(5), 65–95.

Azar, J., I. Marinescu, and M. Steinbaum (2022). Labor market concentration. *Journal of Human Resources 57*(S), S167–S199.

Baker, A. C., D. F. Larcker, C. G. McClure, D. Saraph, and E. M. Watts (2024). Diversity washing. *Journal of Accounting Research 62*(5), 1661–1709.

Baksy, A. (2023). Technology adoption and the slowdown in skilled labor demand. *Working paper, Stanford University*.

Ball, R. (2024). By what criteria do we evaluate accounting? Some thoughts on economic welfare and the archival literature. *Journal of Accounting Research 62*(1), 7–54.

Banker, R. D., H. Chang, and R. Cunningham (2003). The public accounting industry production function. *Journal of Accounting and Economics 35*(2), 255–281.

Barrios, J., P. Gong, and E. Yu (2024). Stemming the tide: The impact of stem designation on accounting education and the labor market. *Working Paper*.

Barrios, J. M. (2022). Occupational licensing and accountant quality: Evidence from the 150-hour rule. *Journal of Accounting Research 60*(1), 3–43.

Berger, D., K. Herkenhoff, and S. Mongey (2022). Labor market power. *American Economic Review 112*(4), 1147–1193.

Bertomeu, J., Y. Liang, and I. Marinovic (2023). A primer on structural estimation in accounting research. *Foundations and Trends(R) in Accounting 18*(1-2), 1–137.

Bloomfield, M. J., U. Brüggemann, H. B. Christensen, and C. Leuz (2017). The effect of regulatory harmonization on cross-border labor migration: Evidence from the accounting profession. *Journal of Accounting Research 55*(1), 35–78.

Breuer, M. (2021). How does financial-reporting regulation affect industry-wide resource allocation? *Journal of Accounting Research 59*(1), 59–110.

Breuer, M., E. Labro, H. Sapra, and A. A. Zakolyukina (2024). Bridging theory and empirical research in accounting. *Journal of Accounting Research 62*(3), 1121–1139.

Breuer, M., A. Le, and F. Vetter (2023). Audit mandates, audit firms, and auditors. *Working Paper*.

Carnes, R. R., D. M. Christensen, and P. E. Madsen (2023). Externalities of financial statement fraud on the incoming accounting labor force. *Journal of Accounting Research 61* (5), 1531–1589.

Carter, C. and C. Spence (2014). Being a successful professional: An exploration of who makes partner in the Big 4. *Contemporary Accounting Research 31* (4), 949–981.

Cascino, S., A. Tamayo, and F. Vetter (2021). Labor market effects of spatial licensing requirements: Evidence from CPA mobility. *Journal of Accounting Research 59* (1), 111–161.

CBA (2024). UAA/Model rules exposure draft. *California Board of Accountancy*.

Chen, J., N. Hallman, and J. Sunder (2023). The retention and promotion of female auditors at Big-4 accounting firms. *Available at SSRN 4678211*.

Choi, J. H. (2021). Accrual accounting and resource allocation: A general equilibrium analysis. *Journal of Accounting Research 59* (4), 1179–1219.

Choi, J. H., J. Pacelli, K. M. Rennekamp, and S. Tomar (2023). Do jobseekers value diversity information? Evidence from a field experiment and human capital disclosures. *Journal of Accounting Research 61* (3), 695–735.

Dawkins, M. C. (2023). Declining enrollments—a call to action! *Issues in Accounting Education 38* (1), 9–18.

Deming, D. J. and K. Noray (2020). Earnings dynamics, changing job skills, and STEM careers. *The Quarterly Journal of Economics 135* (4), 1965–2005.

Eshleman, J. D. and B. P. Lawson (2017). Audit market structure and audit pricing. *Accounting Horizons 31* (1), 57–81.

Fox, J. T. (2010). Estimating the employer switching costs and wage responses of forward-looking engineers. *Journal of Labor Economics 28* (2), 357–412.

Frecka, T. J., H. F. Mittelstaedt, and J. S. Stevens (2022). Career paths and compensation for accounting graduates. *Accounting Horizons 36* (1), 77–109.

Friedman, H. L., A. Sutherland, and F. Vetter (2024). Technological investment and accounting: A demand-side perspective on accounting enrollment declines. *Available at SSRN 4707807*.

GAO (2003). Public accounting firms: Mandated study on consolidation and competition. *U.S. Government Accountability Office*.

Gendron, Y. (2001). The difficult client-acceptance decision in Canadian audit firms: A field investigation. *Contemporary Accounting Research 18* (2), 283–310.

Geng, H., C. Zhang, and F. S. Zhou (2023). Financial reporting quality and myopic investments: Theory and evidence. *The Accounting Review 98* (6), 223–351.

Ghosh, S. and M. Waldman (2010). Standard promotion practices versus up-or-out contracts. *The RAND Journal of Economics 41* (2), 301–325.

Goldin, C. and L. F. Katz (2016). A most egalitarian profession: pharmacy and the evolution of a family-friendly occupation. *Journal of Labor Economics 34* (3), 705–746.
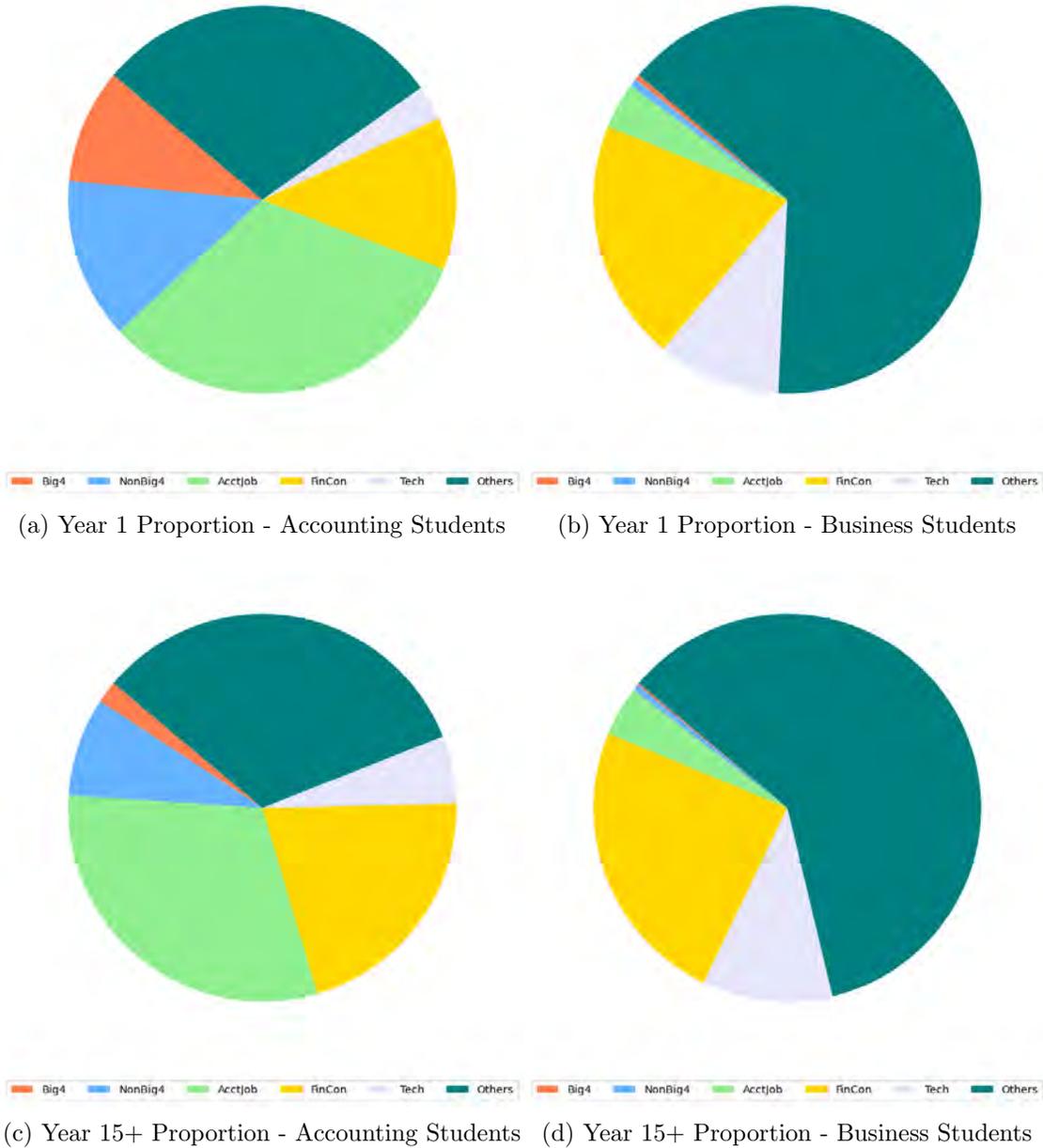
Goos, M., A. Manning, and A. Salomons (2014). Explaining job polarization: Routine-biased technological change and offshoring. *American Economic Review 104*(8), 2509–2526.

Gorry, A., D. Gorry, and N. Trachter (2019). Learning and life cycle patterns of occupational transitions. *International Economic Review 60*(2), 905–937.

Hairston, S., D. Wu, and J. Yu (2019). Analyzing the LinkedIn Profiles of audit partners. *The CPA Journal March*.

Hammond, T. A. (2003). *A white-collar profession: African American certified public accountants since 1921*. University of North Carolina Press.

Hann, R. N., J. Yang, and Y. Zheng (2024). The price of an accountant shortage: Evidence from job vacancy duration and internal control weaknesses. *Available at SSRN 4695588*.

Heckman, J. (1979). *The Incidental Parameters Problem and the Problem of Initial Conditions in Estimating: A Discrete Time-discrete Data Stochastic Process and Some Monte Carlo Evidence*. Graduate School of Business and Department of Economics, University of Chicago.

Heckman, J. and B. Singer (1984). A method for minimizing the impact of distributional assumptions in econometric models for duration data. *Econometrica 52*(2), 271–320.

Heckman, J. J. and G. Sedlacek (1985). Heterogeneity, aggregation, and market wage functions: an empirical model of self-selection in the labor market. *Journal of political Economy 93*(6), 1077–1125.

Hoopes, J. L., K. J. Merkley, J. Pacelli, and J. H. Schroeder (2018). Audit personnel salaries and audit quality. *Review of Accounting Studies 23*, 1096–1136.

Horowitz, J. (1981, October). Identification and diagnosis of specification errors in the multinomial logit model. *Transportation Research Part B: Methodological 15*(5), 345–360.

Hotz, V. J. and R. A. Miller (1993). Conditional choice probabilities and the estimation of dynamic models. *The Review of Economic Studies 60*(3), 497–529.

Huber, S. and C. McClure (2023). Accounting for goodwill. *University of Chicago, Becker Friedman Institute for Economics Working Paper* (2023-142).

Hyslop, D. R. (1999). State dependence, serial correlation and heterogeneity in intertemporal labor force participation of married women. *Econometrica 67*(6), 1255–1294.

Jovanovic, B. (1979). Job matching and the theory of turnover. *Journal of Political Economy 87*(5), 972–90.

Keane, M. and K. I. Wolpin (1997). The career decisions of young men. *Journal of Political Economy 105*(3), 473–522.

Keane, M. and K. I. Wolpin (2001). The effect of parental transfers and borrowing constraints on educational attainment. *International Economic Review 42*(4), 1051–1103.

Keane, M. P., P. E. Todd, and K. I. Wolpin (2011). The structural estimation of behavioral models: Discrete choice dynamic programming methods and applications. In *Handbook of Labor Economics*, Volume 4, pp. 331–461. Elsevier.

Le, A. (2023). Accounting rules and the supply of accountants. *Available at SSRN 4666335*.

Lee, D. and K. I. Wolpin (2006). Intersectoral labor mobility and the growth of the service sector. *Econometrica 74*(1), 1–46.

Lee, G., V. Naiker, and C. R. Stewart (2022). Audit office labor market proximity and audit quality. *The Accounting Review 97*(2), 317–347.

Madsen, P. E. (2013). The integration of women and minorities into the auditing profession since the civil rights period. *The Accounting Review 88*(6), 2145–2177.

Madsen, P. E. (2015). Has the quality of accounting education declined? *The Accounting Review 90*(3), 1115–1147.

Madsen, P. E. and J. Piao (2021). Is accounting a miserable job? *Available at SSRN 3892354*.

Mas, A. and A. Pallais (2017). Valuing alternative work arrangements. *American Economic Review 107*(12), 3722–3759.

Maurer, M. (2023). Job security isn't enough to keep many accountants from quitting. *Wall Street Journal*.

McClure, C. G. and A. A. Zakolyukina (2024). Non-GAAP reporting and investment. *The Accounting Review 99*(2).

Mincer, J. (1958). Investment in human capital and personal income distribution. *Journal of Political Economy 66*(4), 281–302.

Mincer, J. (1978). Family migration decisions. *Journal of Political Economy 86*(5), 749–773.

Rosen, S. (1992). The market for lawyers. *The Journal of Law and Economics 35*(2), 215–246.

Rosen, S. and E. P. Lazear (1981). Rank-order tournaments as optimum labor contracts. *Journal of Political Economy 89*(5), 841–864.

Sauer, R. (1998). Job mobility and the market for lawyers. *Journal of Political Economy 106*(1), 147–171.

Schmalz, M. (2023). Talent "pipeline," audit quality, and other research topics of interest. *PCAOB*.

Shorrock, E. and V. Kibler (1923). Opportunities for the young accountant. *Journal of Accountancy (pre-1986) 35*(4), 311.

Sockin, J. (2022). Show me the amenity: Are higher-paying firms better all around? *CESifo Working Paper*.

Sran, G. (2021). Disclosing labor demand. *Working Paper*.

Sutherland, A. G., M. Uckert, and F. W. Vetter (2024). Occupational licensing and minority participation in professional labor markets. *Journal of Accounting Research 62*(2), 453–503.

Wescott, S. H. and R. M. Seiler (1986). *Women in the accounting profession*. Markus Wiener Publishing.

Yang, J. (2024). Labor market returns to audit experience: Leaps and bounds or snail's pace? *Working paper, University of Maryland*.

Yeh, C., C. Macaluso, and B. Hershbein (2022). Monopsony in the US labor market. *American Economic Review 112*(7), 2099–2138.

Figure 1: Career Distribution of Business Graduates

(a) Year 1 Proportion - Accounting Students (b) Year 1 Proportion - Business Students

(c) Year 15+ Proportion - Accounting Students (d) Year 15+ Proportion - Business Students

This figure shows the job category distribution for career positions held by business majors including accounting majors in the United States from 1 to 15 years(s) (inclusive) after graduation using Revelio data. Jobs held for over 15 years are collapsed under the distribution Year 15+. Career positions are separated into one of six categories based on the following criteria. 1) Big4: The position is labeled with an NAICS code beginning with 5412 (Accounting, tax preparation, bookkeeping, and payroll services), and job descriptions include accounting, accountant, audit, or financial reporting at one of the Big 4 accounting firms: Deloitte, PwC, EY, or KPMG. 2) NonBig4: The position is labeled with an NAICS code beginning with 5412, it is *not* at one of the Big 4 accounting firms, and job descriptions include accounting, accountant, audit, or financial reporting. 3) AcctJob: The position is not captured by categories 1 or 2 and has an aggregated role involving accounting. 4) FinCon: As a finance or consulting job at any firm, the position is labeled with an NAICS code beginning with 52 (Finance and Insurance) or 5416 (Management, Scientific, and Technical Consulting Services). 5) Technology: The position is labeled with an NAICS code beginning with 51 (Information), 5415 (Computer Systems Design and Related Services), or 5417 (Scientific Research and Development Services Techniques). 6) NonAcctJob: All other positions.

Figure 2: Sector Classification
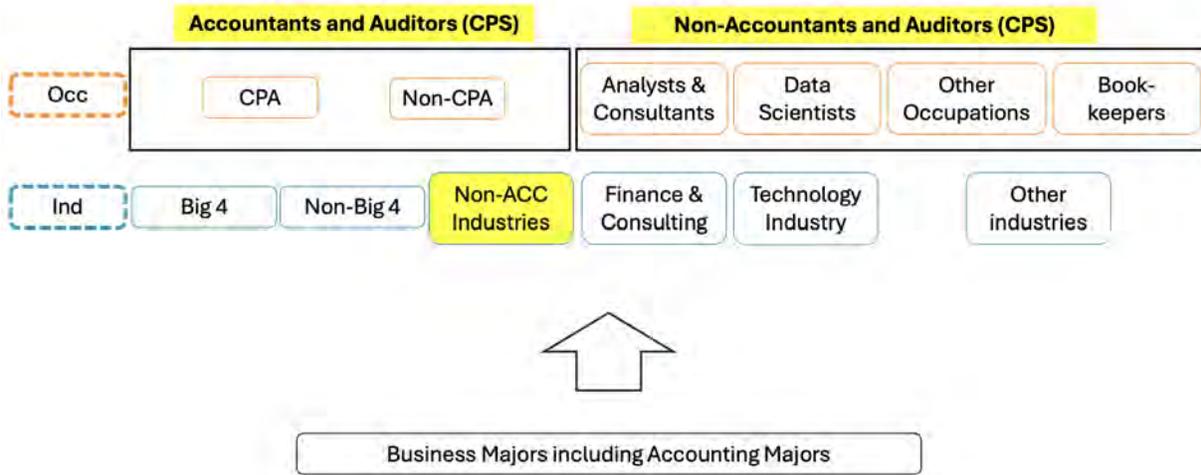
This figure depicts the sector classification. We use both occupation and industry to define each sector. For example, we define internal accountants as such because they work as an accountant or auditor in a non-accounting service industry.

Figure 3: Monopsony Power in the Labor Market
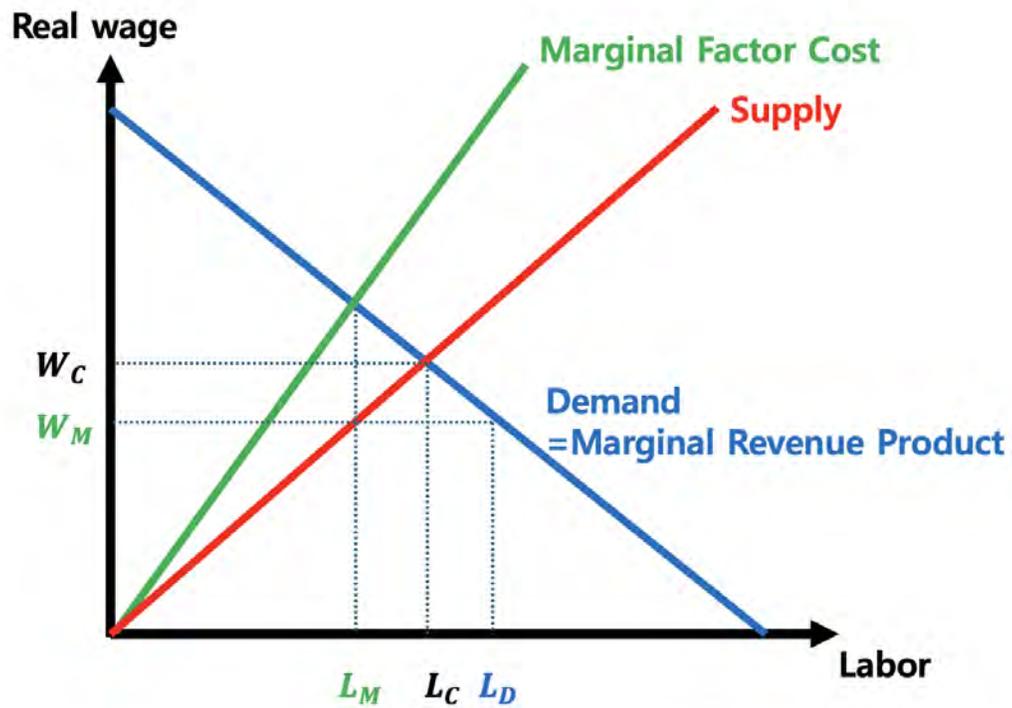
This figure describes the demand and supply of labor in the monopsonistic labor market. The equilibrium employment is determined by Marginal Labor Cost and Marginal Product of Labor. Under the equilibrium employment, the supply of labor determines the equilibrium wage and the employment gap between the demand and supply of labor.

Figure 4: Average Wages over Career of Business Majors
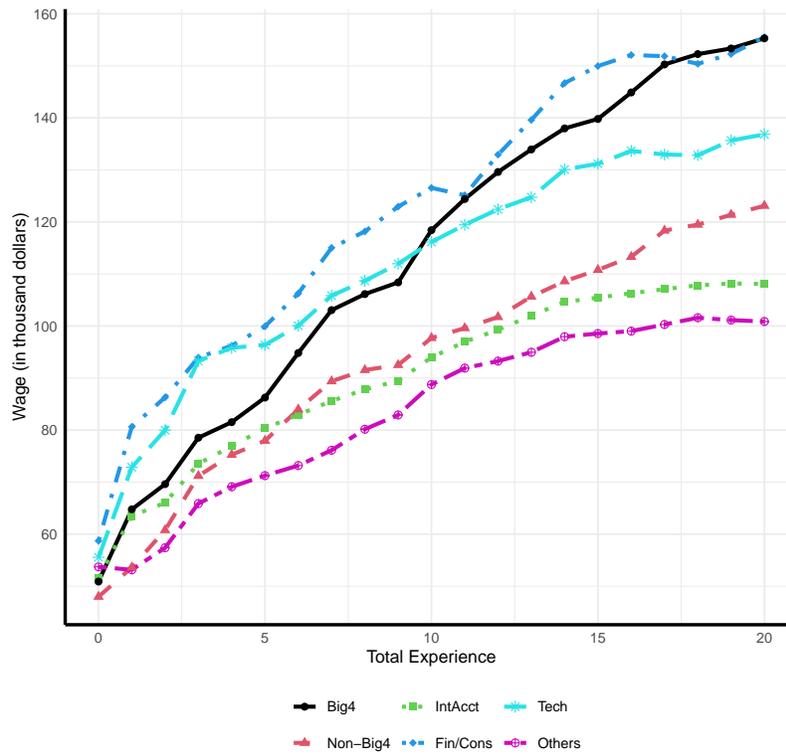
This figure plots the evolution of the wage profiles of Big 4 accounting firms (dots, solid line), non-Big 4 accounting firms (triangles, dashed line), Internal Accountant (squares, dotted line), Finance & Consulting (diamonds, dot-dash line), Technology (stars, long-dash line), and Others (circle-pluses, two-dash line) over workers' career.

Figure 5: Marginal Product of Labor over Time
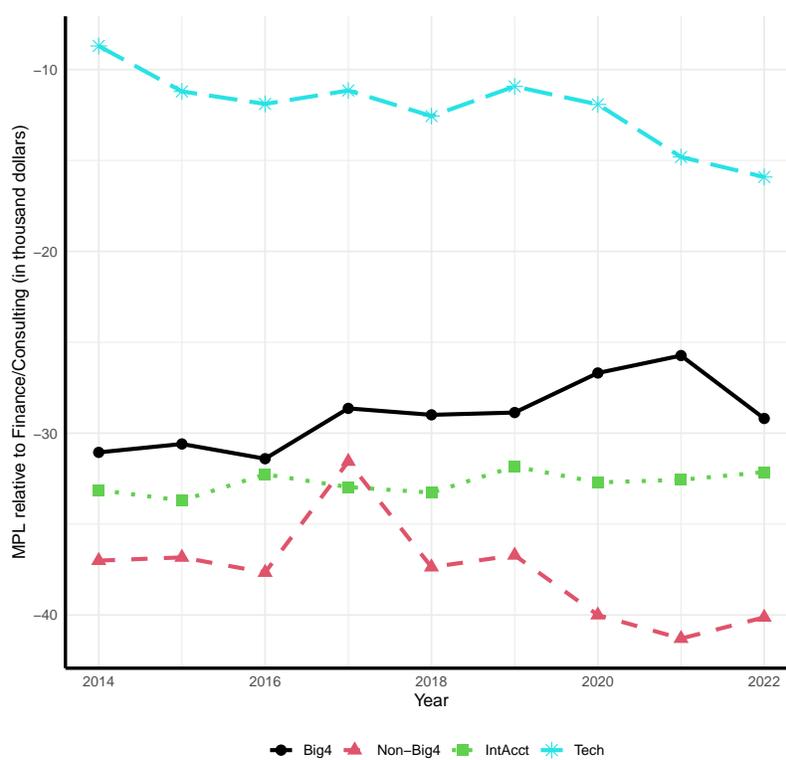
The figure presents the estimates of the average marginal product of labor across sectors over calendar years, relative to those of Finance & Consulting.

Table 1: Demographics of External and Internal Accountants

Year	P/1000	Female	Education	Experience	Audit Firms	Mean Wage	Real Wage
1968	4.14	0.24	13.85	20.06	0.18	7,689.53	38,246.65
1973	4.91	0.25	14.57	18.99	0.16	11,403.26	45,063.68
1978	9.07	0.35	15.00	16.85	0.19	14,540.65	39,587.52
1983	10.13	0.39	15.20	16.74	0.22	22,014.92	37,801.69
1988	10.46	0.51	15.29	15.85	0.19	28,067.98	41,176.26
1993	11.41	0.52	15.39	17.20	0.19	32,058.47	38,060.13
1998	11.50	0.60	15.33	17.59	0.17	36,830.92	37,832.74
2003	12.97	0.59	15.69	20.19	0.18	48,130.98	44,374.12
2008	12.55	0.63	15.69	19.97	0.22	56,453.97	45,389.62
2013	12.61	0.65	15.91	21.71	0.23	62,708.66	45,873.19
2014	12.82	0.65	15.79	22.26	0.22	61,757.00	44,452.95
2015	11.65	0.58	15.79	22.63	0.25	62,992.80	44,662.50
2016	11.83	0.63	15.73	23.30	0.24	63,219.06	44,686.80
2017	11.50	0.59	15.90	22.49	0.27	69,286.91	48,735.57
2018	12.27	0.61	15.96	21.78	0.21	68,368.99	46,912.62
2019	12.63	0.64	15.91	22.12	0.27	67,567.45	45,364.83
2020	11.71	0.61	16.12	22.27	0.22	74,788.11	49,663.37
2021	11.12	0.59	16.18	21.62	0.27	74,514.25	48,396.05
2022	10.75	0.62	16.23	21.48	0.27	79,727.52	49,638.76
2023	10.05	0.59	16.21	21.33	0.29	83,035.69	48,997.38

The table describes the demographics of accountants. The data are sourced from the Current Population Survey. P/1000 represents the number of accountants per 1000 individuals in the workforce. Female denotes the percentage of accountants who are female. Education refers to the average years of education among accountants. Experience indicates the average years of experience in the industry. Audit Firms represents the percentage of accountants working in audit firms. Mean Wage represents the average wage of accountants in the workforce. Real Wage inflates or deflates dollar amounts of Mean Wage to the amount they would have represented in 1999 using CPI.

Table 2: Degrees in Accounting Awarded

Year	Bachelor's	Master's	Accounting Major
1980	43,344	3,449	46,793
1982	45,732	3,046	48,778
1984	47,005	3,207	50,212
1986	43,813	2,920	46,733
1988	43,990	3,265	47,255
1990	45,610	3,566	49,176
1992	48,853	3,887	52,740
1994	43,940	4,494	48,434
1996	40,377	4,424	44,801
1998	37,362	4,789	42,151
2000	32,672	5,295	37,967
2002	33,502	6,830	40,332
2004	37,722	9,085	46,807
2006	41,964	10,415	52,379
2008	44,514	11,415	55,929
2010	48,390	15,937	64,327
2012	49,362	17,587	66,949
2014	50,510	19,261	69,771
2016	50,688	19,468	70,156
2018	48,790	18,980	67,770
2020	46,463	16,490	62,953

This table shows the number of college and graduate students awarded degrees in accounting. We use data from the US Department of Education (NCES) and Integrated Postsecondary Education Data System (IPEDS).

Table 3: Financial and Workforce Data for Big 4 and Non-Big 4 Accounting Firms

	Revenue		Big4			Non-Big4		
Year	Big4	Non-Big4	Partner	Professional	Admin	Partner	Professional	Admin
2010	7,697	123	2,388	21,667	6,597	77	465	146
2011	7,740	121	2,287	21,903	6,101	77	450	143
2012	8,411	127	2,330	24,651	6,278	76	460	147
2013	9,143	134	2,394	27,701	6,828	76	488	148
2014	10,044	143	2,497	29,722	6,688	77	547	139
2015	10,851	155	2,559	32,450	6,881	78	573	140
2016	11,857	169	2,721	36,124	8,631	84	635	146
2017	13,317	187	2,893	40,382	8,438	89	695	159
2018	14,033	201	2,960	42,835	8,803	106	719	173
2019	14,689	217	3,676	44,634	10,189	116	756	178
2020	16,071	239	3,860	49,616	9,807	122	816	190
2021	16,637	251	3,917	52,734	10,556	126	853	193
2022	16,761	286	3,813	56,215	10,224	136	943	214
2023	19,804	341	3,924	68,681	11,546	151	1,115	256
2024	22,270	386	4,201	74,999	13,180	161	1,203	285
Avg	13,288	205	3,095	41,621	8,716	104	714	177

The table describes the industry and organizational structure of 100 accounting firms from 2010 to 2024. The data are sourced from Accounting Today's survey. Each number is the average revenue or average number of employees at the group (e.g., Big4, Non-Big4, Partner, and Professional).

Table 4: Wage Regression with Accounting and Non-Accounting Sectors

	(1)	(2)
	1968-2023	2009-2023
Experience	0.0891***	0.0808***
	(0.0014)	(0.0018)
Experience Squared	-0.00151***	-0.00134***
	(0.0000)	(0.0000)
Nonwhite	-0.0717***	-0.0692***
	(0.0035)	(0.0037)
Marital Status	0.208***	0.227***
	(0.0040)	(0.0023)
Years of Education	0.127***	0.127***
	(0.0006)	(0.0009)
Female	-0.486***	-0.423***
	(0.0104)	(0.0058)
Accounting Sector	0.254***	0.279***
	(0.0082)	(0.0118)
Female × Accounting Sector	0.168***	0.100***
	(0.0171)	(0.0185)
Finance Sector	0.468***	0.472***
	(0.0047)	(0.0073)
Technology Sector	0.397***	0.417***
	(0.0059)	(0.0091)
Firm Size	0.0508***	0.0445***
	(0.0019)	(0.0012)
Constant	7.119***	7.446***
	(0.0183)	(0.0346)
Year Fixed Effects	Yes	Yes
Mean of Dependent Var.	9.961	10.290
R-squared	0.393	0.334
Adjusted R-squared	0.393	0.334
Observations	3,061,313	1,307,454

This table describes the wage regression. The data are sourced from CPS. Experience indicates the years of experience in the industry. Female, Non-white, and Marital are indicator variables. Education refers to the years of education (e.g., 12, 16, and so on). Accounting, Finance, and Technology Sectors are indicator variables based on individuals' occupations and employers. Firm size is measured as a categorical variable. The model includes experience, gender, race, marital status, education, occupation, firm size, and other relevant factors as explanatory variables. The sample consists of 3,061,313 observations from 1968 to 2023. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. Standard errors are clustered at the year level. Standard errors are shown in parentheses.

Table 5: Summary Statistics

Variables	N	Mean	SD	1%	25%	50%	75%	99%
$female$	10,940,852	0.441	0.496	0.000	0.000	0.000	1.000	1.000
$k = 1$	10,940,852	0.006	0.077	0.000	0.000	0.000	0.000	0.000
$k = 2$	10,940,852	0.012	0.109	0.000	0.000	0.000	0.000	1.000
$k = 3$	10,940,852	0.062	0.241	0.000	0.000	0.000	0.000	1.000
$k = 4$	10,940,852	0.194	0.395	0.000	0.000	0.000	0.000	1.000
$k = 5$	10,940,852	0.098	0.297	0.000	0.000	0.000	0.000	1.000
$k = 6$	10,940,852	0.628	0.483	0.000	0.000	1.000	1.000	1.000
m^b	10,940,852	0.000	0.007	0.000	0.000	0.000	0.000	0.000
m^{nb}	10,940,852	0.000	0.014	0.000	0.000	0.000	0.000	0.000
non_acc	10,940,852	0.915	0.280	0.000	1.000	1.000	1.000	1.000
t	10,940,852	8.236	5.570	0.000	4.000	8.000	12.000	20.000
w	10,940,852	89.557	34.487	39.283	63.678	83.475	105.116	196.858
x	10,940,852	6.780	5.269	0.000	2.000	6.000	10.000	20.000

This table presents the summary statistics of key variables from the Revelio data: $female$ is an indicator that equals one for females and zero otherwise; $k=l \in \{1, ..., 6\}$ is an indicator for choosing job sector l; m^b indicates whether the individual works in a manager position for a Big 4 accounting firm; m^{nb} indicates whether the individual works in a manager position for a non-Big 4 accounting firm; non_acc is an indicator that equals one if a worker does *not* hold an accounting degree and zero otherwise; t represents total experience since the start of a worker's first job; w represents wages in thousand dollars; and x represents a worker's experience in their current job sector.

Table 6: Parameter Estimates for Labor Supply

		Panel A: Non-Wage Benefits				
α_0	α_1	α_2	α_3	α_4	δ_b	δ_{nb}
2.852***	−1.504***	0.872***	0.792***	−2.715***	−9.796***	−8.921***
(0.031)	(0.018)	(0.013)	(0.002)	(0.006)	(0.033)	(0.062)

	Panel B: Continuation/Amenity Benefits							
Returns of Job Switching/Continuation				Amenity Benefits				
ξ_0	ξ_1	γ_1	γ_2	$\Delta\theta_1$	$\Delta\theta_2$	$\Delta\theta_3$	$\Delta\theta_4$	$\Delta\theta_5$
5.995***	−0.958***	2.009***	−1.190***	−0.340***	−0.217***	−0.123***	−0.353***	−0.301***
(0.003)	(0.007)	(0.034)	(0.011)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table presents the parameter estimates for the dynamic career choice model presented in Section 3. Individuals choose among K job options, which include Accountants in Big 4 ($k=1$), Accountants in Non-Big 4 ($k=2$), Accountants in Other Industries ($k=3$), Finance & Consulting ($k=4$), Technology ($k=5$), and Non-Accounting in Other Industries ($k=6$). The current-period return of choosing job k in year t for individual i equals:

$$U_{i,k,t} = w_{i,k,t} + b_{i,k,t} + \xi_{i,j,k,t} + \epsilon_{i,k,t},$$

where $w_{i,k,t}$ represents the wage of choosing job k in year t; $b_{i,k,t}$ represents the non-wage benefits/costs of choosing job k in year t; $\xi_{i,k,t}$ denotes the returns of switching or continuing jobs; j_{it} indicates individual i's prior-year job; and $\epsilon_{i,k,t}$ is job-specific shocks, which are assumed to follow Type I extreme value distribution. Non-wage benefits are a linear function of the state variables:

$$b_k(\mathbf{s}_{i,t}) = (\alpha_0 + \alpha_1 non\_acc_i)\mathbb{1}\{k \leq 2\} + \alpha_2\mathbb{1}\{k = 3\} + \alpha_3\mathbb{1}\{k = 4\} + \alpha_4\mathbb{1}\{k = 5\}$$
$$+ \delta_b m_{i,t}^b\mathbb{1}\{k = 1\} + \delta_{nb} m_{i,t}^{nb}\mathbb{1}\{k = 2\} + \Delta\theta_k w_{i,k,t}.$$

where non_acc_i is an indicator variable that equals one if individual i does *not* hold an accounting degree and zero if they do; $m_{i,t}^b$ represents whether the individual is a partner at a Big 4 accounting firm; $m_{i,t}^{nb}$ represents whether the individual is a partner at a Non-Big 4 accounting firm; $\Delta\theta_k$ captures the non-wage benefits/costs of job category k as a proportion of wage. The returns for switching or continuing jobs for individual i equal

$$\xi_{i,j,k,t} = -(\xi_0 + \xi_1 female_i) \cdot \mathbb{1}\{k_{i,t} \neq j_{i,t}\} \times \mathbb{1}\{j_{i,t} \neq 0\}$$
$$+ \underbrace{\gamma_1\left(\mathbb{1}\{j_{i,t} = 1, k_{i,t} = 1\} + \mathbb{1}\{j_{i,t} = 2, k_{i,t} = 2\}\right) + \gamma_2\mathbb{1}\{j_{i,t} = 3, k_{i,t} = 3\}}_{\substack{\text{Value from continuing} \\ \text{to work in accounting jobs}}},$$

where $female_i$ is an indicator that equals one if individual i is female and zero otherwise. Standard errors are presented below coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

Table 7: Parameter Estimates for Labor Demand

Panel A: Parameter Estimates

Oligopsony			Forced Turnover	
χ_1	χ_2		ζ_b	ζ_{nb}
0.067*	0.078***		0.807***	0.892***
(0.034)	(0.009)		(0.002)	(0.004)

Panel B: Marginal Product of Labor

$\bar{\nu}_1$	$\bar{\nu}_2$	$\bar{\nu}_3$	$\bar{\nu}_4$	$\bar{\nu}_5$
98.354***	90.135***	95.190***	128.028***	116.050***
(0.126)	(0.073)	(0.028)	(0.026)	(0.027)

Panel C: Wage Markdown

$\bar{\mu}_1/\bar{\nu}_1$	$\bar{\mu}_2/\bar{\nu}_2$	$\bar{\mu}_3/\bar{\nu}_3$	$\bar{\mu}_4/\bar{\nu}_4$	$\bar{\mu}_5/\bar{\nu}_5$
0.015***	0.014***	0.017***	0.026***	0.020***
(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

This table presents the average marginal product of labor and the percentage of wage markdown at the sector level. The wage offer of a representative firm in sector k equals

$$w_{i,k,t} = \nu_{i,k,t} - \underbrace{\frac{1}{(1-\hat{\eta}_{i,k,t})\theta_k e^{-\chi_1(M_{i,k,t}-1)} + \frac{M_{i,k,t}-1}{M_{i,k,t}} * \chi_2}}_{\equiv \mu_{i,k,t}},$$

where $\nu_{i,k,t}$ is the marginal product of labor of sector k of employees with characteristics $\mathbf{s}_{i,t}$ and $\mu_{i,k,t}$ is the wage markdown with $\hat{\eta}_{i,k,t}$ being the labor demand for individuals with characteristics $\mathbf{s}_{it}$ (defined in Section 3.1), expressed as a fraction of the total number of workers with the same characteristics, and $M_{i,k,t}$ being the number of employers (firms) hiring individuals with characteristics $\mathbf{s}_{it}$. Panel A reports parameters for labor demand and the rate of forced turnover conditional on not making partner in the prior year. Panel B reports the average $\nu_{i,k,t}$ by sector. Panel C reports the sector-level average of wage markdown divided by the average marginal product of labor. Standard errors are presented below coefficient estimates. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels (two-tailed), respectively.

Table 8: Value Function Decomposition and Model Fit

Panel A: Decomposition of Choice-Specific Value Functions

	Per-Period Return	Expected Future Payoff
Variance	3.358%	96.642%

Panel B: Decomposition of Per-Period Return

	Wages	Amenity	Preferences	Being Partner	Switching Costs
Variance	88.019%	11.453%	0.104%	0.093%	0.330%

Panel C: Model Fit

	Big4	NonBig4	AcctJob	FinCon	Tech	Others
Original	0.6%	1.2%	6.2%	19.4%	9.8%	62.8%
Estimated	0.4%	0.9%	5.0%	17.7%	5.3%	70.8%

Panel A of this table decomposes the total *variance* of workers' choice-specific value functions into the current-period return (column (1)) and expected future payoff (column (2)). Panel B decomposes the total *variance* of workers' current-period return into five components: wages (column (1)), amenity (column (2)), whether workers hold an accounting degree (column (3)), being a partner at an audit firm (column (4)), and switching costs (column (5)), respectively. Panel C reports the model fit.

Table 9: Counterfactual Analyses of Reducing Entry Frictions

	External Accounting (1)	Internal Accounting (2)	External + Internal (3)	Remaining Sectors (4)
Original	1.22%	4.99%	6.22%	93.78%
Counterfactual	1.34%	5.06%	6.40%	93.60%
% Change in Employment	9.45%	1.28%	2.89%	-0.19%

This table conducts a counterfactual analysis to understand the effect of entry frictions faced by individuals without an accounting degree. The first row reports the predicted market shares under the estimated parameter values. The second row reports the counterfactual market shares from reducing the magnitude of α_1 by 50%. The third row reports the percentage change.

Table 10: Counterfactual Analyses of Reducing Big 4 Wage Markdowns

	External Accounting (1)	Internal Accounting (2)	External + Internal (3)	Remaining Sectors (4)
Original	1.22%	4.99%	6.22%	93.78%
Counterfactual	1.37%	5.14%	6.51%	93.49%
% Change in Employment	11.77%	3.02%	4.75%	-0.31%

This table conducts a counterfactual analysis to understand the effect of reducing the wage markdowns of Big 4 Accounting Firms. The first row reports the predicted market shares under the estimated parameter values. The second row reports the counterfactual market shares from reducing the Big 4 wage markdowns by their interquartile ranges. The third row reports the percentage change.

Table 11: Counterfactual Analyses of Improving MPL for Non-Big 4

	External Accounting (1)	Internal Accounting (2)	External + Internal (3)	Remaining Sectors (4)
Original	1.22%	4.99%	6.22%	93.78%
Counterfactual	1.77%	4.94%	6.71%	93.29%
% Change in Employment	44.92%	-1.04%	8.01%	-0.53%

This table conducts a counterfactual analysis to understand the effect of improving the marginal product of labor of Non-Big 4 accounting firms. The first row reports the predicted market shares under the estimated parameter values. The second row reports the counterfactual market shares from improving the marginal product of labor of Non-Big 4 accounting firms by 1.97%. The third row reports the percentage change.

Table 12: Counterfactual Analyses of Removing Male-Female Partner Promotion Differences

|	External Accounting (1)	Internal Accounting (2)	External + Internal (3)	Remaining Sectors (4)
Original	2.53%	5.20%	7.72%	92.28%
Counterfactual	2.57%	5.20%	7.76%	92.24%
% Change in Employment	1.55%	0.01%	0.51%	-0.04%

This table conducts a counterfactual analysis to understand the effect of gender disparity in partner promotion at external accounting firms. The first row reports the predicted market shares under the estimated parameter values within the sample of female workers. The second row reports the counterfactual market shares from equalizing the rate of female partner promotion with that of male partner promotion within the sample of female workers. The third row reports the percentage change.
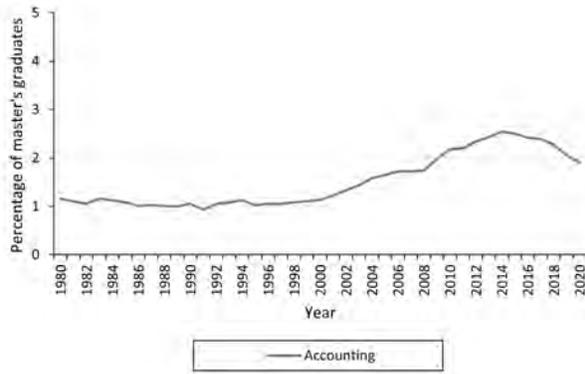
Online Appendix

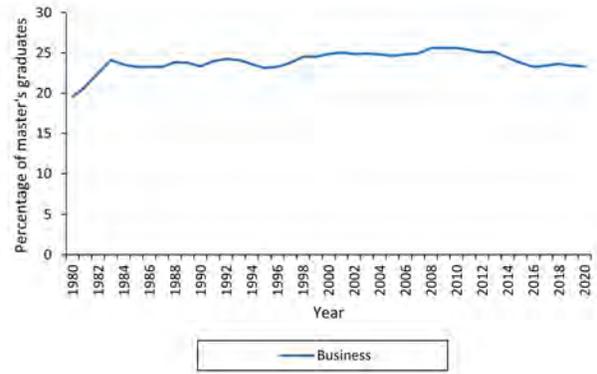Figure OA1: College and Graduate Major Choice
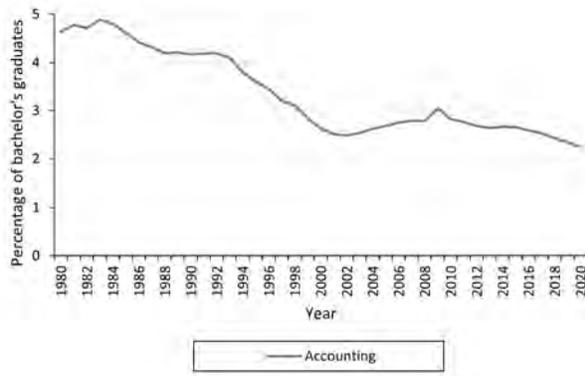
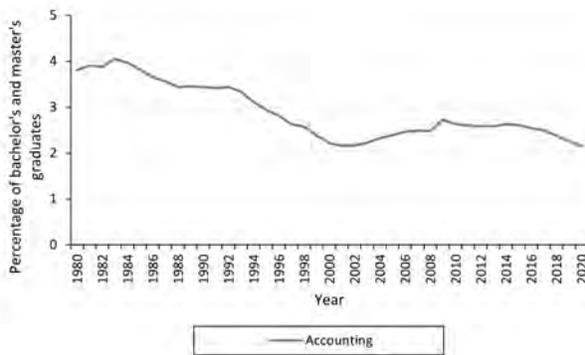(a) Bachelor's Degrees - Accounting Students
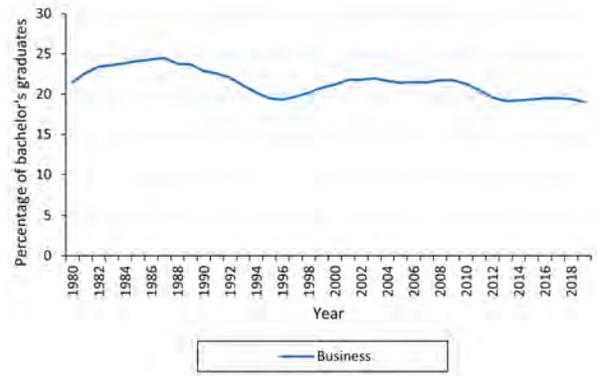
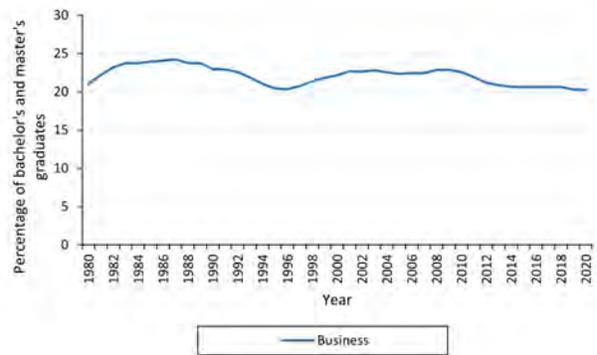(b) Bachelor's Degrees - Business Students

(c) Master's Degrees - Accounting Students

(d) Master's Degrees - Business Students

(e) Combined Degrees - Accounting Students

(f) Combined Degrees - Business Students

This figure shows the annual trend of the percentage of postgraduate degrees in Business and Accounting for all postgraduate students. We use data from the US Department of Education (NCES) and the Integrated Postsecondary Education Data System (IPEDS). The data system provides detailed information on degrees conferred by postsecondary institutions for each field of study. Panel (a) and (b) plot the annual trend in the percentage of bachelor's degrees. Panel (c) and (d) plot the annual trend in the percentage of master's degrees. Panel (e) and (f) plot the annual trend in the percentage of combined bachelor's and master's degrees.

Figure OA2: Occupational HHI Trends over Time
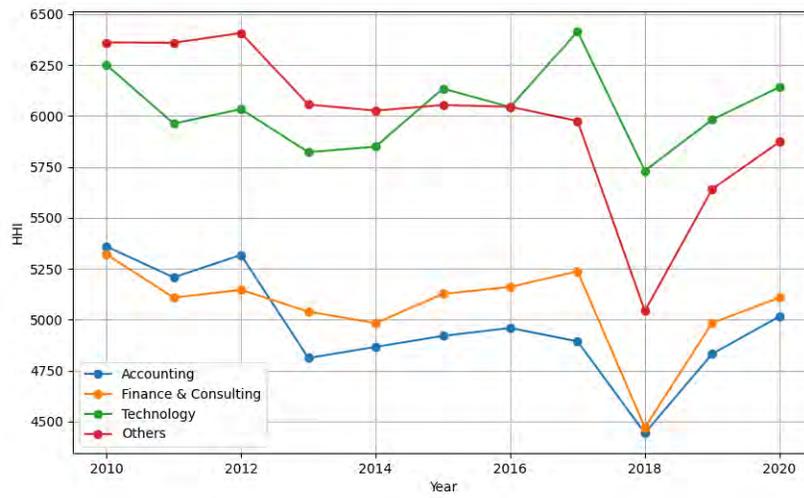
This figure shows the average Herfindahl-Hirschman Index (HHI) trends for three occupational categories—accountants, financial & consulting occupations, technical occupations, and all other occupations—over the years 2010 to 2020. The HHI is first calculated at the county-year-occupation level and then averaged at the year level for each occupational category.

Figure OA3: Technology Investment by Year and Job Category
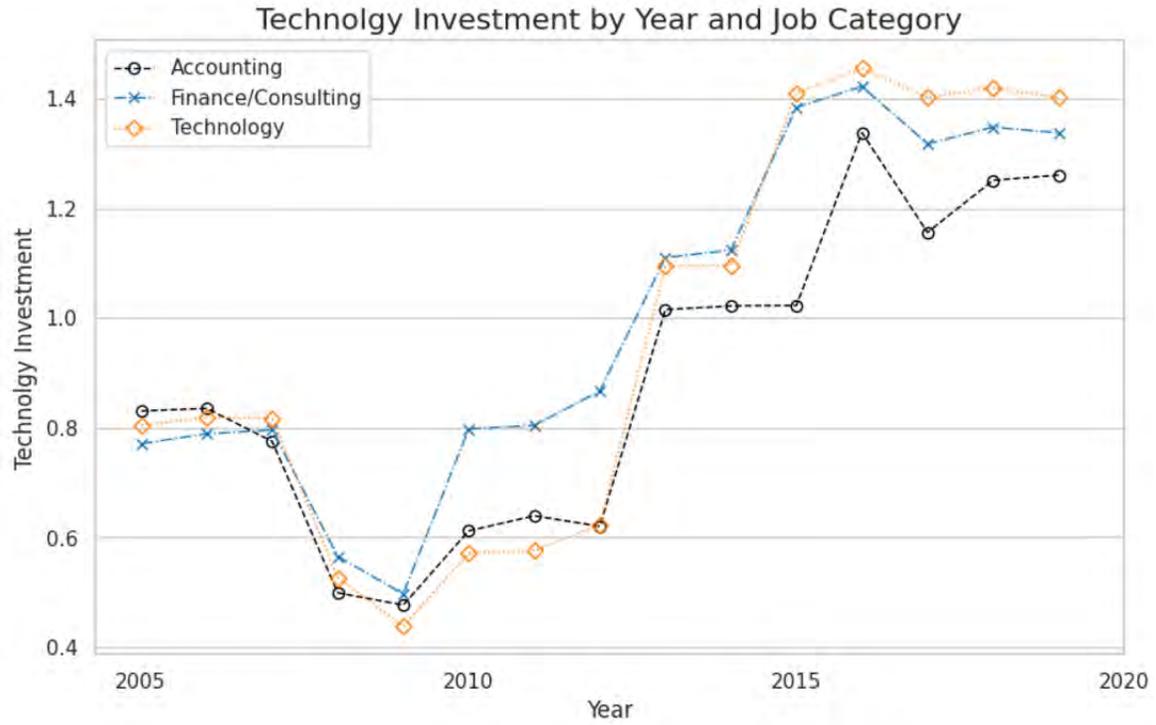
This figure depicts the technology investment by year and by job category. The technology investment is measured by the number of computers per each employee using the CiTDB dataset.

Table OA1: Demographics of Lawyers

Year	P/1000	Female	Education	Experience	Law Firms	Mean Wage	Real Wage
1968	1.48	0.03	17.18	20.97	0.60	14,378	65,288
1973	2.29	0.09	17.28	14.96	0.53	13,246	49,738
1978	3.34	0.12	17.67	12.59	0.42	22,283	57,308
1983	3.90	0.17	17.73	13.72	0.34	38,514	64,464
1988	4.59	0.23	17.68	14.36	0.35	48,492	68,268
1993	4.41	0.29	18.15	16.48	0.32	63,184	72,875
1998	5.08	0.31	18.56	18.24	0.34	96,882	99,063
2003	4.89	0.33	18.75	19.35	0.30	123,610	111,971
2008	5.46	0.35	18.67	19.91	0.33	142,885	110,504
2013	6.74	0.35	18.91	21.47	0.37	156,428	111,948
2018	7.32	0.39	18.98	20.83	0.40	154,614	103,382
2023	7.52	0.46	18.72	21.60	0.43	200,435	124,119

This table describes the demographics of lawyers. The data are sourced from the Current Population Survey. P/1000 represents the number of lawyers per 1000 individuals in the workforce. Female denotes the percentage of lawyers who are female. Education refers to the average years of education among lawyers. Experience indicates the average years of experience in the industry. Law Firms represents the percentage of lawyers working in law firms. Mean Wage represents the average wage of lawyers in the workforce. Real Wage inflates or deflates dollar amounts of Mean Wage to the amount they would have represented in 1999 using CPI.

Table OA2: Partner Promotion

Year	Count(Male)	Count(Female)	Promotion(Male)	Promotion(Female)	Avg. Year
1993	178	117	0.034	0.026	7.136
1994	189	129	0.021	0.023	7.588
1995	196	128	0.031	0.008	9.514
1996	207	162	0.039	0.025	8.935
1997	245	199	0.045	0.010	6.196
1998	254	250	0.028	0.004	7.140
1999	280	287	0.025	0.017	7.098
2000	361	323	0.030	0.009	8.377
2001	332	339	0.024	0.015	9.306
2002	376	379	0.027	0.016	11.111
2003	471	454	0.036	0.015	12.727
2004	568	560	0.023	0.023	10.519
2005	765	754	0.021	0.012	8.954
2006	814	827	0.018	0.004	9.018
2007	1056	901	0.016	0.004	11.548
2008	975	922	0.010	0.007	10.840
2009	822	751	0.012	0.003	9.250
2010	853	742	0.011	0.003	10.294

This table describes the partner promotion probability for each junior accountant cohort by gender from 1993 to 2010 considering the average years to become a partner at accounting firms.

Table OA3: List of Industries for Accounting Graduates

Industry Name (NAICS)	N	Proportion
Professional, Scientific, and Technical Services (54)	112,739	0.293
Finance and Insurance (52)	65,179	0.169
Manufacturing (33)	27,449	0.071
Educational Services (61)	22,495	0.0585
Information Technology (51)	21,668	0.0563
Public Administration (92)	14,683	0.0382
Retail Trade (45)	13,779	0.0358
Manufacturing (32)	13,497	0.0351
Health Care and Social Assistance (62)	11,009	0.0286
Accommodation and Food Services (72)	10,489	0.0273
Total	384,719	1

This table provides descriptive statistics on the top 10 industries with the most significant frequencies of jobs held by accounting majors. The industries are classified under NAICS and identified by the company where workers' positions are held. The table showcases raw and relative frequencies of the NAICS code's prevalence in Revelio's LinkedIn career path dataset filtered for accounting majors. Since NAICS employs a hierarchical structure, we use 2-digit codes to aggregate the dataset at the sector level, which comprises 20 total unique classifications.

Table OA4: List of Occupations for Accounting Graduates

Occupation	N	
Accountant	212,491	0.552
Billing Specialist	26,024	0.0676
Financial Advisor	16,250	0.0422
Investment Specialist	12,375	0.0322
Coordinator	12,209	0.0317
Cashier	11,427	0.0297
Crew Member	10,919	0.0284
Data Analyst	5,561	0.0145
Legal	5,303	0.0138
Customer Service	4,752	0.0124

This table describes the distribution of accounting majors' work positions/roles 5 years post-graduation. The position roles are aggregated at 50 discrete levels based on Revelio's clustering algorithm, which starts with millions of unique job titles scraped from LinkedIn profiles and iteratively clustered to create increasingly broad occupational groups. This produces the k50 identification, a set of the 50 most representative titles for the cumulative collection of LinkedIn job titles. We utilize this k50 identification to aggregate accounting majors' job titles for positions held 5 years after the completion of their degree.

Table OA5: College Majors in Accounting Firms

Field	N
Business	423,294
Accounting	336,335
Engineering	97,629
Finance	83,504
Economics	53,787
Law	15,483
Mathematics	10,764
Marketing	9,719
Education	9,667
Information Technology	5,717

This table provides descriptive statistics for the raw frequency distribution of college majors of individuals working and/or previously employed at a Big 4 accounting firm (PwC, Deloitte, EY, and KPMG). We filter the Revelio dataset for all records of Big 4 employment, which includes all post-secondary degree levels from associate's to doctoral degrees. We then construct this table by aggregating counts of distinct combinations of userid (unique identifier for users) and degree level (i.e., bachelor's, master's) for every row classified by college major field. Users may be double-counted due to the Cartesian Product effect of cross-joining positions and education entries, which augments the total record count. Individuals will be counted multiple times in the same row if 1) the individual held multiple positions at one or more Big 4 firms, and 2) the individual has multiple degrees in the same field at different levels. Individuals will be double-counted in different rows if the individual has multiple degrees in different fields.

Table OA6: University Graduates in Accounting Firms

University Name	N
Gies College of Business, University of Illinois Urbana-Champaign	10,355
University of Southern California	9,699
New York University	9,325
Red McCombs School of Business, University of Texas at Austin	8,489
College of Business Administration, University of Central Florida	7,106
Stephen M. Ross School of Business, University of Michigan	6,539
Columbia University in the City of New York	6,275
George Washington University	5,907
Pennsylvania State University	5,195
Kelley School of Business, Indiana University	5,180

This table provides the raw frequency count for the universities of Big 4 accounting firms' current and past employees. Each row counts the distinct number of userids (unique user identifiers), degree levels, and positionids (unique job position identifiers) for the corresponding university identified in the University Name column. Users may be double-counted in one row if they have multiple degrees (e.g., bachelor's and master's) from the same institution. The initial dataset contained different naming conventions for the same university. We combined counts for institutions based on keyword matches that exceeded the threshold of 75% (more than 75% of the keywords in the first university name matched the keywords in a second university name).