What do 100 Million Job Postings Say about the Audit Process and Market for Accounting Labor?*

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Abstract

We use a sample of 100 million job postings to understand the public and nonpublic accounting competencies involved in the audit process, their relation to audit fees and outcomes, and the market for accounting labor. Skill requirements and pay differ across public and nonpublic accounting positions: public accounting positions demand more (fewer) financial, cognitive, and social (IT) skills and pay more, and these differences are increasing over time. Skill requirements for public and nonpublic positions explain more variation in audit fees than year or auditor fixed effects. Accountants have more similar pay and are more likely to transition into and out of occupations demanding similar skills to accounting. Our paper is the first to jointly model the public and nonpublic accounting inputs to the audit process, and the interactions between accounting and non-accounting occupations in the labor market.

JEL Classification: M41, M42, M51, M52, J23, J24

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1. Introduction

In this paper, we study three questions surrounding the human capital inputs to financial statement preparation and auditing, which we refer to collectively as the “audit process.” First, how is the audit process organized in terms of the mix of competencies (henceforth, “skills”) required of public and nonpublic accounting labor? Second, how do these skills relate to audit fees and quality? And third, how do the skills demanded relate to who enters public and nonpublic accounting occupations and how much they are paid?

We focus on human capital inputs on both the preparer and auditor side to gain a better understanding of the drivers of audit quality, which is vital to contracting and the functioning of capital markets. Audit quality is an outcome of the audit process, and therefore cannot be fully understood without considering the inputs to the process. Personnel are the primary input to the audit process (Causholli et al., 2010, Francis 2011), and therefore the skills of both public and nonpublic accounting personnel can influence audit quality.

As DeFond and Zhang (2014) argue “We also know little about… client competencies.” Additionally, the audit literature investigating personnel is undeveloped and primarily focused on audit firm partners.¹ This gap in competencies research arises because settings commonly studied in the literature offer few signals of the tasks personnel (especially those in nonpublic accounting) perform, the skills they possess, or their compensation.

¹ Existing work studies partner experience and industry expertise, and links these characteristics to audit quality. But partners are only one party of many (non-partners at the audit firm, clients). Furthermore, audit quality is influenced by client firm characteristics and personnel as well. Abbott, Daugherty, Parker, and Peters (2016) provide evidence on the relevance of preparers’ internal audit function. Beck and Mauldin (2014) focus on CFO and audit committee characteristics as determinants of audit fees. The focus in these studies is typically on high-level human capital, plausibly due to a paucity of data on other personnel.
Our study is also motivated by recurring claims that technology is transforming occupations and labor markets (see Acemoglu and Restrepo 2018 for an overview). One common refrain specific to accounting and auditing is that blockchain and other forms of automation will transform certain tasks or the type of candidate employers seek (PCAOB 2017). Notably, technology can affect audit and accounting positions both through the technology explicitly used by personnel (e.g., digitization of ledgers) and through complementarities with other types of labor employed (e.g., using specialized data analysts to detect informative patterns in accounts). Our data spans important technological advances and permits us to observe how these advances manifest in demand for audit and accounting personnel through both the direct adoption and the complementary labor channels.

Beyond technological changes, we consider accounting and auditing competencies in the context of the joint public/non-public labor market as well as the broader labor market, as changes in related jobs can have spillover effects if there is overlap in skill requirements or if there are complementarities across jobs. We investigate skill and salary differences between three types of positions: a) public accounting (auditor side), b) nonpublic accounting (client side), and c) non-accounting (e.g., those in related occupations such as finance or IT). Despite growing interest in the public accounting labor market (e.g., Barrios 2020; Duguay, Minnis, Sutherland 2020), there is little evidence on the effects of related positions such as (b) or (c) on public accountants and the audit process. Cross-effects are likely, as employees switch between these three types of job frequently, and employment decisions and pay should depend on the similarity of tasks and skills required across positions. With inelastic supply of skills relevant to audit personnel, demand for

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2 “In imperfectly competitive labor markets, workers do not necessarily earn their marginal product. Instead, wages depend... on the degree to which workers can find other jobs if the firm’s offer is not sufficiently generous—their outside options.” (Schubert, Stansbury, and Taska 2020).
skills in related positions can have significant effects on the cost to audit firms and clients of obtaining the labor necessary to perform high-quality audits, and the resultant implications for the audit process.

We use a comprehensive sample of over 100 million job postings from Burning Glass Technologies (BGT) to understand the skills demanded by public and nonpublic accounting positions in the context of the broader labor market. According to their website, BGT boasts “the world’s largest and most sophisticated database of labor market data and talent” including the overwhelming majority of online job postings by U.S. employers since 2007. For each posting, they record the occupation, title, employer, location, date, as well as any salary and employment, education, and skill requirements disclosed. This enables us to identify accounting occupations distinctly from related ones (e.g., clerical, IT, or finance positions at the same employer) and further separate public from nonpublic accounting positions based on whether the employer belongs to the industry “Offices of Certified Public Accountants.”

The dataset offers two key advantages for investigating our research questions. First, the detailed skill requirements provide a natural proxy for the public and nonpublic accounting competencies involved in accounting and auditing. Clients and auditors have incentives to organize their competencies to maximize the joint surplus of their relationship (Coase 1937; Williamson 1979). Our assumption is that the mix of client and auditor competencies involved in accounting and auditing is revealed by the skill requirements appearing in job postings for public and nonpublic accounting positions.

Second, the employers covered by BGT span public accounting firms (from the Big 4 to Tier 3 auditors), audit clients (most large publicly traded clients and many privately held ones), and employers in related professions (IT, financial analysis, consulting, etc.). Interestingly, public
accounting comprises only 6% of the job postings and under 10% of the employment recorded by the census within the accounting occupation.

We begin by comparing postings across three types of positions: (a) public accounting, (b) nonpublic accounting, and (c) a benchmark group of management, financial, and computer positions. While public and nonpublic accounting positions demand a similar total number of skills, the skill composition differs considerably. Public accounting positions emphasize financial, cognitive, and social skills, while nonpublic accounting positions more frequently demand IT skills. Public accounting roles also pay more and demand more experience and education. Compared to the benchmark group, public and nonpublic accounting positions pay less, demand fewer IT skills and more cognitive skills.

We then verify that these differences are not a manifestation of geographic heterogeneity or local economic shocks. Specifically, we model total skills, skill composition, and salaries in regressions that control for MSA x year fixed effects and find comparable patterns to those mentioned above. We also extend our findings by modeling the trend for each skill type, and document significant changes in positions over time. Public accounting positions are demanding far fewer IT skills but more cognitive and social skills each year, while the opposite pattern emerges with respect to IT and social skills for nonpublic accounting positions.

In terms of salaries, public accounting positions increasingly pay more, while salaries for nonpublic accounting and the benchmark group of management occupations have been converging to the broader set of occupations. We uncover interesting variation in the sensitivity of salaries to skill, education, and experience requirements across occupations. Across all occupations, there is a sizable premium for cognitive and financial skills, and this premium is even larger for public accounting positions. Meanwhile, cognitive skills are discounted in nonpublic accounting
positions (i.e., nonpublic accounting jobs seeking more cognitive skills offer lower salaries, on average). Moreover, education and experience are less important to explaining public and nonpublic accounting salaries than non-accounting salaries.

Overall, we view this descriptive evidence as useful for understanding public and nonpublic accounting positions and their role in the audit process. Compared to nonpublic accounting positions, public accounting positions pay more, demand more experience, and demand more cognitive and financial skills that are highly valued in the labor market. Moreover, public and nonpublic accounting positions have undergone significant transformations since 2007, diverging in their demand for IT and social skills. Given our research design, these developments cannot be explained by common shifts in how employers craft job postings (e.g., changes in the length of postings or certain widespread skills becoming redundant to list), or by time-invariant features unique to accounting occupations.

Instead, our results plausibly highlight a divergence in the effects of evolving technology on non-public versus public accountants. Non-public accountants are tasked with implementing the firm’s accounting systems, which are essentially software packages that may be updated as software vendors release new versions or discontinue support for legacy options (Labro and Stice-Lawrence, 2020). Operating an accounting system is a specialist job that requires direct use of

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3 This interpretation is consistent with views expressed in accounting trade publications, such as Accounting Today: “That’s what we [public accountants] were educated to do anyway, right? We learned about debits and credits and reconciliations and tax laws so that we could take that knowledge and put it to actual use, not to sit in a corner and do calculations and input numbers into Excel, QuickBooks or whatever else your firm uses!” (Padar 2020).
specific software, may be done relatively independently, and may not have cognitive requirements beyond ensuring the accuracy of the inputs to and outputs from the software.\footnote{4}

Public accountants, in contrast, are generalists and rely more heavily on cognitive skills. While they may work with a single client for extended periods or focus on a specific industry, their jobs require the ability to apply audit procedures across changing firm-specific technologies, evaluate managerial assumptions, and make judgments about the materiality of accounting choices. Technological advances require public accountants who can quickly learn the relevant information about and adapt to firms’ IT systems. Regarding social skills, public accountants need them to operate effectively across audit teams and maintain profitable relationships with clients. Technological improvements can increase the demand for social skills as IT specialists are added to audit teams or auditors are required to work with a broader set of client employees (i.e., both accounting and IT).

Our next tests link public and nonpublic accounting competencies to audit fees by matching the employers in our BGT dataset with the auditors and clients in Audit Analytics. We find that both client and auditor lagged total skill requirements are positively related to fees. While these exploratory analyses are not designed to establish a causal mechanism, we note that our skill variables explain a meaningful share of the variation in fees. For example, the total skill requirements for clients and auditors each explain more variation in fees than auditor and year fixed effects, and roughly the same amount of variation as industry fixed effects.

\footnote{4}{Of course, accounting managers, such as the controller and CFO are likely to require significant cognitive and social skills, but the vast majority of non-public accounting postings come from rank-and-file employees rather than the top management team.}
Our final tests study the role of competencies in the accounting labor market. We predict that similarities in required skills across occupations explain employee mobility as well as the salaries offered. We construct a pairwise measure of skill similarity between accounting and each other occupation based on the cosine similarity of the skill vectors for each pair. Using an occupation transition matrix based on a large sample of resumes collected by BGT, we find that occupations with similar skill demands to accounting experience greater frequency of employees switching into and from accounting positions. Not surprisingly, the occupation with the highest cosine similarity (Financial Managers) also has the highest mobility with respect to accounting. We also find that the gap between the occupation’s salaries and accounting salaries is decreasing in the similarity of their skill demands. Last, to assess the generalizability of our evidence, we complement our BGT data with a sample of postings appearing in major newspapers between 1940 and 2000. Over the past 80 years, we find skill requirements for accounting positions increasingly resemble those for benchmark management, finance, and computer occupations. Moreover, skill similarities across occupations explain wage differentials in the 1940-2000 period. Together, these results illustrate the importance of both changes in skill demand and non-accounting positions to understanding the labor market for accountants.

An important assumption underlying our approach is that job postings provide a useful signal of the competencies involved in the audit process and actual salaries paid. This raises concerns about generalizability, as well as whether postings are representative of the workers actually hired and the tasks they perform. First, Hershbein and Kahn (2018) note that the majority of job postings during our sample period are online postings, and that BGT captures the overwhelming majority of U.S. postings. Second, as we detail in Section 3.3, other research using BGT data finds significant correlations between the industry composition, skill requirements, and
employment requirements in BGT postings and those in other labor datasets including the Current Population Survey and Occupational Employment Statistics. Last, we view our mobility and salary differential tests as providing market-based validation for our assumption that skill requirements in postings are positively correlated with competencies involved in accounting work.

We make two contributions. To our knowledge our paper is the first to jointly model the public and nonpublic accounting competencies involved in the audit process. We show that the two inputs differ in the mix of skills employed, pay, and the relation between skills and pay. Furthermore, both position types undergo meaningful changes during the twelve-year period we study. An implication of these results is that the audit process involves distinct public and nonpublic accounting inputs, and that this process is evolving. Moreover, when modeling audit fees and outcomes, client and auditor fixed effects may not subsume these changes in the process because the client and auditor competencies are changing. Reinforcing this, we find that our skill measures explain more variation in audit fees than auditor or time fixed effects.

Second, we extend the emerging literature concerned with the market for accounting labor. This work focuses on the public accounting side of the market by studying audit partners (Carey and Simnett 2006; Lennox and Wu 2018), occupational licensure (Barrios 2020; Cascino, Tamayo, and Vetter 2020; Duguay, Minnis, and Sutherland 2020), and entrepreneurship (Vetter 2020). However, the majority of accounting positions in the U.S. are nonpublic accounting positions. Our setting permits us to study both types of accounting positions, as well as related occupations in management and finance. We find that the composition of and compensation for the accounting workforce hinge on the skill demands and pay for related occupations. Thus, an understanding of developments in non-accounting occupations is useful for modeling who enters accounting positions and how they are paid.