Tax Reforms and Firms' Demand for Tax Talents

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ABSTRACT

This study analyzes the effect of tax reforms on firms' demand for tax department employees with different qualification and skill profiles. Using 0.7 million tax-related job advertisements from LinkUp and the Tax Cuts and Jobs Act as a quasi-experimental setting, we find a significant increase in the number of posted tax-related job advertisements by an average of 13%. This effect is concentrated in longer time periods of 24- and 36-months post-reform. Given the mix of anti-avoidance measures and features deemed to strengthen the local economy introduced by the reform, we find that firms seek tax department employees for tax planning and tax compliance equally. Lastly, we find that the demand increases both for low- and high-skilled employees.

Keywords: tax department structure; tax risk; tax complexity
JEL Classifications: H25, H26, M12

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I. Introduction

In this study, we analyze firms' tax reform induced costs occurring from the investment in tax department employees. Using job advertisement data from LinkUp, we investigate the demand for tax department employees and their qualifications over time and thereby study firms' hiring strategy based on the number of tax jobs and sought after qualification and skill profiles in demand. This further allows us to estimate the costs associated with the respective hiring strategies. We use the Tax Cuts and Jobs Act (TCJA) as an exogenous shock for a quasi-experimental setting and as a prominent example of a recent tax reform aiming at attracting local investments while simultaneously introducing anti-tax avoidance measures. It is unclear how these two aspects translate into hiring strategies and whether investment in tax planning employees or tax compliance employees dominates. We investigate the demand for different qualification profiles considering the role of increasing technological support structures in firms' tax function.

To answer our research question, we proceed in four steps. First, we study the change in the demand for the number of tax employees. Second, we exploit the qualification section of the job advertisements to examine the demand for employees in tax compliance and tax planning. Third, we use wage changes for the demanded qualifications and the difference in the number of job postings to calculate the incremental labor costs. Finally, we employ heterogeneity analyses to identify differences across firms' demand for qualified talents and labor costs depending on their tax strategy. We identify those firms that respond most sensitively to the reform in their hiring strategy and provide evidence on the dominating mix of qualifications and skills chosen to cope with the complex changes in the tax system.

In recent years, countries have introduced stricter tax regulations to fight undesired tax avoidance, increase overall tax compliance (Kirchler et al., 2008; Batrancea et al., 2019), and generate more tax revenues (OECD, 2023). These reforms often include extensive additional

reporting requirements. Further, they are characterized by a high degree of regulatory uncertainty of how the new regulations and the provided information will be interpreted and used in audits. Very likely these tax reforms increase tax complexity (Hoppe et al., 2018), the administrative burden for firms (Mills, 1996), and the time and resources spent to be tax compliant (Marcuss et al., 2013). For example, the White House Office of Information and Regulatory Affairs estimates that US businesses spend more than 1.1 billion hours to comply with Internal Revenue Service (IRS) tax filing and reporting requirements (Hodge, 2023).

In addition to reporting requirements, the TCJA includes many novel and complex regulations such as the Global Intangible Low-Taxed Income (GILTI), Foreign-Derived Intangible Income (FDII) or the Qualified Business Income Deduction (QBI) that also interact. Against the background of the many new regulations and the inherent tax complexity, tax compliance cost and tax planning cost are expected being substantial and to affect business decisions. For instance, Gao et al. (2009) show that firms reduce overall investment to avoid higher tax complexity and compliance costs. Contrastingly, Euler et al. (2023) and Amberger et al. (2023) provide evidence that multinational firms increase their investment in countries with high complexity in tax regulations. This mixed evidence indicates that firms differ in their strategies in response to regulations that induce increased compliance costs and simultaneously new tax planning opportunities. We unravel these convoluted research results on firms' compliance and tax planning behavior by providing evidence on firms' post-reform hiring strategies and their specific qualification and skill requirements for new tax employees. This analysis will help us to infer about their tax strategy.

Studies investigating tax compliance costs merely rely on a holistic view of the overall firms' compliance activities, such as tax calculation, tax return preparation, documentation, tax planning, and tax audits, to estimate associated tax compliance costs (Slemrod & Blumenthal, 1996; Slemrod & Venkatesh, 2002; Eichfelder & Vaillancourt, 2014). We go beyond these

studies and investigate tax compliance costs arising from major tax reforms and to what extent these additional tax compliance requirements trigger investments in tax department employees and shape the demanded qualifications. Closing this gap is important because qualified tax department employees are essential for tax compliance, especially in an environment with increasing technological investments and support structures (Krüger, 1996; van Reenen, 1997). This is even more the case in times of an alarming shortage of qualified talent and an intensifying war for talent in taxation and related fields of accounting among firms and also by the tax administration (Nessa et al., 2020).

Using 0.7 million tax-related job advertisements[1] from the LinkUp database for a sample of 861 non-financial S&P 1,500 firms, we document an increase in the number of job advertisements after the TCJA. This effect is concentrated in the medium (24 months after the reform) and long run (36 months after the reform). The documented increase in job advertisements of on average 13% translates into additional demand for approximately 3 tax department employees per year. Using an estimate for the salary of tax managers in the US of $ 114,933 (Chen et al., 2021) this translates into average total costs of $ 344,799 per firm in a 12-month period.

In additional tests, we find that firms seek tax department employees both, for tax planning, to exploit potential tax planning opportunities arising from the reform, and similarly for tax compliance, to ensure that they cope with the new or changed complex regulations. Lastly, we document that firms seek both high-skilled as well as lower-skilled employees. However, the demand for high-skilled employees is higher for firms that are more affected by

[1] Using job advertisements instead of e.g. hand-collected LinkedIn data (Barrios & Gallemore, 2023; Giese et al., 2023) or surveys (e.g., Klassen et al., 2017) enables us to focus on firms' demand instead of matched demand and supply outcomes.

the TCJA.

Our study extends previous literature in at least three ways. First, we add to research on compliance costs of tax regulation, by examining firms' labor demand and costs of one specific tax reform. Previous literature documents that the complexity of a tax system leads to additional tax compliance costs (Mills, 1996), e.g., by increasing the time and costs of preparing a tax return. Slemrod (1989) attributes this to the difficulty and manipulability of the tax system. Additionally, compliance costs increase during tax audits (Mills, 1996), are higher for firms operating more internationally (Blumenthal & Slemrod, 1995) but decrease relative to firm size (Slemrod & Venkatesh, 2002; Eichfelder & Hechtner, 2018). Furthermore, introducing new regulations can cause efficiency losses and political, litigation, adoption, or planning costs (Watts & Zimmerman, 1978; Marneffe & Vereeck, 2011).

Second, we extend the literature on the effects of the TCJA by examining its costs. We thereby extend numerous previous studies that provide evidence of the reform's importance for firms and policymakers as it, e.g., affects foreign investments (Samuel, 2023) or triggers income-shifting responses (Atwood & Johnson, 2021; for a full overview, see The TCJA Effects Tracker, Hoopes, 2023). Prior studies mainly focus on the benefits of the TCJA e.g., concerning the tax base. Dyreng et al. (2023) provide evidence that the tax burden of domestic and multinational firms decreases due to lower domestic taxation. Relatedly, Wagner et al. (2020) find that the Cash and GAAP ETR are generally decreasing after the reform. However, they document that about 15 % (30 %) experience an increase in the GAAP (Cash) ETR, resulting in costs for these firms. None of these studies provides compliance cost estimates associated with the TCJA, and our estimates provide a more holistic picture of the economic implications of the reform.

Third, we more broadly contribute to the literature on costs arising from general

regulatory changes in other fields, such as new developments in accounting standards. Research on IFRS implementation in Australia shows that more complex accounting standards increase implementation errors (Loyeung et al., 2016). Furthermore, IFRS adoptions are associated with higher audit fees due to increased audit complexity (Kim et al., 2012; De George et al., 2013) and higher direct implementation costs. In this regard, our study is most closely related to the work by Enache et al. (2022). They investigate the changes in labor costs associated with the introduction of the new reporting standards "Topic 842 Leases" and "Topic 606 Revenue from Contracts with Customers" in the USA. The authors find that the number of accounting job advertisements and, therefore, public firms' labor costs increase after introducing these reporting standards. Following their approach, we are the first to document the change in tax department employees following a tax reform. For our setting, their IFRS-related results reflect only the lower bound of the effect. Due to the country-specific heterogeneity of tax laws, we expect a higher complexity associated with tax reforms than with accounting reforms. Thus, we expect a larger increase in the number of job advertisements compared to Enache et al. (2022). Secondly, we go beyond their findings, by examining to what extent qualification requirements in job advertisements change. By doing so, we provide a more nuanced cost estimate.

Our findings have important implications both for decision-makers in firms and policymakers. From a business perspective, we inform decision-makers about using tax department employees as a strategy to deal with reform-induced complexity. For policymakers, we provide a quantification of tax compliance-related labor costs, which gives them guidance for designing future tax reforms. Finally, our results also inform researchers about the cost side of beneficiary tax reforms.

The remainder of the paper is organized as follows. Section 2 provides a summary of the research and derives our hypotheses. Sections 3 and 4 describe the econometric design and the data set. In Section 5, we present the empirical results. The paper concludes in section 6.

II. Related literature and hypotheses development

Prior studies document that tax reforms increase firms' tax compliance costs, such as tax calculation, tax return preparation, and documentation, but also tax planning (Slemrod & Blumenthal, 1996; Slemrod & Venkatesh, 2002; Eichfelder & Vaillancourt, 2014). While these studies focus on a holistic measurement of tax compliance costs occurring from external advisors and existing internal employees, these findings in general should also hold for labor costs from hiring new tax personnel.

However, firms might not invest in their tax department employees for at least three reasons. First, firms could outsource the increased tax compliance burden to external tax advisors, particularly if they expect only a short-term burden (Lankford & Parsa, 1999). In this case, firms might predict that hiring additional employees would cause more costs in the long term than outsourcing the work to external advisors. Second, firms might employ technology to cope with most of the reform-induced changes. Nevertheless, in the presence of tax personnel, technological investments can even crowd out the compliance efforts of the employees (Dyck et al., 2022). Hence, an investment in technology only is not the most promising approach. Third, even though a firm might prefer hiring employees over implementing new technology, they may anticipate a shortage in the labor market for the needed talents and substitute employees with technology or train existing tax employees to cope with the requirements of the new regulation.[2]

Given the complex and numerous changes of the TCJA, to which the firms needed to react rapidly, we argue that neither external advisors, training of employees, nor the implementation of technology solves the firms' challenges exclusively and state our first hypothesis as follows.

[2] To test the prevalence of the different channels, we will perform seemingly unrelated regressions (SUR).

H1: The number of tax-related job advertisements increases after the reform.

The complexity of the TCJA as well as the increasing use of technology will raise the demand for educated and experienced employees. Moreover, Loyeung et al. (2016) document that firms try to avoid errors while implementing newly enacted regulations and find that higher CFO qualification is negatively associated with implementation errors. Hence, we anticipate that after the tax reform job qualifications will change to higher-qualified labor. Moreover, we expect that firms will seek for TCJA-specific qualifications. We therefore expect an increase in sought-after employees who have previous experiences working with repatriation taxes, depreciation on capital investments, and international tax law (Gale & Haldeman, 2021; IRS, 2023).[3] Leading to the following hypothesis.

H2: The job requirements change towards higher-qualified employees and employees with tax reform-related experiences after the reform.

Besides increasing tax complexity, this tax reform has also eliminated some tax planning opportunities by increasing profit-shifting costs. As a consequence and in line with transaction cost theory (e.g., North, 1990), firms have to adjust their tax planning strategies by employing new tax planning opportunities and being more attentive towards tax compliance. Therefore, we state the following hypothesis.

H3: The demand for tax compliance and tax planning employees increases after the reform.

[3] For example, firms could demand tax experts with experience in multinational firms and exposure to interest deductibility limitations from other countries that are related to the newly introduced corresponding TCJA regulation.

III. Research Design

According to Hypothesis 1, we expect an increase in the number of tax-related job advertisements after the reform. We use two regression designs to test this hypothesis. First, we use an event study design described by Equation (1) based on monthly firm-level job advertisement information and built on the TCJA being a quasi-experimental shock to firms' demand for tax department employees. We estimate the following equation on a firm-month level.

$$\sum JP_{it} = \beta_0 + \beta_1\, post_t + \delta\, firm_i + \gamma\, calendar\_month_t + \varepsilon_{it} \qquad (1)$$

The dependent variable JP_{it} is the natural logarithm of the newly posted job advertisements by firm i in month t. Since this variable is skewed, we use the natural logarithm of newly posted job advertisements.[4] In planned alternative specifications, we will use the number of outstanding job advertisements, the duration of publication as well as a seniority-level-weighted number of job advertisements as well. The post indicator is the main independent variable. It takes the value of one for months after the enactment of the TCJA (January 2018) and zero otherwise. We control for firm-specific properties using firm fixed effects. Additionally, we include calendar month fixed effects to control for seasonality effects. To differentiate between short- and long-term labor effects, we use periods of 12, 24, and 36 months before and past the reform. A definition of all variables used is stated in Table 1.

[Insert Table 1 about here]

The results of Equation (1) allow no causal inferences. Therefore, we expand the event study design through a subsequent regression model and apply the following difference-in-

[4] We increase the number of newly posted job advertisements by one before taking the logarithm to avoid losing meaningful zero values.

differences estimation. We use three distinct control groups for this analysis. First, we use Canadian S&P/TSX Composite Index firms as the control group. Second, we compare more- (e.g., firms with above average foreign subsidiaries) and less-TCJA-affected firms (e.g., firms with below average foreign subsidiaries) and third, a within-firm design, using job advertisements of different non-affected departments such as marketing as the control group (planned).

$$\sum JP_{it} = \beta_0 + \beta_1\, post_t + \beta_2\, treated_i + \beta_3\, post_t * treated_i + \delta\, firm_i + \gamma\, calendar\_month_t + \varepsilon_{it} \qquad (2)$$

The dependent variable JP_{it} and the post indicator are defined as in Equation (1). $treated_i$ is an indicator variable equal to one for US firms and zero for Canadian firms. The explanatory variable of central interest is the interaction term $post_t$*$treated_i$. According to Hypothesis 1, we expect that the TCJA will increase the demand for tax department employees and hence, a positive coefficient estimate for β_3. Again, we include firm and calendar month fixed effects.

In our second hypothesis, we expect firms to hire more qualified and more TCJA-experienced employees (planned). To test this, we apply the following difference-in-differences regression design.

$$\sum Qualification_{it} = \beta_0 + \beta_1\, post_t + \beta_2\, treated_i + \beta_3\, post_t * treated_i + \delta\, firm_i + \gamma\, calendar\_month_t + \varepsilon_{it} \qquad (3)$$

With $Qualification_{it}$ being a Machine Learning-based estimated vector of attributes, the firm seeks after. Required skills in the job advertisements are identified using natural language processing (NLP). We therefore apply a pre-trained Bidirectional Encoder Representations from Transformers (BERT) language model, named JobSpanBERT (Zhang et al., 2022)[5], to the

[5] The respective model is publicly available at the following address: https://huggingface.co/jjzha/jobspanbert-base-cased

job descriptions that classifies certain parts of the description as sought-after skills and knowledge. The model identifies soft skills in the *skills* category and fact-based knowledge as well as technical skills in the *knowledge* category (Zhang et al., 2022). Afterwards, the results are clustered to certain topics using BERTopic.

Lastly, we hypothesize that firms seek equally more tax planning as well as tax compliance employees after the TCJA. According to H3, we expect firms to hire more tax compliance employees. Besides, the TCJA has also eliminated some existing tax planning opportunities, requiring firms to change their tax planning strategies. Therefore, we also anticipate an increase in sought-after tax planning employees, tested in equation (4).

$$\sum Compliance_{it}/Planning_{it} = \beta_0 + \beta_1\, post_t + \beta_2\, treated_i + \beta_3\, post_t * treated_i + \delta\, firm_i + \gamma\, calendar\_month_t + \varepsilon_{it} \quad (4)$$

The dependent variable $Compliance_{it}$ ($Planning_{it}$) is the natural logarithm of the number of job advertisements by firm i in time t that are classified as tax compliance (planning) employees using Machine Learning. We divide job postings into these two categories using the skills and knowledge that were identified by the BERT model. To proxy tax planning employees, we rely on literature investigating how the position, job title, and personal characteristics of tax employees affect tax planning. E.g., (Dyreng et al., 2010) show that executive managers significantly affect firms' ETR. Feller & Schanz (2017) underscore that the successful modification of a firm's tax planning strategy is contingent not only on the accessibility and desirability of such a strategy but also critically depends on the tax manager's ability and skills to implement changes to the firm's tax planning strategy. The authors further divide the characteristics of tax manager power into four categories (internal formal power, internal informal power, external reach, and capabilities), of which 'capabilities' – representing personal requirements – is the most relevant factor for our study. In line with their results, we identify *expert functional knowledge* (higher education, prior work experience, and higher level

of firm relevant/unique knowledge) and *social skills* (clear communication, negotiation skills, and proactivity) as our first two requirements to proxy tax planning (Feller & Schanz, 2017). Furthermore, Ege et al. (2021) find a positive association between the power and status of the tax department, measured by the rank of the title of the top tax executive, and tax planning. Therefore, we consider the described level and profile of employees in demand in job advertisements related to tax planning.

IV. Data and Descriptive Results

Sample Selection

Our sample consists of all firms included in the S&P 1500 as of January 1, 2018, the effective date of the TCJA. These firms represent a sample comparable to the population of US firms and are thus suitable for analyzing the effects of the TCJA. We exclude highly regulated firms in the financial- and insurance industry (SIC 60 to SIC 64) as well as foreign firms without US headquarters from our sample.[6] This sample selection procedure results in 861 unique firms and 8,700 firm-month observations.

LinkUp data

To estimate the firms' demand for tax department employees, we use data from LinkUp. The database offers daily information on 275 million job advertisements beginning in 2007. Using LinkUp data is beneficial as they are scraping job advertisements directly from the firm's website, avoiding duplicated data compared to data providers that also include job market platforms. Other studies utilizing the LinkUp data, e.g., find that the time a firm needs to fill an open accountant position is positively associated with the likelihood of material internal control

[6] Additionally, we exclude firms that provide wage tax assistance only. These firms are not suitable to answer our research question while publishing many jobs and are therefore excluded from the sample to avoid misleading results.

weaknesses (Hann et al., 2023), that job postings are informative for the firms' future performance, and that investors react positively to a change in the number of job advertisements (Gutierrez et al., 2020). To identify relevant tax job advertisements, we first perform a keyword search with tax and transfer pricing-related keywords over all available job descriptions in the LinkUp database. Afterward, we exclude the jobs that use the word *tax* only once and those that include only tax benefit terms. Finally, we use a Bag of Words (BoW) approach to classify tax jobs of the remaining job advertisements.[7] These sample selection steps result in approximately 700,000 identified tax job advertisements for the USA. Considering only the tax job advertisements of the non-financial S&P 1500 firms, our investigated sample covers 185,617 jobs (see Table 2). For further analysis, we use firm-specific data from the databases EIKON, Compustat, and Audit Analytics.

[Insert Table 2 about here]

Bag of Words

To identify a raw sample of tax job advertisements in the first step, we performed a keyword search of all US job advertisements using the keywords *tax* and *transfer pricing*. Afterward, we use the BoW approach to classify the job advertisements as tax or no-tax jobs, to receive our final tax job sample. Therefore, we first identify a subsample of tax and no-tax jobs by hand. The tax jobs included in these subsamples are those, in which the words *tax* or *transfer pricing* are included in the job description and the job title. The subsample of no-tax jobs includes descriptions, that cover the word *tax* only once or only in the context of tax benefits.[8] After identifying these two subsamples of tax and no-tax jobs, we train a prediction

[7] Additionally, we manually check all by the BoW classified tax jobs that have a certainty of being a tax job between 5% to 95%.

[8] The tax benefit keyword list used to identify no-tax jobs is identified by manually checking job descriptions. The keyword list includes the words: "pre-tax flexible spending, pre-tax health savings, post-tax dollars, tax withholding, tax-free, tax free, tax benefit, pre-tax employee contribution, pre-tax".

model that is afterward used to classify the remaining job advertisements. We split the subsamples into 80% training and 20% test data, as is common in the machine learning literature. The model predicts tax jobs with a training accuracy of 96.52% and a test accuracy of 96.31%, indicating a reliable model while being less concerned that the model might be overfitted.[9] The Receiver Operating Characteristic (ROC) curve (Figure 1) and the Confusion Matrix (Figure 2) show further details on the precision of the prediction test.

The ROC curve plots the true positive rate against the false positive rate of the prediction. As shown in Figure 1, the classification model predicts whether a job advertisement is a tax or no-tax job with a high certainty. Besides the almost perfectly shaped ROC curve, the area under the curve (AUC) measure, with possible values between 0 and 1, states a value of 0.99, which confirms the model's precision. The Confusion Matrix in Figure 2 provides further insights into the true and false positive predictions of the classification model for the test data. As stated in the figure, the classifier rarely takes wrong predictions. To further avoid including wrong tax job predictions in our final sample, we check all job advertisements classified by the model with certainty between 5% and 95% by hand.

[Insert Figure 1 and Figure 2 about here]

The classification model identifies two bags of tokens that are the most important for the classification of tax and no-tax jobs. Figure 3 shows these word tokens for the no-tax jobs and Figure 4 for the tax jobs. While the non-tax bag contains tokens that do not appear to be

[9] The low difference of 0.21 percentage points (0.22%) between the training and test accuracies indicates a well-fitted model that suitably can classify the remaining job advertisements as tax or no-tax jobs. We further performed cross-validation tests. Therefore, we used five subsets of test and training data and repeated training and validation of the model to estimate the models' performance. We received, almost similar, five cross-validation accuracy scores (0.95987165, 0.95980879, 0.95976293, 0.95970857, 0.96015533) suggesting a consistent and good model performance. The mean cross-validation accuracy is 95.99%. This score is close to the training and test accuracy further validating the model's robustness and can rule out overfitting concerns of the model.

related to a specific job, the tokens identified in the tax bag have a clear tax and accounting reference. In addition to tokens describing direct tax activities, such as *tax returns*, *tax services*, or *tax preparation* the word *irs* is particularly common. Accordingly, tax department employees often seem to be in demand for communication with the US tax authority. Compliance appears relatively often in the tax job advertisements and therefore seems to be a key responsibility of the sought-after employees. This approach also suggests a close relationship between the tax and accounting departments of the firms. Support during audits is also frequently mentioned. These initial descriptive analyses, primarily used to classify job advertisements, also reveal that employees are often being sought to prepare tax returns, ensure tax compliance, and assist during audits.

[Insert Figure 3 and Figure 4 about here]

Number of Job Advertisements

We start our analysis by descriptively examining the effect of the TCJA on the number of monthly job postings on a macro level. Figure 5 and Figure 6 show that the demand for U.S. tax department employees increased in the S&P 1500 sample after the TCJA, both, for the three-year pre- and post-sample period (Figure 5), as well as for the shorter two-year pre- and post-period (Figure 6).

[Insert Figure 5 and Figure 6 about here]

We test this visual impression using an event study design. Table 4 shows the results for a three-, two-, and one-year pre- and post-TCJA period in columns (1) and (3). We only find statistically significant effects on conventional levels for the longer periods of two years (10%-level) and three years (1%-level). This might indicate that firms needed some time to analyze their demand and post job advertisements. The effect is also significant in economic terms. The coefficient estimate of 0.0749 (0.0304) in the three-year period translates into an increased demand of 8 % (3.3%) after the TCJA. Using the average number of monthly tax-related job

postings (1.95), this translates into 1.9 additional job postings per year or $ 215,154 of additional tax personnel costs (using an average salary of $ 114,933[10]). In contrast, we find no statistically significant effect for the shorter one-year period. Besides, the effect size is also much smaller (0.0194) compared to the two- and three-year period estimates.

[Insert Table 4 about here]

Sought-after skills and knowledge over time

Using the JobSpanBERT model, we identify sought-after skills and knowledge in job advertisements. The model divides the requirements into these two categories, with skills comprising attitude, i.e. soft skills, and knowledge comprising fact-based knowledge, i.e. hard skills (Zhang et al., 2022). Before providing descriptive insights into changes in skills and knowledge over time, we cluster the JobSpanBERT results using BERTopic, to provide first insights into the most important skill and knowledge requirements for tax employees.

The BERTopic model identifies 20 skill topics (Figure 7). Topic 0 shows that the ability to prepare tax returns is a crucial skill for sought-after employees and that employees should also be able to work with data (Topic 11). Besides these knowledge-related tax skills, soft skills like leadership (Topic 2) and good communication (Topic 3) are required frequently, indicating that firms seek employees in higher positions. The employees should be able to work in teams (Topic 5) while being self-motivated and collaborative workers (Topic 13). Additionally, employees should be self-organized, have good time management skills (Topic 8), and be able to manage stress (Topic 12). As analytical thinking and problem-solving (Topic 4) are also relevant skills in the job descriptions, the firms seem to seek employees who can solve complex tasks, communicate well, work in teams, and have leadership skills. Without analyzing every

[10] Chen et al. (2021).

job description yet in detail, firms seem more likely to be interested in employees in higher positions with management responsibility.

Furthermore, the model identifies 12 knowledge topics (Figure 8). Knowledge of tax compliance (Topic 0), financial management, and accounting (Topic 1) is often required from new employees. This provides an early impression that firms focus their tax strategy more on tax compliance and that having a close connection to the accounting departments is relevant. Knowledge of basic software such as Microsoft Office applications (Topic 2) and English and Spanish language skills (Topic 11) are also relevant. It is noticeable that the employee's level of education is highly relevant, as four of the 12 topics include educational knowledge. These topics can be differentiated between lower education, such as high school (Topic 6), first university education (Topic 7 and Topic 9), and higher university and tax-specific education (Topic 4).

[Insert Figure 7 and Figure 8 about here]

In hypotheses 2 and 3, we examine how tax reforms change the required qualifications of tax department employees. We are particularly interested in changes in the demand for skilled and low-skilled employees, as well as employees responsible for tax compliance or tax planning. To provide a first descriptive overview for this analysis, we assign the skills and knowledge topics identified in the BERTopic model to these four categories (see Figure 9 and Figure 10).

Figure 9 shows the skill topic allocation. Concerning H2, we assign almost all skill topics to high-skilled jobs. This is because these topics include requirements that go beyond the qualifications required for instance for accountant positions. For example, the identified skills include a high level of independent working, working with data, or a high level of stress resistance. Such skills are usually attributed to positions where employees have more responsibility and often also hold leadership positions. We only classify the preparation of tax

returns as low-skilled, as this skill describes the basic task of tax department employees and is therefore classified as lower-skilled in comparison to other tax activities. Regarding H3, we follow Feller & Schanz (2017) and allocate social *skills* such as clear communication, negotiation skills, and proactivity as tax planning-related skills. Since almost all topics include skills that are related to analytical thinking, leadership, communication or working independently, and stress resistance, we only assign four topics to the compliance category. Especially, the insurance of corporate governance and preparing tax returns are considered key tax compliance responsibilities. However, we consider the compliance skills teamwork and data work to be relevant for tax planning as well. When comparing the assignment between the categories of the H2 and H3 hypotheses, it is remarkable that almost all skill topics that are assigned to high-skilled jobs are also relevant for tax planning jobs.

As with the skill topics, we also assign the knowledge topics to the four categories (Figure 10). Concerning Hypothesis 2, we consider basic language skills and a high school diploma as well as a bachelor's degree as knowledge that is necessary but sufficient for low-skilled jobs. We also assign software to these jobs. For high-skilled jobs, tax-specific knowledge such as a master's degree in tax, tax compliance expertise, and data analysis skills are considered relevant. As with the skills, we also follow Feller & Schanz (2017) in assigning the knowledge topics for H3 and assign expert functional knowledge to the tax planning category. In particular, this includes tax-specific knowledge and knowledge in related areas such as accounting and data analysis. We also consider some of this knowledge to be necessary for tax compliance, so there is no clear distinction between the two categories for fact-based knowledge as there is for skills. We also assign employees' basic academic education to tax compliance.

[Insert Figure 9 and Figure 10 about here]

Figures 11 and 12 show the development of skill and knowledge topics over time. In

general, knowledge topics seem to increase more than skill topics. Especially the knowledge topics GlobalTaxCompliance, ManagementAccounting, Software, TaxExpertise, and EducationalSkills experience a significant increase over our sample period, which is mostly due to an increase after the TCJA. For the skill topics the demand for ReturnPreparation, AnalyticalThinking, and TimeManagement increase over time. However, in terms of absolute numbers, the knowledge topics dominate.

[Insert Figure 11 and Figure 12 about here]

V. Results

Demand for tax employees (H1)

The event study results, presented in section IV, support our assumption that the TCJA and the associated increase in tax complexity have resulted in greater demand for tax department employees (H1). We validate these findings using a difference-in-differences estimation with Canadian control firms.

Applying a difference-in-differences research design relies on the assumption that parallel trends in the treatment and control groups would have continued absent the reform. Since we cannot test this directly, we focus on investigating whether the treatment and control groups trended similarly before the TCJA using an event study design. Figure 13 displays the corresponding graph. We replace the post indicator of Equation (2) with a series of month indicators. The bars depict 95 percent intervals, and the estimated coefficients can be interpreted as the differential change in the number of job advertisements in the US relative to Canada. The coefficient estimates are indistinguishable from zero for almost all months before the reform, validating the parallel trend assumption. While the pre-trends follow a similar path, in the post-period, the US job advertisements seem to exhibit slightly higher numbers.

[Insert Figure 13 about here]

For the causal interpretation of this figure, we display the results of the difference-in-differences regression in Table 5. The results in column (2) support the descriptive event study results presented in Table 4 for the two-year pre- and post-TCJA period. The number of tax job advertisements significantly increased for the S&P 1500 firms compared to the Canadian firms on a 10%-level (for the two- and three-year period; but also, the coefficient estimates of the one-year period are close to statistical significance at conventional levels). In contrast to the results in Table 4, the coefficient estimates are very comparable in size across the three time periods. The effect size is also 50% larger and ranges from 13.8% (three-year period) to 12.5% (one-year period).

To validate these findings, we use a second control group. Building on previous studies showing that the impact of the TCJA depends on the exposure to foreign operations, we assign treatment and control group based on the number of foreign subsidiaries a US firm has. of US. Focusing on US firms only is advantageous as the S&P 1500 firms should be more homogenous than their Canadian counterparts. However, the heterogeneous effect of the TCJA allows for a less decisive assignment. Using US firms assigned to treatment and control based on a mean number of foreign subsidiary cut-off, we mostly confirm the previous results. We still find a positive and statistically significant effect for the three-year period. The coefficient estimates for the two-year period are close to statistically significance and both effects are of similar size.

[Insert Table 5 and Table 6 about here]

Demand for skills and knowledge (H2)

To address our second hypothesis, we further investigate the results of our NLP analyses described in the data and descriptive results section. First, we identify a potential change in the required qualifications and skill levels of the sought-after tax employees. Therefore, we use the skills and knowledge requirements classified by the JobSpanBERT model and analyze those results in a difference-in-differences design like the ones before. The only difference is that we

replace the natural logarithm of monthly job advertisements with the natural logarithm of the respective skill or knowledge topic (Equation (2)). The respective results (using the US-only sample with treatment and control assigned based on the number of foreign subsidiaries) are depicted in Figure 14 and Figure 15. The results mostly confirm the previously presented time trends. For knowledge, the topics ManagementAccounting and EducationalSkills experience a significant increase due to the TCJA for all three time periods. Surprisingly, also the topic Graduate is sought-after after the TCJA in the treatment group. For the skill topics, the results are more heterogeneous across the three periods. However, ReturnPreparation, Leadership, Communication, AnalyticalThinking, and TeamWork are significant in at least two of the three regressions. However, the coefficient estimates are approximately half the size of the knowledge topics.

[Insert Figure 14 and Figure 15 about here]

To test Hypothesis 2 and 3 more directly, we assign the skill and knowledge topics to low- and high-skilled employees as well as to tax planning- and tax compliance-oriented job advertisements. Figure 9 and Figure 10 display the corresponding classification. Building on this classification, we run regressions following Equation (3). The respective results are reported in Table 7 and Table 8. Table 7 (Table 8) reports the results for the natural logarithm of the number of job advertisements searching for high- or low-skilled (tax planning or tax compliance) tax department employees. The respective Panel A (B) depicts the results for the difference-in-differences analysis using Canadian firms (US firms with lower foreign operations) as controls. The reported results are mixed. While in Table 7 Panel B, the treated firms seek more high-skilled and low-skilled employees, the F-test confirms Hypothesis 2, that the effect is more concentrated among high-skilled employees (approximately 12 to 20% demand for high-skilled tax department employees). However, the evidence in Panel A in this regard is much weaker. In line with previous results, the effects are concentrated within the

two- and three-year columns.

Table 8 depicts the results for Hypothesis 3. We find significant coefficient estimates for the three-year and two-year time periods for the natural logarithm of the number of job advertisements assigned to tax planning and tax compliance. The conducted F-tests point in the direction that treated firms seek more tax planning employees. However, the difference is mostly insignificant on conventional levels.

Further analysis

Building on research on the wage premium of high-skilled labor (Deming & Kahn, 2018), we will estimate the costs firms face for more and higher-skilled employees using a Machine Learning-based wage prediction. Using the identified changes in sought-after skills and knowledge, we can calculate reform-induced labor costs as part of tax compliance costs.

Moreover, firms might be differently affected by the TCJA depending on their characteristics. We expect the demand for more and higher qualified employees to be greater for firms with larger foreign operations and greater capital investments. While we expect firms to act rationally when increasing their tax department size (Chen et al., 2021), we have no clear expectation on whether firms with an above-average number of job advertisements and qualifications cope better with the TCJA regulations, since this also depends on the pre-level tax department size and quality. Hence, we will perform heterogeneity tests and investigate high- vis-à-vis low-reform-affected firms, their responses, and the benefits of those firms hiring more and/or higher-skilled tax department employees.

Robustness tests

Since investing in the tax department's employees (Hypothesis 1) is only one channel firms can manage the TCJA's complexity, we investigate a second channel, the use of auditor-provided tax services. Building on data from Audit Analytics we find that the annual fees

decrease after the TCJA. The results in Table 9 show that the tax fees significantly decrease when considering a three-year timeframe. The estimate of the coefficient in Table 9 of -10.28 translates into a reduction of auditor-provided tax services by almost 10%. Moreover, the reduction in compliance-related fees is almost twice the size of non-compliance fees. However, the effects for the two-year and one-year time window are not significant but still negative. These results support our assumption that the tax department size increased after the regulation and the administrative burden for handling the increased complexity was not shifted to external advisors, especially in the longer period. Firms seem to prefer hiring new employees to build up long-term knowledge in the firm instead of spending the costs to advisors, which might be in sum less costly.

[Insert Table 9 about here]

VI. Conclusion

We analyze firms' investment in tax department employees in response to tax reforms. Using job advertisement data from LinkUp, we first investigate the demand for tax department employees and their qualifications over time. Second, we use the Tax Cuts and Jobs Act (TCJA) as a prominent example and quasi-experimental setting exogenous to firms' hiring strategy and examine its effects on the number and profile of job advertisements. This significant and complex tax reform offers new tax planning opportunities to firms while simultaneously including a multitude of measures deemed to increase tax compliance. In the face of increasing technological support structures in the tax function of firms, it is unclear how these two aspects translate into hiring strategies and whether tax planning or tax compliance is the dominating profile in demand.

We find a significant increase in the demand for tax department employees due to the TCJA using a difference-in-differences design with various control groups. We document an

increase in tax department employee demand of an average of 13%. Second, we document an increase in the demand for both high- and low-skilled employees as well as employees for tax planning and tax compliance tasks. This effect is especially prominent for firms that are more exposed to the TCJA. In further analyses, we will use wage changes for the demanded qualifications and the difference in the number of job postings to calculate the incremental labor costs of the TCJA. Finally, we will employ heterogeneity analyses to identify differences across firms' demand for qualified talents and labor costs depending on their tax strategy. We identify those firms that respond most sensitively to the reform in their hiring strategy and provide evidence on the predominantly chosen mix of qualifications to cope with the complex changes in the tax system.

Our findings have important implications both for decision-makers in firms and policymakers. From a business perspective, we inform decision-makers about using tax department employees as a strategy to deal with reform-induced complexity. For policymakers, we provide a quantification of tax compliance-related labor costs, which gives them guidance for designing future tax reforms. Finally, our results also inform researchers about the cost side of beneficiary tax reforms.

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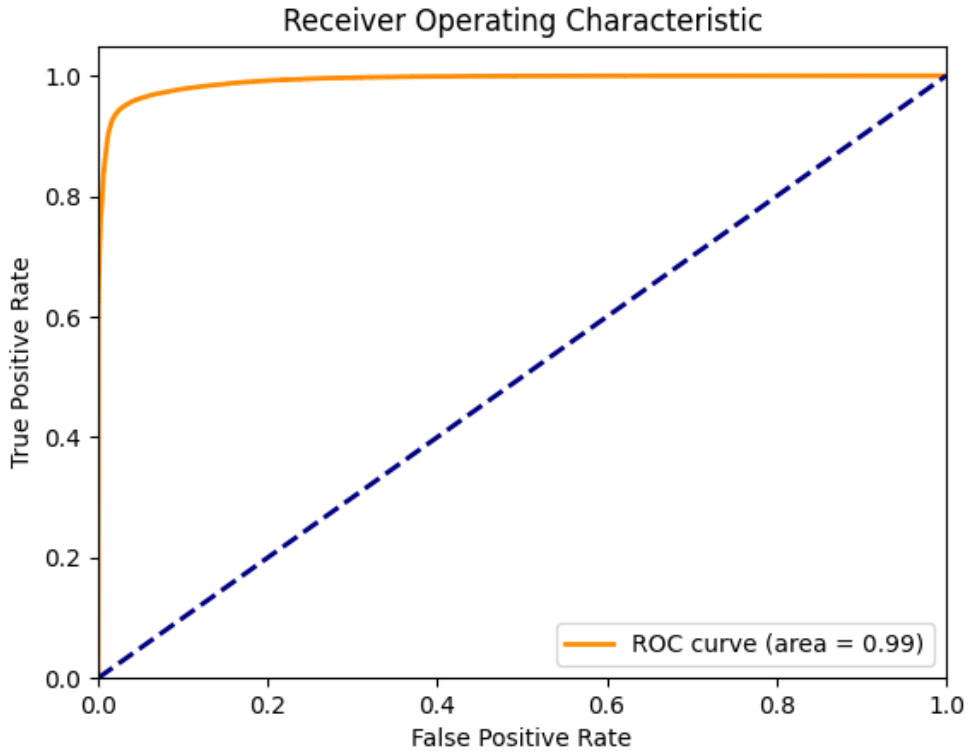
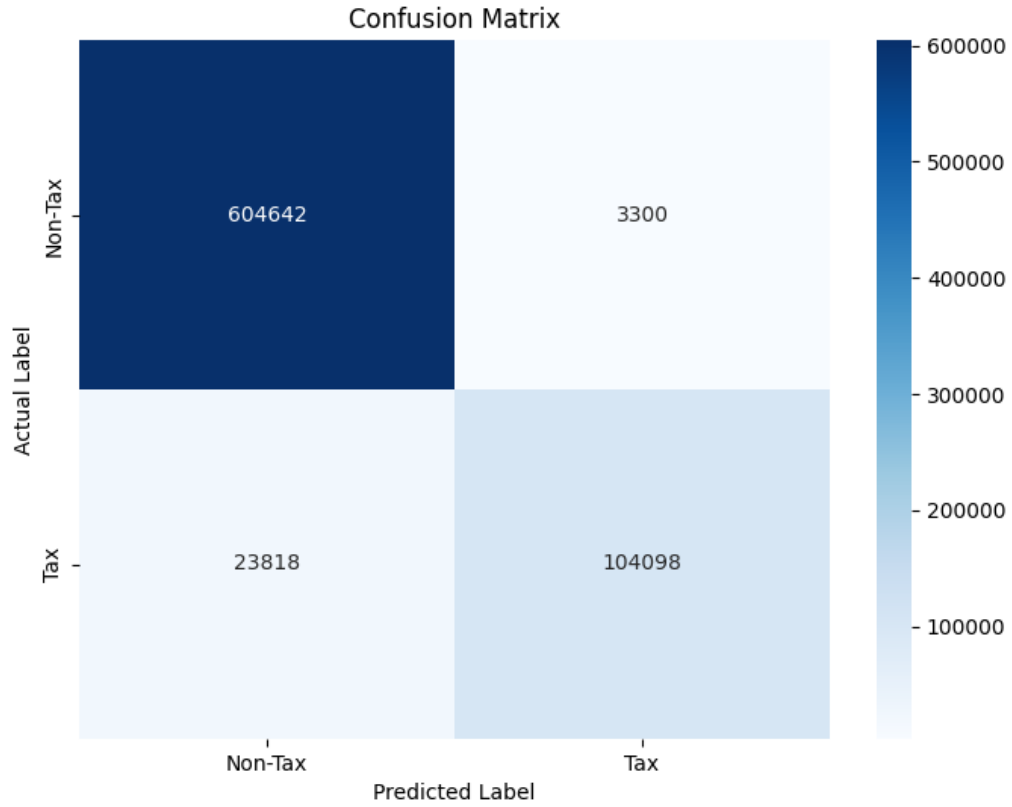
Figures and Tables

Figure 1: ROC Curve of the tax job classifier



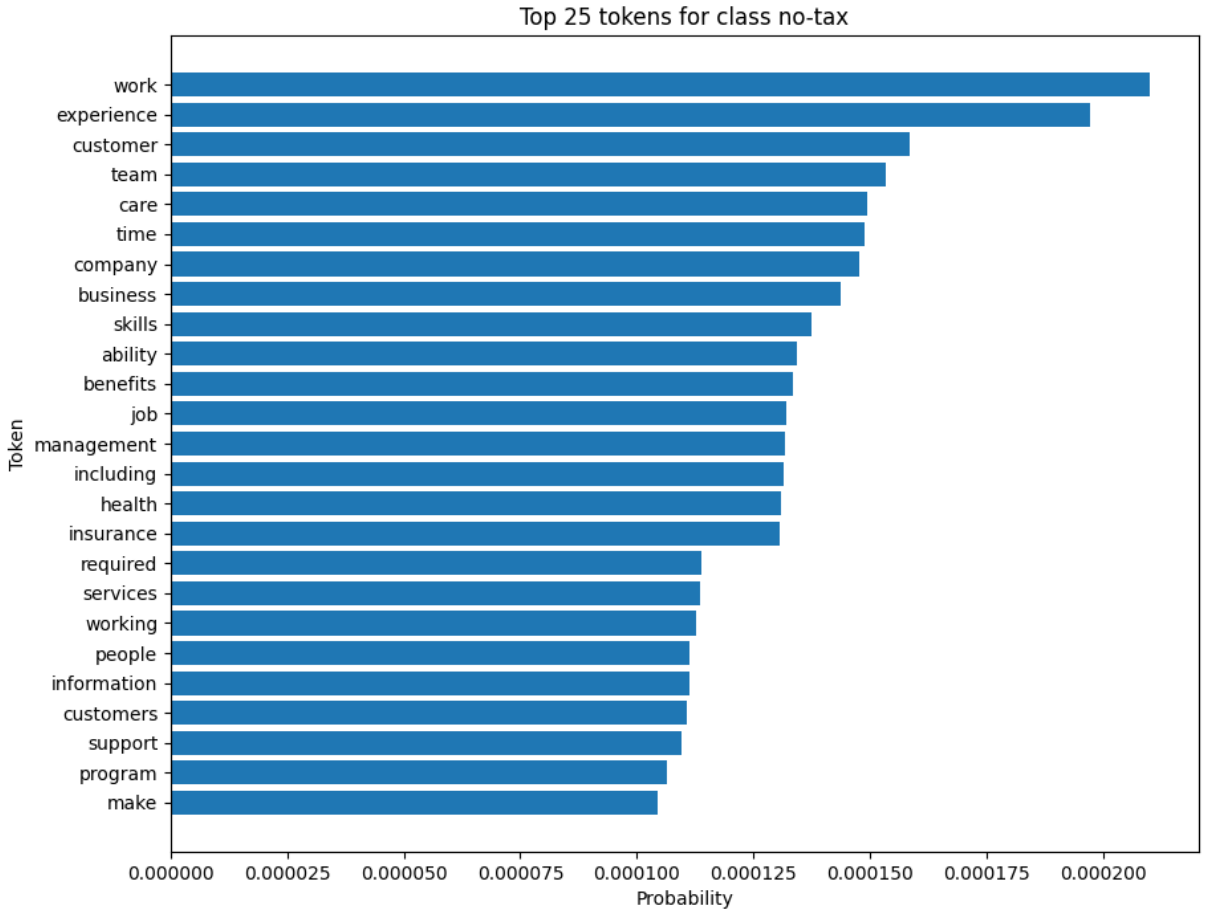
The figure shows the ROC curve of the BoW tax job classifier. It states the true against the false positive rate of the classification model. The area under the curve (AUC), displayed in the figure, can take values between 0 and 1. The larger the AUC value, the higher the precision of the classification model.

Figure 2: Confusion Matrix of the of the tax job classifier



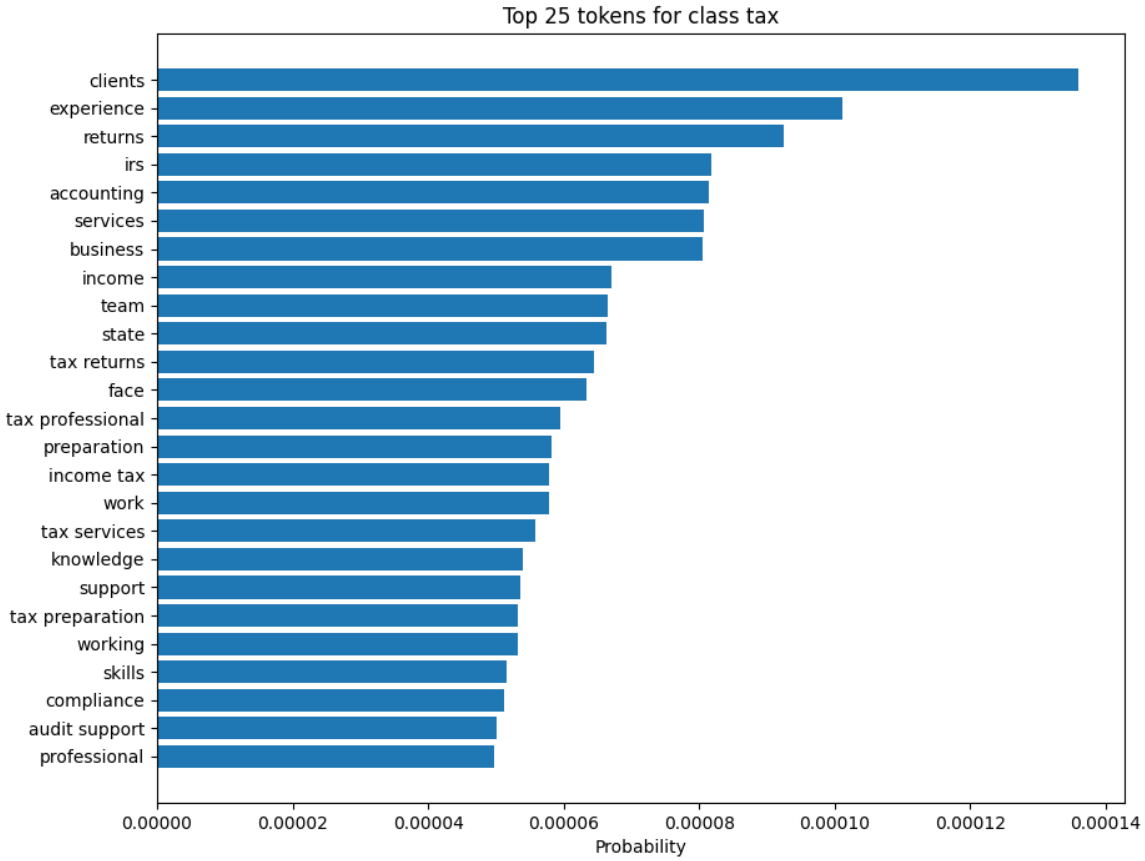
The figure displays the confusion matrix of the BoW tax job classifier. The matrix provides further details on the true and false positive rates for the predictions of the classifier. The darker the color of the cell, the more jobs were classified to the category.

Figure 3: Bag of Words tokens for no-tax jobs



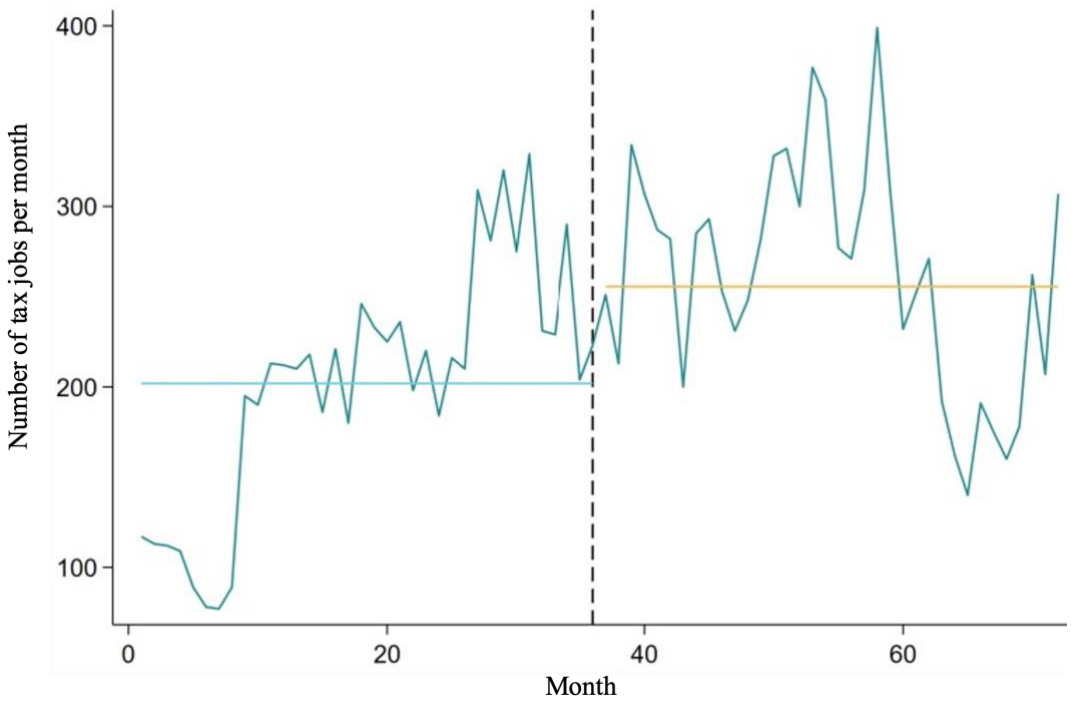
This figure shows 25 most common tokens the BoW classification model identified in the subsample of no-tax jobs.

Figure 4: Bag of Words tokens for tax jobs



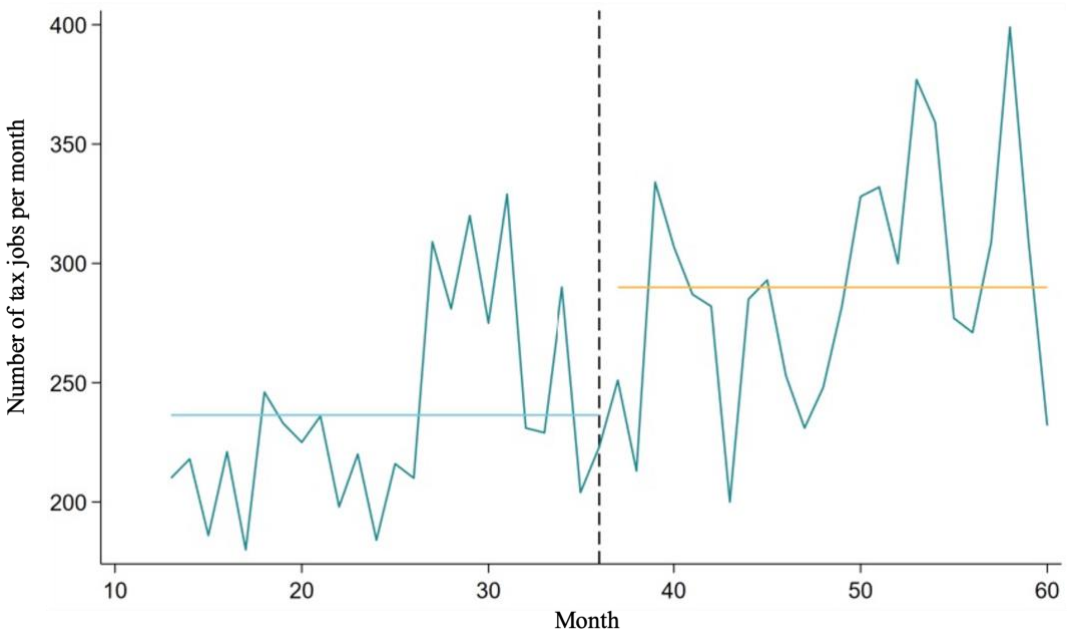
This figure shows 25 most common tokens the BoW classification model identified in the subsample of tax jobs.

Figure 5: Number of S&P 1500 tax department employees pre- and post-TCJA (2015-2020)



This figure displays the number of monthly tax job advertisements for the U.S. headquartered non-financial S&P 1500 firms in the USA from 2015 until 2020. The vertical line represents the enactment date of the TCJA. The first horizontal line depicts the average number of job advertisements in the pre-TCJA period, and the second horizontal represents the average number of job advertisements in the post-TCJA period.

Figure 6: Number of S&P 1500 tax department employees pre- and post-TCJA (2016-2019)



This figure displays the number of monthly tax job advertisements for the U.S. headquartered non-financial S&P 1500 firms in the USA from 2016 until 2019. The vertical line represents the enactment date of the TCJA. The first horizontal line shows the average number of job advertisements in the pre-TCJA period, and the second horizontal line represents the average number of job advertisements in the post-TCJA period.

Figure 7: BERTopic skill topics

The figure shows the skill topics of all S&P 1500 tax jobs using the BERTopic model. Skills presented in a larger font size are more important or appear more frequently within the text. Words presented centrally in the word cloud are more important within the topic. Smaller words are less relevant compared to larger words. They can indicate sub-themes or related concepts within the main topic. The skills were classified before by the JobSpanBERT model. Skills that occur less than 100 times were excluded upfront, to reduce the number of less relevant topics.

Figure 8: BERTopic knowledge topics

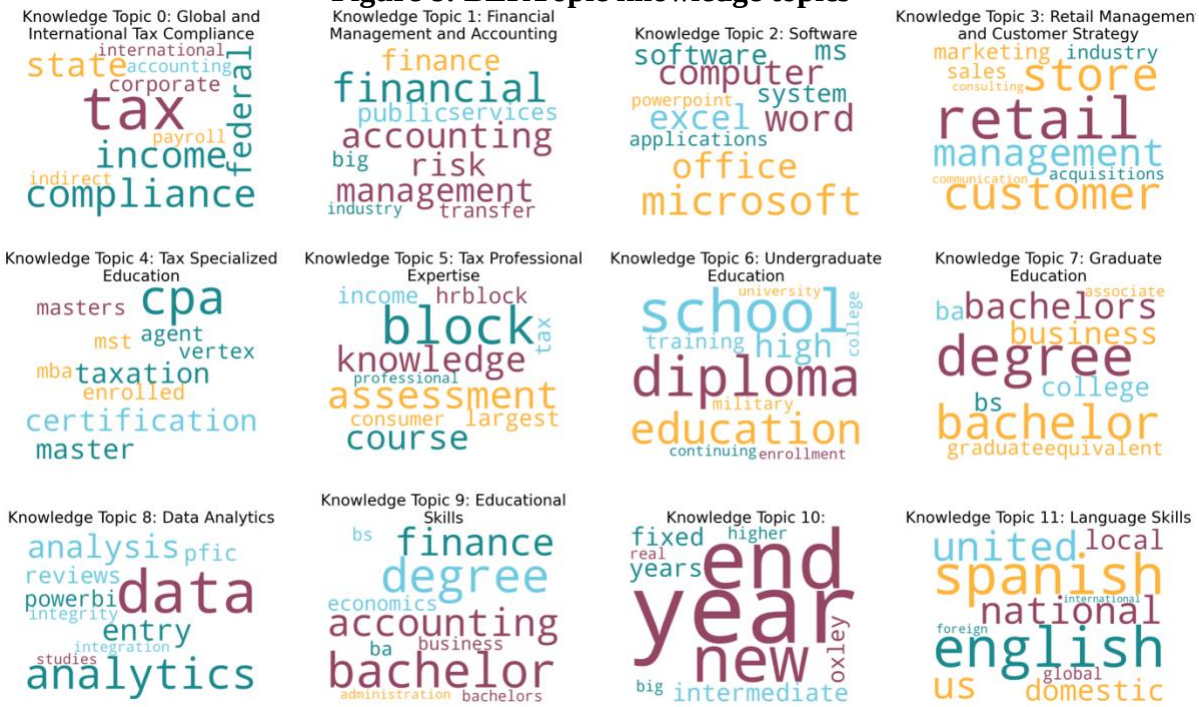


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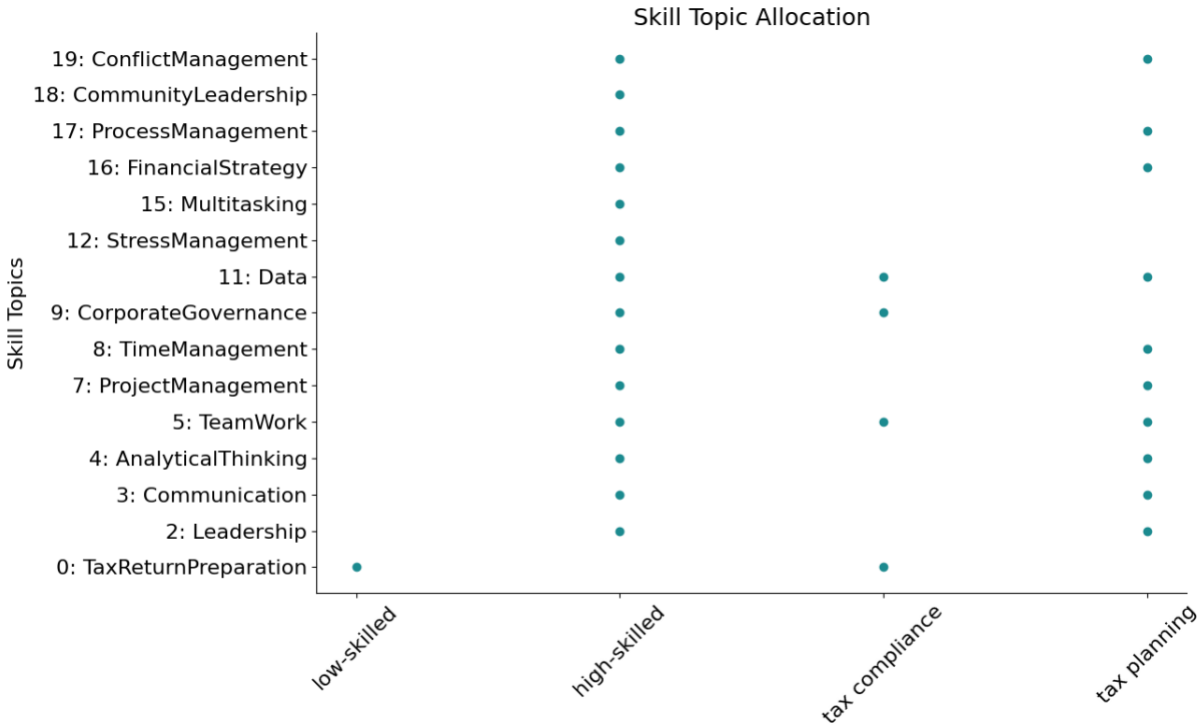
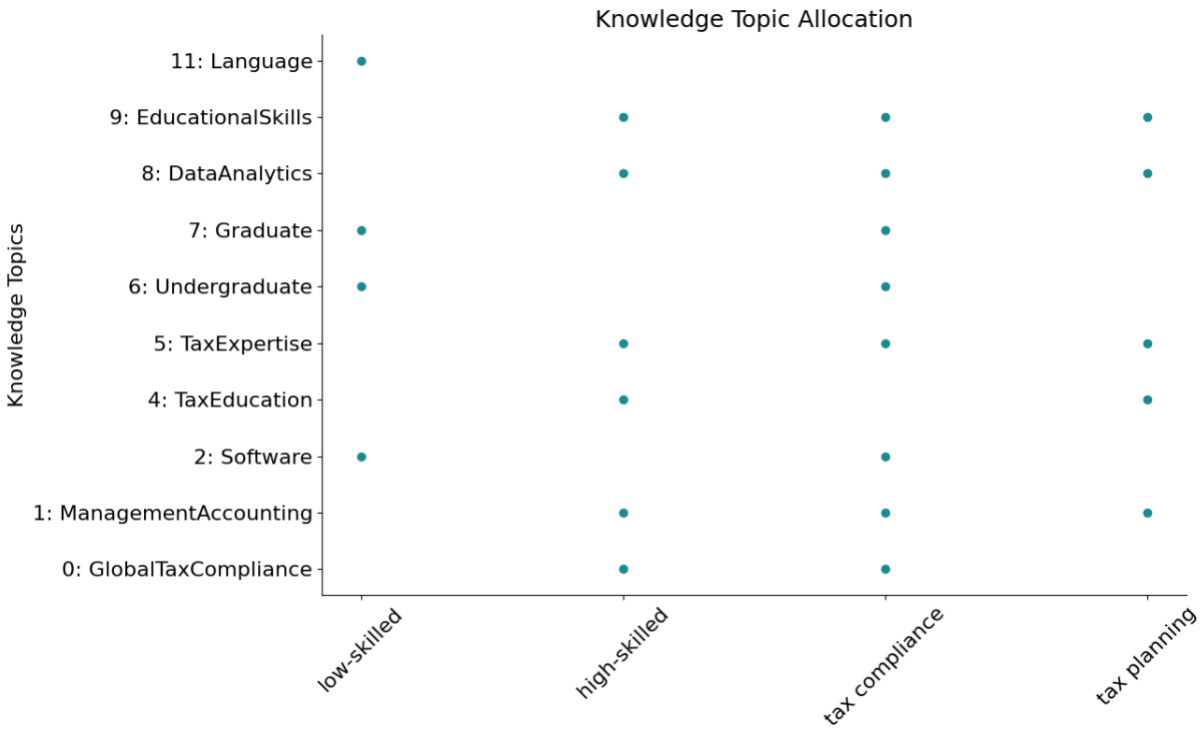
Figure 9: Skill topic allocation for H2 and H3



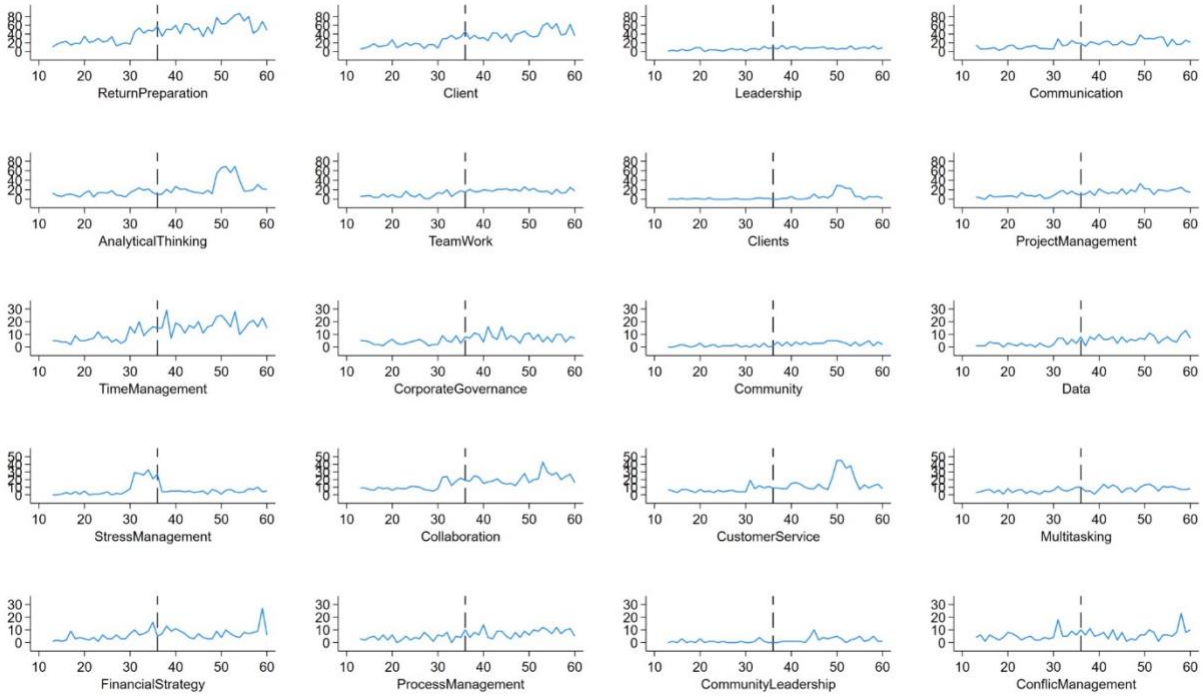
This figure shows the skill topic allocation to the categories low- and high-skilled (H2) and to the categories tax compliance and tax planning (H3). Topics that were not allocated to one of the categories are not shown in the figure.

Figure 10: Knowledge topic allocation for H2 and H3



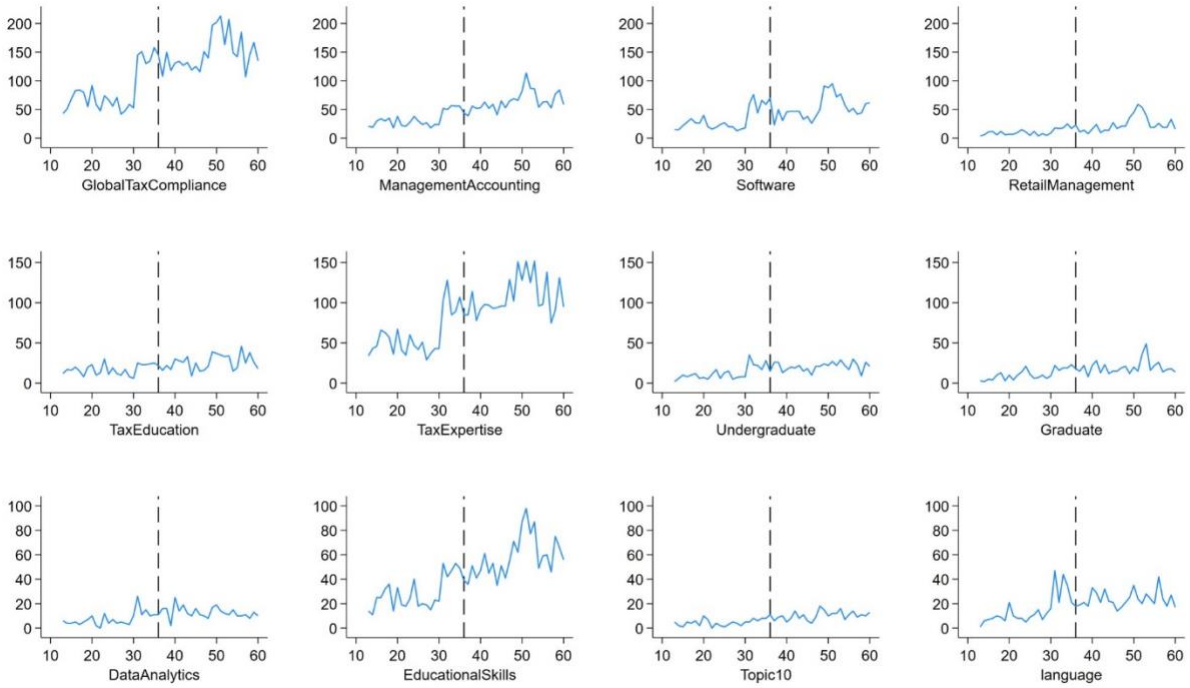
This figure shows the knowledge topic allocation to the categories low- and high-skilled (H2) and to the categories tax compliance and tax planning (H3). Topics that were not allocated to one of the categories are not shown in the figure.

Figure 11: Skill topics over time



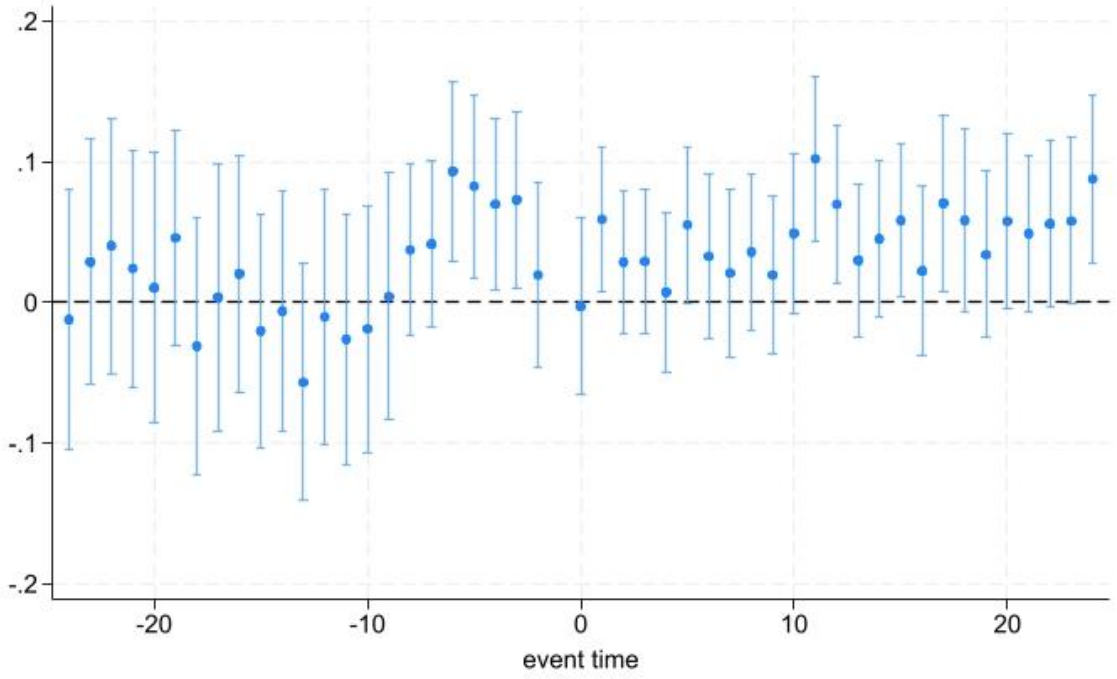
The figure shows the development of the skill topics over time. The x-axis depicts the number of months since May 2012 (with gaps). The y-axis displays the total number of jobs advertisements per month with a given topic. The vertical line represents the enactment date of the TCJA.

Figure 12: Knowledge topics over time



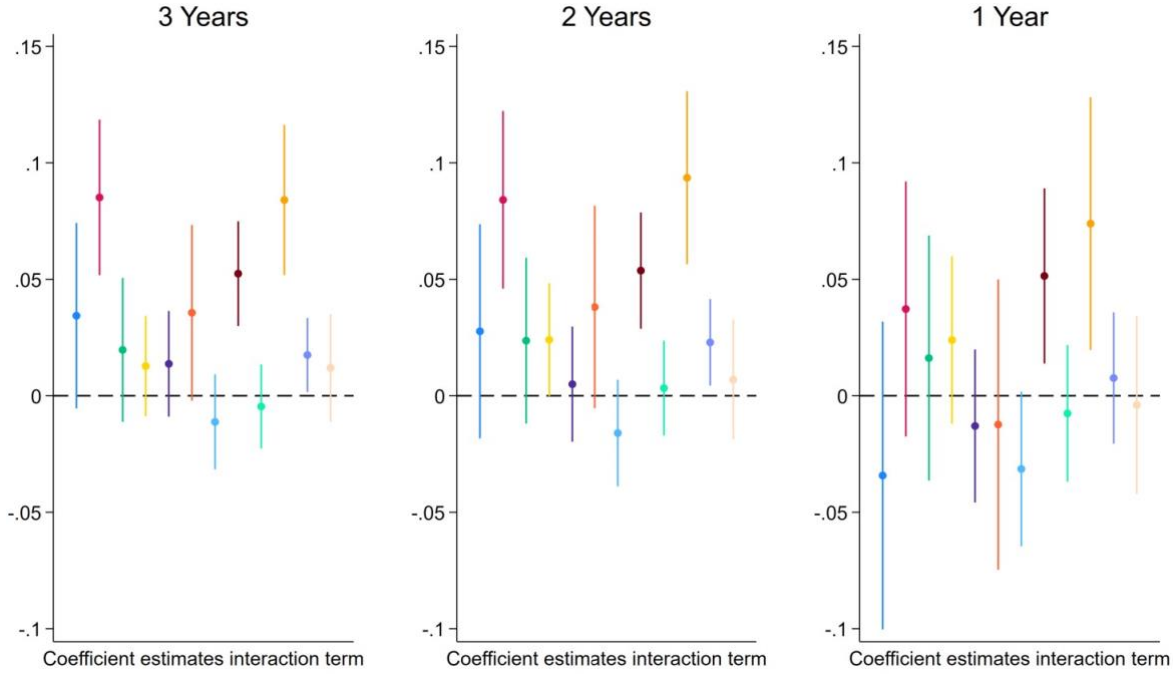
The figure shows the development of the knowledge topics over time. The x-axis depicts the number of months since May 2012 (with gaps). The y-axis displays the total number of jobs advertisements per month with a given topic. The vertical line represents the enactment date of the TCJA.

Figure 13: Parallel trend assumption



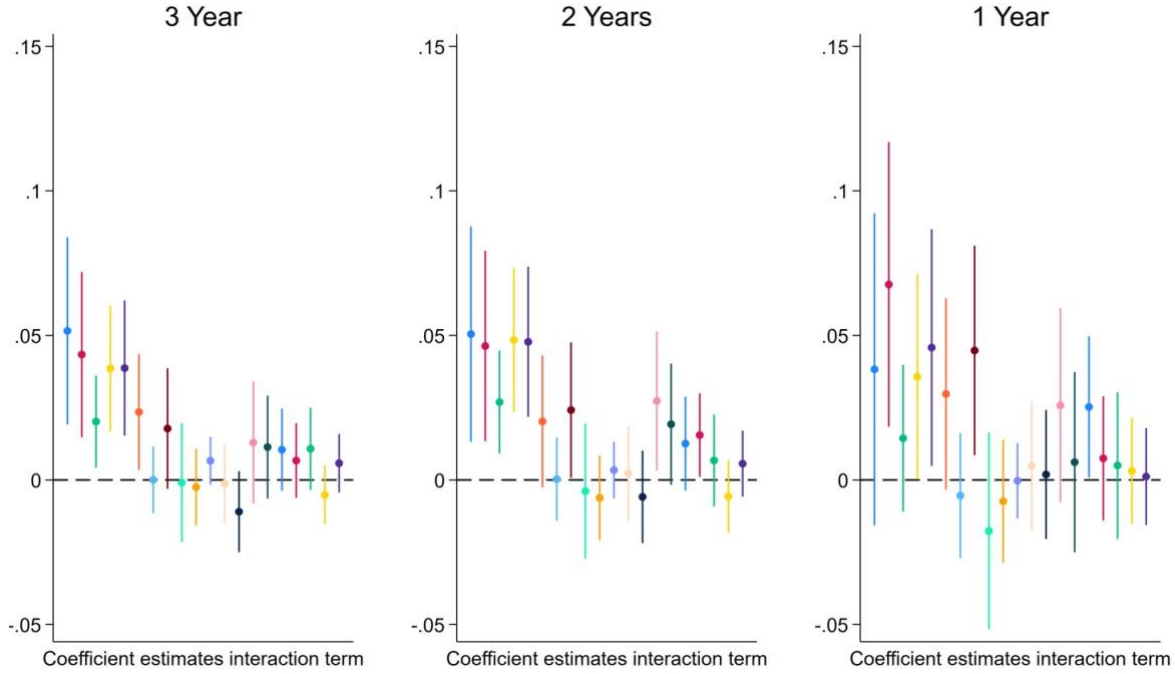
The figure displays the similar trend assumption for the treatment and control firms. The monthly number of job advertisements are scaled using the pre-treatment month (December 2017) values for USA and Canada firms respectively.

Figure 14: Coefficient estimates interaction term DiD – Knowledge topics



The figure shows the coefficient estimates of the interaction term from the difference-in-differences analysis for the change in the demanded knowledge topics over time using non-financial S&P 1500 firms with above-average foreign subsidiaries as the treatment group and those firms with below-average foreign subsidiaries as the control group. The order of the knowledge topics from left to right is as follows: 0: GlobalTaxCompliance, 1: ManagementAccounting, 2: Software, 3: RetailManagement, 4: TaxEducation, 5: TaxExpertise, 6: Undergraduate, 7: Graduate, 8: DataAnalytics, 9: EducationalSkills, 10: Other, 11: language.

Figure 15: Coefficient estimates interaction term DiD – Skill topics



The figure shows the coefficient estimates of the interaction term from the difference-in-differences analysis for the change in the demanded skill topics over time using non-financial S&P 1500 firms with above-average foreign subsidiaries as the treatment group and those firms with below-average foreign subsidiaries as the control group. The order of the skill topics from left to right is as follows: 0: ReturnPreparation, 1: Client, 2: Leadership, 3: Communication, 4: AnalyticalThinking, 5: TeamWork, 6: Clients, 7: ProjectManagement, 8: TimeManagement, 9: CorporateGovernance, 10: Community, 11: Data, 12: StressManagement, 13: Collaboration, 14: CustomerService, 15: Multitasking, 16: FinancialStrategy, 17: ProcessManagement, 18: CommunityLeadership, 19: ConflicManagement.

Table 1: Definition of Variables

Variables	Definition
JP_{it}	Natural logarithm of the newly posted job advertisements per firm per month plus 1.
$Skills_{it}$	Machine Learning-based estimated vector of sought-after skills per firm per month.
$Compliance_{it}$	Natural logarithm of the number of job advertisements per firm per month plus 1 that are classified as tax compliance employees using Machine Learning.
$Planning_{it}$	Natural logarithm of the number of job advertisements per firm per month plus 1 that are classified as tax planning employees using Machine Learning.
$Firm_i$	Indicator variable taking the value of one if firm-fixed effects are included and zero otherwise.
$Post_t$	Indicator variable taking the value of one for months after the enactment of the TCJA (January 2018) and zero otherwise.
$Treated_i$	Indicator variable taking the value of one for US firms and zero for Canadian firms.

Table 2: Number of S&P 1500 job advertisements in the USA

Cleaning step	Number of job advertisements
All U.S. LinkUp tax jobs	785,971
Including only S&P 1500 firms	202,852
Exclude financial and wage tax assistance firms	185,617

This table presents the final number of tax job advertisements for the non-financial S&P 1500 firms with headquarters located in the USA.

Table 3: Summary statistics

Variables	(1) N	(2) mean	(3) sd	(4) p5	(5) p95
Post (3 Years)	10,458	0.7162	0.4508	0	1
Post (2 Years)	7,528	0.6366	0.4810	0	1
Post (1 Years)	3,934	0.5686	0.4953	0	1
Treatment (3 Years)	10,458	0.8721	0.3340	0	1
Treatment (2 Years)	7,528	0.8843	0.3198	0	1
Treatment (1 Years)	3,934	0.8747	0.3311	0	1
ln_taxjobads (3 Years)	10,458	0.9119	0.4482	0	1.7918
ln_taxjobads (2 Years)	7,528	0.9085	0.4358	0	1.7918
ln_taxjobads (1 Years)	3,934	0.9189	0.4462	0	1.7918
Taxfees (3 Years)	3,058	103.613	200.014	0	417.466
Taxcompliancefees (3 Years)	3,058	12.7861	57.3732	0	83.1078
Noncompliancefees (3 Years)	3,058	13.4298	58.9548	0	77.9242

The table presents descriptive summary statistics for our main variables used in equations (1) to (4).

Table 4: Event study results of changes in the number of job advertisements for S&P 1500 firms

	(1) ln_taxjobads	(2) ln_taxjobads	(3) ln_taxjobads
Post	0.0749***	0.0304*	0.0194
	(4.30)	(1.75)	(1.00)
Firm FE	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes
Pre- & Post-Period	3 Years	2 Years	1 Year
Sample	USA	USA	USA
Observations	20,374	6,067	2,952
Adj. R-sq	0.3207	0.3571	0.3563

The table visualizes the event study results for the change in the number of tax job advertisements before and after the enactment date of the TCJA for the non-financial S&P 1500 firms. Columns (1) and (2) report the results for the logarithmic number of tax job advertisements when including firm fixed effects. Columns (3) and (4) report the results for the logarithmic number of tax job advertisements when including industry fixed effects and firm-specific control variables. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 5: DiD results of changes in the number of job advertisements for S&P 1500 vs. Canadian firms

	(1) ln_taxjobads	(2) ln_taxjobads	(3) ln_taxjobads
Post	0.1391	0.1046	0.0345
	(1.54)	(1.52)	(1.04)
Treatment	0.3016***	0.2553***	0.1730***
	(3.44)	(4.13)	(4.24)
Post # Treatment	**0.1261***	**0.1153***	**0.1152**
	(1.83)	**(1.71)**	**(1.55)**
Firm FE	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes
Treatment (Control)	US (CA)	US (CA)	US (CA)
Pre- & Post-Period	3 Years	2 Years	1 Years
Observations	10,458	7,528	3,934
Adj. R-sq	0.0096	0.0108	0.0139

The table visualizes the difference-in-differences results for the change in the number of U.S. tax job advertisements before and after the enactment date of the TCJA. Non-financial S&P 1500 firms represent the treatment group and non-financial Canadian firms the control group. The table represents the effect on the logarithmic number of tax jobs and includes firm fixed effects in the models. Column (1) reports the results for the three-year pre- and post-TCJA period and column (2) for the two-year pre- and post-TCJA period. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 6: DiD results of changes in the number of job advertisements for firms with above- and below-average foreign subsidiaries

	(1) ln_taxjobads	(2) ln_taxjobads	(3) ln_taxjobads
Post	-0.0062	-0.0112	-0.0028
	(-0.39)	(-0.62)	(-0.11)
Post # Treatment	**0.0322***	**0.0335**	**-0.0073**
	(1.73)	**(1.59)**	**(-0.24)**
Firm FE	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes
Treatment	Foreign affiliates	Foreign affiliates	Foreign affiliates
Pre- & Post-Period	3 Years	2 Years	1 Year
Observations	8,677	6,508	3,134
Adj. R-sq	0.3653	0.3860	0.4361

The table visualizes the difference-in-differences results for the change in the number of U.S. tax job advertisements before and after the enactment date of the TCJA. Non-financial S&P 1500 firms with above-average foreign subsidiaries represent the treatment group and those firms with below-average foreign subsidiaries the control group. The table represents the effect on the logarithmic number of tax jobs and includes firm fixed effects in the models. Column (1) reports the results for the three-year pre- and post-TCJA period, column (2) for the two-year pre- and post-TCJA period, and column (3) for the one-year pre- and post-TCJA period. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 7: DiD results of changes in high- and low-skilled jobs

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	HighSkilledJobs	LowSkilledJobs	HighSkilledJobs	LowSkilledJobs	HighSkilledJobs	LowSkilledJobs
Post	0.0797	0.0919	0.0387	0.0197	0.0062	-0.0117
	(1.03)	(1.17)	(0.60)	(0.31)	(0.10)	(-0.22)
Treatment	0.2426***	0.0637	0.1635**	-0.0237	0.1713**	-0.0150
	(2.59)	(0.71)	(2.17)	(-0.30)	(2.05)	(-0.19)
Post # Treatment	**0.0613***	**0.0406**	**0.0125**	**0.0079***	**0.0006**	**0.0288**
	(1.76)	**(1.51)**	**(1.52)**	**(1.67)**	**(0.01)**	**(0.50)**
Diff		-0.0207*		-0.0046		0.0282
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes
Treatment (Control)	US (CA)	US (CA)	US (CA)	US (CA)	US (CA)	US (CA)
Pre- & Post-Period	3 Years	3 Years	2 Years	2 Years	1 Year	1 Year
Observations	10,015	10,015	7,101	7,101	3,565	3,565
Adj. R-sq	0.3286	0.2387	0.3247	0.2372	0.3427	0.2562
Panel B						
Post	-0.0288	-0.0346	-0.0370	-0.0356	-0.0198	-0.0236
	(-1.45)	(-1.63)	(-1.62)	(-1.48)	(-0.62)	(-0.68)
Post # Treatment	**0.0622*****	**0.0557****	**0.0577****	**0.0482***	**0.0122**	**-0.0030**
	(2.64)	**(2.26)**	**(2.15)**	**(1.73)**	**(0.32)**	**(-0.07)**
Diff		-0.0065**		-0.0095*		-0.0152
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes
Treatment	Foreign affiliates	Foreign affiliates	Foreign affiliates	Foreign affiliates	Foreign affiliates	Foreign affiliates
Pre- & Post-Period	3 Years	3 Years	2 Years	2 Years	1 Year	1 Year
Observations	8,677	8,677	6,508	6,508	3,134	3,134
Adj. R-sq	0.2687	0.1816	0.2898	0.2065	0.3277	0.2437

The table visualizes the difference-in-differences results for the change in the number of high- and low-skilled U.S. tax job advertisements before and after the enactment date of the TCJA. Panel A represents results for US firms as treated and Canadian firms as control firms. Panel B shows results for non-financial S&P 1500 firms with above-average foreign subsidiaries representing the treatment group and those firms with below-average foreign subsidiaries the control group. The table represents the effect on the logarithmic number of tax jobs and includes firm and calendar month fixed effects in the models. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 8: DiD results of changes in tax compliance and tax planning jobs

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A	TaxPlanningJobs	TaxComplianceJobs	TaxPlanningJobs	TaxComplianceJobs	TaxPlanningJobs	TaxComplianceJobs
Post	0.0677	0.0467	0.0272	-0.0159	-0.0103	-0.0420
	(0.89)	(0.61)	(0.41)	(-0.24)	(-0.16)	(-0.66)
Treatment	0.2143**	0.1821**	0.1494**	0.1057	0.1577*	0.0705
	(2.32)	(2.07)	(1.96)	(1.43)	(1.92)	(0.90)
Post # Treatment	**0.0233****	**0.0120*****	**0.0384***	**0.0041***	**0.0259**	**0.0454**
	(2.30)	**(3.15)**	**(1.66)**	**(1.75)**	**(0.39)**	**(0.68)**
Diff		-0.0113		-0.0343*		0.0195
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes
Treatment (Control)	US (CA)	US (CA)	US (CA)	US (CA)	US (CA)	US (CA)
Pre- & Post-Period	3 Years	3 Years	2 Years	2 Years	1 Year	1 Year
Observations	10,015	10,015	7,101	7,101	3,565	3,565
Adj. R-sq	0.3175	0.3210	0.3124	0.3102	0.3279	0.3349
Panel B						
Post	-0.0440**	-0.0327	-0.0534**	-0.0337	-0.0352	0.0025
	(-2.16)	(-1.60)	(-2.29)	(-1.45)	(-1.08)	(0.08)
Post # Treatment	**0.0757*****	**0.0673*****	**0.0713*****	**0.0567****	**0.0282**	**-0.0126**
	(3.16)	**(2.83)**	**(2.61)**	**(2.10)**	**(0.73)**	**(-0.33)**
Diff		-0.0084		-0.0146*		-0.0408
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes
Treatment	Foreign affiliates	Foreign affiliates	Foreign affiliates	Foreign affiliates	Foreign affiliates	Foreign affiliates
Pre- & Post-Period	3 Years	3 Years	2 Years	2 Years	1 Year	1 Year
Observations	8,677	8,677	6,508	6,508	3,134	3,134
Adj. R-sq	0.2604	0.2565	0.2829	0.2817	0.3219	0.3328

The table visualizes the difference-in-differences results for the change in the number of tax compliance and tax planning U.S. tax job advertisements before and after the enactment date of the TCJA. Panel A represents results for US firms as treated and Canadian firms as control firms. Panel B shows results for non-financial S&P 1500 firms with above-average foreign subsidiaries representing the treatment group and those firms with below-average foreign subsidiaries the control group. The table represents the effect on the logarithmic number of tax jobs and includes firm fixed effects in the models. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Table 9: Change in auditor provided tax services (ATPS)

	(1) Taxfees	(2) Taxfees	(3) Taxfees	(4) Compliancefees	(5) Compliancefees	(6) Compliancefees	(7) Noncompliancefees	(8) Noncompliancefees	(9) Noncompliancefees
Post	-10.2786**	-8.8909	-3.2321	-3.3307**	-2.2783	-3.8751	-1.7904*	-0.4092	-0.3516
	(-2.50)	(-0.20)	(-0.39)	(-2.29)	(-1.43)	(-1.24)	(-1.67)	(-0.33)	(-0.22)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Calendar month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sample	USA	USA	USA	USA	USA	USA	USA	USA	USA
Pre- & Post-Period	3 Years	2 Years	1 Year	3 Years	2 Years	1 Year	3 Years	2 Years	1 Year
Observations	3,058	2,078	664	3,058	2,078	664	3,058	2,078	664
Adj. R-sq	0.7375	0.7886	0.7205	0.6036	0.6232	0.7015	0.7847	0.7986	0.9097

The table shows the change in scaled APTS for a three-year pre- and post-TCJA period (columns (1), (4), and (7)), a two-year pre- and post-TCJA period (columns (2), (5), and (8)), and a one-year pre- and post-TCJA period (columns (3), (6), and (9)). Data on APTS stems from the database Audit Analytics. All models include company and calendar month fixed effects. The dependent variable Taxfees includes all tax fees of a firm scaled by the size of the firm using total assets. Compliancefees include those fees that are classified as fees for compliance purposes and Noncompliancefees as those for non-compliance, both again are scaled by the size of the firm using total assets. We report robust standard errors clustered at the firm level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.