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Corporate in-house tax departments

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Corporate In-house Tax Departments[*]

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Abstract

In-house tax investment is a significant input to a firm's tax decisions. Yet, due to the lack of data, there is little empirical evidence on how corporate tax departments are associated with tax planning and compliance outcomes. Using hand-collected data on corporate tax employees in S&P1500 firms over the 2009-2014 period, we find that firms with larger tax departments are associated with lower and less volatile cash effective tax rates. Furthermore, using tax employees' specialization, we identify tax departments' relative focus on planning or compliance and document a trade-off between tax avoidance and tax risk: tax departments with a more tax planning focus have incrementally greater tax avoidance but higher tax risk, and tax departments with a more tax compliance focus have incrementally lower tax risk but higher tax rates. Overall, this paper contributes to the literature by looking inside the "black box" of corporate tax departments.

Keywords: Tax Department, Tax Planning, Tax Compliance, Tax Avoidance, Tax Risk
JEL Classifications: J24, H25, H26

1 Introduction

In this study, we investigate how a firm's in-house tax department—a direct input to corporate tax decisions—affects tax planning and compliance outcomes. Building an in-house tax department is important for firms to achieve tax-related objectives. According to survey data, internal tax personnel expenditures account for the majority of corporate tax-related investments.[1] However, despite the significance of internal tax investments, there is limited research on how such investments affect tax planning and compliance outcomes (Dyreng and Maydew 2018), mainly due to the lack of data on in-house tax departments. We circumvent this problem by compiling a novel dataset of corporate tax employees from *LinkedIn* for S&P 1500 firms over the 2009-2014 period.[2]

In-house tax departments' primary roles encompass tax planning and tax compliance. Following prior research, we define tax planning as activities with the objective of reducing the amount of taxes paid (e.g., Dyreng, Hanlon, and Maydew 2008), and tax compliance as activities related to fulfilling the requirements of tax laws and reducing tax risk (e.g., Mills 1996). The job descriptions of tax employees whose job titles include "planning" or "compliance" in *LinkedIn* substantiate these definitions. We find that tax planning employees' job descriptions mostly include activities related to various tax planning mechanisms such as corporate structure and reorganization, transfer pricing, and foreign earnings repatriation, while tax compliance employees' job descriptions mostly include activities such as tax return filings, tax return audits, and tax related internal control.[3]

Our first set of predictions are related to the effect of the overall in-house tax

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[1] For example, based on a survey by the Office of Tax Policy Research, Slemrod and Venkatesh (2002) report that 58.7% of total tax-related expenditures are internal personnel expenditures (such as salary and fringe benefits), 16.5% are internal non-personnel expenditures (such as software, record keeping, and travel), and 24.8% are external tax services. In terms of economic magnitude, Slemrod and Blumenthal (1996) estimate that the total annual tax-related investments for 1,300 large corporations is $2.08 billion, or $1.57 million per firm.

[2] Section 2 discusses *LinkedIn* data collection and data validation in detail.

[3] See Section 2.1 and Appendix A for details.

investments on tax avoidance and tax risk, which are used empirically to capture the outcome of tax planning and tax compliance, respectively. As firms invest more in in-house tax departments, firms can devote more personnel to tax planning and tax compliance and will be better able to implement tax planning strategies and manage tax risk, leading to greater tax avoidance and lower tax risk.

To test our predictions, we use the size of a firm's in-house tax department to proxy for its overall in-house tax investment.[4] Following prior studies (e.g., Dyreng, Hanlon, and Maydew 2008; McGuire, Neuman, and Omer 2013; Guenther et al 2017), we use the level and volatility of cash effective tax rates (ETR) as our proxies for tax avoidance and tax risk, respectively. Because the size of in-house tax departments is likely endogenously determined, we use an instrumental variable (IV) – the number of tax graduate programs in 2004 in the state of the firm's headquarter. The number of tax programs affects the supply of tax professionals in the state, satisfying the relevance criteria of IV. At the same time, it is unlikely that the number of tax programs in 2004 is affected by individual firms' tax outcomes five to ten years later, satisfying the exclusion criteria of IV. We then use the control function approach to address the potential endogeneity. Specifically, we estimate a prediction model for the size of in-house tax departments using the IV and control variables and include the residuals from the prediction model in the regressions explaining tax outcomes.

Consistent with the predictions, we find that firms with larger in-house tax departments are associated with lower and less volatile cash ETR. In terms of economic significance, hiring an additional tax professional is associated with a cash ETR reduction of 0.038 percentage points, or an annual cash tax saving of about $341,050 for an average firm in our

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[4] We measure the size of a firm's in-house tax department as the total number of tax employees deflated by the firm's total number of employees (in thousands). In sensitivity tests, we use alternative measures, including the logarithm of the total number of tax employees and the estimated total salary of tax employees deflated by total assets. We obtain the same inferences.

sample. An increase from the first to the third quartile of in-house tax department size is associated with a reduction in the standard deviation of cash ETR of about 17 percent of the sample mean.

Our next set of predictions are related to how tax departments' resource allocation between planning and compliance incrementally affects tax avoidance and risk. While tax departments engage in both planning and compliance, firms can differ in their tax department's focus and relative resource allocation between the two areas. We use "planning" or "compliance" in the most senior tax executive's job title in *LinkedIn* to identify tax departments that focus relatively more on tax planning or compliance. Among the sample firms with tax departments, 11% are classified as having a tax planning focus and 9% are classified as having a tax compliance focus.[5] We expect that tax departments with a planning focus are associated with incrementally more tax avoidance and tax departments with a compliance focus are associated with incrementally lower tax risk.

We find that, as expected, after controlling for tax department size and other factors, firms whose tax departments have a tax planning focus exhibit greater tax avoidance. Interestingly, they also have incrementally higher tax risk. Similarly, we find that firms whose tax departments have a tax compliance focus exhibit lower tax risk, but they also have higher tax rates. These findings suggest a trade-off between tax planning and tax compliance.

Given this trade-off, we further explore what affects tax departments' focus. We find that tax departments' focus on tax planning or compliance is affected by firms' operation complexity, reputation concern, managerial ownership, the desire to reduce tax expenses, and the desire to reduce tax risk. Specifically, compared to other firms, some complex firms – larger firms, firms with foreign operations, and firms with more segments – are more likely to

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[5] We obtain the same inferences when we classify tax departments' focus based on the proportion of tax employees with "planning" or "compliance" in their job titles. See Section 3 for details.

have a tax planning focus, and some are more likely to have a tax compliance focus. This is indicative of heterogeneity among complex firms, with some having more tax planning opportunities and some having more complicated compliance issues. Consistent with the negative publicity associated with aggressive tax planning, firms with greater reputation concern, as captured by advertising intensity, are less likely to focus on tax planning and more likely to focus on tax compliance. Consistent with shareholders valuing tax savings, firms with higher managerial ownership are more likely to focus on tax planning. Firms with stronger incentives to reduce tax expenses – firms with financial constraint or a tax rate higher than industry peers – are more likely to focus on tax planning. In contrast, firms with other means to save taxes, such as those with higher leverage, more fixed assets, and higher R&D are less likely to focus on tax planning. Lastly, firms with stronger incentives to reduce tax risk – firms with high return volatility, firms that undergo restructuring, high-tech firms, and firms with tax rate volatility higher than industry peers – are more likely to focus on tax compliance.

We conduct two additional analyses to provide more insights. First, we find that tax employees' prior work experience matters for the effectiveness of tax planning and compliance. Compared with other tax employees, those with prior work experience in public accounting (law) firms have a greater impact on the effectiveness of tax planning (compliance). Second, we find that the effect of in-house tax investments on tax avoidance and tax risk is less for firms that also pay tax fees to their auditors. This suggests that in-house tax investments and auditor-provided tax services are substitutes.

Our results are robust to a series of sensitivity tests. For instance, we obtain the same inferences using the change specification. We also find that while adding tax professionals improves the effectiveness of tax planning and compliance, cutting tax professionals does not appear to adversely affect tax planning and compliance in the short-term. Our results also

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hold for alternative measures of tax investments, tax avoidance, and tax risk.

This study contributes to the literature in several important ways. First, our study looks inside the "black box" of in-house tax departments. Despite the importance of internal tax investments, the empirical evidence on their effects is sparse. We hand-collect detailed data on tax employees from *LinkedIn* and conduct comprehensive analyses of the effect of in-house tax departments on both tax avoidance and risk, filling the gap in the literature.

Mills et al. (1998) examine tax investments using survey data from 365 firms in 1992. They document a negative association between *total* tax investments and GAAP ETR, but they *do not* find a significant association between internal tax investments and GAAP ETR, possibly due to the small sample size. We extend Mills et al. by examining a much larger sample (S&P 1500 firms) over a longer and more recent period (2009-2014) and providing robust evidence that internal tax investments lead to more effective tax planning *and* tax compliance. We also extend prior studies that examine internal control material weaknesses and tax avoidance (e.g., De Simone, Ege, and Stomberg 2015; Lynch 2014; Bauer 2016). Those studies document that the use of auditor-provided tax services reduces the likelihood of internal control material weaknesses and the remediation of internal control weaknesses in turn increases tax avoidance. Unlike those studies, we focus on the overall impact of internal tax investments on tax planning and compliance, whereas addressing internal control weaknesses is only one of the many mechanisms through which internal tax investments can facilitate tax planning and compliance. Consistent with this, we obtain the same inferences after excluding observations with internal control weaknesses, about 2% of the sample firm-years.

Second, we take advantage of the richness of *LinkedIn* data to shed light on internal tax departments' structure and tax employees' background, experience, and career path, and to conduct contextual analyses related to tax departments' focus. Our paper is related to but

different from Jiang, Robinson, and Wang (2017), who use *LinkedIn* to identify corporate tax employees with IRS experience and find that those employees are more effective in lowering firms' tax rates. Unlike Jiang et al., we focus on the entire tax department, wherein tax employees with IRS experience are only a small portion (2% among our sample of tax employees). All our inferences remain the same if we exclude tax employees with IRS experiences.

Third, our study adds to the evidence on the interplay between tax avoidance and tax risk. As pointed out in Wilde and Wilson (2018), one question that is not well-understood is whether tax risk increases with tax planning. Our evidence suggests that, on average, larger tax departments are associated with greater tax avoidance *and* lower tax risk, consistent with the notion that firms allocate resources to implement tax planning strategies and manage tax risk (Guenther et al. 2017). At the same time, however, we document a significant trade-off between tax avoidance and tax risk for the subset of firms that choose to focus more on either tax planning or tax compliance. Holding the tax department size constant, a greater focus on tax planning reduces tax rates but leads to higher tax risk, and vice versa.

Fourth, we find that tax departments' focus on tax planning versus compliance varies systematically with firm characteristics. To the best of our knowledge, this study is the first that empirically examines the determinants and consequences of the relative resource allocation between tax planning and compliance *within* the firm.[6]

The remainder of this paper is organized as follows. Section 2 develops the hypotheses. Section 3 describes data and research design. Section 4 presents the main analyses and Section 5 the additional analyses. Section 6 concludes.

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[6] Using data from a survey of about 200 firms in 1999, Robinson et al. (2010) analyze the factors that affect firms' decisions to designate their tax departments as a profit or cost center. While managers' emphasis on tax planning (based on the survey response) is included as a factor influencing the designation of tax departments as a profit or cost center in Robinson et al., we conduct a detailed analysis of the factors that affect managers' relative emphasis on tax planning or tax compliance.

2 Hypothesis Development

To better understand the role of in-house tax departments in tax decisions, we interviewed four tax experts, including a former senior tax partner of a Big 4 accounting firm, a tax partner and a tax director of another Big 4 firm, and a tax partner of a non-Big 4 accounting firm. These individuals have extensive experiences working with corporate clients over tax planning and compliance issues, and two of them have also worked as senior tax executives (Head of Tax and VP-Tax, respectively) in large corporations. We incorporate the key insights of the interviews into our discussions where appropriate.

2.1 Corporate Tax Planning and Tax Compliance

We collect from *LinkedIn* the job descriptions of 50 (50) randomly selected corporate tax employees whose job titles contain "tax planning" ("tax compliance"), to understand the nature and scope of tax planning and tax compliance. Panel A (B) of Appendix A summarizes the most commonly used terms for the tax planning (compliance) employees. Tax planning employees most often mention corporate structure and reorganization (62%), M&A and asset dispositions (56%), transfer pricing (24%), and foreign earnings repatriation (16%). Other planning activities (e.g., those related to compensation, financing, tax credit) are mentioned by 28% of the tax planning employees. In addition, 28% of the tax planning employees explicitly state that their goal is to minimize ETR and tax payments. Hence the job descriptions support the notion that tax planning involves multiple planning strategies to reduce tax payments.

Tax compliance employees most often mention tax return filings (80%), tax-related financial reporting (64%), tax return audits (62%), and tax related internal controls (30%). Other compliance issues such as those related to tax credit, repatriation, and complex transactions are mentioned by 16% of those employees. In addition, about 36% of the tax

compliance employees specifically mention that they work toward achieving target ETR and

tax payment. Hence tax compliance activities can help the firms to fulfill tax law and

reporting requirements and reduce tax risk.

2.2 *Association between In-House Tax Department Size and Tax Avoidance, Tax Risk*

Both tax planning and tax compliance are important to firms. While saving taxes is

beneficial to firms, tax compliance activities, which allow firms to reduce tax risk and

maintain a stable tax rate over time, are also important. Recent studies suggest that the

volatility of tax rates is detrimental to firms. For example, the volatility of cash ETR is

positively associated with the likelihood of unfavorable tax settlement and the volatility of

stock returns, and negatively associated with earnings persistence (McGuire et al. 2013;

Bauer and Klassen 2017; Guenther et al. 2017). A survey by the Tax Executives Institute

(TEI) of 500 chief tax officers around the world reports that the top measures that are used to

evaluate a corporate tax department's performance are related to tax compliance and planning

– "lack of surprises" (72%), "the results of audits" (60%), "meeting compliance deadlines"

(59%), "cash taxes" (57%), and "effective tax rates" (53%) (TEI 2012). The interviewed

experts share that firms keep tax compliance in mind when planning tax saving strategies.

A well-staffed in-house tax department can facilitate a firm's tax planning through

channels such as the identification of tax saving opportunities, coordination and information

sharing with other units of the firm, effective internal control, and in-depth knowledge to

transform opportunities into actual tax savings.[7] At the same time, a well-staffed tax

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[7] For example, Xilinx Inc., the winner of "America's Best In-house Tax Team" award in 2010, saved more than $40 million in taxes through transfer pricing by not allocating employee stock option expenses to its Irish subsidiary. IRS challenged Xilinx's decisions but the tax disputes were resolved in Xilinx's favor. As another example, a retired senior tax counsel shared the following anecdote with us: "In the early 1990s, GE Lighting was the largest lighting company in the world, with approximately $4 billion in sales. There was no in-house professional at Nela Park, Ohio, at the HQ. The CFO was persuaded to hire a tax leader for the business. The CFO agreed, but said 'I don't know if we have enough issues to keep a person busy full-time.' GE Lighting then hired a tax partner from a leading Cleveland law firm. By the end of the first day – even more so by the end of the first week – she had identified so many opportunities (and risks) that she and other GE tax professionals

department can devote more resources to tax compliance work such as research, examination, and documentation to fulfill the tax law requirements. As a result, firms will possess stronger supporting facts regarding their tax positions and will be better able to sustain the tax positions over time, reducing tax risk.

The above discussions suggest that having a larger tax department enables firms to be more effective in saving tax and reducing tax risk, leading to a positive association between in-house tax department size and tax avoidance and a negative association between in-house tax department size and tax risk. Our first two hypotheses are thus stated as (in alternative form):

H1: *Firms' in-house tax department size is positively associated with tax avoidance.*

H2: *Firms' in-house tax department size is negatively associated with tax risk.*

Apart from internal tax spending, firms can obtain tax services (planning or compliance) from accounting firms, consulting firms, and law firms. Such information is not available except for the tax fees paid to firms' own auditor. If firms with small tax departments spend more on such external tax services to substitute for internal tax employees, we will not be able to find evidence consistent with H1 and H2. However, we believe that this is unlikely to be the case for the following reasons. First, while external tax service providers may excel through expertise accumulated from serving a large number of clients across different industries and jurisdictions (McGuire et al. 2012), internal tax employees have advantages over tax service providers because they have intimate knowledge of firms' operations and business. Second, as presented later for our sample, in-house tax department size is insignificantly correlated with whether firms pay tax fees to their auditors. This indicates that firms do not necessarily substitute internal tax investment with outside tax

were continually busy for months. The CFO quickly acknowledged that he should have hired a tax leader many years earlier."

services.

2.3   Association between In-House Tax Departments' Focus and Tax Avoidance, Tax Risk

While on average, firms value both tax planning and tax compliance and tax

departments work toward both goals, tax departments can vary in their relative focus on and

resource allocation between planning and compliance. The interviewed experts comment that

some companies take an "offensive" approach and focus more on tax planning and some

companies take a "defensive" approach and focus more on tax compliance. It follows from

the previous section that tax departments with a tax planning focus should be more effective

in tax planning, further increasing tax avoidance. Similarly, tax departments with a tax

compliance focus should be more effective in managing tax risk, further reducing tax risk.[8]

Thus, we predict that (in alternative form):

> **H3:** *Holding tax department size constant, firms with tax departments that have a tax planning focus have incrementally higher tax avoidance.*

> **H4:** *Holding tax department size constant, firms with tax departments that have a tax compliance focus have incrementally lower tax risk.*

The above hypotheses pertain to the intended effect of tax department focus. It is also

interesting to understand whether there is a trade-off between the two focuses. If a firm's tax

department focuses more on tax planning, does the firm have higher tax risk? Conversely, if a

firm's tax department focuses more on tax compliance, does the firm have a higher tax rate?

On one hand, some prior studies (e.g., Graham et al. 2014) suggest that there are potential

conflicts between tax avoidance and tax risk management. A focus on tax planning can make

the tax positions less sustainable and thus increase tax risk. A focus on tax compliance can

lead to forgoing tax planning opportunities, reducing tax avoidance. On the other hand,

Guenther et al. (2017) argue that greater tax avoidance is not necessarily associated with

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[8] Note that we intend to capture the relative focus of tax departments. That is, tax departments that have a tax planning focus still perform both tax planning and compliance, but allocate relatively more resources to tax planning than to tax compliance. Similarly, tax departments that have a tax compliance focus perform both tax planning and compliance, but allocate relatively more resources to tax compliance than to tax planning.

higher tax risk because firms can undertake more "conventional" tax avoidance activities. Because of the conflicting arguments, we do not have a directional prediction on the incremental effect of tax planning (compliance) focus on tax risk (avoidance). Thus, our final two hypotheses are non-directional:

H5: *Holding tax department size constant, firms with tax departments that have a tax planning focus have a different level of tax risk compared with those without a focus.*

H6: *Holding tax department size constant, firms with tax departments that have a tax compliance focus have a different level of tax avoidance compared with those without a focus.*

For ease of reference, we summarize our predictions in Figure 1.

3   Data and Research Design

3.1   Sample and Data

Sample and Data Collection

We obtain data on corporate tax employees from *LinkedIn*, a professional networking website that has over 300 million members and hosts the homepages of more than three million firms worldwide. Because financial firms likely have different tax strategies from other firms, we start from the 1,204 non-financial firms in the S&P 1500 index in 2014 and then exclude 131 firms that did not have a *LinkedIn* company page in 2014.

For each sample firm, we search for *LinkedIn* members who have worked for or are working for the firm (i.e., current or past employees). We limit the employees to the full time employees whose current or past job titles are related to the income tax function. Based on the individual employees' work history, we construct a panel data of in-house tax departments over the 2009-2014 period, containing year, firm, and individual tax employee information (including their job title in the year, educational background, and prior work experience). Appendix B describes the data collection in more detail.

We collect financial data from COMPUSTAT. The final sample consists of 5,921 firm-years, covering 42,868 employee-years over the 2009-2014 period. The sample used for various regressions can be smaller due to additional data requirements.

LinkedIn Data Validation

One concern with the *LinkedIn* data is whether its coverage of tax employees is comprehensive. We use three independent sources to assess the tax employee coverage of *LinkedIn*. Specifically, we compare our data with 1) the Tax Executive Institute (TEI) survey in 2012, 2) the Klassen, Lisowsky, and Mescall (2017) (KLM) survey, and 3) interviews with senior executives of three sample firms.

The comparisons suggest that the *LinkedIn* coverage is reasonably comprehensive. First, the TEI survey reports an average of 10.6 tax employees for the largest companies from the U.S., Canada, Europe, and Asia. This is close to the average tax department size of 11 for S&P 500 firms in our sample, the group of sample firms that are most comparable to the TEI firms in firm size. Second, the estimated tax department size is on average 13.9 for the KLM firms for which we have total assets information and can reasonably estimate tax department size. The average tax department size is 11.6 based on *LinkedIn* for our sample firms that are matched on total assets with the KLM firms. Third, for the three interviewed sample firms, the tax department size based on *LinkedIn* is very close to the numbers given by senior executives through phone interviews. Please see Appendix B for detailed discussions.

The validation tests help increase our confidence in the *LinkedIn* data and in the empirical analyses. At the same time, we acknowledge that the potential incompleteness of data may introduce noises into the analyses. However, we do not have any strong reason to believe that it introduces any systematic bias to our tests.[9]

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[9] *LinkedIn* company coverage and employee coverage might vary across industries. Our sample's industry composition is similar to S&P 1500 and Compustat firms. To address the concern that the likelihood of employees having *LinkedIn* accounts might vary across industries or over time, we include industry and year

3.2 Proxies for In-house Tax Investments

We measure a firm's overall in-house tax investments by the size of its tax department, calculated as the total number of tax employees (*TAX_TOTAL*). This measure captures whether the firm has a sufficient number of personnel with adequate tax knowledge. Since *TAX_TOTAL* is positively correlated with firm size, we use a scaled measure, *INHOUSE_TAX*, which is measured as *TAX_TOTAL* divided by the firm's total number of employees (in thousands), in the regressions to control for the size effect.

Panel A of Table 1 presents the descriptive statistics of *TAX_TOTAL* and *INHOUSE_TAX*. The average number of tax employees (*TAX_TOTAL*) is 7.24. *INHOUSE_TAX* has a mean of 0.85, implying that on average about 0.085% of a firm's employees work in the income tax function.

Panel B presents the descriptive statistics by firm size, industry, and year. As expected, the number of tax employees increases monotonically with firm size, but the scaled measure decreases with firm size, reflecting the economy of scale in the tax function. The number of tax employees varies across industries, ranging from 5.19 for Utilities to 14.28 for Tele Transmission. The scaled measure also shows a large variation across industries, ranging from 0.46 for Consumer Durables to 1.39 for Energy. Therefore, it is important to control for industry fixed effects in the regressions. Over time, the number of tax employees increases steadily, while the scaled measure is similar across years.

Panel C presents the characteristics of tax employees.[10] The data sheds light on the composition of a typical tax department. On average, a tax department has about seven employees. It is led by about two tax executives, in charge of three tax managers and two tax

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fixed effects in all regressions. In addition, in a robustness check, we use an industry-and-size adjusted measure of tax department size and obtain the same inferences.

[10] Our discussions below are descriptive and are meant to provide readers with a general idea of the tax department and tax employees' backgrounds and career paths, based on *LinkedIn* data.

analysts. Our interviews suggest that tax executives typically report directly to CFO and occasionally to CEO. The tax department is usually located in a firm's headquarter state (78% of the times) or in a neighboring state (untabulated). The tax employees are well-educated in the related fields: for an average firm, among the seven tax employees, around four have an undergraduate degree in accounting, and around five have a graduate degree (three with tax-related graduate degrees such as MTax or JD, two with other business-related graduate degrees). In addition, about two tax employees have CPA or CA qualifications.

With respect to working experience, about three out of the seven tax employees have worked in accounting firms (mostly big N accounting firms) prior to working in the corporate tax departments. About one out of the seven tax employees has previously worked in a corporate tax department (at the manager and above level) and about one out of the seven tax employees has working experience in law firms, or financial institutions, or IRS/Treasury.

We also examine the experiences of individual tax employees to better understand their career paths (untabulated). The data suggests that a tax analyst on average holds the same position for three and half years, a tax manager for four and half years, and a tax executive for five and half years before moving to a higher position (in the same category or the next category) in the same firm or a new firm. On average, it takes a tax analyst about eight years to move up to become a tax manager, and another four years to become a tax executive. The data also suggests that tax is a relatively specialized field, especially at the higher level. About 30% of tax analysts come from non-tax background, but when they switch jobs, only about 17% switch to a non-tax position; about 22% of tax executives come from non-tax background, but when they switch jobs, only about 10% move to a non-tax position (e.g., controller, VP finance, CFO).

3.3 Identifying Tax Departments' Relative Focus: Planning or Compliance

We use two approaches to identify tax departments' relative focus. The first approach is

based on the idea of "tone at the top" – whether the most senior tax executive's job title includes 'planning' or 'compliance'. The most senior tax executive's title likely reflects how he/she and the tax department are evaluated and how the resources are allocated.[11] We construct two indicator variables, one for tax planning focus (*PLANNING1*) and the other for tax compliance focus (*COMPLIANCE1*). *PLANNING1* is one for tax departments whose most senior tax executive has a planning title and zero otherwise; *COMPLIANCE1* is one for tax departments whose most senior tax executive has a compliance title and zero otherwise. As reported in Panel A of Table 2, 11% of the tax departments are classified as having a more tax planning focus and 9% as having a more tax compliance focus. We assume that the rest of the companies' tax departments do not have a specific focus.

The second approach takes into account all the tax employees' specialization. Specifically, we first construct a tax planning (compliance) score. Tax planning score is calculated as

$$\frac{\#Planning\ Executive \times 3 + \#Planning\ Manager \times 2 + \#Planning\ Analyst}{\#\ Tax\ Executive \times 3 + \#Tax\ Manager \times 2 + \#Tax\ Analyst},$$

where *#Planning Executive* (*Manager*, *Analyst*) is the number of tax executives (managers, analysts) with "planning" in their job titles, and *#Tax Executive* (*Manager*, *Analyst*) is the total number of tax executives (managers, analysts). Tax compliance score is calculated similarly. We use different weights for executives, managers, and analysts to reflect their differential effect on tax decisions.[12] We then classify a tax department as having a more tax planning (compliance) focus if the tax department is ranked in the top decile of the tax planning (compliance) score. We construct the indicator variables, *PLANNING2* and *COMPLIANCE2*, accordingly.

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[11] The most senior tax executive usually holds the title of Chief Tax Officer, VP Tax, Tax Director, or Head of Tax. For tax departments with multiple executives who have similar titles, we use professional prefixes such as "Senior" to identify the most senior executive (e.g., Senior VP Tax, Senior Tax Director).

[12] Alternatively, we use as weights the ratio of the average annual salary of tax executives, tax managers, and tax analysts (2.5/1.8/1). The inferences are similar.

3.4   Proxies for Tax Avoidance and Tax Risk

Our main proxy for tax avoidance is cash ETR. To mitigate the measurement issues of the single-year measure, we use the three-year average cash ETR (*CashETR3*), calculated as the sum of a firm's total cash taxes paid over a three-year period (*t*, *t*+1, and *t*+2), divided by the sum of its total pre-tax book income (excluding special items) over the same period (Dyreng et al. 2008). Following prior studies (e.g., McGuire et al. 2013; Guenther et al. 2017), our main proxy for tax risk is the volatility of cash ETR, *SD_CashETR*, calculated as the standard deviation of annual cash ETR over a three-year period (*t*, *t*+1, and *t*+2).

Panel A of Table 2 reports the descriptive statistics. The sample firms have a mean *CashETR3* of 24% and a mean *SD_CashETR* of 10%, comparable to those reported in prior studies (e.g., Dyreng et al. 2008; McGuire et al. 2013; Guenther at al. 2017).[13]

3.5   Regression Specifications

To test H1 and H2, we estimate the following equation:

$$\textit{Tax Avoidance or Tax Risk} = \beta_0 + \beta_1\,\textit{INHOUSE\_TAX} + \pmb{\gamma\,\textit{Controls}} \qquad (1)$$
$$+ \textit{Industry, Year Fixed Effects} + \varepsilon$$

The independent variable of interest is *INHOUSE_TAX*. H1 and H2 predict its coefficient, β_1, to be negative when the dependent variable is *CashETR3* and *SD_CashETR*.

Following prior research, we include a number of firm characteristics associated with tax planning opportunities or tax outcomes (e.g., Mills et al. 1998; Dyreng et al. 2008; McGuire et al. 2013; Guenther at al. 2017). Specifically, we control for firm size (*SIZE*), pre-tax profitability (*ROA*), market-to-book ratio (*MTB*), leverage (*LEV*), property, plant, and equipment (*PPE*), R&D expenditures (*R&D*), intangible assets (*INTANG*), inventory (*INVENTORY*), an indicator for loss carrying forward (*NOL*), change in loss carrying forward (Δ*NOL*), an indicator for foreign operations (*FOR_DUMMY*), income from foreign

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[13] Throughout the analyses, we require that the denominator for tax rate, pre-tax book income (net of special items), to be positive. Observations with negative denominator are dropped.

operations (*FOR_INCOME*), the natural logarithm of the number of business segments (*LN_SEGMENTS*), an indicator for internal control weakness (*ICW_DUMMY*), an indicator for the use of auditor-provided tax services (*TAXFEES_DUMMY*), and industry and year fixed effects. Following De Simone et al. (2015) and Guenther et al. (2017), we also include the level of tax avoidance (*CashETR3*) and the volatility of pre-tax return on assets (*SD_ROA*) in the tax risk regression. To be consistent with the measurement of tax avoidance and tax risk, we measure the control variables as the three-year average over the same period.[14] Appendix C describes variable measurements. ETR measures are winsorized at 0 and 1, and all other continuous regression variables are winsorized at the 1st and 99th percentiles.

3.6   Controlling for Potential Endogeneity

An important concern with our analyses is that in-house tax investments are likely endogenously determined. The size of a firm's tax department is possibly affected by firm characteristics that determine the amount of tax planning and compliance work desired by the firm (e.g., Mills et al. 1998; Klassen et al. 2016). These characteristics might also affect tax avoidance and risk measures. To address this concern, we include a comprehensive list of control variables in Equation (1). In addition, we use the control function approach to address endogeneity (Wooldridge 2015). Specifically, we add to Equation (1) the residuals from the following determinant model of *INHOUSE_TAX*:

$$INHOUSE\_TAX = \alpha_0 + \alpha_1 TAX\_EDUCATION + \boldsymbol{\theta\ Controls}$$
$$+\ Industry,\ Year\ Fixed\ Effects + \varepsilon \qquad\qquad (2)$$

The instrumental variable (IV) in Equation (2) is *TAX_EDUCATION*, which is

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[14] Note that in-house tax investment (*INHOUSE_TAX*) is an annual measure. Using the three-year average leads to the same inferences. As a robustness check, we add additional control variables including firm age, sales growth, advertising expenditures, equity income, minority interest's earnings, tax heavens, and estimated tax benefits associated with option-based compensation (Lisowsky 2010; Gleason and Mills 2011). The inferences remain the same.

calculated as the number of tax graduate programs in 2004 in the state of the firm's

headquarters.[15] We hand-collect the number of tax graduate programs (including law or

accounting programs with a taxation concentration) in each state. This variable satisfies the

relevance criteria because the size of a firm's tax department is affected by the firm's access

to tax professionals, which is in turn affected by the number of tax graduate programs in the

firm's headquarter state.[16] This variable also satisfies the exclusion criteria because it is

measured in 2004 and is unlikely to be affected by individual firms' tax outcomes five to ten

years later. In fact, many of the tax graduate programs were established well before 2004. In

Equation (2), in addition to the IV, we include the control variables from Equation (1).

Appendix D presents the results for the determinant model. The coefficient on

TAX_EDUCATION is significantly positive ($t = 5.56$), consistent with our argument that it is

easier for firms headquartered in states with a greater number of tax programs to recruit tax

employees. The partial F-statistic (untabulated) is 30.91, greater than the critical value of 8.96

for one instrument (Larcker and Rusticus 2010), indicating that the weak instrument problem

is not a big concern. With respect to other variables, we find that *INHOUSE_TAX* decreases

with firm size, consistent with economy of scale in tax investments (Mills et al. 1998;

Slemrod and Venkatesh 2002). Firms with higher ROA, leverage, R&D, NOL, foreign

operations, and segments, and firms with auditor-provided tax services have more tax

employees. Firms with more intangible assets, inventory, and foreign income have fewer tax

employees. The adjusted R^2 of the model is 0.31.

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[15] In an untabulated analysis, we use the number of tax programs (scaled by the number of employees of all firms headquartered in the same state as the firm) as the IV to control for the differential demand for tax employees across states. The inferences remain the same.

[16] To substantiate this conjecture, we examine tax professionals working for companies with headquarters in two large states, California and Texas, in 2014. Of the 320 tax professionals with a tax or law graduate degree working for companies headquartered in California in our sample, 107 (33%) obtained their tax or law degrees from California. Of the 135 tax professionals with a tax or law degree working for companies headquartered in Texas in our sample, 48 (36%) obtained their tax or law degrees from Texas. These percentages are much higher than the percentage of tax and law graduate programs in California or Texas. Only 15.6% and 6.1% of tax and law programs in the U.S. are in California and Texas, respectively.

Larcker and Rusticus (2010) argue that no instrumental variables are perfect and the results based on weak instrumental variables might not be as robust as those based on OLS regressions. Thus, following their suggestion, we report the results using both the OLS regression and the control function approach for the main tests. Obtaining similar results from the two approaches gives us confidence in the inferences.

4   Empirical Results

4.1   Descriptive Statistics

Panel A of Table 2 presents descriptive statistics on the regression variables. On average, the sample firms have total assets of 10,742 million, *ROA* of 10%, market-to-book ratio of 3.22, leverage of 20% (of total assets), *PPE* of 30% (of total assets), *R&D* of 3% (of total assets), intangible assets of 25% (of total assets), inventory of 8% (of total assets), foreign income of 3% (of total assets), and 8.29 business segments. Of the sample firms, 52% have loss carry forward, 61% have positive foreign income, 2% report internal control material weaknesses, and 81% use tax services provided by their auditors. The mean standard deviation of ROA is about 4%. On average, there are about eight tax graduate programs in the firm's headquarter state.

Panel B of Table 2 presents the Pearson correlations among the explanatory variables. Most of the correlations are small, except that *FOR_DUMMY* is highly correlated with *FOR_INCOME* (0.55) and *LN_SEGMENTS* (0.46), which is not surprising given that these variables capture similar aspects of firm operations. *PPE* and *INTANG* are negatively correlated (–0.43). An analysis of the variance inflation factors indicates that multicollinearity is not a major issue.

4.2   In-house Tax Investment and Tax Avoidance and Tax Risk: Test of H1 and H2

Table 3 reports tests of H1 and H2, with Columns (1) and (2) based on the control

function approach and Columns (3) and (4) based on OLS regressions. Column (1) of Table 3 presents the test of H1 with *CashETR3* as the dependent variable. The coefficient on *INHOUSE_TAX* is significantly negative ($t = -3.17$). This indicates that greater in-house tax investment is associated with more tax savings, consistent with H1. The effect is also economically significant; moving from the first quartile (0.15) to the third quartile (1.04) of *INHOUSE_TAX* is associated with a reduction in *CashETR3* of 0.8 percentage points [= (1.04 − 0.15) × (−0.0091)], or a relative decrease of 3.3%. Alternatively, given the mean number of employees (24.26) (in thousands), the coefficient of −0.0091 suggests that having one additional tax professional is associated with a reduction in *CashETR3* of 0.038 percentage points [= (1/24.26) × (−0.0091)]. This reduction would translate into an annual cash tax saving of about $341,050 [= 0.038% × 897.5 million, which is the sample average pre-tax income]. To put this figure into perspective, the average annual base salary for a tax manager in the U.S. is $114,933 in 2016, according to Salary.com.[17]

In terms of control variables, we find that cash ETR decreases with firm size, leverage, R&D, PPE, intangible assets, inventory, NOL, and foreign income, and it increases with pre-tax profitability, existence of foreign operations, the number of segments, presence of internal control material weaknesses, and the indicator for using auditor-provided tax services. The coefficients on the control variables are similar to those reported in prior studies (e.g., Robinson et al. 2010; Hoopes et al. 2012; Gallemore and Labro 2015).

Column (2) of Table 3 reports the test of H2 using the standard deviation of annual cash ETR (*SD_CashETR*) to proxy for tax risk. The results indicate that *INHOUSE_TAX* is

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[17] This discussion leads to the question why some firms appear to "leave money on the table" by not hiring additional tax employees. This can be due to the friction in the labor market for certain firms and certain years. Moreover, here we only consider the benefits of tax planning (in the form of reduced tax rates) without taking into account the potential costs of tax planning, which can include reputational cost, political cost, adverse media attention for being tax aggressive and "a poor corporate citizen," and agency costs between managers and shareholders (Balakrishnan, Blouin, and Guay 2019; Graham et al. 2014). Graham et al.'s (2014) survey evidence suggests that such costs significantly influence firms' tax decisions. It is also consistent with the views of the interviewed tax experts. They comment that reputation concern has become more important in recent years.

significantly negatively associated with *SD_CashETR* ($t = –2.51$). That is, consistent with H2, firms that invest more in their tax departments have lower tax risk. In terms of economic significance, moving from the first to the third quartile of *INHOUSE_TAX* is associated with a reduction in *SD_CashETR* of 0.017 [= (1.04 – 0.15) × (–0.0189)]. This is economically significant given that *SD_CashETR* has a mean of 0.10.

In terms of control variables, we find that tax risk decreases with firm size, profitability, intangible assets, existence of foreign operations, foreign income, and the use of auditor-provided tax services, and it increases with leverage, R&D, PPE, NOL, the number of segments, cash ETR, and the volatility of ROA.

Columns (3) and (4) of Table 3 report the OLS regression results. The inferences remain the same.

In sum, we find that both cash ETR and tax risk decrease with the size of the tax departments. As tax departments become larger, firms allocate more resources to both tax planning and compliance, leading to lower tax rate and lower tax risk. This suggests that firms on average still have room to implement tax strategies with manageable risk (e.g., Guenther et al. 2017).

4.3   In-house Tax Departments' Focus and Tax Avoidance and Risk: Test of H3-H6

To test H3-H6, we add the two indicators for tax department focus to Equation (1):

$$\text{Tax Avoidance or Tax Risk} = \beta_0 + \beta_1 \, INHOUSE\_TAX + \beta_2 \, PLANNING + \beta_3 \quad (3)$$
$$COMPLIANCE + \gamma \, \textbf{Controls} + \textit{Industry, Year}$$
$$\textit{Fixed Effects} + \varepsilon$$

When the dependent variable is *CashETR3*, the proxy for tax avoidance, we expect the coefficient on *PLANNING* (β_2) to be negative (H3), and we do not have a prediction for the sign of the coefficient on *COMPLIANCE* (β_3) (H6). When the dependent variable is *SD_CashETR*, the proxy for tax risk, we expect β_3 to be negative (H4), and we do not have a

prediction for the sign of β_2 (H5).[18]

Table 4 presents the tests of H3-H6 based on the control function approach, with Columns (1) and (2) using the first classification of planning/compliance focus and Columns (3) and (4) using the second classification. Columns (1) and (3) report the tests of H3 and H6. We continue to find a significantly negative coefficient on *INHOUSE_TAX* in both columns ($t = -2.54$ and -2.55, respectively). More importantly, consistent with H3, we find that the coefficient on *PLANNING* is significantly negative in both columns ($t = -2.37$ and -2.41, respectively). This indicates that tax departments with a more planning focus are associated with additional tax savings. In contrast, the coefficient on *COMPLIANCE* is significantly positive in both columns ($t = 2.57$ and 4.20, respectively), suggesting that tax departments with a more compliance focus have incrementally higher tax rates. This result is consistent with the trade-off between tax planning and compliance.

Columns (2) and (4) report the tests of H4 and H5. We continue to find a significantly negative coefficient on *INHOUSE_TAX* in both columns ($t = -2.49$ and -2.51, respectively). More importantly, consistent with H4, the coefficient on *COMPLIANCE* is significantly negative in both columns ($t = -2.20$ and -2.02, respectively). This indicates that tax departments with a more compliance focus are associated with incrementally lower tax risk. In contrast, the coefficient on *PLANNING* is significantly positive in both columns ($t = 2.01$ and 2.58, respectively), suggesting that tax departments with a more planning focus have incrementally higher tax risk, again consistent with the trade-off between tax planning and compliance.

Overall, the above results suggest that after controlling for tax department size, tax departments with a more planning focus are associated with incrementally greater tax avoidance, but at the cost of higher tax risk; tax departments with a more compliance focus

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[18] For this regression, we set *PLANNING* and *COMPLIANCE* as zero for firms without tax departments.

are associated with incrementally lower tax risk, but at the cost of higher tax rate.

4.4   Determinants of In-house Tax Departments' Relative Focus

Given the above results, especially the trade-off between tax planning and compliance, it is interesting to explore why, compared to other firms, some tax departments focus relatively more on tax planning or compliance. We consider the following five aspects that might affect tax departments' focus: (1) firm complexity, (2) firms' reputation concern, (3) shareholder incentives, (4) firms' desire to reduce tax expenses, and (5) firms' desire to reduce tax risk. We investigate how these factors will lead certain tax departments to have a more tax planning or compliance focus, relative to the benchmark group (i.e., tax departments without a specific focus). Appendix C provides detailed variable measurements.

First, complex firms, by taking advantage of complex firm structure, can have more tax planning opportunities. At the same time, complex firms can have more tax compliance issues. Since both scenarios are likely, it is possible that some complex firms will have a more tax planning focus and some complex firms will have a more tax compliance focus, compared to other firms. Hence we expect that firm complexity is associated with a more tax planning focus or a more tax compliance focus. We use firm size (*SIZE*), the existence and size of foreign operations (*FOR_DUMMY*, *FOR_INCOME*), and the number of business segments (*LN_SEGMENTS*) to capture firm complexity.

Second, tax avoidance can attract unfavorable public attention. Prior research suggests that reputation concern deters firms from engaging in aggressive tax planning (Hanlon and Slemrod 2009; Chow et al. 2016; Dyreng et al. 2016; Austin and Wilson 2017). Therefore, we expect that firms with higher reputation concerns are less likely to focus on tax planning but are more likely to focus on tax compliance. We use the amount of advertising expenditures (*ADVERTISING*) to capture firms' reputation concern.

Third, because shareholders benefit from tax avoidance, they have incentives to push firms to focus more on tax planning. Prior research finds that institutional ownership positively affects tax avoidance (e.g., Khan, Srinivasan, and Tan 2017; Chen, Huang, Li, and Shevlin 2019). In addition, since managerial ownership better aligns managers' interest with shareholders', higher managerial ownership can also lead to a greater emphasis on tax planning (Rego and Wilson 2012). Hence we predict that firms with higher institutional ownership (*INST_OWN*) and managerial ownership (*MGMT_OWN*) are more likely to focus on tax planning and less likely to focus on tax compliance.

Fourth, firms vary in their incentives to save taxes. More profitable firms (those with higher *ROA*) have more taxable income and thus greater incentives to focus on tax planning. Financially constrained firms (those with higher *KZ_INDEX*) are also more likely to focus on tax planning because of their greater desire to generate cash tax savings (Law and Mills 2015; Edwards, Schwab, and Shevlin 2016). The capital structure and asset composition of firms can also affect their tax departments' focus. Debt, capital investments, and R&D expenditures provide firms with tax benefits such as interest tax deduction, capital cost allowance, and R&D tax credits, reducing firms' need for active tax planning. Therefore, we expect leverage, capital intensity, and R&D intensity (*LEV*, *PPE*, *R&D*) to be negatively associated with tax planning focus. Prior research suggests that a firm's tax policy can be affected by its peer firms (e.g., Bird, Edwards, and Ruchti 2018). As such, we expect the firms that lag behind their industry peers in tax planning (i.e., those with higher cash ETR than their industry peers, *LAG_CASHETR_POS*) to focus more on tax planning. We do not have predictions on how the above factors affect the likelihood of tax compliance focus.

Lastly, firms vary in their incentives to reduce tax risk. Guenther et al. (2017) find that cash ETR volatility is associated with firm risk. Dyreng et al. (2017) find that the effect of tax avoidance on tax uncertainty is particularly strong for high-tech firms. Therefore, firms

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that have higher risk (*RETVOL*), firms that undergo restructuring (*RESTRUCT*) and thus have

higher uncertainty, and high-tech firms (*HIGHTECH*) have stronger incentives to reduce their

risk exposure and are thus more likely to focus on tax compliance. Those firms likely also

pay less in taxes, again leading them to focus more on tax compliance. Firms that lag behind

their peers in tax compliance (i.e., those with higher cash ETR volatility than their industry

peers, *LAG_SDCASHETR_POS*) likely devote more resources to tax compliance. We do not

have predictions on how the above factors affect the likelihood of tax planning focus.

For the sub-sample of firms with tax departments, we use the following logit regression

to analyze the determinants of tax planning/tax compliance focus:

$$INHOUSE\_TAX\_FOCUS = \beta X + Industry, \ Year \ Fixed \ Effects + \varepsilon \qquad (4)$$

We examine the determinants of tax planning and tax compliance focus separately. For tax

planning (compliance) focus, we compare the tax departments with a tax planning

(compliance) focus and the benchmark group, i.e., tax departments with no specific focus,

and the dependent variable is *PLANNING1* (*COMPLIANCE1*).[19]

Table 5 reports the regression results. Compared to other firms, complex firms are

more likely to have a tax planning focus, and they are also more likely to have a tax

compliance focus. This is consistent with heterogeneity among complex firms, with some

having more tax planning opportunities and some having more complicated compliance

issues. As expected, firms that spend more on advertising and thus care more about reputation

are less likely to focus on tax planning and are more likely to focus on tax compliance.

Consistent with shareholders' incentives to save taxes, firms with higher managerial

ownership are more likely to focus on tax planning, and firms with higher institutional

ownership are less likely to focus on tax compliance. With respect to firms' incentives to

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[19] The inferences remain the same if we use *PLANNING2* and *COMPLIANCE2*.

reduce taxes paid, we find that firms that are more financially constrained and firms with a higher industry-adjusted cash ETR are more likely to focus on tax planning. In contrast, firms with higher leverage, more fixed assets, and more R&D are less likely to focus on tax planning. With respect to firms' incentives to reduce tax risk, we find that firms with high return volatility, firms that undergo restructuring, high-tech firms, and firms with higher industry-adjusted cash ETR volatility are more likely to focus on tax compliance.

In sum, we find that firms' relative focus on tax planning or compliance is systematically related to firm complexity, firms' reputation concern, managerial ownership, firms' desire to reduce tax expenses, and firms' desire to reduce tax risk.

5   Additional Analyses and Sensitivity Tests

5.1   Prior External Work Experience of Tax Employees

In this section, we explore the incremental effects of prior external work experiences of tax employees on tax outcomes. Tax employees with prior experience in accounting or law firms can gain expertise from serving a large number of clients. Such expertise can benefit a firm's internal tax planning and compliance. In fact, the job postings for tax employees often emphasize prior experience in public accounting or law firms as a desirable attribute.

To investigate the incremental effect of prior work experience in public accounting and law firms, we construct two variables: *INHOUSE_TAX_ACCFIRM* and *INHOUSE_TAX_LAWFIRM,* which are measured as the number of tax employees with past experiences in accounting firms and law firms, respectively, scaled by the firm's total number of employees (in thousands). We add these two variables to Equation (1). Since these two variables are components of *INHOUSE_TAX*, the coefficients on these variables capture the incremental effect of tax employees' prior accounting and law firm experience.

Table 6 reports the results using the control function approach. The results in Column

(1) suggest that prior work experience in public accounting firms has an incremental negative effect on tax avoidance ($t = -2.46$).[20] The results in Column (2) suggest that prior work experience in law firms has an incremental negative effect on tax risk ($t = -2.19$). Overall, the findings suggest that tax employees' prior work experiences in public accounting and law firms contribute incrementally to a firm's tax planning and compliance.

5.2   *The Use of Auditor-Provided Tax Services*

Other than its in-house tax team, a firm can also use external tax services, including those provided by its auditor. Prior research finds that auditor-provided tax services help firms to realize greater tax savings (McGuire et al. 2012; Klassen et al. 2016) and improve tax-related internal control (De Simone et al. 2015). Given that both in-house tax departments and auditors can reduce tax rate and risk, the impact of tax departments on tax planning and compliance outcomes will be lower when the auditor also provides tax services. At the same time, tax departments and auditors might complement each other in tax planning and compliance. For instance, the two teams' knowledge and skills can be complementary. In that case, we will expect the opposite.

To shed light on the interplay between internal and external tax investments, we examine the interaction effects of in-house tax investments and auditor-provided tax services on tax avoidance and tax risk.[21] We add the interaction of *INHOUSE_TAX* and an indicator for the use of auditor-provided tax services (*TAXFEES_DUMMY*) to Equation (1).[22]

Table 7 reports the regression results, Column (1) for tax avoidance and Column (2) for tax risk. As shown in Column (1), the coefficient on *INHOUSE_TAX* remains significantly

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[20] An untabulated analysis indicates that firms that have more tax employees with accounting firm experience are not more likely to use auditor-provided tax services. Thus, the coefficient on *INHOUSE_TAX_ACCFIRM* is not capturing the effect of external tax services.

[21] Note that there is no publicly available data on external tax services provided by non-auditors. Hence, this cross-sectional test only focuses on the interplay between in-house tax investments and auditor-provided tax services.

[22] The inferences are the same if we use the natural logarithm of (one plus) the amount of tax fees paid to the auditor or if we use the ratio of tax fees to total fees paid to the auditor.

negative. The coefficient on *INHOUSE_TAX × TAXFEES_DUMMY* is significantly positive ($t = 2.21$). This result indicates that the effect of in-house tax investments on tax avoidance is less when the firm also uses auditor-provided tax services.

With respect to tax risk, as reported in Column (2), the coefficient on *INHOUSE_TAX* remains significantly negative. The coefficient on *INHOUSE_TAX × TAXFEES_DUMMY* is significantly positive ($t = 3.11$). This result suggests that the effect of in-house tax investments on tax risk is less when the firm uses auditor-provided tax services.

Overall, the above results suggest that in-house tax investments and auditor-provided tax services are substitutes. This finding provides some justification for GE's decision of moving its in-house global tax team to PwC, announced in January 2017.[23] Most of GE's tax employees become PwC employees, but they will continue to help GE with tax issues, together with those who remain at GE. Even though GE substantially cut down the size of its in-house tax team, doing so may not negatively affect the effectiveness of GE's tax decisions, given our finding that internal tax investments and external tax services appear to be substitutes.

5.3   Change Analyses

We conduct change analyses to provide additional (Grainger) causal evidence on the link from in-house tax investments to tax avoidance and risk. Based on Equation (1), we use the following specification for change analyses:

$$\Delta Tax\ Avoid_t \text{ or } \Delta Tax\ Risk_t = \beta_0 + \beta_1\ \Delta INHOUSE\_TAX_{t-1} + \gamma\ \Delta\boldsymbol{Controls_t} \qquad (5)$$
$$+\ Industry,\ Year\ Fixed\ Effects + \varepsilon$$

The independent variable of interest is $\Delta INHOUSE\_TAX_{t-1}$. We use the lagged change (from t–2 to t–1) because we want to examine the impact of increasing or decreasing the number of tax employees on subsequent tax avoidance and risk measures. We measure the change in tax

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[23] "GE Tax Trade: Sending Hundreds of Accountants to PwC." *The Wall Street Journal*, January 12, 2017.

avoidance as the change in annual cash ETR (from year t-1 to year t), rather than the change in three-year tax rate, because the change in annual tax rate better captures the immediate effect of the change in tax investments, if any.[24] We use the same control variables as in Equation (1), except that we use annual changes in the control variables.

Panel A of Table 8 reports the results. For the analysis of $\Delta CashETR$ (Column (1)), the coefficient on $\Delta INHOUSE\_TAX$ is significantly negative ($t = -2.51$), indicating that increases in tax investments lead to a subsequent reduction in Cash ETR. For the analysis of $\Delta SD\_CashETR$ (Column (2)), the coefficient on $\Delta INHOUSE\_TAX$ is also significantly negative ($t = -2.36$), indicating that increases in tax investments lead to a subsequent decrease in tax risk.

To shed light on the potentially differential effects of hiring additional tax professionals and losing existing tax professionals, we separately examine the positive and negative changes in tax investments. Ex ante, we expect that the effect of changes in tax investments is driven more by positive changes than by negative changes, because once a firm's tax planning and compliance strategies are in place, tax outcomes may not be influenced by the departure of some tax employees in the short run.

We define two change variables: $\Delta^+INHOUSE\_TAX$ and $\Delta^-INHOUSE\_TAX$, which are equal to $\Delta INHOUSE\_TAX$ when the change is positive and negative, respectively, and zero otherwise. Columns (3) and (4) of Table 8, Panel A, report the regression results. In both columns, the coefficient on $\Delta^+INHOUSE\_TAX$ is significantly negative ($t = -2.37$ and -2.12, respectively), but the coefficient on $\Delta^-INHOUSE\_TAX$ is insignificant. These results suggest that hiring additional tax professionals leads to a subsequent decrease in tax rates and tax risk, but the departure of existing tax professionals does not significantly affect the next year's tax

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[24] Based on a survey of tax executives, Hoopes et al. (2012) report that "12 percent of tax positions could be changed within a month, 39.6 percent within six months, 69.2 percent within one year, 91.25 percent within two-to-three years, and 100 percent within three-to-five years."

avoidance or risk.

5.4   Robustness Checks: Alternative Specifications and Proxies

To ensure that the results are robust, we conduct a series of sensitivity tests. First, while a key benefit of the control function approach is its simplicity, a drawback of the control function approach is its stronger assumptions compared to the IV approach. Hence, we use the IV approach as an alternative way to address endogeneity. We estimate the determinant model of *INHOUSE_TAX* (Equation (2)) together with Equation (1) using the generalized method of moments (GMM) approach.[25] As reported in Panel B of Table 8, we continue to find a significantly negative association between *INHOUSE_TAX* and both tax rate and tax risk, consistent with the main findings.

Second, we use an un-scaled measure of in-house tax investments – the industry-and-size adjusted number of tax employees, defined as the number of tax employees in the firm minus the average number of tax employees of its industry-size-matched peers.[26] The analyses, as reported in Panel C of Table 8, lead to the same inferences.

Third, we use alternative proxies for tax avoidance and risk, including (i) the industry-and-size-adjusted measures (*AdjCashETR3* and *AdjSD_CashETR*) (Balakrishnan, Blouin, and Guay 2019), (ii) tax avoidance and risk measures based on GAAP effective tax rates (*GAAP_ETR3* and *SD_GAAP_ETR*), (iii) the three-year average of book-tax differences (*BTD3*) for tax avoidance and future tax settlements of uncertain tax benefits (*LEAD_SETTLE3*) for tax risk, and (iv) tax avoidance and risk measures based on Henry and Sansing (2018). The results, as reported in Panels D and E of Table 8, lead to the same

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[25] The GMM approach has benefits similar to those of the system of simultaneous equations (Cameron and Trivedi 2005); the inferences are the same if we use the two-stage least squares (2SLS) approach.

[26] We obtain the same inferences when using an expenditure-based measure, calculated as the total annual salary of the firm's tax employees deflated by total assets. The total salary of a firm's tax employees is calculated as the sum of the salary of individual tax employees, which is estimated as the average salary of employees with the same job title who work for firms in the same industry and with the same headquarter location, as reported by Payscale.com, a major human capital data provider in the U.S. We find similar results using salary information from Salary.com.

inferences.

Lastly, we also examine whether the size of accounting departments affects tax avoidance and tax risk. This analysis helps address the alternative explanation that accounting employees help improve financial accounting quality, which facilities tax planning and compliance. We collect data on accounting employees from *LinkedIn* and include both tax department size and accounting department size (not including tax employees) in explaining tax avoidance and risk. We estimate the regressions separately for S&P 500, S&P 400, and S&P 600 firms, because accounting staff in small firms may handle tax issues. The results (untabulated) indicate that the coefficients on *INHOUSE_TAX* remain significantly negative for all three groups of firms. The accounting department size is not significantly associated with tax avoidance or tax risk for S&P 500 firms and S&P 400 firms, although it is significantly associated with lower ETR and lower tax risk for S&P 600 firms. The findings suggest that for small firms, accounting employees also contribute towards tax planning and compliance. More importantly, the findings help strengthen our inferences on the link between in-house tax employees and the effectiveness of tax decisions.

6   Conclusion

This study examines the impact of a firm's in-house tax investments on tax avoidance and risk. Using data on corporate tax employees hand-collected from *LinkedIn* for a sample of 5,921 firm-years from non-financial S&P 1500 firms over the 2009-2014 period, we find that more tax investments are associated with significantly greater tax avoidance and lower tax risk. Using tax employees' specialization to identify tax departments' relative focus on tax planning or compliance, we find evidence consistent with the trade-off between tax planning and tax compliance; tax departments with a more tax planning focus have incrementally greater tax avoidance but higher tax risk, and tax departments with a more tax

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compliance focus have incrementally lower tax risk but lower tax avoidance. We also explore the determinants of tax departments' relative focus and find that firm complexity, reputation concern, managerial ownership, and firms' desire to reduce tax rates and tax risk systematically affect tax departments' focus.

Our study contributes to the literature by looking inside the "black box" of corporate in-house tax departments and by providing comprehensive evidence on the effect of tax departments' size and focus on tax avoidance and risk.

We conclude with several caveats. First, since our analyses rely on *LinkedIn* data which is self-reported, potential data issues such as incompleteness and misclassification of tax departments' focus introduce noises into our analyses. While this likely reduces the power of our tests, readers should keep these data limitations in mind when interpreting our findings. Second, the size and relative focus of tax departments are likely correlated with firm attributes. While we have addressed the endogeneity of tax department size using the number of tax programs in the firm's headquarter state as the instrumental variable, we cannot find a suitable instrumental variable for the focus of tax departments. Third, we do not consider implicit taxes. Our findings only illustrate the effect of corporate tax departments on explicit taxes. Lastly, our analyses focus on the benefits of having a large in-house tax department—reducing tax rates and tax risk. We do not consider the associated costs such as reputational costs of aggressive tax planning. As such, our analyses cannot be used to infer the optimality of in-house tax department size.

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Appendix A: Job Descriptions of Tax Planning and Tax Compliance Employees

From *LinkedIn*, we randomly select 50 corporate tax employees whose job titles include 'planning' and 50 corporate tax employees whose job titles include 'compliance,' over our sample period 2009-2014. This table reports the most commonly used terms in the job descriptions, with Panel A for tax planning employees and Panel B for tax compliance employees. For each commonly used term, we also include one example in parentheses for illustration.

Panel A: Tax planning employees

Job description terms	Number of tax employees	Percentage
Corporate structure and reorganization ("Recommended and implemented a new holding company structure in France to allow company to minimize its tax liability.")	31	62%
M&A and asset dispositions ("Managed tax planning and due diligence efforts in the tax planning area for acquisitions as well as dispositions.")	28	56%
Minimizing ETR and tax payments ("Developed, evaluated, and managed federal and international tax planning strategies to minimize the Company's effective tax rate and maximize cash flow.")	14	28%
Transfer pricing ("Assisting in the design, review, and implementation of transfer pricing methodologies for the global organization.")	12	24%
Foreign earnings repatriation ("Evaluated tax planning strategies to repatriate foreign earnings to the U.S. in a tax-efficient manner.")	8	16%
Others (Tax planning issues related to compensation, tax efficient financing transactions, foreign tax credit planning, or capital loss utilization.)	14	28%

Panel B: Tax compliance employees

Job description terms	Number of tax employees	Percentage
Tax return filings ("Responsible for preparing all U.S. federal and state income and franchise tax filings on a timely basis.")	40	80%
Tax-related financial reporting ("Management of tax accounting and reporting (US GAAP, IFRS, local country), including review and preparation of the worldwide tax provision.")	32	64%
Tax return audits ("Managed all federal and state direct and indirect tax audits.")	31	62%
Target ETR or tax payment estimation ("Establish target ETR and ensure achievement of such target.")	18	36%
Tax related internal controls ("Successfully remediated a pre-existing significant deficiency in the income tax accounts. Rewrote and ensured compliance with Sarbanes-Oxley including identifying and monitoring key tax controls.")	15	30%
Others (Tax compliance issues related to foreign tax credits, repatriation, complex transactions, or R&D tax credits.)	8	16%

Appendix B: Data Collection from *LinkedIn* and Data Validation

Data collection

Our data collection begins with identifying a list of non-financial S&P 1500 companies in 2014 (with a *LinkedIn* company page) as our sample firms. For each sample firm, we use *LinkedIn* to search for *LinkedIn* members who have worked for or are working for the firm (i.e., current or past employees). We limit the members to those whose current or past job titles contain the keyword "tax." [27] We exclude the tax employees whose jobs are temporary, such as tax clerks and tax interns (about 26%). We further exclude the tax employees whose job titles indicate that they do not work in the corporate income tax function, such as those with job titles related to property tax, sales tax, or payroll tax (about 12%). The above steps provide us with a sample of individuals who currently work or previously worked in a corporate income tax position in one of our sample firms. The search results provide the name, picture (if available), current and past job titles and employers, and educational background of tax employees.

Since our individual-level data contains both current and past tax employees of the sample firms, we are able to construct the tax departments of the sample firms in 2014 and prior years, as long as the tax employees have *LinkedIn* accounts that include their work history. Going too far back in time, however, can introduce more estimation errors due to missing past tax employees. For example, some tax employees who worked in the tax departments in the earlier years may no longer be working and might not have a *LinkedIn* account. Some may not list all their earlier work experience. Hence we use 2009 as the start of our sample period since it is not too far back and still allows us to have a sufficiently large sample for empirical analyses. Using a different starting year (specifically, one or two years

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[27] We do not restrict our search to those members who work in the accounting and finance function because depending on the organization structure, firms may have tax employees in other divisions (e.g., legal). We thank Michelle Hanlon for this suggestion.

before, or one or two years later) leads to the same inferences.

Based on the individual-level data, we construct a dataset containing year, firm, and the individual tax employees who work for the firm in a given year. The final sample consists of 5,921 firm-years, covering 42,868 individual-years over the 2009-2014 period.

Based on job titles, we group the tax employees into three categories: tax analysts, tax managers, and tax executives. Specifically, tax analysts include those with job titles including "Tax Analyst," "Tax Specialist," "Corporate Tax Accountant," or "Tax Associate." Tax managers include those with job titles including "Tax Manager," "Senior Tax Lawyer," "Tax Attorney," or "Global Tax Accounting Manager." Tax executives include those with job titles including "Tax Director," "VP Tax," "Chief Tax Counsel," or "International Tax Counsel." The size of a company's in-house tax departments is the total number of tax analysts, tax managers, and tax executives. We also collect information on tax employees' educational background, professional designation (e.g., CPA or CA), and work experience.

Data validation

Since it is important to assess the extent of the tax employee coverage of *LinkedIn*, we conduct three independent validation tests, comparing our data with 1) the 2012 Tax Executive Institute (TEI) survey, 2) the Klassen, Lisowsky, and Mescall (2017) (KLM) survey, and 3) interviews of senior executives of three sample firms.

1)   Comparison with the 2012 TEI survey

The TEI conducted a survey of 500 chief tax officers around the world and summarized the responses in the TEI's 2011-2012 Corporate Tax Department Survey. This survey shows that on average there are 10.6 tax employees for the largest companies in the U.S., Canada, Europe, and Asia. Because the TEI survey is for the largest companies in the world, we believe that S&P 500 firms within our sample are most comparable to the surveyed firms.

The average number of tax employees is 11 for our S&P 500 sample firms, quite close to the average of 10.6 tax employees reported by the TEI.

2)   Comparison with the Klassen et al. (2017) survey

Klassen et al. (2017) conducted a survey (hereafter the KLM survey) on corporate tax issues related to transfer pricing in collaboration with the TEI in 2010. As part of the survey, the respondents were asked a question related to their tax department size:

How many full time tax personnel are employed companywide?

Category 1 [≤5]; Category 2 [6-10]; Category 3 [11-20];

Category 4 [21-50]; Category 5 [51-100]; Category 6 [>100]

We obtained the KLM survey responses to the above question with firm identity hidden. [28] Among the 208 respondents to this question, 69 are public firms with total asset information. One limitation of the KLM survey is that the respondents only indicated the range of their tax department size (i.e., ≤5; 6-10; 11-20; 21-50; 51-100; >100). For firms in the last two categories, it is difficult to come up with reasonable estimates of their average tax department size, given the small number of firms in these two categories (three and four, respectively) and the wide or open-ended range. Hence we exclude those seven firms. We focus on the remaining 62 firms (hereafter the KLM firms) for the following comparison.

We compare the tax department size of the KLM firms with our sample firms matched on total assets. For each KLM firm, we find all our sample firms with total assets in the [98%, 102%] range of the KLM firm's total assets. Note that for each KLM firm, there can be several matched firms. The following table compares the tax department size between the KLM firms and the matched sample firms. For the KLM firms, we assume that the average tax department size for firms in each category is the midpoint of the range. For the matched sample firms, we use their tax department size based on *LinkedIn* in 2010, when the KLM

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[28] We thank Ken Klassen, Pete Lisowksy, and Devan Mescall for sharing the data with us.

survey was conducted. As reported, for Category 1, the mean tax department size is 2.5 for the KLM firms and 4.7 for the matched sample firms; for Category 2, the means are 8 and 6.7; for Category 3, the means are 15.5 and 11.2; and for Category 4, the means are 35.5 and 28.7. For the four categories combined, the mean tax department size is 13.9 for the KLM firms and 11.3 for the matched sample firms. The average difference of 2.6 is about 19% of the average tax department size of the KLM firms.

Response Category in the KLM Survey [number of tax employees]	KLM survey responses		Matched sample firms		
	Number of firms	Midpoint of the range (1)	Number of firms	Mean Tax department size per *LinkedIn* (2)	Difference (2) – (1)
Category 1 [≤5]	20	2.5	128	4.7	+2.2
Category 2 [6–10]	16	8	127	6.7	−1.3
Category 3 [11–20]	12	15.5	90	11.2	−4.3
Category 4 [21–50]	14	35.5	83	28.7	−6.8
Mean tax department size across the firms		13.9		11.3	-2.6

3)   Comparison with interviews of senior executives of three sample firms

Lastly, we compare the tax department size per *LinkedIn* with the interview responses of senior executives of three sample firms. We contacted 15 sample firms for interviews related to tax departments. Some firms did not respond to our request and some declined the request for privacy reasons. Three firms agreed to phone interviews, including one airline (Director for Financial Reporting), one manufacturer of durable goods (Vice President and Controller), and one wholesale firm (Senior Vice President and Controller).

The following table reports the number of tax employees in these firms per the interviewed executives and based on *LinkedIn* in February 2019 (the time of the interviews). We also report the firm size quintile and the industry of the firms, using the same definitions

as in Table 1. As reported, the tax department sizes from the two sources are very close to each other. For firm A, the number of tax employees is 12 and 10 from the two sources; for firm B, 5 and 5; and for firm C, 31 and 32. The mean difference of -0.3 is small.

	Firm Size Quintile	Fama-French 12 Industries	Number of tax employees per the interviews (1)	Number of tax employees per *LinkedIn* (2)	Difference (2) – (1)
Firm A (airline)	4	Others (Mining, Construction, Transportation, etc.)	12	10	-2
Firm B (manufacturing)	3	Consumer Durables	5	5	0
Firm C (wholesale)	5	Wholesale, Retail	31	32	+1
Average across the three firms			16	15.7	-0.3

The above validation tests suggest that the tax department size estimated using *LinkedIn* data is smaller than but still close to the actual tax department size based on surveys and interviews. Hence it seems that the coverage of tax employees in *LinkedIn* is reasonably comprehensive.

Appendix C: Variable Definitions

The data source is *Compustat*, unless otherwise noted.

Variables	Definitions
In-house Tax Department	
TAX_TOTAL	The total number of in-house tax employees of a firm per *LinkedIn*.
INHOUSE_TAX	The total number of in-house tax employees (*TAX_TOTAL*), divided by the total number of employees of the firm (in thousands).
PLANNING1	An indicator variable that equals 1 if the most senior tax executive has "planning" in his/her job title, such as "Director of Tax Planning" or "VP Tax Planning," and 0 otherwise.
COMPLIANCE1	An indicator variable that equals 1 if the most senior tax executive has "compliance" in his/her job title, such as "Director of Tax Compliance" or "VP Tax Compliance," and 0 otherwise.
PLANNING2	An indicator variable that equals 1 if the firm is in the top decile of *PLANNING_SCORE*, which is calculated as: (*#Planning Executive* $\times 3$ + *#Planning Manager* $\times 2$ + *#Planning Analyst*) / (*# Tax Executive* $\times 3$ + *#Tax Manager* $\times 2$ + *#Tax Analyst*), where *#Planning Executive* (*Manager*, *Analyst*) is the number of tax executives (managers, analysts) with "planning" in their job titles and *#Tax Executive* (*Manager*, *Analyst*) is the total number of tax executives (managers, analysts).
COMPLIANCE2	An indicator variable that equals 1 if the firm is in the top decile of *COMPLIANCE_SCORE*, which is calculated as: (*#Compliance Executive* $\times 3$ + *#Compliance Manager* $\times 2$ + *#Compliance Analyst*) / (*# Tax Executive* $\times 3$ + *#Tax Manager* $\times 2$ + *#Tax Analyst*), where *# Compliance Executive* (*Manager*, *Analyst*) is the number of tax executives (managers, analysts) with "compliance" in their job titles and *#Tax Executive* (*Manager*, *Analyst*) is the total number of tax executives (managers, analysts).
Δ*INHOUSE_TAX*	Change in *INHOUSE_TAX*, from year t–2 to t–1.
Tax Avoidance and Tax Risk	
CashETR3	Three-year average cash effective tax rate, calculated as the sum of the firm's cash tax paid over three years (year t, $t+1$, and $t+2$) divided by the sum of its total pre-tax book income (excluding special items) over the same period. Observations with a negative denominator are dropped from the analyses. *CashETR3* is winsorized at 0 and 1.
CashETR	Annual cash effective tax rate, calculated as cash tax paid divided by total pre-tax book income (excluding special items). Observations with a negative denominator are dropped from the analyses. *CashETR* is winsorized at 0 and 1.
SD_CashETR	Standard deviation of annual *Cash ETR* over three years (year t, $t+1$, and $t+2$).
Δ*CashETR*	Change in *CashETR* from year t–1 to year t.
Δ*SD_CashETR*	Change in *SD_CashETR* from year t–1 to year t.
Control Variables in the Analyses of Tax Avoidance and Risk	
SIZE	Average total assets over three years. We use the natural logarithm of average total assets in the regressions.

ROA	Average pre-tax income (excluding special items) over three years divided by average lagged assets over the same period.
MTB	Average market value of equity over three years divided by the average book value of common equity over the same period.
LEV	Leverage, calculated as the average long-term debt over three years divided by average lagged assets over the same period.
R&D	Average research and development expenditures over three years divided by average lagged assets over the same period.
PPE	Capital intensity, calculated as the average net property, plant, and equipment over three years divided by average lagged assets over the same period.
INTANG	Average intangible assets over three years divided by average lagged assets over the same period.
INVENTORY	Average inventory over three years divided by average lagged assets over the same period.
NOL	An indicator variable for loss carry forward, set as 1 if the loss carry forward is nonzero in any of the three years and 0 otherwise.
ΔNOL	Average change in loss carry forward over three years divided by average lagged assets over the same period.
FOR_DUMMY	An indicator variable for positive foreign income, set as 1 if the average three-year foreign income is positive and 0 otherwise.
FOR_INCOME	Average foreign income over three years divided by average lagged assets over the same period.
LN_SEGMENTS	The natural logarithm of one plus *SEGMENTS*, which is the average number of business segments over three years.
ICW_DUMMY	An indicator variable for the presence of internal control material weaknesses, set as 1 if the firm reports a SOX 404 or 302 material weakness in internal control in any of the three years and 0 otherwise. Source: *Audit Analytics*.
TAXFEES_DUMMY	An indicator variable for the use of auditor-provided tax services, set as 1 if the firm reports positive tax fees paid to its auditor in any of the three years and 0 otherwise. Source: *Audit Analytics*.
SD_ROA	Standard deviation of pre-tax return on assets (excluding special items) over three years.

Instrumental Variable

TAX_EDUCATION	The number of tax graduate programs (e.g., LLM in Tax and MS in Tax) offered by the universities in the state of the firm's headquarters in 2004. Source: *U.S. News Education, TaxTalent, TaxProf Blog, and universities' websites*.

Additional Variables for the Determinants of Tax Departments' Focus

ADVERTISING	Average advertising expenditures over three years divided by average lagged assets over the same period.
INST_OWN	The number of shares owned by institutional investors as a percentage of the number of shares outstanding.

MGMT_OWN	The number of shares owned by the CEO as a percentage of the number of shares outstanding.
KZ_INDEX	Cash constraint index as developed in Kaplan and Zingales (1997), calculated as -1.002(Cash Flow/K) + 0.283Q + 3.139(Debt/Total Capital) − 39.368 (Dividends/K) − 1.315(Cash/K), where K = net PPE and Q = (total shareholders' equity + market capitalization − common equity − deferred tax assets)/ total shareholders' equity. A higher KZ Index indicates that the firm is more cash constrained.
LAG_CASHETR_POS	An indicator variable for higher past cash ETR, set as 1 if the industry-size adjusted three-year cash ETR measured from year t–3 to t–1 is positive and 0 otherwise.
RETVOL	Return volatility, measured as the standard deviation of daily returns during the year.
RESTRUCT	An indicator variable for firms that undergo restructuring, set as 1 if the firm reports non-zero restructuring changes in any of the three years and 0 otherwise.
HIGHTECH	An indicator variable for firms in the high-tech industries (Bhojraj and Lee 2002), set as 1 for firm-year in the following industries: biotechnology (SIC codes 2833-2836 and 8731-8734), computer, computer programming, data process (3570-3577 and 7370-7379), electronics (3600-3674) and telecommunication (4810-4841), and 0 otherwise.
LAG_SDCASHETR_POS	An indicator variable for higher past tax risk, set as 1 if the industry-size adjusted three-year *SD_CashETR* measured from year *t*–3 to *t*–1 is positive and 0 otherwise.

Appendix D: Determinants of Corporate Tax Department Size

This table reports the OLS regression results on the determinants of *INHOUSE_TAX* based on 5,921 firm-years from S&P 1500 firms with available data over the 2009-2014 period. See Appendix C for variable definitions. Intercepts are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	INHOUSE_TAX
TAX_EDUCATION	0.0239***
	(5.56)
SIZE	-0.2230***
	(-16.37)
ROA	0.4674*
	(1.88)
MTB	0.0028
	(0.42)
LEV	0.4765***
	(3.79)
PPE	-0.1020
	(-0.76)
R&D	1.0420**
	(2.00)
INTANG	-0.2931***
	(-3.52)
INVENTORY	-1.0461***
	(-5.32)
NOL	0.0737**
	(2.14)
ΔNOL	-0.3359
	(-0.60)
FOR_DUMMY	0.1111*
	(1.88)
FOR_INCOME	-3.8606***
	(-5.72)
LN_SEGMENTS	0.0748*
	(1.88)
ICW_DUMMY	0.0702
	(0.53)
TAXFEES_DUMMY	0.0770*
	(1.80)
Year + Industry FEs	Included
N	5,921
Adj. R^2	0.31

Figure 1 In-house Tax Department:
Tax Planning, Tax Compliance Activities and the Outcomes: Tax Avoidance and Tax Risk

This figure depicts our conceptual framework. We argue that in-house tax departments' key activities include tax planning and tax compliance. While tax planning can lead to more tax avoidance, tax compliance can lead to lower tax risk. Hence we predict that:

H1: Firms' in-house tax department size is positively associated with tax avoidance.
H2: Firms' in-house tax department size is negatively associated with tax risk.

With respect to the incremental effect of tax departments' relative focus, we predict accordingly that:

H3: Holding tax department size constant, firms with tax departments that have a tax planning focus have incrementally higher tax avoidance.
H4: Holding tax department size constant, firms with tax departments that have a tax compliance focus have incrementally lower tax risk.

Given the potential tradeoff between tax avoidance and tax risk, it's unclear ex ante how tax planning activities will affect tax risk or how tax compliance activities will affect tax avoidance, hence we predict that:

H5: Holding tax department size constant, firms with tax departments that have a tax planning focus have a different level of tax risk compared with those without a focus.
H6: Holding tax department size constant, firms with tax departments that have a tax compliance focus have a different level of tax avoidance compared with those without a focus.
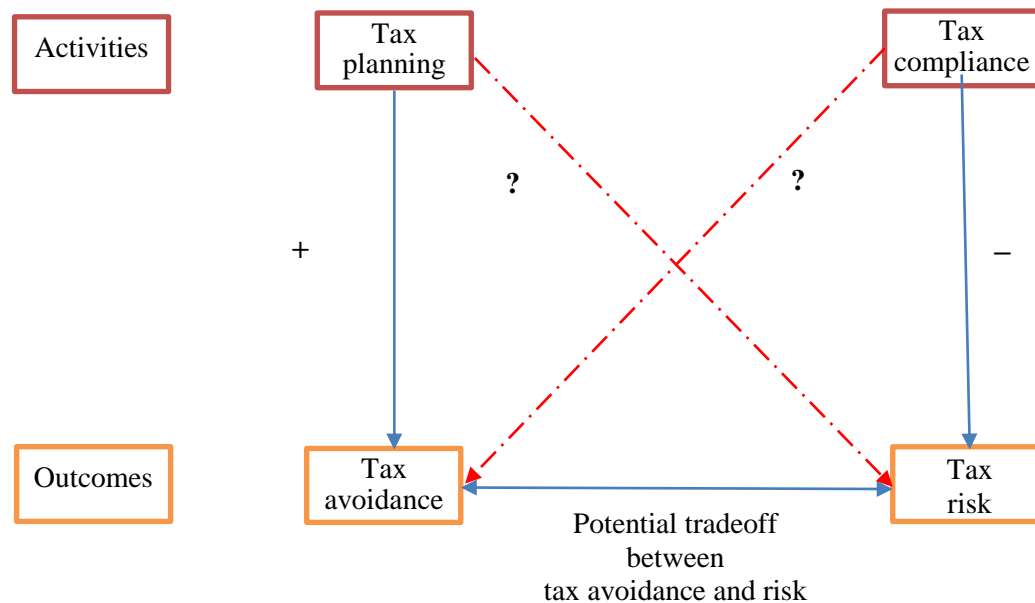
Table 1 Descriptive Statistics on Tax Department Size and Tax Employees

Our full sample includes 5,921 firm-years from S&P 1500 firms with available data over the 2009-2014 period. This table presents the descriptive statistics on tax department size for the full sample (Panel A) and by firm size, industry, and year (Panel B). It also presents the descriptive statistics on tax employee characteristics (Panel C). *TAX_TOTAL* is the number of tax employees in the tax department and *INHOUSE_TAX* is *TAX_TOTAL* scaled by the number of employees in the firm (in thousands).

Panel A: Descriptive Statistics on Tax Department Size

	N	Mean	S.D.	Q1	Median	Q3
TAX_TOTAL	5,921	7.24	10.99	1.00	4.00	8.00
INHOUSE_TAX	5,921	0.85	1.18	0.15	0.45	1.04

Panel B: Descriptive Statistics on Tax Department Size by Firm Size, Industry, and Year

Firm Size Quintile	Mean *Total Assets* (*Billions*)	N	Mean *TAX_TOTAL*	Mean *INHOUSE_TAX*
1	0.41	1,185	1.79	1.29
2	1.14	1,184	2.93	0.93
3	2.67	1,184	4.68	0.83
4	7.01	1,184	8.04	0.66
5	42.50	1,184	18.74	0.53
Fama-French 12 Industries				
FF1 Consumer Non-Durables		443	6.15	0.59
FF2 Consumer Durables		168	5.68	0.46
FF3 Manufacturing		902	6.96	0.64
FF4 Energy – Extraction and Products		263	7.25	1.39
FF5 Chemicals and Allied Products		245	8.42	0.91
FF6 Business Equipment		1,183	8.56	1.20
FF7 Tele Transmission		163	14.28	1.25
FF8 Utilities		304	5.19	0.82
FF9 Wholesale and Retail		833	7.54	0.53
FF10 Healthcare, Medical Equipment, and Drugs		570	6.07	1.04
FF12 Others		847	6.06	0.72
Year				
2009		961	6.16	0.83
2010		966	6.68	0.86
2011		985	7.13	0.86
2012		1,007	7.38	0.85
2013		1,009	7.75	0.85
2014		993	8.25	0.86

Table 1 (Cont'd)

Panel C: Tax Employee Characteristics

The full sample includes 42,868 employee-year observations for the 5,921 firm-years. This panel presents the seniority, educational background, qualifications, and prior work experience of tax employees. We classify tax employees into tax analysts, tax managers, and tax executives based on their self-reported profiles on *LinkedIn*. Tax executives include those with job titles "Chief Tax Officer," "VP Tax," "Tax Director," "Head of Tax," or "Tax Counsel." Tax managers include those with job titles "Tax Manager," "Tax Lawyer," "Tax Attorney," or "Tax Accounting Manager." Tax analysts include those with job titles "Tax Analyst," "Tax Specialist," "Corporate Tax Accountant," or "Tax Associate." Note that prior work experience sums to less than one across the categories because we only count these specific types of experiences.

	Number of Employee-years	Percentage of Full Sample
Full Sample	42,868	100%
Seniority		
Tax Executives	11,022	26%
Tax Managers	18,457	43%
Tax Analysts	13,389	31%
Educational Background and Qualifications		
Undergraduate Degree in Accounting	24,987	58%
MTax or MAcc (Tax Concentration)	12,425	29%
JD or LLM in Tax Law	5,717	13%
Other Graduate Degrees in Business	12,689	30%
CPA/CA	10,643	25%
Prior Work Experience		
BIG N Accounting Firms	15,730	37%
As a Tax Partner	453	1%
As a Tax Manager	7,374	17%
Non-BIG N Accounting Firms	2,135	5%
Law Firms	3,155	7%
Financial Institutions	1,371	3%
IRS or Treasury	1,018	2%
Other Corporate Tax Departments (Manager or above)	6,452	15%

Table 2 Descriptive Statistics on Regression Variables

Panel A: Descriptive Statistics on Firm Characteristics

Our full sample includes 5,921 firm-years from S&P 1500 firms with available data over the 2009-2014 period. This panel presents the descriptive statistics on firm-level characteristics, including in-house tax investments, tax avoidance and tax risk, and control variables. Note that the statistics for *PLANNING1*, *COMPLIANCE1*, *PLANNING2*, and *COMPLIANCE2* are for firms with tax departments. See Appendix C for variable definitions.

	N	Mean	S.D.	Q1	Median	Q3
PLANNING1	5,029	0.11	0.33	0.00	0.00	0.00
COMPLIANCE1	5,029	0.09	0.28	0.00	0.00	0.00
PLANNING2	5,029	0.10	0.30	0.00	0.00	0.00
COMPLIANCE2	5,029	0.10	0.30	0.00	0.00	0.00
CashETR3	5,921	0.24	0.14	0.14	0.24	0.31
SD_CashETR	5,660	0.10	0.09	0.05	0.08	0.13
SIZE (*in millions*)	5,921	10,742	24,109	860	2,585	8,659
ROA	5,921	0.10	0.10	0.05	0.09	0.15
MTB	5,921	3.22	4.94	1.58	2.36	3.74
LEV	5,921	0.20	0.19	0.05	0.18	0.30
PPE	5,921	0.30	0.25	0.10	0.21	0.42
R&D	5,921	0.03	0.05	0.00	0.00	0.03
INTANG	5,921	0.25	0.24	0.05	0.19	0.39
INVENTORY	5,921	0.08	0.11	0.00	0.02	0.12
NOL	5,921	0.52	0.50	0.00	1.00	1.00
ΔNOL	5,921	0.01	0.02	0.00	0.00	0.00
FOR_DUMMY	5,921	0.61	0.49	0.00	1.00	1.00
FOR_INCOME	5,921	0.03	0.04	0.00	0.01	0.04
SEGMENTS	5,921	8.29	4.30	5.00	8.00	10.00
ICW_DUMMY	5,921	0.02	0.15	0.00	0.00	0.00
TAXFEES_DUMMY	5,921	0.81	0.40	1.00	1.00	1.00
SD_ROA	5,921	0.04	0.06	0.01	0.03	0.05
TAX_EDUCATION	5,921	7.92	7.35	2.00	8.00	12.00

Table 2 (Cont'd)

Panel B: Correlation Table for Control Variables

The full sample includes 5,921 firm-years from S&P 1500 firms with available data over the 2009-2014 period. This table reports the Pearson correlations between *INHOUSE_TAX* and the control variables. The correlations in shaded cells are significant at the 0.10 level (based on two-tailed tests). See Appendix C for variable definitions.

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
(1)	*INHOUSE_TAX*																
(2)	*SIZE*	-0.22															
(3)	*ROA*	-0.04	-0.07														
(4)	*MTB*	0.01	-0.03	0.29													
(5)	*LEV*	-0.05	0.27	-0.17	-0.03												
(6)	*PPE*	-0.04	0.21	-0.06	-0.09	0.29											
(7)	*R&D*	0.17	-0.19	0.02	0.13	-0.25	-0.31										
(8)	*INTANG*	-0.04	0.09	-0.07	-0.01	0.20	-0.43	0.02									
(9)	*INVENTORY*	-0.09	-0.08	0.02	-0.05	-0.11	-0.15	-0.09	-0.17								
(10)	*NOL*	0.04	0.00	-0.12	-0.02	0.03	-0.22	0.10	0.17	0.01							
(11)	*ΔNOL*	0.00	0.04	-0.02	-0.01	0.01	0.03	0.00	0.02	-0.01	0.06						
(12)	*FOR_DUMMY*	0.00	0.14	0.06	0.02	-0.09	-0.33	0.19	0.16	0.04	0.22	-0.04					
(13)	*FOR_INCOME*	-0.02	0.18	0.25	0.09	-0.13	-0.18	0.22	0.00	-0.02	0.14	0.01	0.55				
(14)	*LN_SEGMENTS*	-0.04	0.29	-0.07	-0.09	-0.02	-0.16	0.05	0.10	-0.03	0.17	0.04	0.46	0.36			
(15)	*ICW_DUMMY*	0.02	-0.08	-0.05	-0.01	0.00	-0.01	0.00	-0.01	0.04	0.03	0.00	-0.04	-0.04	-0.01		
(16)	*TAXFEES_DUMMY*	-0.02	0.16	-0.01	0.02	0.04	-0.06	0.02	0.07	-0.02	0.07	0.01	0.17	0.12	0.13	0.02	
(17)	*SD_ROA*	0.04	-0.15	-0.28	0.01	-0.10	-0.06	0.12	-0.05	-0.08	0.04	0.04	-0.06	-0.08	-0.01	0.04	-0.02

Table 3 In-House Tax Investments and Tax Avoidance / Risk

This table reports the results for the effect of in-house tax investments on tax avoidance and risk, using the control function approach to address endogeneity in Columns (1) and (2) and using OLS regressions in Columns (3) and (4). See Appendix C for variable definitions. *STAGE1_RESIDUAL* is the residuals estimated from the determinant model, as reported in Appendix D. The full sample includes 5,921 firm-years from S&P 1500 firms with available data over the 2009-2014 period. Intercepts are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Control Function		OLS	
	(1)	(2)	(3)	(4)
	CashETR3	*SD_CashETR*	*CashETR3*	*SD_CashETR*
INHOUSE_TAX	-0.0091***	-0.0189**	-0.0060***	-0.0023**
	(-3.17)	(-2.51)	(-3.51)	(-2.06)
SIZE	-0.0093***	-0.0126***	-0.0087***	-0.0112***
	(-5.98)	(-6.48)	(-5.69)	(-9.65)
ROA	0.2132***	-0.1444***	0.097***	-0.2953***
	(9.17)	(-8.68)	(4.22)	(-15.87)
MTB	-0.0002	-0.0002	-0.0003	-0.0000
	(-0.61)	(-1.14)	(-0.83)	(-0.24)
LEV	-0.0574***	0.0135**	-0.0298***	0.0317***
	(-6.14)	(2.36)	(-3.72)	(4.55)
R&D	-0.4491***	0.1039***	-0.4214***	-0.0371
	(-9.51)	(2.90)	(-8.48)	(-1.18)
PPE	-0.1141***	0.0189**	-0.0753***	0.0058
	(-9.26)	(2.24)	(-5.41)	(0.69)
INTANG	-0.0373***	-0.0356***	-0.0298***	-0.0044
	(-4.16)	(-5.29)	(-3.20)	(-0.73)
INVENTORY	-0.0657***	0.0206	-0.0096	0.0198
	(-2.97)	(1.16)	(-0.43)	(1.30)
NOL	-0.0147***	0.0056**	-0.0197***	0.0046**
	(-4.21)	(2.27)	(-5.57)	(1.97)
ΔNOL	0.1088	-0.0621	0.1591**	0.0499
	(1.32)	(-1.59)	(1.98)	(1.25)
FOR_DUMMY	0.0217***	-0.0059*	0.0200***	-0.0086***
	(4.15)	(-1.70)	(3.77)	(-2.63)
FOR_INCOME	-0.5422***	-0.3003***	-0.5080***	-0.1513***
	(-8.99)	(-7.38)	(-8.30)	(-3.55)
LN_SEGMENTS	0.0230***	0.0170***	0.0243***	0.0173***
	(4.99)	(5.81)	(5.13)	(5.98)
ICW_DUMMY	0.0471***	-0.0066	0.0505***	0.0120
	(3.07)	(0.86)	(3.26)	(1.56)
TAXFEES_DUMMY	0.0076*	-0.0054*	0.0086**	-0.0034
	(1.89)	(-1.82)	(2.11)	(-1.23)
CashETR		0.1844***		0.1602***
		(15.13)		(17.43)
SD_ROA		0.0042***		0.0235***
		(2.61)		(6.50)
STAGE1_RESIDUAL	0.0034	0.0190**		
	(1.06)	(2.54)		
Year+Industry FEs	Included	Included	Included	Included
N	5,921	5,660	5,921	5,660
Adj. R^2	0.24	0.26	0.25	0.21

Table 4 The Incremental Effect of In-House Tax Departments' Focus

This table reports the regression results on the incremental effect of the tax departments' focus on tax planning and compliance, using the control function approach to address endogeneity. See Appendix C for variable definitions. *STAGE1_RESIDUAL* is the residuals estimated from the determinant model, as reported in Appendix D. The full sample includes 5,921 firm-years from S&P 1500 firms with available data over the 2009-2014 period. Intercepts are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	Classification based on "Tone at the top" (*PLANNING = PLANNING1 COMPLIANCE = COMPLIANCE1*)		Classification based on all tax employees' specializations (*PLANNING = PLANNING2 COMPLIANCE = COMPLIANCE2*)	
	(1)	(2)	(3)	(4)
	CashETR3	*SD_CashETR*	*CashETR3*	*SD_CashETR*
INHOUSE_TAX	-0.0091**	-0.0191**	-0.0091**	-0.0192**
	(-2.54)	(-2.49)	(-2.55)	(-2.51)
PLANNING	-0.0129**	0.0077**	-0.0127**	0.0087***
	(-2.37)	(2.01)	(-2.41)	(2.58)
COMPLIANCE	0.0205**	-0.0087**	0.0290***	-0.0067**
	(2.57)	(-2.20)	(4.20)	(-2.02)
SIZE	-0.0081***	-0.0120***	-0.0084***	-0.0121***
	(-3.66)	(-5.92)	(-3.86)	(-6.02)
ROA	0.1000***	-0.1575***	0.1324***	-0.1575***
	(3.58)	(-8.64)	(4.61)	(-8.65)
MTB	-0.0004	-0.0006*	-0.0005*	-0.0006
	(-1.27)	(-1.70)	(-1.70)	(-1.58)
LEV	-0.0333***	0.0130**	-0.0319***	0.0128**
	(-2.91)	(2.17)	(-3.12)	(2.13)
R&D	-0.3556***	0.1275***	-0.3579***	0.1305***
	(-6.19)	(3.12)	(-6.30)	(3.19)
PPE	-0.0709***	0.0232**	-0.0791***	0.0238***
	(-4.10)	(2.52)	(-4.62)	(2.58)
INTANG	-0.0253**	-0.0387***	-0.0369***	-0.0374***
	(-2.57)	(-5.43)	(-3.52)	(-5.24)
INVENTORY	-0.0157	0.0235	-0.0196	0.0234
	(-0.65)	(1.31)	(-0.82)	(1.30)
NOL	-0.0102**	0.0053**	-0.0105**	0.0052**
	(-2.46)	(2.18)	(-2.54)	(2.13)
ΔNOL	0.0929	-0.0404	0.0952	-0.0405
	(1.20)	(-0.99)	(1.23)	(-0.99)
FOR_DUMMY	0.0173***	-0.0078**	0.0179***	-0.0077**
	(2.88)	(-2.28)	(2.99)	(-2.26)
FOR_INCOME	-0.4646***	-0.2558***	-0.4984***	-0.2571***
	(-6.69)	(-7.03)	(-7.18)	(-7.05)
LN_SEGMENTS	0.0297***	0.0170***	0.0301***	0.0168***
	(5.49)	(5.92)	(5.58)	(5.87)
ICW_DUMMY	0.0471***	0.0020	0.0472***	0.0018
	(3.15)	(0.26)	(3.15)	(0.23)
TAXFEES_DUMMY	0.0061	-0.0074**	0.0063	-0.0073**
	(1.39)	(-2.45)	(1.44)	(-2.43)
CashETR		0.2304***		0.2306***
		(15.23)		(15.25)
SD_ROA		0.0006		0.0008
		(0.63)		(0.81)

STAGE1_RESIDUAL	0.0054	0.0198**	0.0055	0.0064***
	(1.54)	(2.56)	(1.58)	(3.19)
Year + Industry FEs	Included	Included	Included	Included
N	5,921	5,660	5,921	5,660
Adj. R^2	0.24	0.26	0.24	0.26

Table 5 Determinants of Tax Department's Focus – Planning or Compliance

This table reports the results for the determinants of a tax department's focus using Logit regressions. The benchmark group includes firm-years whose tax departments have no specific focus. Column (1) reports the coefficient estimates when comparing tax departments with a tax planning focus and the benchmark group; Column (2) reports the coefficient estimates when comparing tax departments with a tax compliance focus and the benchmark group. Firm-years without a tax department (i.e., firm-years with no tax employees) are excluded from this analysis. The focus of tax departments is based on the "tone at the top" approach. See Appendix C for variable definitions. The z-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) *PLANNING1*		(2) *COMPLIANCE1*	
	Predicted signs	Coeff. (z-stat)	Predicted signs	Coeff. (z-stat)
Firm Complexity				
SIZE	+	1.0498***	+	0.7526***
		(14.62)		(13.80)
FOR_DUMMY	+	0.1274	+	0.7112***
		(0.45)		(4.24)
FOR_INCOME	+	7.2463***	+	-2.2144
		(2.77)		(-1.13)
LN_SEGMENTS	+	0.6928***	+	0.5113***
		(3.86)		(3.21)
Firm's Reputation Concern				
ADVERTISNG	–	-7.6053*	+	9.3585***
		(-1.78)		(5.27)
Shareholder Incentives				
INST_OWN	+	0.6963	–	-0.8589**
		(1.29)		(-2.18)
MGMT_OWN	+	0.4500**	–	-0.1433
		(2.16)		(-0.81)
Desire to Reduce Tax Expenses				
ROA	+	2.0842	?	2.2352***
		(1.38)		(2.95)
KZ_INDEX	+	0.02088**	?	0.0037
		(2.25)		(0.74)
LEV	–	-0.9620**	?	0.3140
		(-1.96)		(1.06)
PPE	–	-2.4688***	?	-1.8831***
		(-3.72)		(-3.61)
R&D	–	-7.6430**	?	-1.0811
		(-2.18)		(-0.69)
LAG_CASHETR_POS	+	0.4033**	?	-0.1402
		(2.55)		(-0.91)
Desire to Reduce Tax Risk				
RETVOL	?	19.1112*	+	18.1994**
		(1.68)		(2.03)
RESTRUCT	?	-0.0972	+	0.6845*
		(-0.15)		(1.66)
HIGHTECH	?	-0.2420	+	0.5844**
		(-1.01)		(2.44)
LAG_SDCASHETR_POS	?	0.0168	+	1.8406***
		(0.12)		(2.70)
Year + Industry FEs		Included		Included
N		4,556		4,495
Pseudo R^2		0.20		0.21

Table 6 Incremental Effect of Tax Employees' External Work Experience

This table reports the regression results for the incremental effect of tax employees' external work experience on tax avoidance and tax risk, using the control function approach to address endogeneity. See Appendix C for variable definitions. Intercepts are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. The external work experience variables are defined as follows:

INHOUSE_TAX_ACCFIRM =	The total number of tax employees with prior work experience in a public accounting firm, divided by the total number of employees of the firm (in thousands).
INHOUSE_TAX_LAWFIRM =	The total number of tax employees with prior work experience in a law firm, divided by the total number of employees of the firm (in thousands).

	(1) *CashETR3*	(2) *SD_CashETR*
INHOUSE_TAX	-0.0070**	-0.0217***
	(-2.41)	(-2.75)
INHOUSE_TAX_ACCFIRM	-0.0051**	0.0030
	(-2.46)	(1.35)
INHOUSE_TAX_LAWFIRM	0.0096	-0.0129**
	(1.18)	(-2.19)
Control Variables	Included	Included
Year + Industry FEs	Included	Included
N	5,921	5,660
Adj. R^2	0.23	0.26

Table 7 In-House Tax Investments and Auditor-Provided Tax Services

This table reports the regression results for the interaction effects of in-house tax investments and auditor-provided tax services, using the control function approach to address endogeneity. See Appendix C for variable definitions. Intercepts and control variables are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CashETR3	(2) SD_CashETR
INHOUSE_TAX	-0.0148***	-0.0244***
	(-4.16)	(-3.14)
TAXFEES_DUMMY	-0.0007	-0.111***
	(-0.14)	(-3.32)
INHOUSE_TAX× TAXFEES_DUMMY	0.0074**	0.0064***
	(2.21)	(3.11)
Control Variables	Included	Included
Year + Industry FEs	Included	Included
N	5,921	5,660
Adj. R^2	0.24	0.27

Table 8 Alternative Specifications and Proxies

Panel A: Change Analysis

This table reports results for the effect of in-house tax investments on tax avoidance and tax risk using OLS change specifications. The model is the same as in Table 3 except that all variables are replaced with their corresponding first differences. Columns (3) and (4) separately test the effect of positive and negative changes in in-house tax investments. $\Delta^{+}INHOUSE\_TAX = \Delta INHOUSE\_TAX$ if $\Delta INHOUSE\_TAX \geqslant 0$, and 0 otherwise. $\Delta^{-}INHOUSE\_TAX = \Delta INHOUSE\_TAX$ if $\Delta INHOUSE\_TAX < 0$, and 0 otherwise. See Appendix C for definitions of other variables. Intercepts are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) $\Delta CashETR$	(2) $\Delta SD\_CashETR$	(3) $\Delta CashETR$	(4) $\Delta SD\_CashETR$
$\Delta INHOUSE\_TAX$	-0.0138**	-0.0048**		
	(-2.51)	(-2.36)		
$\Delta^{+}INHOUSE\_TAX$			-0.0170**	-0.0075**
			(-2.37)	(-2.12)
$\Delta^{-}INHOUSE\_TAX$			-0.0025	-0.0011
			(-0.87)	(-0.57)
Control Variables	Included	Included	Included	Included
Year + Industry FEs	Included	Included	Included	Included
N	3,987	3,924	3,885	3,924
Adj. R^2	0.04	0.09	0.04	0.09

Panel B: Alternative Specifications - IV Estimation

This table reports results for the effect of in-house tax investments on tax avoidance and tax risk using the IV estimation. *INHOUSE_TAX* is the predicted value estimated from the determinant model (Appendix D). See Appendix C for variable definitions. Intercepts are included but not tabulated. The t-statistics (in parentheses) are based on standard errors clustered by both firm and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1) CashETR3	(2) SD_CashETR
INHOUSE_TAX	-0.0148***	-0.0161***
	(-3.66)	(-3.78)
Control Variables	Included	Included
Year + Industry FEs	Included	Included
N	5,921	5,687
Adj. R^2	0.12	0.17

Table 8 (Cont'd)

Panel C: Alternative Proxy for Tax Investments

This table reports the results using an un-scaled measure of in-house tax department size (*ADJ_INHOUSE_TAX_COUNT*), using the control function approach to address endogeneity. See Appendix C for variable definitions. The alternative proxy for tax investments is defined below:

ADJ_INHOUSE_TAX_COUNT = The firm's number of tax employees minus the average number of tax employees of firms with similar size (the same decile rank) in the same industry (Fama-French industries).

	(1) ADJ_INHOUSE_TAX_COUNT	(2) CashETR3	(3) SD_CashETR
ADJ_INHOUSE_TAX_COUNT		-0.0008***	-0.0006***
		(-3.17)	(-3.32)
TAX_EDUCATION	0.0133***		
	(3.28)		
Control Variables	Included	Included	Included
Year + Industry FEs	Included	Included	Included
N	5,921	5,921	5,660
Adj. R^2	0.17	0.20	0.19

Panel D: Alternative Proxies for Tax Avoidance

This table reports the results using alternative proxies for tax avoidance, using the control function approach to address endogeneity. See Appendix C for variable definitions. The alternative proxies for tax avoidance are defined below:

AdjCashETR3 =	Industry-and-size-adjusted *CashETR3*, defined as the firm's *CashETR3* minus the average *CashETR3* of firms with similar size (the same decile rank) in the same industry.
GAAP_ETR3 =	Average GAAP effective tax rate over three years, calculated as the sum of a firm's income tax expense over three years divided by the sum of its total pre-tax book income (excluding special items) over the same period. Observations with a negative denominator are dropped from the analyses.
BTD3 =	Average total book-tax difference over three years.
Δ/MVA3 =	Average of *Δ/MVA* over three years, where Δ is calculated as the adjusted cash taxes paid (cash taxes paid adjusted for the change in tax reserves) minus expected tax payment (pre-tax book income times the U.S. statutory tax rate), and MVA is the market value of assets (Henry and Sansing 2018).

	(1) AdjCashETR3	(2) GAAP_ETR3	(3) BTD3	(4) Δ/MVA3
INHOUSE_TAX	-0.0073**	-0.0102**	0.0019***	-0.0008**
	(-3.49)	(-3.41)	(3.27)	(-2.11)
Controls Variables	Included	Included	Included	Included
Year + Industry FEs	Included	Included	Included	Included
N	5,921	5,799	5,681	6,054
Adj. R^2	0.21	0.18	0.31	0.12

Table 8 (Cont'd)

Panel E: Alternative Proxies for Tax Risk

This table reports the results using alternative proxies for tax risk, using the control function approach to address endogeneity. See Appendix C for variable definitions. The alternative proxies for tax risk are defined below:

AdjSD_CashETR =	Industry-and-size-adjusted *SD_CashETR*, defined as the firm's *SD_CashETR* minus the average *SD_CashETR* of firms with similar size (the same decile rank) in the same industry.
SD_GAAP_ETR =	Standard deviation of annual GAAP ETR over three years.
LEAD_SETTLE3 =	FIN 48 tax reserve that is settled with the tax authority from year t+1 through year t+3, divided by the ending balance of tax reserve in year t.
SD(Δ/MVA) =	Standard deviation of annual Δ/MVA over three years.

	(1) *AdjSD_CashETR*	(2) *SD_GAAP_ETR*	(3) *LEAD_SETTLE3*	(4) *SD(Δ/MVA)*
INHOUSE_TAX	-0.0049***	-0.0011***	-0.0151***	-0.0007**
	(-2.60)	(-3.13)	(-2.61)	(-2.55)
Controls Variables	Included	Included	Included	Included
Year + Industry FEs	Included	Included	Included	Included
N	5,687	5,663	4,815	5,781
Adj. R^2	0.21	0.20	0.06	0.32