Tax Authority Monitoring and Equity Pricing: A Revision to Prior Inferences

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ABSTRACT

We re-examine the role of tax authority monitoring in equity pricing. Prior research documents a negative association between IRS audit probability and the cost of equity capital. In contrast, when using improved IRS audit probability data and two firm-specific proxies for tax authority monitoring, we find a positive association between tax authority monitoring and the cost of equity capital. When we reconcile our results to prior literature, we find that a non-linear association between firm size and the cost of equity potentially accounts for these contradictory conclusions. Our results imply that, on average, shareholders believe that the possible negative consequences of tax authority monitoring (e.g., increased tax cash outflows) outweigh the potential value-enhancing consequences of tax authority monitoring (e.g., reduced managerial rent extraction). Consistent with this interpretation, our results are stronger among firms with the opportunity to engage in international transfer pricing, a potentially lucrative but highly scrutinized form of tax avoidance. Finally, we find some evidence suggesting shareholders positively value tax authority monitoring in the absence of other external monitors.

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I. INTRODUCTION

El Ghoul, Guedhami, and Pittman (2011), hereafter EGP, provide evidence suggesting shareholders perceive tax authority monitoring as a value-enhancing corporate governance mechanism that may constrain insiders' diversionary activities. However, other studies provide evidence that, when considered together, appears to contradict this notion. Specifically, studies find that corporate tax avoidance is often positively valued (e.g., Desai and Dharmapala, 2009; Drake, Lusch, and Stekelberg, 2019), is associated with a reduction in the cost of equity capital (Goh, Lee, Lim and Shevlin, 2016), and is negatively associated with tax authority monitoring (Hoopes, Mescall, and Pittman, 2012). Thus, if tax avoidance is value-enhancing, tax authority monitoring may limit a value-enhancing activity. Accordingly, shareholders would likely demand higher returns when tax authority monitoring is higher, an implication that is inconsistent with EGP's findings.

Motivated by this tension, we re-examine the valuation consequences of tax authority monitoring by taking advantage of three empirical innovations that have occurred since EGP's publication. The first innovation is improved data on Internal Revenue Service (IRS) audit probabilities, which was EGP's proxy for tax authority monitoring.[1] At the time of EGP's study, these data did not differentiate IRS audit probability among firms with greater than $250 million in total assets, resulting in over three-fourths of EGP's sample having audit probabilities that varied only by year. Since EGP's study, the IRS has split this size category into five size categories, providing greater within-year variation in audit probability among large firms. The second and third innovations are two firm-specific proxies for tax authority monitoring developed after EGP's

[1]We gather IRS audit probability data from the Transaction Records Access Clearinghouse (TRAC).

publication. Specifically, we utilize Bozanic, Hoopes, Thornock, and Williams's (2017) dataset of IRS attention to firms' public financial statement disclosures and Finley and Stekelberg's (2022) unrecognized tax benefit (UTB)-based proxy as additional monitoring measures.

In our primary analyses, we regress an estimate of a firm's cost of equity capital on the aforementioned measures of tax authority monitoring. Across all three measures, and in contrast to EGP's results, we find a *positive* association between tax authority monitoring and the cost of equity capital. We interpret this finding as shareholders valuing the potential benefits of tax avoidance more than those of tax authority monitoring. Economically, we estimate that moving from the 25th percentile of IRS audit probability to the 75th percentile is associated with an increase in the cost of equity capital of approximately 2.19 percent. These results are robust to changes in our research design, such as alternative sample selection criteria and additional control variables.

Next, we attempt to reconcile our results regarding the association between tax authority monitoring and the cost of equity with those of EGP. We begin by replicating EGP's study using the old (pre-2007) data structure and find similar results to their work (i.e., a negative association). We then repeat the analysis using only the new (2007–onwards) data structure and find comparable results to our primary tests (i.e., a positive association). Besides sample periods and firm composition, the main difference between these two analyses is the IRS audit probability data structure. We consolidate the new data structure to mimic the old one to determine whether the differences in sample periods, firm composition, or data structures explain the flipped association. We find results consistent with EGP in both periods using the compressed IRS audit probability data. Additionally, we require firms to be present before and after the change in data structure and continue to find a flipped association. These tests support the conclusion that the negative

association observed by EGP was likely due to the lack of variation within the data available at the time of their study and not due to other factors that may have altered the association over time, as merely restructuring the new data to mimic the old data structure flips the coefficient on IRS audit probability from positive to negative.

We then explore why the relatively minimal variation in the old data leads to a negative association with the cost of equity capital. We begin by examining scatterplots with quadratic prediction lines of the associations between explanatory variables and the cost of capital. We find that IRS audit probability and firm size have non-linear associations with the cost of equity capital. Furthermore, we note that a high correlation exists between these two variables. This suggests the non-linear association in the IRS audit probability data may be due to grouping audit probabilities by firm size. We add the square of our size control variable into the model to address the non-linearity issue with size. In this analysis, all three proxies positively correlate with the cost of equity capital, but the IRS audit probability measure is no longer statistically significant. Next, we address the non-linearity issue with the IRS audit probability variable by orthogonalizing the variable with firm size. Using the orthogonalized variable, we find that audit probability is positively associated with the cost of equity capital across all sample periods, including the period examined by EGP. These findings suggest that considering non-linearity issues is essential when examining tax authority monitoring's association with the cost of equity capital.

In additional analyses, we provide further insights into investors' valuation of tax authority monitoring. First, we show that our association is more pronounced among firms with greater ability to engage in international transfer pricing (multinational firms with higher intangible intensity), a highly scrutinized opportunity for tax avoidance. Second, we show that our association is more pronounced among firms with other strong external monitors (analysts, institutional

owners, big-N auditors). This is consistent with EGP's finding that investors value tax authority monitoring less when a firm has other monitoring mechanisms to mitigate managerial rent extraction.

Our findings contribute to the literature in several ways. Most directly, we contribute to the stream of research on the economic consequences of tax authority monitoring (e.g., Guedhami and Pittman, 2008; Hoopes et al., 2012; Hanlon, Hoopes, and Shroff, 2014; Beck and Lisowsky, 2014; DeBacker, Heim, Tran, and Yuskavage, 2015; Gupta and Lynch, 2016; Kubick, Lockhart, Mills, and Robinson, 2017; Ayers, Seidman, and Towery, 2019; Li, Pittman, and Wang, 2019; De Simone, Stomberg, and Williams, 2021; Bauer, Fang, and Pittman, 2021; Belnap, Hoopes, Maydew, and Turk, 2022; Mason and Williams, 2022). Specifically, we provide evidence that tax authority monitoring is positively associated with the cost of equity capital. In doing so, we also contribute to the literature on the valuation implications of corporate tax avoidance (e.g., Desai and Dharmapala, 2009; Inger, 2014; Drake et al., 2019). Our results suggest that shareholders perceive that the potential negative consequences of tax authority monitoring in terms of increased tax cash outflows (e.g., Hanlon and Slemrod, 2009) outweigh the potential value-enhancing consequences of tax authority monitoring discussed in EGP.

Our study also adds to the broader literature on external monitoring mechanisms. In particular, unlike boards who monitor through direct oversight of corporate decisions or institutional investors who monitor through private information channels (Carleton, Nelson, and Weisbach, 1998), the threat of filing a proxy resolution (Gillan and Starks, 2000), or the threat of shareholder litigation (Cheng, Huang, Li, and Lobo, 2010), tax authorities function as external monitors due to their ability to audit firms' tax returns and impose penalties on companies for claiming overly aggressive tax positions. Because all firms are potentially subject to tax authority

monitoring, it is essential to understand the implications of their monitoring for a firm's shareholders. Our findings suggest that shareholders perceive tax authority monitoring less (more) negatively in the absence (presence) of other strong external monitors.

II. PRIOR LITERATURE AND MOTIVATION

For decades, academics have theorized and demonstrated that external monitors, such as institutional investors and boards, may alleviate agency problems between managers and shareholders (e.g., Jensen and Meckling, 1976; Shleifer and Vishny, 1986). Furthermore, the literature provides evidence consistent with firms experiencing second-order positive effects from these alleviations, such as alignment of manager and shareholder interests (Hartzell and Starks, 2003), higher financial reporting quality (Klein, 2002), and lower cost of debt (Anderson, Mansi, and Reeb, 2004).

More recently, academics have begun examining tax authorities' (e.g., the IRS) roles as external monitors. Unlike boards who monitor through direct oversight of corporate decisions or institutional investors who monitor through private information channels (Carleton et al., 1998), the threat of filing a proxy resolution (Gillan and Starks, 2000), or the threat of shareholder litigation (Cheng et al., 2010), tax authorities function as external monitors due to their ability to audit firms' tax returns and impose penalties on companies for claiming overly aggressive tax positions. In turn, the threat of audits and associated penalties may deter management from engaging in opportunistic tax planning behavior. However, it is also possible that tax authority monitoring may discourage more appropriate forms of tax planning.[2] Therefore, it is unclear

[2] Consistent with this notion, Hoopes et al. (2012) surveyed Tax Executive Institute members on their views regarding tax authority monitoring. Seventy-two percent of respondents stated that they assess tax audit likelihood when making tax decisions, while 59.1 percent indicated that higher probabilities of tax audits deter their companies from undertaking certain tax avoidance strategies.

whether shareholders would desire the deterrence of a potential value-enhancing activity (Drake et al., 2019).

To explore this conundrum, EGP and others (e.g., Guedhami and Pittman, 2008; Bauer et al., 2021; Hanlon et al., 2014; Mason and Williams, 2022) have relied on IRS audit probability data to proxy for the ex-ante likelihood of tax authority monitoring. Specifically, EGP use this data to investigate the role of IRS monitoring in the equity pricing of public firms. The authors document a negative association between tax authority monitoring and the cost of equity capital, suggesting that the possibility of tax authority scrutiny functions as a corporate governance mechanism constraining insiders' diversionary activities. In other words, EGP's results imply that shareholders positively value this attention from tax authorities, even though it may deter firms from engaging in appropriate forms of tax avoidance.

Despite EGP's findings, we believe that significant tension remains regarding the role that tax authority monitoring plays in equity pricing. This tension mainly stems from studies that appear to indirectly contradict EGP's conclusions. Theory suggests that firm valuation should be a function of expected cash flows and risks associated with those cash flows. Higher expected net cash inflows and lower risk should elicit higher firm value. Successful tax avoidance should reduce tax cash outflows.

Additionally, Goh et al. (2016) document a negative association between tax avoidance and the cost of equity capital, suggesting lower financing cash outflows. Moreover, Guenther, Matsunaga, and Williams (2017) find that tax avoidance is negatively associated with firm risk. Therefore, it follows that Drake et al. (2019) document that corporate tax avoidance is positively valued on average.[3] Consistent with this finding, some research shows that higher institutional

[3] In contrast, Lewellen, Mauler, and Watson (2021) suggest that some forms of tax avoidance are negatively valued.

ownership is associated with greater tax avoidance (Khan, Srinivasan, and Tan, 2017; Chen, Huang, Li, and Shevlin, 2019), suggesting that tax avoidance is viewed positively by other external monitors in their push for improved overall firm performance.[4] However, Hoopes et al. (2012) find that corporate tax avoidance is negatively associated with IRS audit probability.[5] Thus, tax authority monitoring should have negative valuation implications for firms to the extent that it reduces net cash inflows and increases tax audit risk.

Though numerous studies appear to challenge EGP's work indirectly, several studies support their findings. For instance, research suggests that the threat of tax enforcement may improve firm performance (Mironov, 2013) and market value (Desai, Dyck, and Zingales, 2007). Therefore, investors may value the extra monitoring if cash inflows from improved performance or gains from increased market value outweigh costs from increased taxes. Furthermore, Banerjee, Gupta, and Krishnamurti (2022) find that markets punish firms by increasing their implied capital costs when identified as utilizing corrupt tax strategies. Therefore, investors may value extra monitoring because it may deter managers from using corrupt tax strategies.

Based on this discussion, we believe that a re-examination of EGP's work that implies positive valuation consequences, on average, of tax authority monitoring is appropriate at this time. To add power to our empirical approach, we take advantage of an improvement to the tax authority monitoring proxy used in EGP's study and the development of two firm-specific proxies for tax authority monitoring that were unavailable at the time of EGP's publication. We discuss these measures in the following section.

III. RESEARCH DESIGN

[4] In contrast, Khurana and Moser (2013) find that institutional ownership with long-term investment horizons is associated with lower levels of tax avoidance.

[5] Consistent with Hoopes et al. (2012), we document (untabulated) that IRS audit probability is negatively associated with tax avoidance (measured using the cash effective tax rate) in our sample.

Measures of Tax Authority Monitoring

For shareholders to incorporate tax authority monitoring into their firm valuations, they need to develop an expectation of the firm's likelihood of being subject to audit. However, there is likely no sole source of information that all shareholders rely upon to develop this expectation. Consistent with this proposition, Hoopes et al. (2012) surveyed several tax directors to determine how they assess tax audit probability when making tax decisions and found that they use several sources of information. Specifically, Hoopes et al.'s findings suggest that tax directors rely on tax experts, industry peers, and other external sources that disclose audit rates to determine their firms' audit probabilities. Though not the focus of Hoopes et al.'s study, external stakeholders likely assess tax authority monitoring similarly to tax directors, along with utilizing a firm's publicly available tax disclosures.

We first follow EGP by utilizing data on historical IRS audit probabilities to proxy for the degree of tax authority monitoring. Specifically, we use the probability of being subject to an IRS audit by year across several categories of firm size. We define this variable as *PCT_RET_AUDITED*. Prior to 2007, the largest firm size category in these data began at just $250 million in total assets. Consequently, over three-fourths of the firms in EGP's sample were included in the largest firm size category and had audit probabilities that only varied by year. EGP acknowledged this lack of variation in most of their sample as a significant limitation of their study. However, the data structure has since changed, providing more within-year variation in audit probability among large firms. In particular, in 2007, the formerly largest firm size category was split into five categories, with the largest category now beginning at $20 billion in total assets. Compared to the old data structure, this shift in firm size thresholds provides greater variation in audit rates among publicly traded corporations.

To provide additional detail on this change, Table 1 compares our sample firms under the old and new data structures. Like EGP, we find that using the old structure results in approximately 77 percent of our sample firm-year observations from 1992 to 2006 being included in the largest firm size category. In contrast, using the new structure results in only nine percent of our sample firm-year observations from 2007 to 2017 being included in the largest category of firm size.[6] Furthermore, Figure 1 illustrates the trends in IRS audit probability by asset groups over the 1992 to 2006 and 2007 to 2017 periods. Comparing these graphs illustrates the greater variation within the more recent data.

Our second empirical proxy for tax authority monitoring utilizes Bozanic et al.'s (2017) novel dataset of IRS attention to firms' public financial statement disclosures. To construct this dataset, Bozanic et al. obtained server log data on the IRS's usage of the Securities and Exchange Commission's Electronic Data Gathering, Analysis, and Retrieval system to retrieve a particular firm's 10-K during the year. The authors suggest that this dataset provides direct insight into the IRS's monitoring of a firm's financial reporting activities. This dataset is publicly available through the year 2014 and has been used in several subsequent studies (e.g., Fox and Wilson, 2022; Yost, 2023; Cheng, Chow, Lin, and Ng, 2019; Akamah and Song, 2019).[7] We utilize this dataset to create our second proxy for tax authority monitoring, *IRS_ATTENTION*. We calculate *IRS_ATTENTION* as the natural logarithm of one plus the number of IRS downloads of a firm's 10-K during the year.

Our final proxy for tax authority monitoring is constructed using the information in firms' income tax footnotes. In particular, we use Finley and Stekelberg's (2022) measure of tax authority

[6] When using the new data structure, our sample's most-represented firm size category is between $1 billion and $5 billion in total assets, which includes approximately 40 percent of our sample firm years.

[7] To be clear, we are not suggesting that shareholders acquire this data to determine the degree to which the IRS monitors firms.

monitoring based on firms' 10-K disclosures regarding UTB releases. Finley and Stekelberg argue that UTB releases due to settlements indicate more tax authority monitoring, while UTB releases due to lapses in the statute of limitations indicate less tax authority monitoring. The authors support their argument by documenting that their measure has decreased over time, coinciding with IRS resource reductions. Moreover, Finley and Stekelberg demonstrate that their measure is positively associated with other measures of tax authority monitoring and predicted determinants of tax authority monitoring, such as R&D intensity and tax haven usage. Therefore, we utilize their measure, which we define as *UTB_MONITOR,* as our third proxy for tax authority monitoring. We calculate *UTB_MONITOR* as the summation by firm of UTB settlements reduced by UTB lapses over the years *t*-3 to *t*, scaled by year *t*-3 beginning total UTBs.[8]

Primary Regression Model

Based on the above discussion, we estimate the following model to re-examine the role of tax authority monitoring in equity pricing:

$$AVG\_COC_{it} = \beta_0 + \beta_1 TAX\_MONITOR_{it} + \beta_2 SIZE_{it} + \beta_3 BETA_{it} + \beta_4 BTM_{it} + \beta_5 LN\_DISP_{it} + \beta_6 LTG_{it} + \beta_7 DEBT\_EQUITY_{it} + \lambda\ Industry\ Indicators + \varphi\ Year\ Indicators + \varepsilon \quad (1)$$

The dependent variable *AVG_COC* is the average of four cost of capital measures adjusted for the risk-free rate. Specifically, we average proxies from two residual income valuation models (Claus and Thomas, 2001; Gebhardt, Lee, and Swaminathan, 2001) and two abnormal growth models (Easton, 2004; Ohlson and Juettner-Nauroth, 2005).[9] The independent variable of primary interest

[8] We note that prior research has employed other proxies for tax authority monitoring, such as the number of IRS employees per year (El Ghoul et al., 2011) and completed IRS corporate audits within a geographic region (Hoopes et al., 2012). Unlike these other proxies and *PCT_RET_AUDITED,* a distinct advantage of *IRS_ATTENTION* and *UTB_MONITOR* is that they are annual firm-specific measures.

[9] To maintain the largest sample possible, we calculate this average based on the available cost of equity capital measures for each firm-year observation. Requiring all four measures to be populated for the firm-year to be included in the sample reduces the number of observations available for our primary tests reported in Table 5 to 18,639, 6,269, and 3,138 for Columns (1), (2), and (3), respectively. On this reduced sample the inferences from

TAX_MONITOR is one of the three tax authority monitoring proxies (*PCT_RET_AUDITED*, *IRS_ATTENTION*, or *UTB_MONITOR*) discussed above. Earlier reasoning suggests that shareholders may positively or negatively value monitoring from a tax authority. If shareholders view tax authorities as value-enhancing monitors, we expect a negative association between *TAX_MONITOR* and *AVG_COC* ($\beta_1 < 0$). However, if shareholders view tax authorities as value-diminishing monitors, we expect a positive association between *TAX_MONITOR* and *AVG_COC* ($\beta_1 > 0$).

To facilitate the comparison of our results to those reported by EGP, we include control variables utilized in EGP's study. These variables account for factors that may explain a firm's cost of equity capital. In particular, we control for firm size (*SIZE*) using the natural logarithm of total assets, which is expected to have a negative association with *AVG_COC*. We control for a firm's systematic risk by including a firm's beta (*BETA*), which is calculated by regressing daily stock returns over the year on CRSP value-weighted market returns over the same period. We also control for a firm's liquidity risk by including *DEBT_EQUITY*, calculated as the ratio of long-term debt to firm equity. As a firm's risk increases, we expect investors to require a higher return from their investment, resulting in positive coefficients on *BETA* and *DEBT_EQUITY*. We control for a firm's growth potential by including the firm's book-to-market ratio (*BTM*), which is expected to have a positive association with *AVG_COC*. Additionally, we control for characteristics of a firm's forecast environment by including the natural logarithm of analyst forecast dispersion (*LN_DISP*) and analysts' long-term growth forecasts (*LTG*). All continuous variables are winsorized by year at their 1st and 99th percentiles. Lastly, we cluster standard errors by firm and include industry

Table 5 continue to hold. Please refer to the online appendix for a detailed discussion regarding our estimation of the cost of equity capital.

(Fama-French 48) and year fixed effects to control for unmodeled industry and time-invariant factors that may explain a firm's cost of equity capital.

IV. RESULTS

Sample Selection

Our sample selection procedure, summarized in Table 2, begins with 64,534 non-financial and non-utility firm-year observations from 1992 to 2017 with a CRSP and IBES match. Next, we delete 6,894 observations for which our cost of equity capital measure cannot be estimated and 28,018 observations for which the control variables in our model cannot be calculated. These restrictions result in a final sample of 29,622 observations. IRS audit probability data is available for this full sample. However, our analyses using the IRS attention and UTB-based proxies of tax authority monitoring impose additional data constraints and are only determinable over specific time periods. These additional restrictions result in a sample of 12,050 observations for our IRS attention tests and a sample of 5,662 observations for our UTB-based tax authority monitoring tests.

Descriptive Statistics and Correlations

Table 3 presents descriptive statistics for all regression variables used in our primary analyses. The mean of *AVG_COC* is 0.0594, which indicates that, on average, observations in our sample have an equity risk premium over the yield on 10-year Treasuries of approximately 5.94 percent. Regarding our tax authority monitoring variables, the average observation in our sample has a 36.04 percent probability of being audited by the IRS, has its annual report downloaded 3.39 times by the IRS, and releases slightly more of its UTBs via settlements than through statute of limitation lapses.

Correlations among our regression variables are presented in Table 4. We document mixed correlations among our proxies for tax authority monitoring and the cost of equity capital. Specifically, we find correlations with *AVG_COC* that are significantly negative (*PCT_RET_AUDITED*), significantly positive (*IRS_ATTENTION*), and insignificant (*UTB_MONITOR*), which underscores the tension in our research question. In addition, many control variables significantly correlate with the cost of equity capital, highlighting the need to examine our research question in a multivariate setting.

Audit Probability Results

Table 5 presents our main findings on the association between tax authority monitoring and the cost of equity capital. In column 1, we begin by re-examining the association between IRS audit probability (*PCT_RET_AUDITED*) and the cost of equity capital for our full sample period (i.e., 1992–2017). Contrary to the results reported by EGP, we find that IRS audit probability is positively associated with the cost of equity capital ($\beta_1 = 0.0070$; *p*-value < 0.01). We interpret this finding as evidence that investors value the potential benefits associated with tax avoidance more than those associated with tax authority monitoring. In terms of economic significance, our coefficient estimates suggest that an increase in *PCT_RET_AUDITED* from its 25th percentile of 27.30 percent to its 75th percentile of 45.86 percent results in an increase to *AVG_COC* of 13 basis points, which equates to a 2.19 percent increase in the cost of equity capital. The effects of our control variables on the cost of equity capital are consistent with EGP and other cost of equity capital studies.

IRS Attention Results

Having documented that IRS audit probability is positively associated with the cost of equity capital over our full sample period, we examine the associations between two additional tax

authority monitoring proxies and equity pricing. Table 5, column 2 presents the results of using *IRS_ATTENTION* as a proxy for tax authority monitoring. Consistent with earlier results, we continue to find that tax authority monitoring is positively associated with the cost of equity capital ($\beta_1 = 0.0011$; *p*-value < 0.01). In terms of economic significance, our coefficient estimates suggest that an increase in *IRS_ATTENTION* from its 25th percentile of 0.6931 (approximately one download) to its 75th percentile of 2.3026 (approximately nine downloads) increases *AVG_COC* by 17.7 basis points, which equates to a 2.98 percent increase in the cost of equity capital.

Finley and Stekelberg (2022) Tax Authority Monitoring Results

Table 5, column 3 presents the results of our final proxy for tax authority monitoring, *UTB_MONITOR*. As with the other proxies, we observe that tax authority monitoring is positively associated with the cost of equity capital ($\beta_1 = 0.0019$; *p*-value < 0.05). In terms of economic significance, our coefficient estimates suggest that an increase in *UTB_MONITOR* from its 25th percentile of -0.2649 to its 75th percentile of 0.2826 results in an increase to *AVG_COC* of 10.4 basis points, which equates to a 1.75 percent increase in the cost of equity capital. In summary, we consistently find that tax authority monitoring is associated with statistically significant and economically meaningful increases in the cost of equity capital.[10]

Replication of EGP and Consolidation of New Asset Groupings

As discussed above, EGP document a negative association between tax authority monitoring (as measured using IRS audit probability data) and the cost of equity capital. Due to

[10] Firm characteristics that affect the cost of equity capital in year t-1 may also affect tax authority monitoring in year t, eliciting endogeneity concerns. To address these concerns, we follow EGP and include the lag of *AVG_COC* (untabulated) as a control variable in equation (1). Our inferences for *PCT_RET_AUDITED* remain unchanged. However, the positive coefficients on *IRS_ATTENTION* and *UTB_MONITOR* are now statistically insignificant (p=0.14 and p=0.11, two-tailed, respectively), which may be due to sample attrition from requiring this lag. Additionally, because it may take time for investors to fully incorporate information on tax authority monitoring into their valuation decisions, we re-estimate our tests using lagged measures of *PCT_RET_AUDITED* and *IRS_ATTENTION* (note we do not lag *UTB_MONITOR* because this variable is already constructed using multiple years of lagged data). Results are reported in the online appendix; all inferences remain unchanged.

the asset size groupings within the old data, approximately 82 percent of EGP's sample had audit probabilities that only varied by year. We believe that this data limitation may explain EGP's negative association. To further explore this assertion, we replicate EGP's study by using a sample period of 1992 to 2006 and the less granular data. In Table 6, column 1, we observe results consistent with EGP's finding that higher IRS audit probability is associated with a lower cost of equity capital. However, when we use a sample period of 2007 to 2017 and more granular data in Table 6, column 2, we observe that IRS audit probability is positively associated with the cost of equity capital.[11]

To help determine whether this change in the directional association is due to improvements in the data or other external factors that may have changed over time, we transform the new data to mirror the size classifications of the old data. We do this by creating a weighted average of the audit probabilities for the asset groups over $250 million of total assets, resulting in only one group representing all companies with $250 million or more of total assets, mirroring the pre-2007 data. We then use these transformed data to re-estimate our regressions. If our findings are due to changes in the data, we expect to observe consistent results using the old data and the consolidated new data.[12]

[11] One potential concern with this finding is that *PCT_RET_AUDITED* is the same for all observations in a given year-size category, and prior research in economics (Angrist and Pischke, 2009; Romano and Wolf, 2017) and accounting (Guenther, 2018) demonstrates that this could bias the standard errors and coefficient estimates of our regressions. Solon, Haider, and Wooldridge (2015) suggest that researchers should estimate regressions using both OLS and weighted least squares (WLS) when faced with this grouped data issue. We draw similar inferences when estimating our regressions using WLS for Table 6, columns 1 and 2. As such, we conclude that model misspecification due to grouped data is not a significant concern in our tests.

[12] Additionally, we re-estimate equation (1) by year using *PCT_RET_AUDITED* (untabulated). The coefficient is negative (significantly negative in all but one year) in all years before 2007 and positive (significantly positive in all but two years) in all years after 2006. If the directional association flip in columns (1) and (2) of Table 6 is due to other external factors rather than changes in the IRS audit probability data, we would expect to observe a more gradual change in the coefficient on *PCT_RET_AUDITED* over time versus a marked shift in 2007.

The consolidated asset groupings results are reported in Table 6, columns 3 and 4. Column 3 presents the results when we examine our entire sample period of 1992 to 2017 (combining the old data with the compressed new data), while column 4 presents the results of using the compressed new data for 2007 to 2017. Across both columns, we identify a significantly negative coefficient on *PCT_RET_AUDITED*, consistent with the findings of EGP.

Furthermore, to rule out that changes in sample composition explain the flipped association, we examine samples that required (i) the firm to appear at least 24 out of 26 sample years, (ii) the firm to appear at least 20 out of 26 sample years, (iii) the firm to appear at least five times before and after the data structure change, (iv) the firm to appear at least three times before and after the data structure change, and (v); the firm to appear at least once before and after the data structure change. In untabulated analyses, we continue to document the positive association between *PCT_RET_AUDITED* and *AVG_COC* with these alternative samples, alleviating concerns that our findings are due to changes in sample composition. Taken together, we interpret these results as evidence that EGP's findings are driven by a lack of variation in the audit probability data that was available to the authors at that time.[13] Specifically, we believe that the lack of variation in the audit probability variable among firms with total assets of $250 million or greater seems to cause the audit probability variable to act more like a size variable, which would explain its negative association with the cost of equity capital.[14]

To explore this possibility further, we test for differences between the coefficients in Table 6, column 2 (using the old data) and column 4 (using the compressed new data). The results, which we present in column 5 of Table 6, show that *PCT_RET_AUDITED* and *SIZE* are the only

[13] It should be emphasized that this was the best data available to the authors at the time of their study.
[14] Consistent with this argument, we note that the correlation between *PCT_RET_AUDITED* and *SIZE* reported in Table 4 is 0.57 and is the largest correlation for both variables.

coefficients that change significantly between these columns (p-values < 0.01). We also observe that the coefficient on *SIZE* in column 4 is one-third the magnitude of the coefficient in column 2. Considering that the only difference between these columns is the data structure, these findings suggest that *PCT_RET_AUDITED* subsumes a substantial portion of the size-related effect on the cost of capital when using fewer asset-size classifications for IRS audit probabilities.

Exploration of IRS Audit Probability, Size, and Cost of Capital

The flipped association documented in the prior section may be due to *PCT_RET_AUDITED* having a non-linear association with the cost of capital; that is, the association may be negative for firms with less than $250 million in assets, but this association changes from negative to positive at some point after this cut off. To explore this possibility, in Figure 2, Panel A, we present a scatterplot with a quadratic prediction line for the association between *PCT_RET_AUDITED* and *AVG_COC*.[15] We conclude from examining this figure that non-linearity between these variables may be a concern. However, recall that we note a high correlation between *PCT_RET_AUDITED* and *SIZE* and that *PCT_RET_AUDITED* subsumes a significant portion of *SIZE*'s explanatory power when we compress the asset-size audit probability categories. Accordingly, in Figure 2, Panel B, we also examine a scatterplot with a quadratic prediction line for the association between *SIZE* and *AVG_COC*. We conclude from this figure that non-linearity may also be a concern between these variables.

In Table 7, we attempt to address the non-linearity issue by including *SIZE* squared as an additional control variable in our primary regressions.[16] Including this squared term should help

[15] We use the means of *AVG_COC* by *PCT_RET_AUDITED* and *SIZE* in Figure 2, Panels A and B, respectively, to facilitate a visual examination of these non-linear associations.

[16] Alternatively, we follow EGP and Hoopes et al. (2012) by using asset size-decile fixed effects in our regressions instead of *SIZE* (untabulated). The advantage of this approach is that it does not impose a specific functional form on the relation between size and the cost of equity capital. When we re-estimate Table 5 with size-decile fixed effects we observe the following coefficients (t-stats) for variable of interest: *PCT_RET_AUDITED* 0.0026 (1.25); *IRS_ATTENTION* 0.0005 (1.68); *UTB_MONITOR* 0.0016 (1.65).

alleviate the non-linearity issue documented for the *SIZE* control. However, it is unclear whether its inclusion would address the non-linearity issue with the IRS audit probability proxy. That said, we continue to find evidence of a positive association between tax authority monitoring and the cost of capital in columns 2 and 3 (p-values < 0.10, respectively). However, including *SIZE* squared results in weak evidence of a positive association between IRS audit probability and cost of capital (p-value < 0.10, one-tailed test). As expected for the *SIZE* controls, we find that the coefficients on the unsquared *SIZE* control are negative in all three columns (p-value < 0.01), while the coefficients on the squared *SIZE* control are positive in all three columns (p-value < 0.01). Overall, these findings support the notion that *SIZE* does have a non-linear association with the cost of capital.

Although we provide weak evidence that the IRS audit probability is positively associated with the cost of equity capital when including the squared *SIZE* control variable, it remains unclear whether it would address the documented non-linearity issue. With this in mind, we attempt to remove any non-linearity issues attributable to firm size that categorizing by firm size introduces into the IRS audit probability proxy. Specifically, we replace *PCT_RET_AUDITED* with the residuals from the following regression model:

$$PCT\_RET\_AUDITED_{it} = \beta_0 + \beta_1 MVE_{it} + \beta_2 MVE_{it} * MVE_{it} + \varepsilon \quad (2)$$

MVE is the natural logarithm of the market value of equity and is commonly used as a control for firm size in other cost of equity studies (e.g., Dhaliwal, Krull, and Li, 2007; Dhaliwal, Judd, Serfling, and Shaikh, 2016). We use the market value of equity rather than total assets as our size measure in this regression to remain consistent with EGP by keeping asset-based controls for size in our cost of capital regression model. Due to the orthogonal nature of residuals, the residuals

from the above model, which we define as *RES_PCT_RET_AUDITED,* should reflect the probability of tax authority audit that is not directly explained by *MVE* or its square.[17] With this new variable, we revisit the findings from Table 6, columns 1 and 3, that suggest the old monitoring proxy and the compressed monitoring proxy have a negative association with the cost of capital.

To start, we include the square of *SIZE* as an additional control variable in our regression investigating the 1992–2006 time period and our regression investigating the 2007–2017 time period. Table 8, columns 1 (1992–2006) and 3 (2007–2017), show that the inclusion of the squared term subsumes the explanatory power of the IRS audit probability proxy; specifically, the coefficient on *PCT_RET_AUDITED* is not significantly different from zero using a one or two-tailed test in either period. Due to the possibility of the size controls subsuming the explanatory power of *PCT_RET_AUDITED*, which by design is a function of size, we replace *PCT_RET_AUDITED* with *RES_PCT_RET_AUDITED* in Table 8, columns 2 and 4. With this measure, we find evidence consistent with tax authority monitoring having a positive association with the cost of equity capital. These findings support the notion that the older IRS audit probability data structure employed in EGP's study resulted in their tax authority monitoring proxy behaving like a size control, which, as discussed above, has a non-linear association with the cost of capital.

V. ADDITIONAL ANALYSES AND ROBUSTNESS CHECKS

R&D Intensity and Foreign Operations

[17] *SIZE*'s correlation with *RES_PCT_RET_AUDITED* is 0.116, or approximately one-fifth of its correlation with *PCT_RET_AUDITED*. Thus, if grouping by size explains *PCT_RET_AUDITED*'s non-linear association with *AVG_COC*, we expect *RES_PCT_RET_AUDITED* to have a linear association with *AVG_COC*. Examining the scatterplot with a fitted regression line for the association between *RES_PCT_RET_AUDITED* and *AVG_COC* reveals a linear association.

Earlier, we suggest that investors may negatively value tax authority monitoring because it decreases net cash flows and increases tax audit risk. We expect this effect to be more substantial when firms use international transfer pricing. International transfer pricing can provide significant tax savings. However, these tax savings strategies occur between related parties and are often limited by arm's length statutes (De Simone, 2016). Due to the complexity and subjectivity of pricing at "arm's length," this form of tax avoidance is more likely to attract tax authority scrutiny upon examination. Consistent with this notion, Towery (2017) finds that international transfer pricing is one of the most common sources of uncertain tax positions reported to the IRS on Schedule UTP. Transfer pricing strategies can take many forms. However, Grubert (2003) documents that nearly half of all income shifted from high tax to low tax jurisdictions is related to R&D-based intangible assets. Based on these findings, we expect our results will be stronger among firms that simultaneously report a high level of R&D intensity and report foreign income.

Table 9 presents the results of testing this assertion. We identify a subsample of firms that report non-zero foreign income for these tests. We then interact our monitoring proxies with *HIGH_R&D*, an indicator variable equal to one if the firm-year observation's R&D expense as a percentage of assets is greater than our sample mean. For these tests, we also include additional controls commonly used in tax avoidance research, such as the return on assets (*ROA*), net operating losses levels (*NOL*) and changes (*CHANGE_NOL*), intangibles intensity (*INTANGIBLES*), foreign operations intensity (*FOREIGN_INC*), and plant, property, and equipment intensity (*PPE*). Consistent with earlier expectations, we find that among firms reporting foreign operations, investors demand a higher return when firms engage in high R&D and tax monitoring increases. Finally, we reperform these tests with a subsample of firms reporting

subsidiaries in tax havens and find similar results (reported in the online appendix).[18] Specifically, we find that among firms operating in tax havens, investors demand a higher return when firms engage in high R&D and tax monitoring increases. Taken together and consistent with expectations, these results indicate that investors view tax authority monitoring more negatively when the firm has opportunities for income shifting using R&D-based intangibles, a common and particularly uncertain form of tax avoidance.

The Presence of Other External Monitors

In additional tests, EGP examine the effect of other external monitoring mechanisms, such as institutional ownership and analyst coverage, on the association between IRS audit likelihood and the cost of equity capital. The authors find that other strong monitoring mechanisms moderate their primary finding of a negative association between tax authority monitoring and the cost of equity capital. EGP interpret this result to indicate that investors value tax authority monitoring less when a firm has other monitoring mechanisms to mitigate managerial rent extraction.

As discussed earlier, in contrast to EGP, we identify an overall positive association between tax authority monitoring and the cost of equity capital. However, similar to EGP's arguments, we believe that other external monitoring mechanisms may help ensure that a firm is only engaging in methods and levels of corporate tax avoidance that would not facilitate managerial rent extraction. Consistent with this conjecture, Allen, Francis, Wu, and Zhao (2016) document that higher levels of analyst coverage constrain aggressive forms of tax planning. Likewise, examining an exogenous decrease in analyst coverage, Chen, Chiu, and Shevlin (2018) find that treatment firms realize a reduction in cash and GAAP ETRs, which implies that analysts were previously constraining the firms' tax avoidance efforts. Furthermore, Guo, Li, and Lin (2023) suggest that

[18] We define tax havens consistent with the dataset provided by Scott Dyreng at https://sites.google.com/site/scottdyreng/ Home/data-and-code/EX21-Dataset.

visits from institutional investors influence firms' tax avoidance strategies. The authors suggest that these visits constrain tax avoidance by overly aggressive managers through the threat of disciplinary action and improve tax avoidance by cautious managers through knowledge transfer. Relatedly, Goh et al.'s (2016) examination of the association between tax avoidance and the cost of equity capital provides evidence that higher levels of analyst coverage and institutional ownership lead to an incremental decrease in the cost of equity capital for a given level of tax avoidance. This finding suggests that investors incrementally value tax avoidance in the presence of strong external monitoring because tax avoidance is less likely to be overly risky. As such, the potential for the tax authority to serve as an alternative governance mechanism would lessen within firms with other monitoring mechanisms.

This discussion predicts that investors may value tax authority monitoring in the absence of other external monitors. However, that value may be negated in the presence of other strong external monitoring mechanisms because tax authority monitoring will potentially continue to have negative consequences (e.g., tax savings no longer being realized) while providing relatively fewer corporate governance benefits. We test this prediction by examining the incremental effect of tax authority monitoring on the cost of capital when other strong external monitors are present. In the results reported in the online appendix, we consistently find that investors demand higher returns when other strong external monitors are present. Specifically, we document this result among firms with high analyst following, high institutional ownership, and big-N auditors.

Additional Controls and Firm Fixed Effects

In earlier tests, we only used EGP's original control variables and did not include firm fixed effects to facilitate the comparison of our results to those of EGP. However, including additional controls and/or firm fixed effects allows us to control for unmodeled firm characteristics

that may explain the association between tax authority monitoring and the cost of equity capital. Therefore, we repeat our primary analyses with the additional controls listed in Table 9. In the results reported in the online appendix, we find that our inferences remain unchanged.

Next, we replace industry fixed effects with firm fixed effects and repeat our primary analyses. In the results reported in the online appendix, we continue to draw similar inferences for *PCT_RET_AUDITED*, providing some comfort that our results are not due to unmodeled firm characteristics. However, when including firm fixed effects, we fail to find a significant association between tax authority monitoring and the cost of equity capital using *IRS_ATTENTION* or *UTB_MONITOR* as our monitoring proxy. Our inability to document a significant association may result from firm fixed effects subsuming a significant portion of the explanatory power from our variable of interest, given that these variables do not exhibit significant year-to-year variation.

Additional Sample Cuts

In the United States, large firms can volunteer to be audited by the IRS continuously under the Coordinated Industry Case or Large Corporate Compliance programs. Therefore, the audit probability for these firms is 100 percent. To ensure that our earlier results are not due to large firms engaging in these continual audits, we repeat our main analyses with observations using the new data IRS audit probability data but with the largest size category (i.e., assets > $20 billion) of firms removed. In the results reported in the online appendix, inferences remain unchanged using this subsample. Additionally, we remove all loss firms from our full sample due to loss firms possibly engaging in fewer or different forms of tax planning. In results reported in the online appendix, inferences remain unchanged.

VI. CONCLUSION

In this study, we re-examine the role of tax authority monitoring in the equity pricing of public firms. In contrast with earlier research, our results indicate that tax authority monitoring is *positively* associated with the cost of equity. Our findings suggest that investors perceive that the potential negative consequences of tax authority monitoring in terms of decreased net cash inflows outweigh the potential value-enhancing consequences of tax authority monitoring discussed in EGP. While we do find some evidence that investors positively value tax authority monitoring in the absence of other external monitors, we consistently find that investors negatively value this attention when other strong external monitors are present. These results are consistent with the notion that shareholders perceive that the potential for the tax authority to serve as an external monitor is lessened within firms with other strong monitoring mechanisms.

Moreover, we provide evidence suggesting that the EGP's results are likely an artifact of their tax authority monitoring proxy's non-linear association with the cost of equity capital. This potentially explains why other research appears to indirectly contradict EGP's conclusions. In doing so, our study contributes to the literature on tax authority monitoring and tax enforcement (e.g., Guedhami and Pittman, 2008; Hoopes et al., 2012; Hanlon et al., 2014; Beck and Lisowsky, 2014; DeBacker et al., 2015; Gupta and Lynch, 2016; Kubick et al., 2017; Ayers et al., 2019; Li et al., 2019; Bauer et al., 2021; De Simone et al., 2021; Belnap et al., 2022; Mason and Williams, 2022) and the literature on the valuation implications of corporate tax avoidance (e.g., Desai and Dharmapala, 2009; Inger, 2014; Drake et al., 2019). In addition, our study adds to the broader literature on external monitoring by providing insights into how shareholders perceive tax authority monitoring and how other monitoring mechanisms influence this perception. Finally, our findings contribute to the external monitoring literature by suggesting that researchers should

consider the relationship between firm size, IRS audit probabilities, and their dependent variable in deciding whether IRS audit probabilities are the best measure of tax authority monitoring to use in their setting or whether firm-specific measures of monitoring (e.g., IRS attention or a UTB-based measure of monitoring) may be more appropriate.

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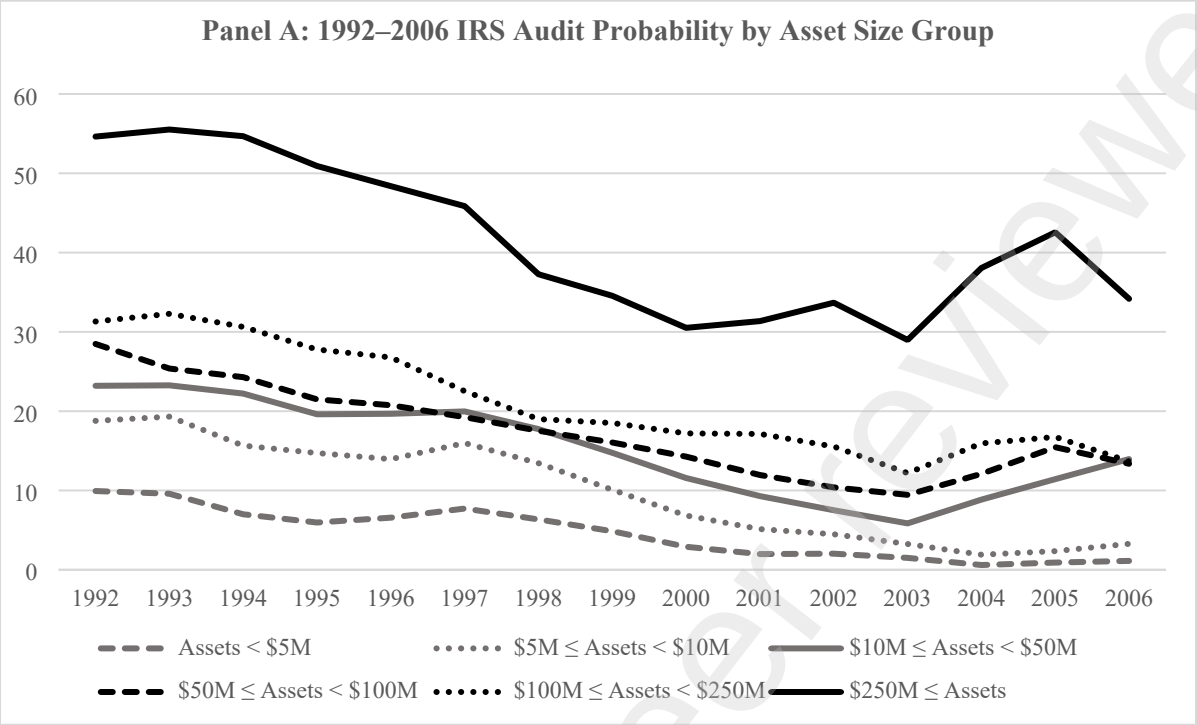
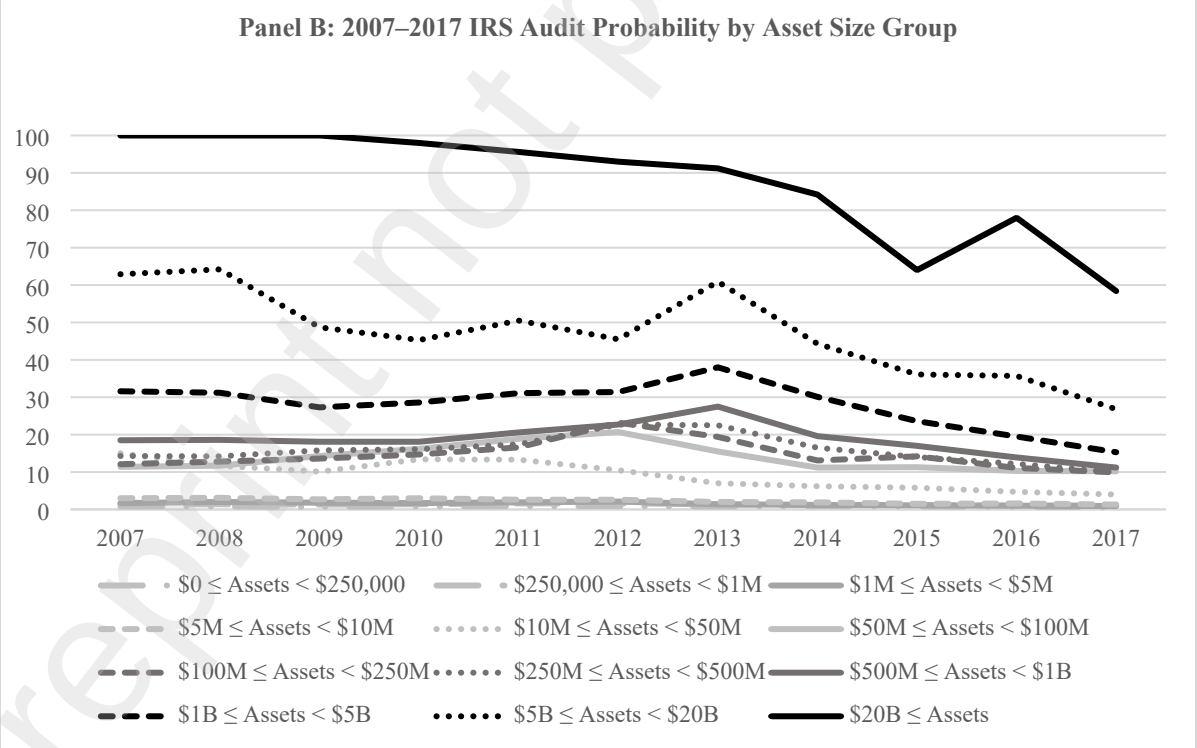
Appendix: Variable Definitions

Variable	Definition
AVG_COC	The average of four cost of capital measures (Claus and Thomas (2001), Easton (2004), Ohlson and Juettner-Nauroth (2005), and Gebhardt et al. (2001)) that have been reduced by the yield on a 10-year Treasury bond in year *t*.
BETA	Calculated by regressing daily stock returns over the year on CRSP value-weighted market returns over the same period.
BTM	The ratio of the book value of equity to the market value of equity in year *t*.
CHANGE_NOL	The change in tax loss carryforwards from *t-1* to *t* scaled by total assets in *t-1*.
DEBT_EQUITY	The ratio of long-term debt to the market value of equity in year *t*.
FOREIGN_INC	The ratio of foreign pre-tax income to total pre-tax income.
HIGH_R&D	Indicator variable equal to one if the firm-year observation's R&D expense as a percentage of assets is greater than the sample mean.
INTANGIBLES	Total intangible assets in *t* scaled by total assets in *t-1*.
IRS_ATTENTION	The natural logarithm of one plus the number of IRS EDGAR downloads per Bozanic et al. (2017) by firm-year.
LN_DISP	The natural logarithm of one plus the ratio of the standard deviation of analyst forecasts in year *t* to the absolute value of the mean analyst forecast in year *t*.
LTG	Median analyst forecast of the long-term earnings growth rate.
MVE	The natural logarithm of the market value of equity in year *t*.
NOL	A dichotomous variable coded as 1 when tax loss carryforwards are non-zero; coded 0 otherwise.

PCT_RET_AUDITED	The audit rate of firms by asset-size category in year *t*, provided by TRAC.
PPE	Total net plant, property, and equipment in *t* scaled by total assets in *t-1*.
RES_PCT_RET_AUDITED	Residual from a regression of *PCT_RET_AUDITED* on *MVE* and *MVE* squared in year *t*.
ROA	The ratio of pre-tax income in *t* to total assets in *t*.
SIZE	The natural logarithm of total assets in year *t*.
TAX_MONITOR	One of three proxies for tax authority monitoring: *PCT_RET_AUDITED, IRS_ATTENTION,* or *UTB_MONITOR.*
UTB_MONITOR	The summation by firm of UTB settlements reduced by UTB lapses over the years *t*-3 to *t*, scaled by year *t*-3 beginning total UTBs.

Figure 1: IRS Audit Probabilities Time Trends

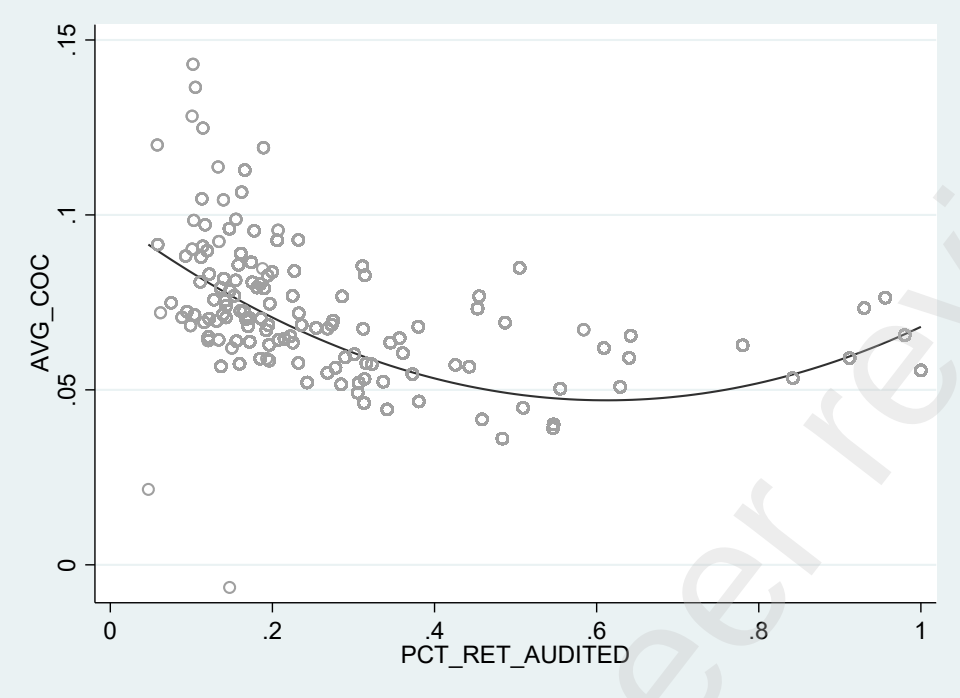




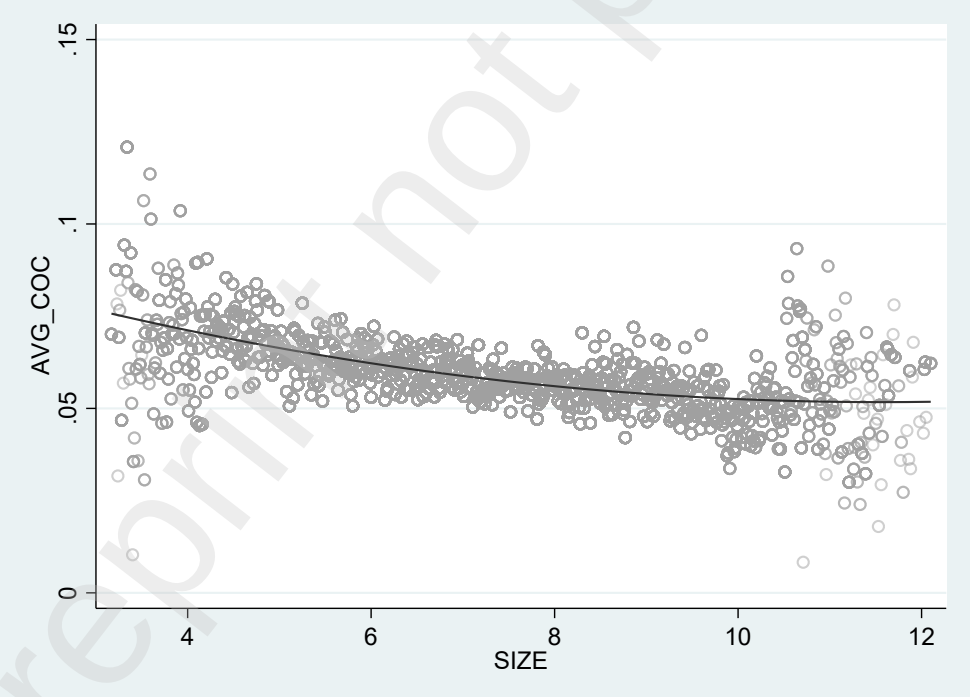
Notes: this figure presents IRS audit probability by asset-size group by year using the old data structure (1992-2006) in Panel A and the new data structure (2007-2017) in Panel B.

Figure 2: Scatterplots

Panel A: *PCT_RET_AUDITED* and *AVG_COC*



Panel B: *SIZE* and *AVG_COC*



Notes: this figure presents quadratic prediction lines of the associations between *PCT_RET_AUDITED* (Panel A) and *SIZE* (Panel B) and the cost of equity capital.

Table 1: IRS Audit Probability Data Comparison

Old data structure (1992 through 2006)		New data structure (2007 through 2017)	
Firm Size Category	Sample Frequency	Firm Size Category	Sample Frequency
Assets < $5M	0.00%	Assets < $0.25M	0.00%
		$.25M ≤ Assets < $1M	0.00%
		$1M ≤ Assets < $5M	0.00%
$5M ≤ Assets < $10M	0.03%	$5M ≤ Assets < $10M	0.00%
$10M ≤ Assets < $50M	2.69%	$10M ≤ Assets < $50M	0.25%
$50M ≤ Assets < $100M	5.72%	$50M ≤ Assets < $100M	1.09%
$100M ≤ Assets < $250M	14.36%	$100M ≤ Assets < $250M	5.11%
$250M ≤ Assets	77.19%	$250M ≤ Assets < $500M	9.17%
		$500M ≤ Assets < $1B	14.72%
		$1B ≤ Assets < $5B	40.36%
		$5B ≤ Assets < $20B	19.98%
		$20B ≤ Assets	9.31%

Notes: this table presents the asset classes under the old categorization scheme (i.e., prior to 2007) and the new categorization scheme (i.e., 2007 onward). The frequency column provides the percentage of our sample within each asset class.

Table 2: Sample Selection

Selection Criteria	Observations
Non-financial and non-utilities observations with non-missing and positive sales, stockholders' equity, share price, and common shares outstanding, as well as total assets greater than or equal to $1M from 1992 through 2017 with a CRSP and IBES match	64,534
Less: Observations for which *AVG_COC* cannot be estimated	(6,894)
Less: Observations without the necessary data to calculate all control variables	(28,018)
IRS audit probability sample	29,622
IRS audit probability sample	29,622
Less: 1992 through 2003 observations and 2016 and 2017 observations	(16,503)
Less: IRS attention data not available	(1,069)
IRS attention sample	12,050
IRS audit probability sample	29,622
Less: 1992 through 2009 observations	(22,093)
Less: Observations without necessary data to calculate Finley and Stekelberg (2022) tax monitoring measure	(1,867)
UTB-based measure sample	5,662

Notes: this table presents the sample selection procedure followed in this study.

Table 3: Descriptive Statistics

Variables	N	Mean	Std. Dev.	P25	P50	P75
AVG_COC	29,622	0.0594	0.0366	0.0350	0.0523	0.0755
PCT_RET_AUDITED	29,622	0.3604	0.1589	0.2730	0.3368	0.4586
IRS_ATTENTION	12,050	1.4792	1.2168	0.6931	1.3863	2.3026
UTB_MONITOR	5,662	0.0113	0.5024	-0.2649	0.0000	0.2826
SIZE	29,622	7.1147	1.6472	5.9447	7.0354	8.1892
BETA	29,622	1.1774	0.6722	0.7222	1.0868	1.5242
BTM	29,622	0.4703	0.3356	0.2542	0.4068	0.6149
LN_DISP	29,622	0.0570	0.1246	0.0089	0.0187	0.0465
LTG	29,622	0.1597	0.0918	0.1050	0.1500	0.2000
DEBT_EQUITY	29,622	0.3541	0.5293	0.0598	0.1847	0.4226

Notes: this table presents descriptive statistics for all primary regression variables.

Table 4: Correlations

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) *AVG_COC*	-	**-0.18**	**0.08**	-0.00	**-0.13**	**0.24**	**0.27**	**0.19**	**0.15**	**0.32**
(2) *PCT_RET_AUDITED*	**-0.24**	-	**0.37**	**0.20**	**0.57**	**-0.07**	**-0.04**	**-0.05**	**-0.19**	**0.06**
(3) *IRS_ATTENTION*	**0.11**	**0.20**	-	**0.17**	**0.46**	**-0.05**	-0.01	**-0.05**	**-0.12**	**0.02**
(4) *UTB_MONITOR*	-0.01	**0.21**	**0.18**	-	**0.21**	-0.01	**-0.04**	-0.01	-0.02	**-0.05**
(5) *SIZE*	**-0.12**	**0.50**	**0.43**	**0.23**	-	**-0.08**	**-0.10**	**-0.14**	**-0.32**	**0.12**
(6) *BETA*	**0.24**	**-0.05**	**-0.02**	-0.02	**-0.06**	-	0.01	**0.10**	**0.19**	**0.05**
(7) *BTM*	**0.8**	**-0.03**	-0.01	**-0.04**	**-0.10**	0.02	-	**0.14**	**-0.12**	**0.34**
(8) *LN_DISP*	**0.22**	**-0.04**	**-0.10**	-0.01	**-0.21**	**0.19**	**0.24**	-	**0.13**	**0.17**
(9) *LTG*	**0.07**	**-0.21**	**-0.19**	**-0.05**	**-0.41**	**0.19**	**-0.17**	**0.11**	-	**-0.11**
(10) *DEBT_EQUITY*	**0.28**	**0.17**	**0.07**	**-0.03**	**-0.24**	**-0.01**	**-0.35**	**0.18**	**-0.27**	-

Notes: Pearson (Spearman) correlations are reported above (below) the diagonal. Bolded coefficients are significant at the $p < 0.05$ level or better.

Table 5: Tax Authority Monitoring and the Cost of Equity Capital

VARIABLES	(1) *PCT_RET_AUDITED*	(2) *IRS_ATTENTION*	(3) *UTB_MONITOR*
TAX_MONITOR	*0.0070***	*0.0011***	*0.0019***
	(3.25)	*(3.33)*	*(1.98)*
SIZE	-0.0051***	-0.0039***	-0.0032***
	(-20.36)	(-12.34)	(-7.82)
BETA	0.0070***	0.0085***	0.0122***
	(16.18)	(14.75)	(11.12)
BTM	0.0166***	0.0161***	0.0168***
	(15.13)	(9.49)	(7.36)
LN_DISP	0.0255***	0.0276***	0.0275***
	(11.23)	(6.83)	(4.17)
LTG	0.0580***	0.0564***	0.0542***
	(16.61)	(12.47)	(9.92)
DEBT_EQUITY	0.0184***	0.0167***	0.0219***
	(21.01)	(12.41)	(13.30)
CONSTANT	0.0728***	0.0677***	0.0587***
	(13.43)	(8.99)	(4.43)
Observations	29,622	12,050	5,662
Fixed Effects	Ind&Yr	Ind&Yr	Ind&Yr
Clustered SEs	Firm	Firm	Firm
Adjusted R-squared	0.387	0.416	0.458

Notes: this table presents the results of estimating model (1) using *PCT_RET_AUDITED*, *IRS_ATTENTION*, and *UTB_MONITOR* to proxy for tax authority monitoring in columns 1, 2, and 3, respectively. The dependent variable is *AVG_COC* in all three columns. All variables are defined in the appendix and all continuous variables are winsorized at the 1% and 99% levels. Robust t-statistics are presented in parentheses. The symbols *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (based on two-tailed tests).

Table 6: IRS Audit Probability and the Cost of Equity Capital Using Compressed Groupings

	Old data structure 1992 - 2006	New data structure 2007 - 2017	Compressed data structure 1992 - 2017	Compressed data structure 2007 - 2017	Test of Differences
	(1)	(2)	(3)	(4)	(5)
VARIABLES	Y=*AVG_COC*	Y=*AVG_COC*	Y=*AVG_COC*	Y=*AVG_COC*	(2) – (4)
PCT_RET_AUDITED	*-0.0325***	*0.0218***	*-0.0401***	*-0.0486***	0.0704***
	(-8.32)	*(5.59)*	(-11.07)	(-5.63)	[42.20]
SIZE	-0.0037***	-0.0062***	-0.0033***	-0.0027***	-0.0035***
	(-13.59)	(-10.29)	(-14.51)	(-8.16)	[39.61]
BETA	0.0049***	0.0117***	0.0072***	0.0116***	0.0001
	(10.30)	(14.41)	(16.72)	(14.38)	[0.13]
BTM	0.0161***	0.0158***	0.0166***	0.0160***	-0.0002
	(12.03)	(9.00)	(15.17)	(9.07)	[2.13]
LN_DISP	0.0253***	0.0268***	0.0246***	0.0263***	0.0005
	(10.25)	(6.19)	(10.89)	(6.07)	[0.93]
LTG	0.0702***	0.0487***	0.0563***	0.0487***	0.0000
	(12.37)	(11.34)	(16.18)	(11.38)	[0.00]
DEBT_EQUITY	0.0189***	0.0174***	0.0187***	0.0174***	0.0000
	(18.39)	(13.38)	(21.20)	(13.37)	[0.09]
CONSTANT	0.0472***	0.0820***	0.0681***	0.0685***	
	(15.69)	(8.15)	(12.97)	(7.62)	
Observations	18,936	10,686	29,622	10,686	
Fixed Effects	Ind&Yr	Ind&Yr	Ind&Yr	Ind&Yr	
Clustered SEs	Firm	Firm	Firm	Firm	
Adjusted R-squared	0.346	0.392	0.392	0.393	

Notes: this table presents the results of estimating model (1) using *PCT_RET_AUDITED* and a modified version of *PCT_RET_AUDITED*. Columns 1 and 2 present the results using *PCT_RET_AUDITED* with the old and new size categories, respectively. Columns 3 and 4 present the results using the modified IRS audit probability data, in which we weight IRS audit probability data by observation count to compress the newer size categories to mirror the older size categories. The dependent variable is *AVG_COC* in columns 1 through 4. Column 5 presents a test of difference between the coefficients in column 2 to the coefficients in column 4. All variables are defined in the appendix and all continuous variables are winsorized at the 1% and 99% levels. Robust t-statistics are presented in parentheses, χ^2-statistics are presented in brackets. The symbols *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (based on two-tailed tests).

Table 7: Tax Authority Monitoring and the Cost of Equity Capital with Size Squared

VARIABLES	(1) *PCT_RET_AUDITED*	(2) *IRS_ATTENTION*	(3) *UTB_MONITOR*
TAX_MONITOR	*0.0027*	*0.0006**	*0.0017**
	(1.33)	*(1.71)*	*(1.79)*
SIZE	-0.0203***	-0.0203***	-0.0199***
	(-18.23)	(-10.20)	(-6.63)
*SIZE * SIZE*	0.0010***	0.0011***	0.0010***
	(14.18)	(8.54)	(5.67)
BETA	0.0073***	0.0086***	0.0125***
	(17.05)	(14.91)	(11.53)
BTM	0.0163***	0.0161***	0.0162***
	(14.96)	(9.52)	(7.08)
LN_DISP	0.0237***	0.0248***	0.0241***
	(10.55)	(6.18)	(3.63)
LTG	0.0547***	0.0547***	0.0526***
	(15.75)	(12.21)	(9.73)
DEBT_EQUITY	0.0191***	0.0175***	0.0228***
	(21.62)	(12.81)	(13.56)
CONSTANT	0.1254***	0.1280***	0.1220***
	(18.53)	(11.76)	(6.62)
Observations	29,622	12,050	5,662
Fixed Effects	Ind&Yr	Ind&Yr	Ind&Yr
Clustered SEs	Firm	Firm	Firm
Adjusted R-squared	0.396	0.424	0.464

Notes: this table presents the results of estimating model (1) using *PCT_RET_AUDITED*, *IRS_ATTENTION*, and *UTB_MONITOR* to proxy for tax authority monitoring in columns 1, 2, and 3, respectively, and including *SIZE* squared as an additional control variable. The dependent variable is *AVG_COC* in all three columns. All variables are defined in the appendix and all continuous variables are winsorized at the 1% and 99% levels. Robust t-statistics are presented in parentheses. The symbols *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (based on two-tailed tests).

Table 8: IRS Audit Probability and the Cost of Equity Capital with Residual Transformations and Control for Size Squared

	Old data structure 1992 – 2006		Compressed data structure 1992 – 2017	
	(1)	(2)	(3)	(4)
VARIABLES	Y=*AVG_COC*	Y=*AVG_COC*	Y=*AVG_COC*	Y=*AVG_COC*
PCT_RET_AUDITED	*0.0001*	-	*-0.0020*	-
	(0.01)	-	*(-0.41)*	-
RES_PCT_RET_AUDITED	-	*0.0216***	-	*0.0193****
	-	*(4.15)*	-	*(4.11)*
SIZE	-0.0191***	-0.0223***	-0.0198***	-0.0223***
	(-9.82)	(-13.98)	(-12.60)	(-17.71)
*SIZE * SIZE*	0.0001***	0.0019***	0.0010***	0.0012***
	(7.96)	(11.16)	(10.57)	(14.50)
BETA	0.0050***	0.0050***	0.0073***	0.0073***
	(10.62)	(10.68)	(17.06)	(17.14)
BTM	0.0159***	0.0151***	0.0163***	0.0157***
	(11.90)	(11.17)	(14.98)	(14.23)
LN_DISP	0.0244***	0.0240***	0.0237***	0.0234***
	(9.92)	(9.77)	(10.54)	(10.43)
LTG	0.0677***	0.0685***	0.0547***	0.0551***
	(11.98)	(12.15)	(15.76)	(15.87)
DEBT_EQUITY	0.0192***	0.0188***	0.0191***	0.0187***
	(18.66)	(18.15)	(21.60)	(21.16)
CONSTANT	0.0936***	0.1074***	0.1235***	0.1381***
	(14.00)	(16.20)	(15.93)	(17.86)
Observations	18,936	18,936	29,622	29,622
Fixed Effects	Ind&Yr	Ind&Yr	Ind&Yr	Ind&Yr
Clustered SEs	Firm	Firm	Firm	Firm
Adjusted R-squared	0.350	0.351	0.396	0.397

Notes: this table presents the results of estimating model (1) using *PCT_RET_AUDITED* and *RES_PCT_RET_AUDITED* to proxy for tax authority monitoring. *RES_PCT_RET_AUDITED* is the residual from model (2). Columns 1 and 2 present the results using the old size categories, while columns 3 and 4 use the compressed data. The dependent variable is *AVG_COC* in all three columns, and all models include *SIZE* squared as an additional control variable. All variables are defined in the appendix and all continuous variables are winsorized at the 1% and 99% levels. Robust t-statistics are presented in parentheses. The symbols *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (based on two-tailed tests).

Table 9: Effect of R&D on Monitoring in Firms with Foreign Operations (i.e., non-zero foreign income)

VARIABLES	(1) *PCT_RET_AUDITED*	(2) *IRS_ATTENTION*	(3) *UTB_MONITOR*
TAX_MONITOR	*0.0054***	*0.0004*	*0.0001*
	(2.01)	*(0.83)*	*(0.05)*
HIGH_R&D	-0.0033**	-0.0035**	0.0011
	(-2.05)	(-2.39)	(0.74)
HIGH_R&D TAX_MONITOR*	*0.0072***	*0.0015***	*0.0040**
	(1.99)	*(2.53)*	*(1.74)*
SIZE	-0.0043***	-0.0034***	-0.0032***
	(-13.39)	(-9.30)	(-7.29)
BETA	0.0069***	0.0086***	0.0127***
	(12.14)	(11.68)	(10.31)
BTM	0.0154***	0.0159***	0.0173***
	(9.88)	(7.41)	(6.53)
LN_DISP	0.0221***	0.0191***	0.0299***
	(6.32)	(3.24)	(3.44)
LTG	0.0477***	0.0493***	0.0465***
	(10.66)	(8.67)	(7.73)
DEBT_EQUITY	0.0188***	0.0169***	0.0246***
	(11.47)	(7.20)	(10.90)
ROA	-0.0453***	-0.0417***	-0.0194**
	(-9.98)	(-6.83)	(-2.28)
NOL	0.0004	0.0010	0.0010
	(0.58)	(1.13)	(0.98)
CHANGE_NOL	0.0048	0.0063	0.0092
	(0.92)	(1.09)	(1.11)
INTANGIBLES	-0.0069***	-0.0079***	-0.0077***
	(-5.14)	(-4.67)	(-3.61)
FOREIGN_INC	0.0007	0.0009*	0.0014**
	(1.64)	(1.81)	(2.32)
PPE	0.0091***	0.0042	0.0025
	(3.85)	(1.26)	(0.62)
CONSTANT	0.0680***	0.0648***	0.0523***
	(11.06)	(8.28)	(4.03)
Observations	16,026	7,741	4,345
Fixed Effects	Ind&Yr	Ind&Yr	Ind&Yr
Clustered SEs	Firm	Firm	Firm
Adjusted R-squared	0.435	0.456	0.490

Notes: The dependent variable is *AVG_COC* in all three columns. All variables are defined in the appendix and all continuous variables are winsorized at the 1% and 99% levels. Robust t-statistics are presented in parentheses. The symbols *, **, and *** indicate statistical significance at the 0.10, 0.05, and 0.01 levels, respectively (based on two-tailed tests).