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How do IRS resources affect the corporate audit process?

Michelle Nessa
Michigan State University
nessa@broad.msu.edu

Casey Schwab
Indiana University
cmschwab@indiana.edu

Bridget Stomberg
Indiana University
bstomber@iu.edu

Erin Towery*
University of Georgia
etowery@uga.edu

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The Internal Revenue Service (IRS) provided confidential tax information to Towery pursuant to provisions of the Internal Revenue Code that allow disclosure of information to a contractor to the extent necessary to perform a research contract for the IRS. None of the confidential tax information received from the IRS will be disclosed in this treatise. Statistical aggregates will be used so that a specific taxpayer cannot be identified from information supplied by the IRS. All opinions are those of the authors and do not reflect the views of the IRS.

* Corresponding author: Physical address: J.M. Tull School of Accounting, Terry College of Business, University of Georgia, A322 Moore-Rooker Hall, Athens, GA, 30602, USA.
Telephone number: 706-542-3620.

How do IRS resources affect the corporate audit process?

Abstract: This study investigates how Internal Revenue Service (IRS) resources affect the IRS audit process for publicly-traded corporations. Using confidential IRS audit data, we examine the effect of IRS resources on the incidence and magnitude of proposed deficiencies and settlement outcomes. We find that IRS resources are positively associated with both the likelihood and magnitude of proposed deficiencies but negatively associated with the proportion of proposed deficiencies collected. These results are consistent with the IRS focusing on fewer positions but targeting positions supported by weaker taxpayer facts when resources are more limited. Based on our findings, we estimate the loss in tax collections from audits of LB&I corporate tax returns alone exceeds the savings from reductions in the IRS enforcement budget. This study contributes to the literature examining the strategic game between tax authorities and corporate taxpayers and has important implications for policymakers, particularly in light of recent IRS budget cuts.

Keywords: *Tax enforcement, Internal Revenue Service, tax avoidance*



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I. INTRODUCTION

“Over the last fifty years, none of us has ever witnessed anything like what has happened to the IRS appropriations over the last five years and the impact these appropriations reductions are having on our tax system.” – Seven former IRS Commissioners (Hoffman 2015)

The enforcement role of the Internal Revenue Service (IRS) is critical to maintaining the integrity of the U.S. tax system. Many, including several former IRS Commissioners, warn that recent cuts to IRS resources threaten the fundamental effectiveness of tax administration in the U.S. (Cohn 2011; Davidson 2017; Cohen 2017a; Rapoport 2017). Our study speaks directly to these concerns by providing evidence on how the level of IRS resources affects the audits of corporate taxpayers. Specifically, we examine the relation between IRS resources and: (1) the incidence and magnitude of proposed deficiencies, conditional on audit, and (2) the proportion of proposed deficiencies collected by the IRS (“the settlement ratio”), conditional on a deficiency being proposed. We also estimate the effect of IRS budget reductions on net government cash flows from corporate audits.

The IRS makes a number of decisions when allocating its resources, starting with the number of returns to audit. It is logical to assume the IRS audits fewer returns when it has fewer resources, and anecdotal evidence is consistent with audit rates dropping in recent years as a result of budget cuts (Marr and Murray 2016).¹ It is not clear, however, how variation in IRS resources affects other resource allocation decisions such as which returns to audit, the scope of audits and the level of resources dedicated to collecting proposed deficiencies. For example, when the IRS has more limited resources and audits fewer returns, it could maintain the criteria it uses to select firms for audit, as well as the scope of those audits, such that the average

¹ We find IRS resources are positively associated with audit probabilities for the corporate tax returns in our sample. These results are tabulated in Appendix B. This study is intended to improve our understanding of the effect of IRS resources on the corporate audit process for *audited* firms. All analyses are conditional on advancing to a given stage of the audit process.

deficiencies proposed and collected *per return* remain unchanged. This response could be beneficial given the voluntary nature of tax compliance in the U.S. Instead, the IRS could focus its efforts on auditing tax positions that are most likely supported by weak taxpayer facts (i.e., positions that have a high probability of being settled in the IRS's favor).² Because this response results in the IRS targeting fewer positions per return but settling a higher proportion of the positions challenged, it would result in IRS resources being positively related to the magnitude of deficiencies proposed per audited return but negatively related to the proportion of proposed deficiencies collected. Moreover, this response would result in lower aggregate tax collections.

Alternatively, the IRS could respond strategically by proposing higher initial deficiencies per audited return to preserve aggregate collections. This strategic response would reflect the fact that “the resolution of the ultimate tax liability is often a long process of negotiation...[in which]...the initial deficiency assessed by the examination team may be partly a tactical opening bid that is [not the] best estimate of the “true” tax liability” (Slemrod 2007, p.32). Because this response results in auditors inflating proposed deficiencies, a large portion of which will not be collected, this response would result in IRS resources being negatively related to the magnitude of proposed deficiencies per audited return and positively related to the settlement ratio.

Although not exhaustive, these examples illustrate that it is unclear *ex ante* how the level of IRS resources affects each stage of the audit process. To determine how IRS resources affect corporate audit outcomes, we use confidential audit examination data for tax return years 2000 through 2010. We end the sample with 2010 tax returns to allow sufficient time for audits to be completed. Because our sample consists of publicly-traded corporations, our primary measures of IRS resources are based on audit hours within the Large Business and International (LB&I)

² We expect the IRS to begin by challenging the weakest taxpayer positions and then move on to more uncertain or stronger taxpayer positions as it has greater resources available. Thus, fewer resources leads the scope of the audit to be limited to taxpayer positions supported by the weakest facts.

division of the IRS. Our first measure is an annual aggregate measure of the total number of LB&I hours spent auditing C corporation taxpayers, scaled by the number of LB&I audits of C corporations closed during the year. Our second measure is a firm-specific measure of the number of hours spent auditing firm i 's year t tax return, scaled by firm i 's total assets in year t .³

We conduct our primary analyses in two stages. First, we examine the impact of IRS resources on the incidence and magnitude of proposed deficiencies to explore how resources affect the scope of audits. We find a positive association between IRS resources and both the incidence and magnitude of proposed deficiencies within a sample of audited tax returns. A one standard deviation reduction in aggregate audit hours is associated with an 11.3 percent decrease in the magnitude of proposed deficiencies relative to the mean level of proposed deficiencies. These results are consistent with lower levels of IRS resources limiting the scope of audits, with the IRS proposing fewer and smaller deficiencies per audited return.

Next, we examine the impact of IRS resources on the settlement ratio. A higher (lower) settlement ratio indicates better settlement outcomes for the IRS (taxpayer). Using a sample of audited tax returns with a proposed deficiency, we find a negative association between IRS resources and settlement ratios. Thus, the IRS collects a greater proportion of proposed deficiencies when it has fewer resources. A one standard deviation reduction in aggregate audit hours is associated with a 2.1 percent increase in the proportion of proposed deficiencies retained by the IRS relative to the mean.

We further decompose total settlements into those collected following the initial examination and those collected following an appeal. Our results suggest that when the IRS has

³ We use audit-hours based measures as our primary IRS resource measures to most closely align the resource variables with the sample of LB&I taxpayers used in this study. We believe audit hours are a useful proxy for IRS resources spent auditing returns because approximately 93 percent of the IRS's total enforcement budget is devoted to personnel compensation. Further, our annual aggregate audit hours measure is highly correlated with the IRS's total enforcement budget ($\rho=0.84$). We were unable to obtain data on the LB&I enforcement budget.

fewer resources, it collects a larger portion of proposed deficiencies after the initial examination stage. We find no effect of IRS resources on collections after appeals. Thus, it appears taxpayers concede a larger portion of proposed deficiencies without appeal when the IRS has fewer resources. Although we are unable to observe the specific tax positions the IRS challenges, the settlement ratio results are consistent with the IRS challenging taxpayers' weakest positions first and then challenging more uncertain or ambiguous positions when it has more resources. To our knowledge, these results provide some of the first, albeit indirect, evidence of how the IRS audits corporate taxpayers.

To better gauge the economic effect of IRS resources on net government revenues from corporate audits, we repeat these analyses using the total IRS enforcement budget scaled by the total number of audited tax returns as an alternative measure of IRS resources. We find a positive (negative) association between the total IRS enforcement budget and the incidence and magnitude of proposed deficiencies (settlements). Based on these results, we estimate a one standard deviation reduction in the total IRS enforcement budget during our sample period, approximately \$13.7 billion, is associated with a net loss of \$3.5 billion in tax collections just among the large publicly-traded corporate taxpayers *in our sample*. Extrapolating to all large corporate tax returns audited during our sample period, we estimate lost collections in excess of \$34.3 billion. Thus, the loss in tax collections from audits of LB&I corporate tax returns alone exceeds the savings from reducing the IRS enforcement budget. Further, our estimates potentially represent only a fraction of the total loss in tax collections resulting from reduced IRS resources because they do not include collections lost from audits of small corporations, pass-

through entities, individuals, or foreign taxpayers.⁴

Our study makes two contributions. First, our study informs the ongoing debate about the level of resources necessary for the IRS to perform its duties. Proponents of recent budget cuts argue that current allocations are sufficient for the IRS to “perform its core duties” and characterize the cuts as a tool to incentivize the IRS to streamline inefficient operations and eliminate wasteful spending (Bade 2015). However, the IRS is one of the most efficient tax administrators in the world (OECD 2011). Critics of the budget cuts therefore posit the cuts are politically motivated (Bade 2015; Rubin 2017). Although the purpose of this study is not to examine the motivation for the IRS budget cuts, we provide robust empirical evidence on the potential consequences of those decisions. We estimate that reductions in IRS resources are associated with a net loss of tax revenue. This finding is particularly relevant given that any resource constraints the IRS currently faces will likely be magnified as a result of recent tax reform that substantially overhauls the Internal Revenue Code and introduces complex new provisions for virtually every type of taxpayer. As former IRS Commissioner John Koskinen warned, “[i]f the budget keeps being cut and the agency keeps being given more things to do, the IRS is simply not going to work” (Cohen 2017b).

Second, we extend the stream of research examining the interaction between corporate taxpayers and the tax authority. Several studies in this area focus on taxpayer strategy in deciding which positions to claim (e.g., Mills, Robinson and Sansing 2010; Hoopes, Mescall and Pittman 2012; De Simone, Sansing and Seidman 2013; Kubick, Lockhart, Mills and Robinson 2017; Ayers, Seidman and Towery 2018) or on factors that influence audit probabilities and deficiencies proposed by the IRS (Mills 1998; Mills and Sansing 2000; Kubick et al. 2017). We

⁴ To illustrate, LB&I corporate returns are only about two percent of all audited returns during our sample period (based on Table 6 of the IRS Annual Data Book), and total corporate income tax collections comprise only 19 percent of all income tax collections (based on Table 9 of the IRS Annual Data Book).

examine the ultimate *outcomes* of audited tax avoidance, which has important implications for government collections and taxpayer cash flows (and thus shareholder value). Further, general models of taxpayer-tax authority interaction often assume noncompliance detected by the tax authority (i.e., proposed deficiencies) necessarily results in additional tax payments (e.g., Allingham and Sandmo 1972; Graetz, Reinganum and Wilde 1986). However, negotiations between taxpayers and the IRS after noncompliance is alleged are an important aspect of taxpayer-tax authority interaction, with the IRS often settling for less than the initial proposed deficiency (Hanlon, Mills and Slemrod 2007; Gleason and Mills 2011). We provide evidence that the level of IRS resources affects the proportion of proposed deficiencies collected. Thus, IRS settlement outcomes vary with the level of IRS resources.

II. BACKGROUND & HYPOTHESIS DEVELOPMENT

Overview of the IRS Tax Enforcement Process for Business Taxpayers

One of the IRS's primary responsibilities is collecting income taxes from individuals and business entities. The LB&I division of the IRS is responsible for ensuring the tax compliance of corporations and partnerships with assets greater than \$10 million. Although many LB&I taxpayers are audited every year, the IRS audits only 14 percent of all tax returns filed by C corporations (IRS Form 1120) on average, according to the IRS Audit Information Management System database. The IRS selects returns for audit based on a number of factors, including suspected participation in an abusive transaction and computer-generated scores intended to identify returns with a high likelihood of noncompliance. As part of the examination, IRS agents issue a Notice of Proposed Assessment (NOPA) if they believe a taxpayer has misreported taxable income. A taxpayer who disagrees with the proposed deficiencies first requests a conference with the examination agent's manager and can further appeal disputed amounts to the

IRS Office of Appeals, which is independent of IRS compliance functions. Any issues that remain unresolved after administrative appeal can be litigated in the U.S. Tax Court, the U.S. Court of Federal Claims, or a U.S. District Court.

Prior research has examined the strategic interaction between taxpayers and the tax authority. For example, existing studies consider how the probability of audit affects taxpayers' initial filing positions (Slemrod, Blumenthal and Christian 2001; Hoopes et al. 2012; Ayers et al. 2018) and how financial reporting regimes (Mills et al. 2010) and Compliance Assurance Program participation (De Simone et al. 2013) affect the strength of claimed tax positions. Studies also examine factors that contribute to the IRS proposing deficiencies (Mills 1998; Mills and Sansing 2000), the magnitude of settlement collections (Mills and Sansing 2000), and the productivity of IRS audits, measured using proposed deficiencies per audit hour (Kubick et al. 2017). Our study furthers our understanding of taxpayer-tax authority interactions and the enforcement role of the IRS by investigating how the level of IRS resources affects various stages of the audit process, including the final settlement between the IRS and the taxpayer. We also offer estimates of how the level of IRS resources affects aggregate tax collections from large corporate audits.

IRS Resources

The IRS Oversight Board reviews and approves the annual IRS budget request submitted to the Department of the Treasury. The budget is ultimately set by Congress. To illustrate, for the 2015 fiscal year, the IRS Oversight Board recommended a total budget of \$13.6 billion and President Obama requested \$12.5 billion, but Congress ultimately approved a budget of \$11 billion. After Congress sets the annual budget, the IRS Commissioner allocates resources to the various divisions (e.g., LB&I, the Small Business/Self-Employed division, etc.) based on input

from division Commissioners. Once each division receives its resource allocation, the division Commissioner decides how to deploy resources to achieve objectives. Historically, the IRS devotes approximately 43 percent of its total budget to enforcement, which the IRS defines as “activities to determine and collect owed taxes, to provide legal and litigation support, to conduct criminal investigations, to enforce criminal statutes related to violations of internal revenue laws, and to purchase and hire passenger motor vehicles” (IRS Data Book, Table 28). Personnel compensation and benefits including salaries, overtime and holiday pay, incentive awards, bonuses, and severance pay consume more than 90 percent of the enforcement budget.

It is important to understand how IRS resources affect the enforcement process, especially given recent reductions in the IRS budget that have resulted in 13,000 fewer employees and 10,000 fewer enforcement staff (Marr and Murray 2016). These budget reductions have occurred despite a four percent increase in the number of returns filed since 2010 and other increased IRS responsibilities related to the implementation of the Foreign Account Tax Compliance Act and the Affordable Care Act (Marr and Murray 2016). Increasing the IRS’s responsibilities without similarly increasing its resources could adversely affect net government cash flows. The IRS collected over \$17 trillion of income taxes during our sample period, which represents a substantial portion of all IRS collections and makes income tax enforcement a meaningful part of the IRS’s overall focus (IRS Annual Data Book, Table 6).

Several Congressional members claim the recent reductions in the IRS budget were intended to streamline inefficiencies and eliminate wasteful spending. For example, Representative Hal Rogers justified the cuts as part of a focus to target “poor-performing” and “inefficient” agencies (Bade 2015). This characterization of the IRS conflicts with evidence that it is one of the most efficient tax administrators among OECD countries, consistently incurring

less than the OECD average in tax administration costs per \$100 of revenue (OECD 2011). Critics of the cuts posit that the cuts are politically motivated in response to allegations that the IRS improperly scrutinized conservative political groups' applications for tax-exempt entity status more so than other groups (Bade 2015; Rubin 2017). Indeed, some Republican legislators went as far as to say, "one of the reasons we went after [the IRS] so hard is they did target people for their political views" (Ohlemacher 2017). The budget cuts also came in conjunction with other seemingly politically-motivated Congressional actions that prevented the IRS from finalizing regulations regarding the tax-exempt status of 501(c)(4) groups, limited IRS employee bonuses and eliminated IRS funds to implement the Affordable Care Act's individual health insurance mandate. The purpose of our study is not to examine the motivation for these budget cuts, but rather to empirically test and evaluate the potential consequences of the cuts. In this way, our study is related to Kubick et al. (2017). Although Kubick et al. (2017) focus primarily on how geographic proximity affects the probability of IRS audit and proposed deficiencies per hour, they also examine whether IRS resource constraints moderate these effects. In contrast, we focus on the direct effect of IRS resources on the entire IRS audit process, including the final settlement between the IRS and taxpayer. Moreover, we estimate the overall impact of IRS resources on net government cash flows.

Hypothesis Development

In light of these recent and continuing budget cuts, we examine how IRS resources affect tax collections upon audit. Collections from the audit process depend on both the magnitude of proposed deficiencies and the IRS's ability to defend and collect the deficiencies it proposes. If the IRS does not detect an area of potential noncompliance (i.e., if the agent does not propose a deficiency), there is no chance of additional tax collections through audit. Similarly, if the IRS

proposes deficiencies but does not have the resources to collect those deficiencies – either because it has too few resources available for the appeals process or because it proposes deficiencies related to positions that are supported by strong taxpayer facts that the taxpayer is unlikely to concede – there is a low probability of additional tax collections through audit. We therefore explore the outcomes of individual stages of the audit process separately, including the incidence and magnitude of proposed deficiencies and proportion of deficiencies ultimately collected.

The IRS faces a number of decisions when allocating its resources, including the number of returns to audit, which returns to audit, the scope of the audits, and the level of resources dedicated to collecting proposed deficiencies. One potentially obvious response to a reduction in enforcement resources is to audit fewer returns. Indeed, there is evidence that the current level of individual and business audits is the lowest it has been in a decade (Rubin 2015; Marr and Murray 2016). Consistent with recent anecdotal evidence, we document a positive association between the level of the IRS's total enforcement budget and the probability of audit for large publicly-traded corporations in Appendix B. The effect of IRS resources on proposed deficiencies per audited return and settlement ratios remains unclear *ex ante*. We provide three examples below to illustrate potential IRS responses to resource limitations and the expected effects of those responses.

First, if the IRS (1) addresses its resource limitations by auditing fewer returns such that the remainder of the audit process is unchanged (i.e., the scope of audits and the level of resources dedicated to collecting proposed deficiencies are held constant), and (2) maintains its selection criteria for auditing returns such that the characteristics of the average audited return do not change, then the level of proposed deficiencies and settlement ratio *per audited return* would

not change. In this scenario, we would observe no significant relation between IRS resources and the magnitude of proposed deficiencies or settlement ratios among audited returns.

If the IRS cannot completely address resource limitations by auditing fewer returns, it could audit both fewer returns and fewer tax positions. Restricting the scope of audits would likely result in audits focused on tax positions supported by the weakest taxpayer facts. In this scenario, we would observe a positive relation between the level of IRS resources and the magnitude of proposed deficiencies *per audited return* because the IRS challenges fewer positions when its resources are limited. However, we would observe a negative relation between the level of IRS resources and settlement ratios because the positions it does challenge are those supported by the weakest facts, which are more likely to be settled in the IRS's favor.

A third possibility is that the IRS could respond to resource limitations through strategic negotiation tactics. As Slemrod (2007) notes, proposed deficiencies capture true noncompliance with error and initial proposed deficiencies may reflect a “tactical ‘opening bid’ that is [not the examiner’s] best estimate of the ‘true’ tax liability” (p. 32). IRS agents faced with limited resources could propose an inflated level of deficiencies per audited return in the hopes of mitigating the effect of limited resources on aggregate collections.⁵ This IRS response would result in resources being negatively related to the magnitude of proposed deficiencies per audited return but positively related to the percentage of proposed deficiencies collected.

The discussion above illustrates that the association between IRS resources and the incidence and magnitude of proposed deficiencies and settlement ratios is unclear *ex ante*. Moreover, although we expect *aggregate* tax collections to be lower when the IRS has fewer resources, the magnitude of the decline in tax collections is unclear. To determine whether and

⁵ Such an approach could be successful given the IRS's “reputation for trading [penalties] away” (Slemrod 2007, p. 32). By proposing a higher initial deficiency and offering to waive penalties for settlement, agents can mitigate lost collections resulting from resource reductions.

how IRS behavior in each audit stage varies with the level of IRS resources, and to estimate the tax revenue effects of any changes in IRS resources, we test the following hypotheses, stated in the null form. The pattern of results we obtain across the different stages of the audit process can shed light on IRS behavior given different levels of enforcement resources.⁶

H1a: IRS resources are not associated with the incidence of proposed deficiencies, conditional upon a return being audited.

H1b: IRS resources are not associated with the magnitude of proposed deficiencies, conditional upon a return being audited.

H1c: IRS resources are not associated with the proportion of deficiencies collected, conditional upon a deficiency being proposed.

III. RESEARCH DESIGN

Regression Analysis

Proposed Deficiencies

We estimate the following model to examine the effect of IRS resources on both the incidence and magnitude of proposed deficiencies, conditional upon a return being audited.

⁶ One important empirical consideration is that, while IRS resources have generally been decreasing over time, required tax return disclosures have been increasing. Thus, the growth in disclosure could potentially offset any negative effects of resource reductions. For example, corporate taxpayers have provided more disaggregated detail on book-tax differences on Schedule M-3 since 2004. Schedule M-3 was intended to enable the IRS to better analyze book-tax differences for compliance risks while simultaneously reducing the likelihood that the IRS will pursue a return based on an incorrect assumption about aggressive tax reporting (Boynton and Mills 2004). However, some practitioners note “little change in the examination approach” following the implementation of Schedule M-3, and some IRS agents view Schedule M-3 as less informative than its predecessor, Schedule M-1 (AICPA 2011). Further, there is limited evidence on the extent to which taxpayers report completely and truthfully on Schedule M-3. Another required tax return disclosure is Schedule UTP, which requires corporate taxpayers to report federal uncertain tax positions to the IRS starting with 2010 tax years. While the purpose of the form was to help the IRS more efficiently identify uncertain tax positions, research suggests firms found ways to avoid Schedule UTP disclosure requirements (Towery 2017). Overall, it is not clear how useful increased disclosures are to the IRS.

$$\begin{aligned}
Deficiency_{i,t} = & \alpha_0 + \alpha_1 * IRSResources_{t+k} + \alpha_2 * CIC_{i,t} + \alpha_3 * BTD_{i,t} \\
& + \alpha_4 * PaidPreparer_{i,t} + \alpha_5 * Haven_{i,t} + \alpha_6 * Foreign_{i,t} + \alpha_7 * Size_{i,t} \\
& + \alpha_8 * Leverage_{i,t} + \alpha_9 * ROA_{i,t} + \alpha_{10} * R\&D_{i,t} + \alpha_{11} * BigN_{i,t} \\
& + \alpha_{12} * NOL_{i,t} + \alpha_{13} * LagETR_{i,t} + \alpha_{14} * EquityEarnings_{i,t} + \alpha_{15} * Mezz_{i,t} \\
& + \alpha_{16} * Litigation_{i,t} + \alpha_{17} * PTDA_{i,t} + \varepsilon
\end{aligned} \tag{1}$$

Deficiency equals either *PropDefInd* or *PropDef_TaxSavings*. *PropDefInd* captures the incidence of proposed deficiencies and is an indicator variable equal to one if the IRS proposes a deficiency for the year t tax return and zero otherwise. *PropDef_TaxSavings* equals the deficiency proposed by the IRS scaled by *TaxSavings*, where *TaxSavings* equals pretax income times 35 percent minus total tax payments reported on the corporate tax return. We use worldwide pretax income rather than domestic pretax income to construct *TaxSavings* to capture tax savings generated by cross-border income shifting.⁷ Results are robust to using U.S. pretax income to construct *TaxSavings* (untabulated). This measure differs from prior studies such as Mills (1998), which scales proposed deficiencies by total assets, and Kubick et al. (2017), which scales proposed deficiencies by audit hours. We scale proposed deficiencies by total estimated tax savings claimed on the return to capture the portion of total possible adjustments the IRS identifies and targets.

We measure IRS enforcement resources using both aggregated and disaggregated measures. *TotalHours_RetAudited* is an annual aggregate measure of the total number of hours LB&I spent auditing C corporation tax returns during the year, scaled by the number of LB&I C corporation audits closed during the year. We measure *TotalHours_RetAudited* in the year the audit of firm i 's tax return begins.⁸ Our second measure, *FirmHours_Assets*, is a firm-specific

⁷ We acknowledge using worldwide or domestic pretax income to construct *TaxSavings* will not capture conforming tax avoidance.

⁸ We obtain the audit start date from the IRS Audit Information Management System (AIMS) database. This is the date that revenue agents first charge time to the case. Shortly thereafter, revenue agents contact the taxpayer and begin requesting information. If an audit begins on September 10, 2012, for example, we measure *TotalHours_RetAudited* as the total number of LB&I hours spent auditing C corporation tax returns during the IRS fiscal year beginning October 1, 2011 and ending September 30, 2012, scaled by the number of LB&I C corporation

measure of the number of hours spent auditing firm i 's year t tax return, scaled by firm i 's assets in year t . Both measures are intended to capture IRS resources relative to its responsibilities, with *TotalHours_RetAudited* capturing the aggregate resources available given the population of audited firms and *FirmHours_Assets* capturing firm-specific resources given the size (and likely scope) of the audit. We recognize that the aggregated and disaggregated measures have unique strengths and limitations. *TotalHours_RetAudited* is relatively exogenous to individual tax return audits, but because the variable is measured annually, we cannot include year fixed effects in these specifications to control for other macroeconomic effects that could be correlated with audit outcomes. Conversely, *FirmHours_Assets* permits us to include year fixed effects, but the measure is more likely to be endogenously determined by the firm's level of suspected noncompliance.⁹ A positive (negative) coefficient on *IRSResources* is consistent with the incidence and/or magnitude of proposed deficiencies per audited return increasing (decreasing) in the level of IRS resources.

We acknowledge limitations of both of these audit hours-based measures. The data provided to us by the IRS do not provide details on the revenue agents auditing the return (e.g., senior vs. staff auditor, specialist vs. generalist, etc.). This limitation prevents us from accounting for potential heterogeneity in the effects of audit hours based on the characteristics of revenue agents performing the audit. Hours-based measures also do not capture non-labor resources such as investments in technology. To triangulate results and strengthen inferences, we also use a dollar-based measure of resources in supplemental analysis. Specifically, we use

audits closed during that fiscal year. To address concerns about measurement issues when audits span multiple IRS fiscal years, we also conduct our tests using measures of aggregate IRS resources (*TotalHours_RetAudited* and *Enforce_RetAudited*) averaged over all fiscal years in which the audit is considered open in the AIMS database. Inferences are robust to this alternative measurement (untabulated).

⁹ Results in these specifications are also robust to replacing year fixed effects with IRS Commissioner fixed effects to account for any significant influence the IRS Commissioner has on the audit process.

Enforce_RetAudited, which is the total IRS enforcement budget (across all divisions, not just LB&I) scaled by the total number of returns audited across all categories of taxpayers (i.e., individuals, small corporations, large corporations, etc.).¹⁰ This measure also allows us to better gauge the net economic effect of IRS resources on the corporate audit process.¹¹

We control for factors that could potentially affect corporate audit outcomes. We include *CIC*, which equals one if a firm is in the Coordinated Industry Case (CIC) program and zero otherwise, because the IRS likely has greater knowledge of these firms' business operations and tax positions based on recurring audits. We include *BTD* because Mills (1998) documents a positive association between book-tax differences and proposed audit deficiencies. Including this control is important if IRS resources affect the magnitude of tax savings taxpayers claim on originally filed returns. By including this control, we can interpret the effect of IRS resources on proposed deficiencies as attributable to IRS resource availability upon audit (i.e., *ex post* enforcement) and not to potential changes in taxpayer behavior in response to the expected level of IRS resources. We include *PaidPreparer*, equal to one if a paid preparer signed the tax return and zero otherwise, because Klassen, Lisowsky and Mescall (2016) find an association between tax return preparers and corporate tax avoidance. Additionally, to the extent paid preparers negotiate regularly with the IRS on their clients' behalf, they could achieve more favorable outcomes for the taxpayer. Our remaining control variables are based on models of tax sheltering proposed by Wilson (2009) and Lisowsky (2010), many of which capture characteristics the IRS considers when attempting to identify aggressive taxpayers (Treasury 1999). All variables are

¹⁰ To capture potential changes in non-labor resources, we also use the total IRS budget as an alternative measure of resources. These tests are discussed in Section V.

¹¹ Kubick et al. (2017) measure IRS resources using an indicator variable equal to one if the IRS allocates a below median percentage of its *total* budget to enforcement. We believe it is important to consider the IRS's enforcement budget relative to its enforcement responsibilities. Moreover, using a continuous measure allows us to estimate the net government revenue effects associated with changes in IRS enforcement budgets.

defined in Appendix A. We winsorize all continuous variables at the 1st and 99th percentiles.

We include industry fixed effects when *TotalHours_RetAudited* is the variable of interest and both industry and year fixed effects when *FirmHours_Assets* is the variable of interest. We estimate equation (1) using a logistic regression when *PropDefInd* is the dependent variable. We estimate a left censored Tobit model when *PropDef_TaxSavings* is the dependent variable because the variable has a lower bound of zero. We cluster standard errors by firm when estimating logistic regressions. We do not cluster standard errors when estimating the Tobit models because the version of SAS software provided by the IRS for this study does not have this functionality. We confirm, however, that inferences are unchanged if we re-estimate these analyses using OLS regressions with firm-level clustering.

Settlement Outcomes

We estimate the following model to examine the effect of IRS resources on settlements, conditional on the IRS proposing a deficiency.

$$\begin{aligned} \text{Settlement}_{i,t} = & \beta_0 + \beta_1 * \text{IRSResources}_{t+k} + \beta_2 * \text{PropDef_TaxSavings}_{i,t} + \beta_3 * \text{CIC}_{i,t} \quad (2) \\ & + \beta_4 * \text{BTD}_{i,t} + \beta_5 * \text{PaidPreparer}_{i,t} + \beta_6 * \text{Haven}_{i,t} + \beta_7 * \text{Foreign}_{i,t} \\ & + \beta_8 * \text{Size}_{i,t} + \beta_9 * \text{Leverage}_{i,t} + \beta_{10} * \text{ROA}_{i,t} + \beta_{11} * \text{R\&D}_{i,t} + \beta_{12} * \text{BigN}_{i,t} \\ & + \beta_{13} * \text{NOL}_{i,t} + \beta_{14} * \text{LagETR}_{i,t} + \beta_{15} * \text{EquityEarnings}_{i,t} + \beta_{16} * \text{Mezz}_{i,t} \\ & + \beta_{17} * \text{Litigation}_{i,t} + \beta_{18} * \text{PTDA}_{i,t} + \varepsilon \end{aligned}$$

When estimating equation (2), we set *Settlement* equal to total settlements paid to the IRS scaled by the level of the proposed deficiency (*TotalSettle_PropDef*). This ratio represents the portion of the deficiency proposed by the IRS that the IRS retains. Higher (lower) values of *TotalSettle_PropDef* indicate more favorable outcomes for the IRS (taxpayers). Because this ratio is bounded between zero and one, we estimate equation (2) using a double-censored Tobit model. In supplemental analyses, we decompose *TotalSettle_PropDef* into settlements during the examination process (*ExamsSettle_PropDef*) and settlements during the appeals process

(*AppealsSettle_UnagreedDef*). A positive (negative) coefficient on *IRSResources* is consistent with the proportion of proposed deficiencies retained by the IRS increasing (decreasing) in the level of IRS resources. We include *PropDef_TaxSavings* as an additional control because the absolute dollar amount of the proposed deficiencies likely influences the willingness of the IRS and the taxpayer to negotiate. All other variables are as defined above.

Sample

We use four distinct samples of audited corporate returns from LB&I. Table 1 summarizes the construction of these samples. Due to data availability, we focus our analysis on the various stages of the audit process for audited corporation returns within LB&I. We acknowledge that our results may not generalize to large *unaudited* corporations or to other types of (non-corporate) taxpayers. To construct our initial sample, we use employer identification numbers to merge public financial statement data from Compustat with three confidential IRS datasets: (i) the IRS Business Return Transaction File (BRTF) that contains corporate income tax return data; (ii) the IRS Audit Information Management System (AIMS) that contains proposed tax deficiencies, and (iii) the IRS Enforcement Revenue Information System (ERIS) that contains settlements. We restrict the sample to publicly-traded firms so that we can include a more comprehensive set of control variables than would be possible if the sample included both public and private firms.¹²

We use data for corporate audits started and completed from January 2002 through September of 2017 for a sample of tax returns for the 2000 through 2010 tax years. We end with 2010 tax years to allow sufficient time for returns to complete the audit process.¹³ Consistent with prior tax research (e.g., Lisowsky 2010), we exclude financial firms (SIC codes 6000-6999)

¹². This approach is similar to more recent studies that link IRS data to public corporations (e.g., Lisowsky 2010; Lisowsky, Robinson and Schmidt 2013).

¹³ Gleason and Mills (2011) estimate an average time of 4.6 years to complete an IRS audit.

and utilities (SIC codes 4900-4999) because the empirical models on which we base our research design were developed using non-financial and non-utility firms. However, results are not sensitive to this sample selection criteria. We also exclude observations with insufficient data for our empirical tests, and remove observations with inconsistent data between the AIMS and ERIS datasets. These criteria yield an initial sample of 34,749 return year observations.

Because the likelihood of the IRS proposing a deficiency is conditional on the IRS auditing a tax return, we exclude return years that are not audited when examining the impact of IRS resources on the incidence of proposed deficiencies. This yields a sample of 12,274 audited return years used in these tests. When we examine the magnitude of proposed deficiencies, we eliminate observations with negative values of *TaxSavings* and positive values of proposed deficiencies because these ratios are difficult to interpret.¹⁴ This yields a sample of 10,920 audited return years with meaningful values of *PropDef_TaxSavings*. Additionally, because settlements are conditional on the IRS proposing a deficiency, we exclude return years for which the IRS does not propose a deficiency when examining the impact of resources on settlements. This yields a sample of 4,585 audited return year observations with a proposed deficiency. Finally, we retain 631 return years with an unagreed deficiency amount following the initial examination to examine the impact of IRS resources on settlements following an appeal.

IV. RESULTS

Descriptive Statistics

Table 2, Panel A presents descriptive statistics for the audit outcome variables. Roughly 48 percent of audited returns receive a proposed deficiency from the IRS. The average magnitude of the proposed deficiency is \$5.2 million, which represents approximately 7.6

¹⁴ We also eliminate observations for which the IRS has proposed a deficiency but the IRS data do not allow us to reliably determine the magnitude of the proposed deficiency.

percent of the tax savings claimed on the originally filed return. On average, taxpayers pay 81 percent of proposed deficiencies. The average magnitude of appeals settlements is \$12.2 million, whereas the average magnitude of settlement after examination is only \$4.9 million. This larger magnitude of settlements after appeals likely reflects the fact the taxpayer and IRS examiner are less able to resolve large dollar-value issues during the examination phase of the audit.

Panel B presents descriptive statistics for IRS resources, measured using both audit hours and enforcement budget dollars. The average value of our annual aggregate audit-hours measure, *TotalHours_RetAudited*, is 513 hours per LB&I audit, with an interquartile range of 458 to 549 hours. Focusing on our tax return-specific audit-hours measure (*FirmHours_Assets*), we find the IRS incurs an average of one audit hour per million dollars of total assets among audited firms. In untabulated analyses, we also examine the total number of audit hours per return (unscaled) and report an average (median) audit duration of 662 (231) revenue agent hours. We observe an average enforcement budget of \$3,882 per audited return (*Enforce_RetAudited*) across *all* categories of taxpayers (i.e., individuals, small corporations, large corporations, etc.).

Panel C presents descriptive statistics for the control variables. CIC audits comprise approximately 24 percent of the audited returns in the sample. The mean value of book-tax differences is -0.0072.¹⁵ Roughly 58 percent of audited returns were signed by a paid preparer, and 87 percent of audited return years are associated with financial statements that were audited by one of the Big N accounting firms.

Finally, Panel D provides annual data from 2002 to 2014 related to our measures of IRS

¹⁵ Twenty-four (19.7) percent of our sample of 12,274 observations report negative taxable (book) income (untabulated). We confirm in untabulated analyses that the inclusion of return years reporting either book or tax losses does not affect our inferences; results remain unchanged when we exclude either subsample of returns from our analysis.

resources. The first (last) year in which audits of sample tax returns were *initiated* is 2002 (2014). We allow audits to be completed as late as September 2017. We note *TotalHours_RetAudited* generally decreases over time, whereas we observe a less consistent time trend with *FirmHours_Assets*. This likely reflects both changes in LB&I enforcement efforts and variation in the size of firms being audited.¹⁶ Column (c) presents the annual IRS enforcement budget adjusted for inflation to express amounts in 2014 constant dollars. We use the inflation-adjusted IRS enforcement budget in supplemental analyses. Column (d) presents the annual number of returns audited. Neither the annual enforcement budget nor the annual number of returns audited exhibit a monotonic trend. Column (e) shows total IRS enforcement dollars per return audited by year. This ratio varies across time and ranges from \$5,892 in 2002 to \$3,247 in 2013.

Multivariate Results

Proposed Deficiencies

Table 3 Panel A presents results from estimating equation (1) with *PropDefInd* as the dependent variable. Consistent with the IRS being *less* likely to propose a deficiency when it has *fewer* resources, we find positive and significant coefficients on both measures of *IRSResources* (p -value < 0.01). Focusing on *TotalHours_RetAudited*, these results indicate that a one standard deviation reduction in LB&I corporate audit hours scaled by closed audits is associated with a 2.6 percentage point decrease in the probability of the IRS proposing a deficiency during audit.¹⁷ This represents a 5.4 percent decrease from the base probability of the IRS proposing a

¹⁶ The mean value of *FirmHours_Assets* differs substantially in 2014 because fewer than five observations in our sample had an audit initiated in 2014.

¹⁷ In general, we estimate economic magnitudes for our sample in terms of IRS resource *reductions* in light of recent, consistent IRS budget *cuts*. In Section V, we extrapolate these in-sample magnitudes to estimate the net effect of IRS budget reductions on net government cash flows. To do so, we estimate how much additional tax revenue the IRS could have collected had it received additional funds from Congress (i.e., if the IRS budget had not been reduced).

deficiency (48.4 percent). The economic magnitudes of the estimated effects are higher when we measure resources using *FirmHours_Assets* (a 4.6 percentage point decrease in probability and a 9.4 percent decrease relative to the mean). Collectively, these results suggest that conditional on a return being audited, IRS resources have a significant and economically meaningful impact on the likelihood that the IRS will propose a deficiency.

We also find the probability of receiving a proposed deficiency is higher for CIC firms, larger firms, more profitable firms, and firms reporting higher prior year ETRs. Proposed deficiencies are less common for firms with higher leverage, firms with higher R&D, firms with NOLs, firms audited by Big N auditors, and firms with higher pretax discretionary accruals. Somewhat surprisingly, we estimate the probability of a proposed deficiency is also negatively associated with *BTD*.¹⁸

Next, we examine the association between IRS resources and the magnitude of proposed deficiencies. Table 3 Panel B presents the results of estimating equation (1) with *PropDef_TaxSavings* as the dependent variable. We find positive and significant coefficients on both measures of *IRSResources* (p-value < 0.01). Focusing on *TotalHours_RetAudited*, our results indicate that a one standard deviation decrease in IRS resources is associated with an 11.3 percent decrease in the ratio of proposed deficiencies to tax savings relative to the mean (0.0763). These results indicate that among firms selected for audit, the level of IRS resources is a statistically and economically significant determinant of the magnitude of proposed deficiencies. We provide evidence in Section V that these results are not attributable to changes in taxpayer behavior in response to varying levels of IRS resources.

¹⁸ Mills (1998) estimates a positive association between book-tax differences and proposed deficiencies. Importantly, her model does not include a control for profitability because she includes both public and private firms in her sample. When we estimate equation (1) excluding *ROA* to be more consistent with the research design in Mills (1998), the probability of a proposed deficiency is positively associated with *BTD*.

We also find that the magnitude of proposed deficiencies is higher for firms participating in the CIC program, firms engaging a paid preparer, larger firms, firms with higher effective tax rates in the prior year, and firms reporting higher profits. We find that proposed deficiencies are lower for firms with higher leverage, firms with higher R&D expenses, and firms with NOLs.

Settlement Outcomes

We next examine the association between IRS resources and settlement outcomes, conditional on the IRS proposing a deficiency. Table 4 presents results from estimating equation (2) with *TotalSettle_PropDef* as the dependent variable. *TotalSettle_PropDef* captures the proportion of the proposed deficiency that is actually collected from the taxpayer. We find a negative and significant coefficient on both measures of *IRSResources* (p -value < 0.01), which suggests the IRS collects a larger proportion of proposed deficiencies when it has fewer resources. To interpret the economic impact of IRS resources on settlements, we focus on the first column where we measure IRS resources using *TotalHours_RetAudited*. Our results indicate that a one standard deviation decrease in IRS resources is associated with a 1.7 percentage point increase in the proportion of proposed deficiencies retained by the IRS. This represents a 2.1 percent increase relative to the mean proportion of proposed deficiencies retained by the IRS (0.814).

With respect to control variables, we find a negative and significant coefficient on *PropDef_TaxSavings* (p -value < 0.01). This result likely indicates that taxpayers are willing to concede relatively small adjustments. We also find that settlement ratios are lower for larger firms and more profitable firms, firms using a paid preparer and firms with litigation settlements in year t . The settlement ratio is also decreasing in *BTD* but increasing in mezzanine financing

(Mezz).

Decomposing the Settlement Ratio

In Table 5, we conduct an exploratory analysis that further investigates the relation between IRS resources and settlements. For completeness, we separately examine settlements following the initial examination and those following an appeal. We find a negative and significant association between IRS resources and settlements following the initial examination (Panel A), but we find no association between IRS resources and settlements following an appeal (Panel B). Results are similar across both measures of IRS resources. Thus, the IRS collects a larger portion of proposed deficiencies after the initial examination stage when faced with reduced resources, but settlements after appeals do not appear to be affected by the level of IRS resources. A potential explanation for this pattern of results is that when the IRS has fewer resources, the scope of its examinations are limited to taxpayers' weakest positions, and taxpayers are more likely to concede those weak positions after the examination phase. This explanation is consistent with the inference in Kubick et al. (2017) that "the IRS prefers to select more noncompliant returns... during constrained budgets" (p. 448).¹⁹

Overall, our results indicate that IRS resources are positively associated with the incidence and magnitude of proposed deficiencies (Table 3), but negatively associated with the proportion of proposed deficiencies collected (Table 4). These results are consistent with the IRS employing a risk-based approach to auditing large corporate taxpayers whereby auditors first focus resources on tax positions they suspect are supported by the weakest facts and then

¹⁹ Kubick et al. (2017) base this inference on their finding that IRS audits of distant taxpayers yield greater deficiencies per hour relative to IRS audits of nearby taxpayers during constrained budget years (Table 9 Panel B). They argue that, because audits of more distant taxpayers are most costly for the IRS, this finding is consistent with the IRS focusing on the most noncompliant *distant* taxpayers when faced with resource constraints.

challenge relatively stronger taxpayer positions as resources increase.²⁰

V. SUPPLEMENTAL ANALYSES

Estimating the Net Effect of Budget Reductions on U.S. Government Revenues

To better gauge the net economic effect of IRS resources on the corporate audit process, we repeat the analyses in Tables 3 and 4 using the total IRS enforcement budget scaled by the total number of returns audited as an alternative measure of IRS resources (*Enforce_RetAudited*). For this analysis to be meaningful, the resources allocated to the large public corporation taxpayers that comprise our sample must vary with the IRS's total enforcement budget. If the IRS reallocates resources either from other divisions of the IRS to LB&I or within LB&I from partnership and private corporation returns to public C corporation returns, then an increase in the IRS's total enforcement budget would likely have no effect on tax collections from audits of large, publicly-traded corporate taxpayers.

To provide evidence on the relation between the IRS's total enforcement budget and LB&I enforcement, Figure 1 plots audit rates for individual, flow-through entity, small corporation and large corporation tax returns along with the IRS's total enforcement budget over time. The percentage of large corporation returns audited each year varies with the total IRS enforcement budget. This pattern is consistent with resources allocated to public corporation audits within LB&I varying with total IRS resources, and is *inconsistent* with the IRS shifting resources from other areas to maintain a constant level of resource allocation to large corporate audits. Further, the large corporate audit rate has the largest correlation with the total IRS enforcement budget among the return-types shown in Figure 1 ($p=0.53$, significant at the ten

²⁰ This conclusion is consistent with 2012 IRS Advisory Council recommendations on how the IRS could refine its risk assessment protocols (McCormally 2014). However, the IRS data available to us do not include information on the individual tax positions examined, and thus we are not able to directly test how the type of tax positions challenged vary with the level of IRS resources.

percent level, untabulated). Finally, if the IRS shifts resources away from other divisions to audits of large corporations when faced with reduced resources, we would expect the correlation between the large corporate audit rate and the audit rates of other taxpayers to be negative. However, this is not the case. The correlation (untabulated) between the audit rates of large corporations and individual (small corporation, partnership, and S corporation) taxpayers is positive and significant (insignificant). Thus, these statistics provide evidence that the corporate division of LB&I is not shielded from IRS budget cuts, and our suggestion that the audit outcomes of large public corporations vary with the IRS's total enforcement budget is valid.²¹

Table 6 reports the results of re-estimating our tests using *Enforce_RetAudited* as the measure of IRS resources. Inferences are unchanged from our main analyses; we estimate a positive association between the total IRS enforcement budget and the incidence and magnitude of proposed deficiencies and a negative association between the total IRS enforcement budget and settlement ratios.

We use the coefficient estimates from Table 6 to gauge the overall effect of IRS resource reductions on net government cash flows. Appendix C provides the detailed calculations of these amounts. Using the average value of tax savings for sample returns that were audited (\$64.37 million, untabulated), a one standard deviation decrease in the IRS enforcement budget is associated with a \$474,100 decrease in the average level of proposed deficiencies per audited return and an aggregate reduction in proposed deficiencies of \$5.18 billion for the 10,920 tax returns in the sample employed in our proposed deficiency magnitude tests. Holding the settlement ratio constant at the mean of 81.4 percent, this translates into \$4.2 billion in lost

²¹ Although we do not observe significant shifting of resources across divisions, the IRS can respond strategically to changes in resources by reallocating resources within divisions. For example, the LB&I division has announced 13 campaigns related to the areas of high compliance risk on which it will focus its enforcement efforts (<https://www.irs.gov/businesses/large-business-and-international-launches-compliance-campaigns>).

collections for our sample returns. However, we also find an increase in the settlement ratio when the enforcement budget is lower. Using the average value of proposed deficiencies for the sample of returns with settlements (\$12.42 million, untabulated), we estimate a \$150,300 increase in the level of settlements per return and an aggregate increase in the level of settlements of \$689 million for the 4,585 returns in our sample with settlements. Thus, the net effect is a loss of \$3.5 billion for the returns in our sample.

Extrapolating these figures to all audited large corporations, we estimate the IRS could have increased collections from audited LB&I corporate taxpayers by \$34.3 billion if given an additional \$13.7 billion in overall enforcement resources (a one standard deviation increase in the total enforcement budget).²² Our estimate of \$34.3 billion is approximately 19.3 percent of the estimated corporate tax gap from 2002 through 2014.²³ Thus, increasing overall IRS funding by this amount would increase net government cash inflows even when only taking large corporate tax return audits into consideration. It is possible that the total net cash inflow given an additional \$13.7 billion in *total* enforcement expenditures could be much larger given that our estimate does not include additional collections from audits of small corporations, individuals or foreign entities, and it does not reflect the impact of IRS resources on the probability of audit.

We also confirm in untabulated tests that the pattern of our coefficient estimates is robust to using the *total* IRS budget scaled by audited returns. The total budget includes expenditures on activities other than enforcement, which is overwhelmingly comprised of labor costs in the form

²² We assess the sensitivity of our estimate of aggregate lost collections to various research design choices. Although we observe variation in our estimates of lost tax revenues, all estimates indicate that the decline in corporate tax revenues exceeds the one standard deviation reduction in total enforcement expenditures. Thus, our conclusion that net government cash flows would increase with increases in the IRS budget is not sensitive to the design choices we present herein.

²³ The Tax Policy Center estimated a \$41 billion total corporate tax gap from 2008 through 2010, or \$13.66 billion each year. We estimate aggregate lost collections of \$34.3 billion from 2002 through 2014, or \$2.64 billion each year. Thus, our estimate (\$2.64 billion) is 19.3 percent of the total corporate tax gap (\$13.66 billion). For more detail on the Tax Policy Center's estimates, see <https://www.taxpolicycenter.org/briefing-book/what-tax-gap>.

of revenue agents' compensation.²⁴ Using the total budget allows us to capture expenditures on non-labor costs such as investments in information technology through the Business Systems Modernization initiative. These findings provide comfort that our primary results are robust to any reallocation of resources between labor and non-labor costs the IRS might have undertaken in a strategic response to budget reductions.

Potential Selection Issues

Our research question examines the effect of IRS resources on different stages of the corporate audit process, *conditional upon audit (or a proposed deficiency)*. Thus, our sample is not a random sample of all corporate tax returns but rather a purposefully selected subsample of that population. Sample selection concerns must be viewed in light of the research question. As Wooldridge (2010) explains, “[S]ample selection can only be an issue once the population of interest has been carefully specified. If we propose a model for a subset of a larger population, it is proper to proceed by obtaining a random sample from that subpopulation and then using the standard econometric methods.” Thus, the fact that our sample is not randomly selected from the entire population of corporate tax returns – both audited and unaudited – “does not affect our ability to consistently estimate the parameters of the model for the subpopulation” (Wooldridge 2010, p. 790).²⁵

Nonetheless, to allay concerns about sample selection, we implement a two-stage procedure where we first estimate the probability of audit and then include the Inverse Mills

²⁴ Other budget activities include Taxpayer Services (pre-filing taxpayer assistance and education, filing and account services, and taxpayer advocacy services), Operations Support (facilities, telecommunications, information technology development, and various other agency-wide activities to support taxpayer services and enforcement programs), Business Systems Modernization (capital investments in information technology) and Health Insurance Tax Credit Administration. Allocations of the total IRS budget to these activities has remained fairly stable from 2006 (the first year these disaggregated data are publicly available) through 2014 (the last year of our sample). Thus, we do not observe substantial shifting of resources across activities based on the level of the total budget.

²⁵ When interpreting the economic magnitudes of our results, we are careful to apply the estimated effects on proposed deficiencies (settlements) only to audited large corporate returns (large corporate returns with proposed deficiencies).

Ratio based on this first-stage regression in equations (1) and (2). We incorporate the Discriminant Analysis System (DAS) score into our model examining the likelihood of IRS audit presented in Appendix B. The DAS score is an IRS-generated score based on a confidential mathematical formula assigned to each LB&I return that is used to select returns for audit. We believe the DAS score serves as a valid exclusion restriction because it directly affects the probability of audit (in untabulated results, we observe a positive and significant association between the DAS score and audit probability) but should not *directly* affect the second-stage dependent variables (e.g., Lennox, Francis, and Wang 2012). The DAS score is an audit selection mechanism (e.g., IRSAC 2016; GAO 2017) and does not play any role in the actual audit process once a return has been selected for audit. When we re-estimate equations (1) and (2) including the Inverse Mills Ratio from the probability of audit model, our inferences are unchanged.²⁶

Ex Ante Enforcement

The results in Panel B of Table 3 indicate that the magnitude of proposed deficiencies as a percentage of originally claimed tax savings is increasing in the level of IRS resources. Our interpretation of these results is that the IRS uncovers more potential non-compliance when it has greater resources such that the magnitude of proposed deficiencies increases. An alternative explanation is that taxpayers are less likely to claim questionable or aggressive positions when IRS resources are high because taxpayers anticipate a higher probability of audit and/or more thorough IRS enforcement. Under this alternative explanation, the level of IRS resources affects taxpayers' filing decisions by serving as a deterrence mechanism or a form of *ex ante* enforcement. In other words, the magnitude of originally claimed tax savings could be lower when IRS resources are higher, such that the results in Panel B of Table 3 capture the effect of

²⁶ We do not tabulate these results because (1) the Heckman procedure generally uses OLS in the second stage but our second stage models are estimated using logistic and Tobit models and (2) the version of SAS software provided by the IRS does not allow us to implement the second-stage standard error correction.

IRS resources on the denominator (taxpayer behavior) and not the numerator (IRS behavior) as we suggest. Although we consider this alternative to be unlikely given taxpayers do not know when a return will be audited, what the IRS's level of resources will be at that time, or what portion of IRS resources will be allocated to auditing any particular return, we address this possibility in our main analysis by controlling for *BTD*, which is a measure of claimed tax avoidance and is highly correlated with estimated tax savings (the denominator of *PropDef_TaxSavings*).

To further address this alternative explanation, we re-estimate equation (1) after replacing the dependent variable with the ratio of claimed tax savings to assets. This analysis (untabulated) provides evidence on whether firms' tax avoidance behavior varies with the level of IRS resources. We measure *IRSResources* in two ways that are observable to taxpayers. Our first measure is the total IRS enforcement budget scaled by total audited returns in the fiscal year the return is filed (*Enforce_RetAudited*). Taxpayers can observe the IRS's budget when deciding which tax positions to claim. Our second measure is the total number of hours the IRS spent in its most recent audit of the company's tax return within the past three years, scaled by total assets (*PriorFirmHours_Assets*). If a firm was not audited within the past three years, we set *PriorFirmHours_Assets* to zero. This measure captures how much effort a particular firm *expects* the IRS to devote to reviewing its tax positions based on past experience. A negative (positive) coefficient on *IRSResources* would be consistent with taxpayers engaging in less (more) tax avoidance when the IRS has greater resources. We do not find a significant association between either *Enforce_RetAudited* or *PriorFirmHours_Assets* and claimed tax savings, which is inconsistent with the interpretation that our main results reflect a *decrease* in originally claimed tax savings when IRS resources are higher.

Measuring Control Variables using IRS Data

In our main analysis, we use Compustat data to calculate controls, which can lead to measurement error if the IRS uses tax return data instead of financial statement data in its audit. To gauge the robustness of our results, we construct control variables using IRS tax return data where possible. We calculate tax return-based measures of firm size, leverage, net operating loss carryforwards, and both R&D and foreign tax credit amounts. Table 7 presents the results. Although inferences with respect to our variables of interest are generally unchanged, some inferences with respect to these controls change based on how we construct them. For example, using Compustat data we find NOLs and R&D expense are negatively associated with the incidence and magnitude of proposed deficiencies, and not generally associated with settlements. However, we find NOLs (R&D credits) measured with IRS data are positively associated with the incidence and magnitude of proposed deficiencies but are unrelated to (positively associated with) settlements. Results with respect to size are unchanged regardless of which data source we use.

Results Omitting CIC firms

Some firms included in our sample are audited as part of the IRS's CIC program. The program was developed in the 1960s to address unique issues and difficulties the IRS encounters when auditing large U.S. firms. Between 500 and 1,500 taxpayers are assigned to the CIC program in any year. For CIC firms, an LB&I team consisting of an examination team manager, field agents, industry specialists, and subject matter experts spends substantial time at the taxpayer's place of business, which enables the IRS to conduct more in-depth audits than is typical for other firms. Because it is possible that resource allocation decisions differ for CIC and non-CIC firms, we re-estimate equations (1) and (2) after excluding returns audited under the

CIC program (untabulated) and inferences remain unchanged.

VI. CONCLUSION

We examine how IRS resources affect the entire corporate audit process. Using multiple measures of IRS resources, we find that the incidence and magnitude of proposed deficiencies are lower among audited returns when the IRS has fewer resources. However, we also find that the IRS retains a greater proportion of the deficiencies it proposes when it has fewer resources. Although the evidence is indirect, these results complement the inferences from Kubick et al. (2017) that the IRS LB&I division employs a risk-based audit strategy whereby auditors first focus on positions supported by the weakest taxpayer facts and then challenge positions with relatively stronger taxpayer facts as resources increase. Because researchers are unable to observe which specific positions the IRS targets during audit, it is important to triangulate inferences across multiple studies.

Despite the IRS's success in retaining more of the deficiencies it proposes *per return* when its resources are limited, our estimates indicate an overall net decline in revenue collected through the corporate audit process as IRS resources decrease. Specifically, extrapolating our results to all audited large corporations, we estimate the IRS could have increased collections from audited LB&I corporate taxpayers by \$34.3 billion if given an additional \$13.7 billion in overall enforcement resources (a one standard deviation increase in the total enforcement budget). Our estimate of \$34.3 billion accounts for approximately 19.3 percent of the estimated corporate tax gap from 2002 through 2014.

Our study makes multiple contributions. First, we offer empirical estimates of tax revenue lost when the IRS has fewer resources. These estimates should be of interest to Congress when deciding the amount of resources to allocate to the IRS. Our findings are particularly

relevant given that any resource constraints the IRS currently faces will be magnified by the increased responsibilities it will have as a result of recent tax reform.

Second, we extend the literature examining the interaction between corporate taxpayers and the tax authority. Prior research examines taxpayer strategy in deciding which positions to claim and taxpayer characteristics associated with proposed deficiencies. We provide evidence that the tax authority's enforcement resources directly affect the deficiencies it proposes. Further, to the best of our knowledge, we are among the first to examine the determinants of the outcomes of the negotiation process that follows alleged noncompliance. We provide evidence that the proportion of proposed deficiencies collected by the IRS varies with the level of IRS resources. Taxpayers should therefore be aware that when the IRS has fewer resources, it proposes fewer adjustments but is better able to sustain the adjustments it proposes.

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APPENDIX A
Variable definitions

IRS Audit Outcomes

<i>PropDefInd</i>	=	One if the IRS proposes a deficiency for the return-year (AIMS database), and zero otherwise
<i>PropDef</i> (\$M)	=	Initial deficiencies proposed to the taxpayer by the IRS (AIMS database)
<i>PropDef_TaxSavings</i>	=	Deficiency proposed by the IRS divided by <i>TaxSavings</i> , where <i>TaxSavings</i> equals pretax income times 35 percent minus total tax payments reported on the corporate tax return
<i>UnagreedDef</i> (\$M)	=	Amount of proposed deficiency unagreed at the conclusion of the exam process (AIMS database)
<i>TotalSettle</i> (\$M)	=	Total deficiencies retained by the IRS (ERIS database)
<i>TotalSettle_PropDef</i>	=	<i>TotalSettle</i> divided by <i>PropDef</i>
<i>ExamsSettle</i> (\$M)	=	Deficiencies retained by the IRS during the exam process (ERIS dataset)
<i>ExamsSettle_PropDef</i>	=	<i>ExamsSettle</i> divided by <i>PropDef</i>
<i>AppealsSettle</i> (\$M)	=	Deficiencies retained by the IRS during the appeals process (ERIS dataset)
<i>AppealsSettle_UnagreedDef</i>	=	<i>AppealsSettle</i> divided by <i>UnagreedDef</i>
<i>IRS Resource Measures</i>		
<i>TotalHours_RetAudited</i>	=	Total number of LB&I audit hours of C Corporation tax returns during the year divided by the # of C Corporation audits closed during the year (obtained from IRS)
<i>FirmHours_Assets</i>	=	Number of LB&I hours spent auditing firm <i>i</i> 's year <i>t</i> tax return (AIMS database) divided by the taxpayer-specific year <i>t</i> total assets (\$M) (AT)
<i>Enforce_RetFiled</i>	=	IRS inflation-adjusted enforcement expenditures (\$Thousands) divided by the # of total tax returns filed (both from IRS Annual Data Book)
<i>Enforce_RetAudited</i>	=	IRS inflation-adjusted enforcement expenditures (\$Thousands) divided by the # of total tax returns audited (both from IRS Annual Data Book)

APPENDIX A (continued)*Variable definitions****Control Variables***

<i>CIC</i>	=	One if a firm is in the CIC program, and zero otherwise
<i>BTD</i>	=	Pretax domestic income (PIDOM) minus federal tax expense (TXFED) divided by 35 percent scaled by total assets (AT)
<i>PaidPreparer</i>	=	One if a paid preparer signed the tax return (BRTF dataset), and zero otherwise
<i>Haven</i>	=	One if a firm reports a subsidiary located in a tax haven jurisdiction, and zero otherwise (measured using Exhibit 21 data obtained from Scott Dyreng)
<i>Foreign</i>	=	Pretax foreign income (PIFO) divided by lagged total assets (AT)
<i>Size</i>	=	Natural log of total assets (AT)
<i>Leverage</i>	=	Long-term debt (DLTT) plus debt in current liabilities (DLC) divided by total assets (AT)
<i>ROA</i>	=	Pretax income (PI) divided by total assets (AT)
<i>R&D</i>	=	Research and development expenses (XRD) divided by lagged total assets (AT)
<i>BigN</i>	=	One if a taxpayer is audited by a Big N auditor, and zero otherwise
<i>NOL</i>	=	One if tax loss carryforwards (TLCF) are positive, and zero otherwise
<i>LagETR</i>	=	Lagged <i>ETR</i> , where <i>ETR</i> equals total tax expense (TXT) divided by pretax income (PI)
<i>EquityEarnings</i>	=	One if income statement equity in earnings (ESUB) is present, and zero otherwise
<i>Mezz</i>	=	Convertible debt and preferred stock (DCPSTK) divided by total assets (AT)
<i>Litigation</i>	=	One if pretax litigation/insurance settlement (SETP) or after-tax litigation/insurance settlement (SETA) is negative, and zero otherwise
<i>PTDA</i>	=	Pretax discretionary accruals from the performance-adjusted modified cross-sectional Jones (1991) model (Kothari, Leone and Wasley 2005)
<i>Size_TaxReturn</i>	=	Natural log of total assets reported on Form 1120 Page 1
<i>Leverage_TaxReturn</i>	=	Liabilities reported on Form 1120 Schedule L divided by total assets reported on Form 1120 Page 1

APPENDIX A (continued)
Variable definitions

Control Variables (continued)

<i>NOL_TaxReturn</i>	=	One if tax loss carryforwards reported on Form 1120 are positive, and zero otherwise
<i>R&D_TaxReturn</i>	=	Research and experimentation credits reported on Form 6765 divided by total assets reported on Form 1120 Page 1
<i>FTC_TaxReturn</i>	=	Foreign tax credits reported on Form 1118 divided by total assets reported on Form 1120 Page 1



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APPENDIX B

The relation between the IRS enforcement budget and audit probability

Dependent Variable =	<i>IRSAudit</i>		
<i>IRSResources</i> =	<i>Enforce_RetFiled</i>		
Variable	Coef. (<i>Chi-Sq</i>)		<i>dy/dx</i>
<i>IRSResources</i>	23.8769 (5.11)	**	3.9137
<i>CIC</i>	1.9561 (288.77)	***	0.3206
<i>BTD</i>	0.0047 (0.00)		0.0008
<i>PaidPreparer</i>	-0.0109 (0.06)		-0.0018
<i>Haven</i>	0.0865 (3.71)	*	0.0142
<i>Foreign</i>	-1.1236 (3.03)	*	-0.1842
<i>Size</i>	0.4316 (635.57)	***	0.0707
<i>Leverage</i>	-0.7351 (59.20)	***	-0.1205
<i>ROA</i>	1.7268 (58.32)	***	0.2830
<i>R&D</i>	-1.8272 (46.99)	***	-0.2995
<i>BigN</i>	-0.0520 (1.01)		-0.0085
<i>NOL</i>	-0.1930 (23.41)	***	-0.0316
<i>LagETR</i>	0.4362 (109.95)	***	0.0715
<i>EquityEarnings</i>	-0.0289 (0.24)		-0.0047
<i>Mezz</i>	-0.5413 (7.12)	***	-0.0887
<i>Litigation</i>	0.0745 (1.63)		0.0122
<i>PTDA</i>	-1.0444 (33.06)	***	-0.1712
Fixed Effects	Industry		
R-Square	0.2687		
Area Under ROC Curve	0.81		
N	34,749		

This table presents the results of estimating audit probability as a function of the IRS enforcement budget. Results are estimated using a logit model. Standard errors are clustered by firm. Continuous variables are winsorized at the 1st and 99th percentiles. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significance is assessed using two-tailed p-values. See Appendix A for variable definitions.

APPENDIX C
Calculation of Economic Magnitudes

Panel A: Net aggregate increase (decrease) in collections for our sample given one standard deviation decrease in IRS enforcement budget

Standard deviation of <i>Enforce_RetAudited</i> (Table 2 Panel B)	0.7516
x Aggregate number of total returns with audits initiated from 2002-2014	18,274,831
Aggregate one standard deviation decrease in IRS enforcement budget from 2002-2014 (in thousands \$)	\$ (13,735,363)

Effect on proposed deficiencies for sample returns

Standard deviation of <i>Enforce_RetAudited</i> (Table 2 Panel B)	0.7516
x Marginal Effect for <i>Enforce_RetAudited</i> (Table 6)	0.0098
x Mean <i>TaxSavings</i> of sample audited returns (in thousands \$, untabulated)	\$ 64,366
Change in <i>PropDef</i> per sample audited return (in thousands \$)	\$ (474.10)
x Number of audited sample returns (Table 1)	10,920
Aggregate change in <i>PropDef</i> during 2002-2014 for sample returns (in thousands \$)	\$ (5,177,172)
x Mean <i>TotalSettle_PropDef</i> (Table 2 Panel A)	0.8140
Aggregate change in collections for sample returns assuming no change in the settlement ratio (in thousands \$)	\$ (4,214,218)

Effect on settlements for sample returns

Standard deviation of <i>Enforce_RetAudited</i> (Table 2 Panel B)	0.7516
x Marginal effect for <i>Enforce_RetAudited</i> (Table 6)	-0.0161
x Mean <i>PropDef</i> of sample returns with settlements (in thousands \$, untabulated)	\$ 12,421
Change in <i>TotalSettle</i> per sample return with a settlement (in thousands \$)	\$ 150.30
x Number of sample returns with settlements (Table 1)	4,585
Aggregate change in <i>TotalSettle</i> for sample returns (in thousands \$)	\$ 689,126

Net effect on total collections for sample returns

Aggregate change in collections for sample returns assuming no change in the settlement ratio (in thousands \$)	\$ (4,214,218)
Aggregate change in collections for sample returns resulting from the estimated change in the settlement ratio (in thousands \$)	\$ 689,126
Net aggregate increase (decrease) in collections for our sample given one standard deviation decrease in IRS enforcement budget (in thousands \$)	\$ (3,525,092)

APPENDIX C (continued)
Calculation of Economic Magnitudes

Panel B: Extrapolated effect of one standard deviation decrease in IRS enforcement budget on net aggregate collections for population of audited large corporations

Extrapolation of results to all audited large corporation returns

Change in <i>PropDef</i> per sample audited return (in thousands \$)	\$ (474.10)
x Aggregate number of large corporation returns audited from 2002-2014 (untabulated)	124,236
x Mean <i>TotalSettle_PropDef</i> (Table 2 Panel A)	0.8140

Aggregate increase (decrease) in collections during 2002-2014 for all audited large corporation returns assuming no change in the settlement ratio (in thousands \$)

\$ (47,944,834)

Change in <i>TotalSettle</i> per sample return with a settlement (in thousands \$)	\$ 150.30
x Approximate number of large corporation returns with settlements	91,039

Aggregate increase (decrease) in collections for all large corporation returns with settlements resulting from the estimated change in the settlement ratio (in thousands \$)

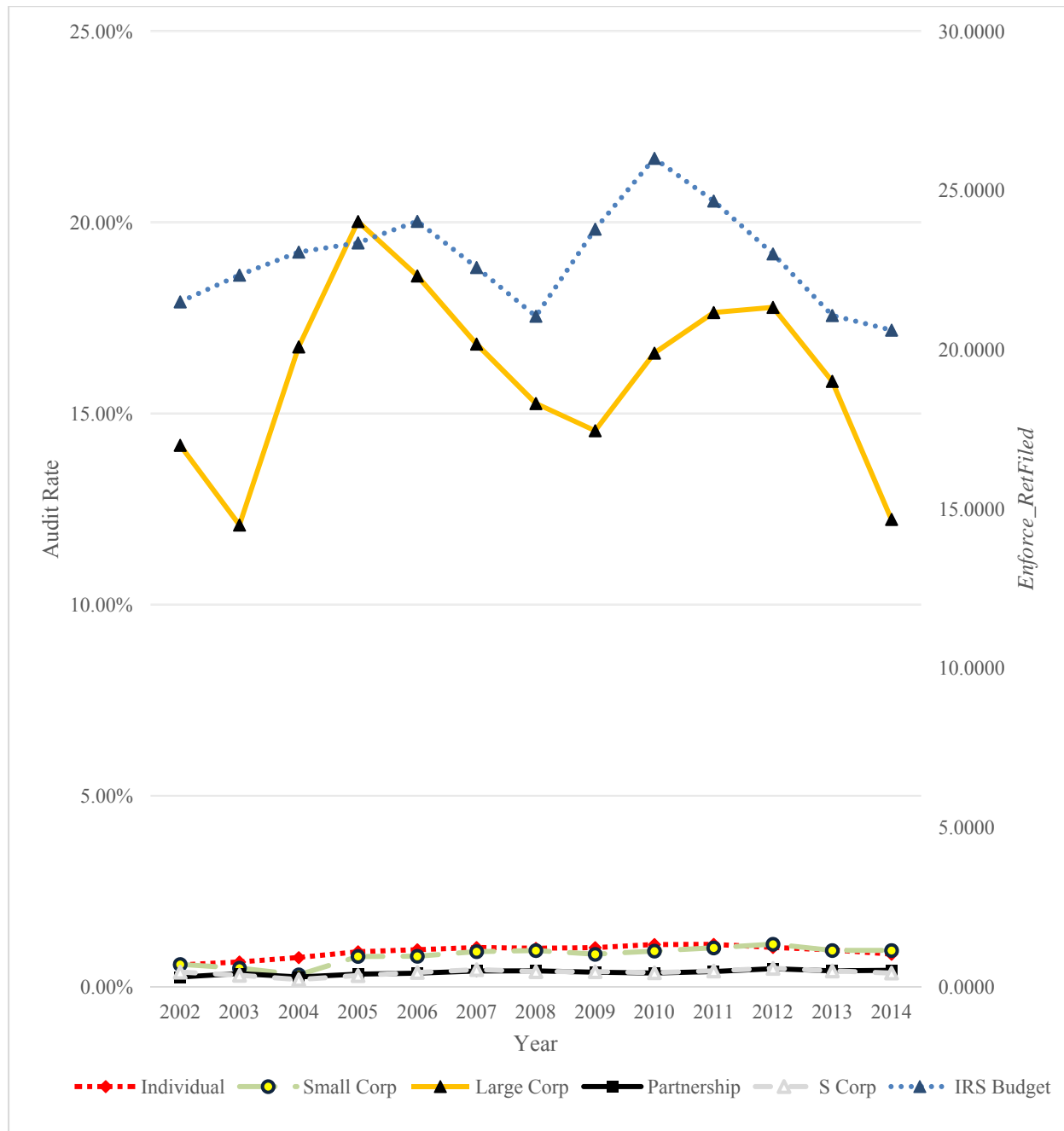
\$ 13,683,162

Net aggregate increase (decrease) in collections for all audited large corporations given one standard deviation decrease in IRS enforcement budget

\$ (34,261,672)

Appendix C outlines the calculation of economic magnitudes, in thousands of US\$, based on coefficient estimates. The first step in the estimation calculates anticipated changes in collections based on the decrease in the magnitude of proposed deficiencies and assumes the percentage of proposed deficiencies collected is unchanged (81.4 percent for our sample). The next step incorporates the increase in settlement collections associated with a decrease in IRS resources to arrive at a net aggregate estimated change in total collections. Panel A presents the magnitude of an estimated one standard deviation decrease in the IRS enforcement budget and presents the estimated increase (decrease) in collections for our sample of audited large public corporations. These amounts represent a lower bound because they are based on collections from only a subsample of corporate taxpayers. Panel B presents estimates of increases (decreases) in collections extrapolated to include all audited large corporations. These estimates are also a lower bound because they do not include potential collections from small corporations, individuals, etc. to which the total IRS enforcement budget is applied. Untabulated amounts related to numbers of returns audited and number of returns with proposed deficiencies are from the IRS Annual Data Book. Large corporations are all corporations with at least \$10M in assets. We obtain the number of large corporation returns with proposed deficiencies from the IRS Annual Data Book. Because this measure is only available starting in 2006, we apply the average percentage of returns receiving a proposed deficiency over the 2006-2014 time period to the years 2002 through 2005.

FIGURE 1
IRS Enforcement Budget and Audit Rates



This figure plots the IRS's enforcement budget and audit rates for individuals, small corporations, large corporations, and flow-through entities (including partnerships and S corporations) over time. *Enforce_RetFiled* equals IRS inflation-adjusted enforcement expenditures (\$ Thousands) divided by the number of total tax returns filed (both from IRS Annual Data Book). We obtain data on audit rates from the IRS Annual Data Book Table 9.

TABLE 1*Sample*

Panel A: Full sample					N
Return years from 2000 through 2010 in IRS datasets and Compustat					48,886
Less: financial and utility return years					(11,545)
Less: return years with insufficient data for empirical tests					(2,377)
Less: return years with mismatch between AIMS and ERIS databases					(215)
IRS and Compustat merged file (Audit probability sample - Appendix B)					34,749
Less: return years not audited by IRS					(22,475)
Proposed deficiency incidence sample					12,274
Less: return years with negative <i>TaxSavings</i> and proposed deficiencies greater than \$1					(788)
Less: return years where amount of proposed deficiency is unknown					(566)
Proposed deficiency magnitude sample					10,920
Less: return years with no proposed deficiencies					(6,335)
Settlement sample					4,585
Less: return years with no unagreed deficiencies					(3,954)
Appeals sample					631
Panel B: Sample by year					
Return Year	Audit probability sample	Proposed deficiency incidence sample	Proposed deficiency magnitude sample	Settlement sample	Appeals sample
2000	3,222	961	861	371	57
2001	3,367	1,075	913	330	59
2002	3,358	1,090	943	363	69
2003	3,364	1,093	976	464	71
2004	3,338	1,230	1,124	551	81
2005	3,232	1,219	1,104	522	78
2006	3,131	1,231	1,089	510	62
2007	3,047	1,120	995	463	59
2008	2,936	1,142	1,007	357	44
2009	2,896	1,148	1,019	323	29
2010	2,858	965	889	331	22
	34,749	12,274	10,920	4,585	631

This table presents the sample selection process. Panel A provides the derivation of the sample and Panel B provides the number of observations per return year.

TABLE 2
Descriptive statistics

Variable	N	Mean	Std. Dev.	Skewness	P25	Median	P75
Panel A: Stages of IRS audit process							
<i>PropDefInd</i>	12,274	0.4843	0.4998	0.0629	0.0000	0.0000	1.0000
<i>PropDef (\$M)</i>	10,920	5.2202	21.6050	6.0587	0.0000	0.0000	0.5839
<i>PropDef_TaxSavings</i>	10,920	0.0763	0.2444	5.0740	0.0000	0.0000	0.0304
<i>UnagreedDef (\$M)</i>	10,919	2.5516	13.3471	6.6012	0.0000	0.0000	0.0000
<i>TotalSettle (\$M)</i>	4,585	6.5856	18.8167	4.6838	0.0655	0.5505	3.4502
<i>TotalSettle_PropDef</i>	4,585	0.8140	0.3588	-1.5751	1.0000	1.0000	1.0000
<i>ExamsSettle (\$M)</i>	4,585	4.9061	15.3160	5.0169	0.0097	0.2780	2.0956
<i>ExamsSettle_PropDef</i>	4,585	0.7564	0.4203	-1.1878	0.6067	1.0000	1.0000
<i>AppealsSettle (\$M)</i>	631	12.1563	27.8787	4.5190	0.4899	2.6049	10.1215
<i>AppealsSettle_UnagreedDef</i>	631	0.4504	0.3324	0.3979	0.1597	0.3779	0.7538
Panel B: IRS resources							
<i>TotalHours_RetAudited</i>	12,274	512.5918	86.3111	0.6386	458.5000	526.0000	549.2000
<i>FirmHours_Assets</i>	12,274	1.0221	2.0515	3.6794	0.0465	0.2774	0.9420
<i>Enforce_RetAudited</i>	12,274	3.8822	0.7516	1.4875	3.4208	3.4536	4.0331
Panel C: Control variables							
<i>CIC</i>	12,274	0.2408	0.4276	1.2124	0.0000	0.0000	0.0000
<i>BTD</i>	12,274	-0.0072	0.0935	-3.6233	-0.0153	0.0094	0.0325
<i>PaidPreparer</i>	12,274	0.5798	0.4936	-0.3232	0.0000	1.0000	1.0000
<i>Haven</i>	12,274	0.4620	0.4986	0.1523	0.0000	0.0000	1.0000
<i>Foreign</i>	12,274	0.0166	0.0362	1.7585	0.0000	0.0000	0.0226
<i>Size</i>	12,274	6.8768	1.8682	0.0693	5.5961	6.8709	8.1107
<i>Leverage</i>	12,274	0.2272	0.2101	1.3769	0.0456	0.1985	0.3390
<i>ROA</i>	12,274	0.0565	0.1584	-3.2952	0.0173	0.0722	0.1282
<i>R&D</i>	12,274	0.0314	0.0648	4.3652	0.0000	0.0000	0.0347
<i>BigN</i>	12,274	0.8674	0.3392	-2.1664	1.0000	1.0000	1.0000
<i>NOL</i>	12,274	0.4079	0.4915	0.3751	0.0000	0.0000	1.0000
<i>LagETR</i>	12,274	0.2734	0.3528	-2.8605	0.2485	0.3445	0.3834
<i>EquityEarnings</i>	12,274	0.1854	0.3886	1.6197	0.0000	0.0000	0.0000
<i>Mezz</i>	12,274	0.0243	0.0759	4.3987	0.0000	0.0000	0.0000
<i>Litigation</i>	12,274	0.0940	0.2919	2.7824	0.0000	0.0000	0.0000
<i>PTDA</i>	12,274	-0.0083	0.0795	0.0016	-0.0407	0.0000	0.0226

TABLE 2 (Continued)
Descriptive statistics

Panel D: IRS resources by year

	(a)	(b)	(c)	(d)	(e)
			IRS Enforcement Budget - Inflation Adjusted¹	Total Returns Audited²	Enforce_ RetAudited
Year	TotalHours_ RetAudited	FirmHours_ Assets			
2002	639.20	0.8180	4,872,826	827	5,892.32
2003	647.26	0.9336	4,966,267	929	5,347.11
2004	546.81	1.0958	5,175,599	1,070	4,835.71
2005	537.85	1.2010	5,293,260	1,312	4,033.15
2006	520.59	1.2939	5,482,633	1,406	3,898.67
2007	514.27	1.1689	5,316,186	1,551	3,427.76
2008	506.84	0.8865	5,270,594	1,541	3,420.75
2009	475.15	0.8725	5,625,319	1,578	3,563.84
2010	444.47	1.0549	5,992,249	1,735	3,453.58
2011	417.40	1.0104	5,786,269	1,725	3,354.89
2012	399.10	0.8182	5,460,893	1,658	3,294.26
2013	400.56	1.0988	5,059,739	1,558	3,247.47
2014	412.30	1.8399	4,944,885	1,384	3,571.95

¹ Denotes figures are in thousands of dollars.

² Denotes figures are in thousands.

This table provides summary statistics for the sample. Panel A provides statistics related to outcomes of each stage of the audit process. Panel B provides statistics for IRS resources. Panel C provides statistics for control variables. Continuous variables are winsorized at the 1st and 99th percentiles. Panel D provides information on IRS resources by year. See Appendix A for variable definitions. Note that any descriptive statistics calculated using data presented in Panel D would not tie to the descriptive statistics in Panel B due to an uneven distribution of sample observations by year.

TABLE 3

The relation between IRS resources and the incidence and magnitude of proposed deficiencies

Panel A: The incidence of proposed deficiencies						
Dependent Variable =			<i>PropDefInd</i>			
<i>IRSResources</i> =			<i>TotalHours_RetAudited</i>		<i>FirmHours_Assets</i>	
Variable	Coef. (<i>Chi-Sq</i>)		<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)		<i>dy/dx</i>
<i>IRSResources</i>	0.0013 *** (23.32)		0.0003	0.1028 *** (62.70)		0.0222
<i>CIC</i>	0.5976 *** (57.96)		0.1305	0.4873 *** (37.58)		0.1054
<i>BTD</i>	-1.6667 *** (14.57)		-0.3641	-1.6889 *** (14.77)		-0.3652
<i>PaidPreparer</i>	0.0392 (0.47)		0.0086	0.0395 (0.48)		0.0085
<i>Haven</i>	-0.0108 (0.04)		-0.0024	-0.0084 (0.02)		-0.0018
<i>Foreign</i>	0.0369 (0.00)		0.0081	-0.1804 (0.05)		-0.0390
<i>Size</i>	0.2342 *** (115.50)		0.0512	0.3101 *** (161.29)		0.0670
<i>Leverage</i>	-0.7014 *** (24.25)		-0.1532	-0.6911 *** (22.96)		-0.1494
<i>ROA</i>	4.0249 *** (174.69)		0.8793	3.8824 *** (161.34)		0.8395
<i>R&D</i>	-0.8645 * (3.84)		-0.1888	-0.9477 ** (4.61)		-0.2049
<i>BigN</i>	-0.2480 *** (8.82)		-0.0542	-0.1984 ** (5.42)		-0.0429
<i>NOL</i>	-0.1632 *** (10.05)		-0.0356	-0.1592 *** (9.42)		-0.0344
<i>LagETR</i>	0.2071 *** (12.06)		0.0452	0.2267 *** (14.08)		0.0490
<i>EquityEarnings</i>	-0.0697 (1.19)		-0.0152	-0.0900 (1.93)		-0.0195
<i>Mezz</i>	-0.2575 (0.55)		-0.0562	-0.3209 (0.88)		-0.0694
<i>Litigation</i>	0.0120 (0.03)		0.0026	-0.0146 (0.04)		-0.0032
<i>PTDA</i>	-0.7718 *** (7.83)		-0.1686	-0.7635 *** (7.63)		-0.1651
Fixed Effects	Industry			Industry, Year		
R-Square	0.1256			0.1342		
Area Under ROC Curve	0.706			0.712		
N	12,274			12,274		

TABLE 3 (Continued)

The relation between IRS resources and the incidence and magnitude of proposed deficiencies

Panel B: The magnitude of proposed deficiencies						
Dependent Variable =			<i>PropDef_TaxSavings</i>			
<i>IRSResources</i> =			<i>TotalHours_RetAudited</i>		<i>FirmHours_Assets</i>	
Variable	Coef.		Coef.		Coef.	
	(<i>Chi-Sq</i>)			<i>dy/dx</i>	(<i>Chi-Sq</i>)	<i>dy/dx</i>
<i>IRSResources</i>	0.0003 ***		0.0001		0.0277 ***	0.0094
	(34.50)				(90.66)	
<i>CIC</i>	0.1299 ***		0.0443		0.1047 ***	0.0357
	(78.43)				(50.03)	
<i>BTD</i>	0.1997		0.0681		0.1947	0.0664
	(2.67)				(2.55)	
<i>PaidPreparer</i>	0.0345 ***		0.0118		0.0332 ***	0.0113
	(9.37)				(8.74)	
<i>Haven</i>	0.0013		0.0004		0.0016	0.0005
	(0.01)				(0.02)	
<i>Foreign</i>	-0.1203		-0.0410		-0.1858	-0.0633
	(0.61)				(1.48)	
<i>Size</i>	0.0343 ***		0.0117		0.0521 ***	0.0178
	(64.60)				(125.06)	
<i>Leverage</i>	-0.1218 ***		-0.0415		-0.1195 ***	-0.0407
	(18.03)				(17.29)	
<i>ROA</i>	1.1396 ***		0.3884		1.0894 ***	0.3713
	(294.21)				(269.20)	
<i>R&D</i>	-0.1795 *		-0.0612		-0.2117 **	-0.0721
	(2.92)				(4.09)	
<i>BigN</i>	-0.0181		-0.0062		-0.0002	-0.0001
	(1.13)				(0.00)	
<i>NOL</i>	-0.0395 ***		-0.0135		-0.0367 ***	-0.0125
	(14.71)				(12.75)	
<i>LagETR</i>	0.0438 ***		0.0149		0.0490 ***	0.0167
	(7.82)				(9.85)	
<i>EquityEarnings</i>	-0.0070		-0.0024		-0.0124	-0.0042
	(0.30)				(0.96)	
<i>Mezz</i>	-0.1166		-0.0397		-0.1185	-0.0404
	(2.29)				(2.39)	
<i>Litigation</i>	-0.0060		-0.0021		-0.0093	-0.0032
	(0.13)				(0.30)	
<i>PTDA</i>	-0.0687		-0.0234		-0.0735	-0.0250
	(1.00)				(1.16)	
Fixed Effects	Industry				Industry, Year	
N	10,920				10,920	

This table presents the results of estimating equation (1). Panel A presents results of estimating the likelihood of the IRS proposing a deficiency as a function of IRS resources using a logit model. Panel B presents results of estimating the magnitude of proposed deficiencies relative to tax savings originally claimed as a function of IRS resources using a Tobit model. Continuous variables are winsorized at the 1st and 99th percentiles. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significance is assessed using two-tailed p-values. See Appendix A for variable definitions.

TABLE 4

The relation between IRS resources and settlements

Dependent Variable = <i>IRSResources</i> =	<i>TotalSettle_PropDef</i>				
	<i>TotalHours_RetAudited</i>			<i>FirmHours_Assets</i>	
	Coef. (<i>Chi-Sq</i>)		<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>
<i>IRSResources</i>	-0.0012 *** (10.38)		-0.0002	-0.0728 *** (14.77)	-0.0117
<i>PropDef_TaxSavings</i>	-1.1743 *** (217.52)		-0.1884	-1.1392 *** (205.56)	-0.1826
<i>CIC</i>	-0.1300 * (2.71)		-0.0209	-0.0805 (1.03)	-0.0129
<i>BTD</i>	-2.3303 ** (5.90)		-0.3739	-1.9309 ** (4.06)	-0.3095
<i>PaidPreparer</i>	-0.1860 *** (8.05)		-0.0298	-0.1826 *** (7.78)	-0.0293
<i>Haven</i>	-0.0364 (0.31)		-0.0058	-0.0458 (0.50)	-0.0073
<i>Foreign</i>	-0.6129 (0.51)		-0.0983	-0.3962 (0.21)	-0.0635
<i>Size</i>	-0.2946 *** (129.67)		-0.0473	-0.3393 *** (146.79)	-0.0544
<i>Leverage</i>	0.0046 (0.00)		0.0007	0.0112 (0.00)	0.0018
<i>ROA</i>	-0.8661 ** (3.86)		-0.1390	-0.9433 ** (4.57)	-0.1512
<i>R&D</i>	-0.7957 (1.36)		-0.1277	-0.5790 (0.72)	-0.0928
<i>BigN</i>	0.1492 (1.66)		0.0239	0.1336 (1.29)	0.0214
<i>NOL</i>	-0.0796 (1.79)		-0.0128	-0.1126 * (3.57)	-0.0181
<i>LagETR</i>	0.0212 (0.04)		0.0034	0.0359 (0.12)	0.0058
<i>EquityEarnings</i>	-0.1156 * (2.85)		-0.0186	-0.1077 (2.48)	-0.0173
<i>Mezz</i>	1.4313 *** (6.90)		0.2296	1.4128 *** (6.77)	0.2265
<i>Litigation</i>	-0.1804 ** (3.88)		-0.0289	-0.1808 ** (3.91)	-0.0290
<i>PTDA</i>	0.0630 (0.02)		0.0101	0.0642 (0.02)	0.0103
Fixed Effects	Industry			Industry, Year	
N	4,585			4,585	

This table presents the results of estimating equation (2) using a Tobit model. The dependent variable equals the proportion of proposed deficiencies retained by the IRS. Continuous variables are winsorized at the 1st and 99th percentiles. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significance is assessed using two-tailed *p*-values. See Appendix A for variable definitions.

TABLE 5

The relation between IRS resources and settlements at the initial examination and upon appeal

Panel A: Settlements following the initial examination						
Dependent Variable =			<i>ExamsSettle_PropDef</i>			
<i>IRSResources</i> =			<i>TotalHours_RetAudited</i>		<i>FirmHours_Assets</i>	
Variable	Coef. (<i>Chi-Sq</i>)		<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)		<i>dy/dx</i>
<i>IRSResources</i>	-0.0040 *** (17.52)		-0.0003	-0.1936 *** (15.50)		-0.0146
<i>PropDef_TaxSavings</i>	-3.4135 *** (173.03)		-0.2581	-3.3059 *** (166.33)		-0.2499
<i>CIC</i>	-0.3965 * (3.67)		-0.0300	-0.2445 (1.39)		-0.0185
<i>BTD</i>	-6.6401 *** (6.95)		-0.5021	-5.5900 ** (4.97)		-0.4225
<i>PaidPreparer</i>	-0.5771 *** (11.11)		-0.0436	-0.5660 *** (10.77)		-0.0428
<i>Haven</i>	-0.2121 (1.56)		-0.0160	-0.2281 (1.81)		-0.0172
<i>Foreign</i>	0.3111 (0.02)		0.0235	0.8100 (0.13)		0.0612
<i>Size</i>	-0.7865 *** (111.47)		-0.0595	-0.9129 *** (124.76)		-0.0690
<i>Leverage</i>	0.1053 (0.05)		0.0080	0.1335 (0.07)		0.0101
<i>ROA</i>	-2.0889 * (3.31)		-0.1579	-2.2907 ** (3.98)		-0.1731
<i>R&D</i>	-0.5957 (0.11)		-0.0450	-0.0492 (0.00)		-0.0037
<i>BigN</i>	0.5329 * (3.20)		0.0403	0.4962 (2.69)		0.0375
<i>NOL</i>	-0.1807 (1.35)		-0.0137	-0.2795 * (3.20)		-0.0211
<i>LagETR</i>	-0.1674 (0.37)		-0.0127	-0.1255 (0.21)		-0.0095
<i>EquityEarnings</i>	-0.1858 (1.07)		-0.0140	-0.1615 (0.81)		-0.0122
<i>Mezz</i>	3.7503 *** (6.92)		0.2836	3.7272 *** (6.90)		0.2817
<i>Litigation</i>	-0.3386 (1.96)		-0.0256	-0.3435 (2.03)		-0.0260
<i>PTDA</i>	-0.0424 (0.00)		-0.0032	-0.0402 (0.00)		-0.0030
Fixed Effects	Industry			Industry, Year		
N	4,585			4,585		

TABLE 5 (Continued)

The relation between IRS resources and settlements at the initial examination and upon appeal

Panel B: Settlements following an appeal					
Dependent Variable =		<i>AppealsSettle_UnagreedDef</i>			
<i>IRSResources</i> =		<i>TotalHours_RetAudited</i>		<i>FirmHours_Assets</i>	
Variable		Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>
<i>IRSResources</i>		0.0003 (2.39)	0.0003	0.0126 (1.55)	0.0103
<i>PropDef_TaxSavings</i>	***	-0.2040 (39.37)	-0.1676	-0.2180 (44.98)	-0.1790
<i>CIC</i>		0.0562 (2.06)	0.0461	0.0413 (1.11)	0.0339
<i>BTD</i>		-0.5709 (1.21)	-0.4689	-0.7750 (2.20)	-0.6362
<i>PaidPreparer</i>	**	0.0700 (4.50)	0.0575	0.0757 (5.37)	0.0621
<i>Haven</i>		-0.0052 (0.03)	-0.0043	-0.0097 (0.09)	-0.0080
<i>Foreign</i>		-0.7184 (2.60)	-0.5900	-0.7272 (2.65)	-0.5970
<i>Size</i>		-0.0172 (1.81)	-0.0141	-0.0081 (0.33)	-0.0066
<i>Leverage</i>		0.1698 (2.41)	0.1395	0.1767 (2.57)	0.1450
<i>ROA</i>		-0.2389 (1.04)	-0.1962	-0.2297 (0.95)	-0.1885
<i>R&D</i>		-0.4499 (1.48)	-0.3695	-0.4316 (1.34)	-0.3543
<i>BigN</i>		0.0015 (0.00)	0.0012	0.0166 (0.07)	0.0136
<i>NOL</i>	**	-0.0735 (5.73)	-0.0604	-0.0714 (5.34)	-0.0587
<i>LagETR</i>		-0.0082 (0.01)	-0.0067	-0.0122 (0.03)	-0.0100
<i>EquityEarnings</i>		-0.0529 (2.39)	-0.0435	-0.0571 (2.80)	-0.0469
<i>Mezz</i>		-0.0330 (0.01)	-0.0271	0.0125 (0.00)	0.0102
<i>Litigation</i>		-0.0562 (1.31)	-0.0462	-0.0456 (0.88)	-0.0375
<i>PTDA</i>		0.2926 (1.40)	0.2403	0.3079 (1.58)	0.2528
Fixed Effects		Industry		Industry, Year	
N		631		631	

This table presents the results of estimating equation (2) using a Tobit model. The dependent variable in Panel A (Panel B) is the proportion of proposed deficiencies retained by the IRS following the initial examination (appeals). Continuous variables are winsorized at the 1st and 99th percentiles. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Significance is assessed using two-tailed *p*-values. See Appendix A for variable definitions.

TABLE 6
The relation between the IRS enforcement budget and corporate audit outcomes

Dependent Variable =	<i>PropDefInd</i>		<i>PropDef_TaxSavings</i>		<i>TotalSettle_PropDef</i>	
<i>IRSResources</i> =	<i>Enforce_RetAudited</i>		<i>Enforce_RetAudited</i>		<i>Enforce_RetAudited</i>	
	Coef.		Coef.		Coef.	
Variable	(<i>Chi-Sq</i>)	<i>dy/dx</i>	(<i>Chi-Sq</i>)	<i>dy/dx</i>	(<i>Chi-Sq</i>)	<i>dy/dx</i>
<i>IRSResources</i>	0.0750 ** (5.97)	0.0164	0.0286 *** (17.96)	0.0098	-0.1002 ** (6.22)	-0.0161
<i>PropDef_TaxSavings</i>					-1.1746 *** (217.34)	-0.1886
<i>CIC</i>	0.6061 *** (59.59)	0.1327	0.1324 *** (81.49)	0.0451	-0.1329 * (2.83)	-0.0213
<i>BTD</i>	-1.6633 *** (14.59)	-0.3641	0.1969 (2.60)	0.0672	-2.3018 ** (5.75)	-0.3696
<i>PaidPreparer</i>	0.0318 (0.31)	0.0070	0.0334 *** (8.78)	0.0114	-0.1828 *** (7.79)	-0.0294
<i>Haven</i>	-0.0147 (0.07)	-0.0032	0.0007 (0.00)	0.0003	-0.0366 (0.32)	-0.0059
<i>Foreign</i>	0.0046 (0.00)	0.0010	-0.1269 (0.68)	-0.0433	-0.5952 (0.48)	-0.0956
<i>Size</i>	0.2273 *** (108.97)	0.0498	0.0333 *** (60.91)	0.0113	-0.2933 *** (128.70)	-0.0471
<i>Leverage</i>	-0.6848 *** (23.18)	-0.1499	-0.1219 *** (17.95)	-0.0416	0.0126 (0.00)	0.0020
<i>ROA</i>	4.0314 *** (175.02)	0.8825	1.1457 *** (297.24)	0.3907	-0.8788 ** (3.98)	-0.1411
<i>R&D</i>	-0.8465 * (3.71)	-0.1853	-0.1797 * (2.93)	-0.0613	-0.7826 (1.30)	-0.1257
<i>BigN</i>	-0.2184 *** (6.87)	-0.0478	-0.0136 (0.63)	-0.0046	0.1355 (1.37)	0.0218
<i>NOL</i>	-0.1791 *** (12.15)	-0.0392	-0.0420 *** (16.63)	-0.0143	-0.0710 (1.43)	-0.0114
<i>LagETR</i>	0.2188 *** (13.45)	0.0479	0.0454 *** (8.43)	0.0155	0.0152 (0.02)	0.0024
<i>EquityEarnings</i>	-0.0702 (1.20)	-0.0154	-0.0064 (0.25)	-0.0022	-0.1187 * (3.00)	-0.0191
<i>Mezz</i>	-0.2379 (0.47)	-0.0521	-0.1095 (2.02)	-0.0373	1.3937 ** (6.56)	0.2238
<i>Litigation</i>	0.0088 (0.02)	0.0019	-0.0066 (0.15)	-0.0023	-0.1762 * (3.70)	-0.0283
<i>PTDA</i>	-0.7617 *** (7.62)	-0.1667	-0.0658 (0.92)	-0.0224	0.0484 (0.01)	0.0078
Fixed Effects	Industry		Industry		Industry	
N	12,274		10,920		4,585	

This table presents the results of re-estimating equations (1) and (2) using the IRS enforcement budget, scaled by the number of returns audited, to measure IRS resources. A logit (Tobit) model is used when the dependent variable is *PropDefInd* (*PropDef_TaxSavings* or *TotalSettle_PropDef*). Continuous variables are winsorized at the 1st and 99th percentiles. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Significance is assessed using two-tailed *p*-values. See Appendix A for variable definitions.

TABLE 7

The relation between IRS resources and corporate audit outcomes: Measuring controls using IRS data

Dependent Variable = IRSResources =	<i>PropDefInd</i>				<i>PropDef_TaxSavings</i>				<i>TotalSettle_PropDef</i>			
	<i>TotalHours_ RetAudited</i>		<i>FirmHours_ Assets</i>		<i>TotalHours_ RetAudited</i>		<i>FirmHours_ Assets</i>		<i>TotalHours_ RetAudited</i>		<i>FirmHours_ Assets</i>	
	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>	Coef. (<i>Chi-Sq</i>)	<i>dy/dx</i>
<i>IRSResources</i>	0.0011 *** (13.46)	0.0002	0.1010 *** (52.49)	0.0218	0.0003 *** (16.14)	0.0001	0.0281 *** (82.86)	0.0097	-0.0005 (1.93)	-0.0001	-0.0579 *** (9.13)	-0.0096
<i>Size_TaxReturn</i>	0.1932 *** (78.71)	0.0421	0.2709 *** (123.26)	0.0584	0.0253 *** (33.01)	0.0087	0.0433 *** (79.71)	0.0150	-0.2520 *** (102.71)	-0.0419	-0.2882 *** (112.42)	-0.0479
<i>Leverage_TaxReturn</i>	0.0091 (0.00)	0.0020	0.5030 (0.62)	0.1084	-0.2484 (2.58)	-0.0858	-0.2120 (1.68)	-0.0732	3.3531 *** (6.68)	0.5578	2.1136 (2.47)	0.3511
<i>NOL_TaxReturn</i>	0.2940 *** (32.11)	0.0640	0.2677 *** (26.18)	0.0577	0.0398 *** (12.99)	0.0138	0.0335 *** (9.23)	0.0116	0.0591 (0.93)	0.0098	0.0556 (0.82)	0.0092
<i>R&D_TaxReturn</i>	92.4621 *** (35.92)	20.1223	94.9753 *** (36.77)	20.4642	9.8727 *** (11.37)	3.4092	10.6962 *** (13.47)	3.6934	34.9344 ** (4.39)	5.8113	34.5174 ** (4.30)	5.7336
<i>FTC_TaxReturn</i>	2.9342 (0.32)	0.6386	3.4810 (0.44)	0.7500	-2.0006 ** (4.06)	-0.6908	-2.0084 ** (4.13)	-0.6935	10.4184 ** (3.97)	1.7331	10.6271 ** (4.14)	1.7653
Other Controls	Yes		Yes		Yes		Yes		Yes		Yes	
Fixed Effects	Industry		Industry, Year		Industry		Industry, Year		Industry		Industry, Year	
R-Square	0.1294		0.1377									
Area Under ROC Curve	0.708		0.714									
N	11,047		11,047		9,800		9,800		4,173		4,173	

This table presents the results of re-estimating equations (1) and (2) and constructing firm size, leverage, net operating loss carryforwards, R&D credit, and foreign tax credit control variables using IRS data. A logit (Tobit) model is used when the dependent variable is *PropDefInd* (*PropDef_TaxSavings* or *TotalSettle_PropDef*). Continuous variables are winsorized at the 1st and 99th percentiles. ***, ** and * denote statistical significance at the 1%, 5%, and 10% levels, respectively. Significance is assessed using two-tailed *p*-values. See Appendix A for variable definitions.