The Impact of Legal Enforcement: An Analysis of Corporate Tax Aggressiveness after an Audit*

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Abstract

We study how legal enforcement changes subsequent corporate behavior. Using confidential IRS data, we find that corporations *increase* their tax aggressiveness after an audit for a few years and then *reduce* it gradually. In the long run, audited corporations become more tax aggressive than before the audit, reducing their effective tax rate by around 14%. This finding is in contrast to the usual expectation that subjects should behave better after experiencing legal enforcement, at least for some time. We show that this U-shaped impact indicates a strategic calculation of firms, including Bayesian updating of audit risk. This adverse effect on illicit activities calls for reexamining both existing theory and current policy of legal enforcement.

Keywords: legal enforcement, tax audit, tax evasion, Bayesian updating

JEL Classifications:

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* The views expressed in this paper are those of the authors and do not necessarily reflect the views of the U.S. Department of the Treasury or the Office of Tax Analysis.

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1. Introduction

Corporations are subject to a wide variety of laws and regulations, including rules regarding labor, health and safety, environmental impacts, and taxation. Because enforcement is costly, theory and practice have shown that agencies should check for compliance intermittently instead of checking every possible occasion for violation ((Becker, 1968), (Nagin & Pogarsky, 2001)). This underlines the need for understanding the deterrent effect of such intermittent compliance checks on corporate conduct. Nevertheless, research on this question has been limited by the lack of systematic data on illegal behavior when there is no inspection.

Data from the Internal Revenue Service (IRS) offers us several clear advantages to address this challenge. First, we observe tax payments every year, even when there is no audit. Second, we can assess the relative possibility of violation by comparing annual tax payments across firms and time. Third, we have data on the behavior of almost all U.S. firms and individuals. Using these advantages, our paper employs a unique and confidential database of tax filings and audit data from the universe of U.S. corporations to study how firms behave following an audit.[1]

The modern economic literature on law enforcement emerged with Gary Becker's work on the economics of crime (1968).[2] The Becker framework was put to work with tax evasion in a seminal paper by Allingham and Sandmo (1972). Their key argument is that illicit tax behavior is shaped by audit probability and penalty. Since then, the Allingham-

[1] Needless to say studying tax evasion and avoidance is important per se since this activity affects the main resource for the government to operate and to fight other illegal activities. Tax evasion is known for being pervasive. By our calculations, tax noncompliance results in around $30 billion of IRS adjustments per year on corporate income tax returns. \citet{Plumley2005} estimates that individual income tax noncompliance results in over $200 billion in lost revenue per year.

[2] Earlier noneconomic works include \citet{Montesquieu1748}, \citet{Beccaria1764}, and \citet{Bentham 1789}

Sandmo model has been extended and tested in many ways.[3] Interestingly, this literature suggests two opposing effects following an audit.

On the one hand, several studies point out that taxpayers often do not know their true risk of audit. As a result, taxpayers may calculate the probability of whether they are in a high risk group (high risk type) that is likely to be audited frequently, and take that probability into account when reporting their taxes to the IRS. Using Bayes' rule, taxpayers will revise this probability upward if they experience an audit. Conversely, they will revise this probability downward if they do not encounter an audit in that period. This updating process suggests that taxpayers would decrease their tax aggressiveness immediately after an audit, and then increase it gradually over time if they are not audited again.

Intriguingly on the other hand, recent studies suggest that taxpayers can misperceive the audit probability in an opposite way. Guala and Mittone (2005) and Mittone (2006) find that lab subjects increase tax evasion right after an audit. Maciejovsky et al. (2007) also found their lab subjects to increase tax evasion immediately following an audit but decrease it gradually over time to the pre-audit level. Kastlunger et al. (2009) show that this surprising behavior is caused mostly by misconception of auditing probability. Taxpayers tend to believe that they are unlikely to get audited right after an audit and therefore it is safe to misbehave during this period. Guala and Mittone (2005) refer to this behavior as the "bomb crater" effect as it is similar to the belief of many soldiers during the First World War that the safest place to hide is the last bomb's crater because the next bomb is unlikely to fall there.

If both of the type-updating and bomb-crater effects operate concurrently after an audit, we may predict several scenarios. First, if one effect dominates the other throughout,

[3] For a review of tax evasion literature see \citet{Slemrod2007} and a critique of this literature see \citet{Alm2010}.

we should observe a monotonic trend in tax aggressiveness after the first year following an audit, either increasing or decreasing. Second, if the type-updating effect dominates first and then the bomb-crater effect dominates, then we should see a U-shaped trend: taxpayers continuously reduce tax payments during the first few year as they learn that IRS do not classify them as high risk; and then increase their tax payment back as they perceive that the IRS will increase the audit probability with time for everyone. Last and conversely, we should see an inverse U-shaped trend if the bomb-crater effect dominates before the type-updating effect dominates does. Our simple model in the next section will demonstrate that it is the relative marginal changes of these two effects that determine the shape of the overall post-audit effect.

In addition to the bomb-crater and type-updating effects, there may be another learning process. Taxpayers may also not know well how stringent an audit would be, or how large would be the penalty for tax evasion. Contrary to the impact of updating the audit probability above, learning additional information about the stringency of an audit may have an ambiguous effect on subsequent tax payments. If the stringency experienced during the audit is higher than the initial perception, taxpayers would increase subsequent tax payment. Otherwise, they would reduce it. Current evidence comes mainly from lab experiments and is not conclusive. Friedland et al. (1978), Friedland (1982), Alm et al. (1992), Alm et al. (1995), and Park and Hyun (2003) find a negative effect while Collins and Plumlee (1991) and Robben et al. (1990) find insignificant effects of penalty variation on tax aggressiveness. Schwartz and Orleans (1967) and Fjeldstad and Semboja (2001) even report that higher penalties lead to higher levels of tax aggressiveness.

Putting these current studies altogether, it seems to suggest that an audit can have two impacts on subsequent corporate tax behavior: one is transitory and the other is

permanent over time. The transitory impact is shaped by corporations' updating about their audit risk every time they do not get audited and by the perception that audit risk is low immediately after the audit and increasing after that. Depending on the relative magnitudes of these two effects, the transitory impact can be take a monotonous, U-shaped or inverse U-shaped pattern. On the other hand, the permanent impact characterizes the learning of corporations about the audit stringency and violation penalty through their direct audit experience. This learned information does not change when no audit takes place. Depending on whether the learned stringency is smaller or higher than the initial perception, it can raise or lower the whole transitory pattern over time.

These theoretical predictions provide guidance for empirical investigation. So far, the study of aftereffect of audit has only been limited to the lab. Kastlunger et al. (2009) note "Reliable data from the field are difficult to obtain; while self-reported data may be affected by social desirability and, therefore, may not reflect the actual size of tax non-compliance." This provides a motivation to seek reliable field data to address this important question. The IRS data used in this paper allow us to observe the actual corporate tax payments and audits of all U.S corporations since 1996. To determine tax aggressiveness, we use the effective tax rate (ETR), which is measured as the ratio of the income tax paid to corporate net income in a given year. Since IRS audits sanction tax non-compliance, one would expect that if audits impact corporate behavior, it should show up in the corporation's subsequent ETRs.

We analyze how firms change their ETR following an audit, using fixed effects for each audit of each firm. That is, we compare the taxes paid by the same firm, before and after a particular audit. This econometric design is employed to deal with the non-randomness of audits across firms and across years. We find that corporations reduce their average ETR by 8.8% immediately in the year following an audit. Then, they continuously

decrease ETR further and reach the lowest level around the fifth year after the audit, paying 21.3% lower tax than before the audit. Afterward, they increase ETR somewhat and stay at a level of around 14% lower than the pre-audit level.

This adverse and U-shaped impact reflects both the permanent and transitory impacts predicted from the literature. First, the overall adverse impact indicates that evading firms that are caught upon audit may learn that the penalty for evasion is less than they expected. This is consistent with the fact that the statue penalty for tax non-compliance in the U.S. is very small and explains why corporations reduce their tax payments in the long run after an audit. Second, the U-shaped pattern indicates the dynamic updating of auditing probability, dominated initially by the revising of audit risk type and later by the perception of increasing audit probability over time. We also find that this impact pattern to be more influential among larger firms, which face a disproportionally higher risk of being re-audited.

Our paper is organized into five sections. Following this introduction, Section 2 provides a simple model of the mechanisms at work. Section 3 describes the data and preliminary statistics. Section 4 presents our main empirical strategy and results. Section 5 presents further evidence from subsample analyses. Section 6 offers a conclusion.

2. A simple model of tax payment following an audit

2.1 Intuition

To ensure a more rigorous discussion of the combined impact of an audit on subsequent perceived audit risk and tax payment, we present a very simple model. The intuition of this model is as follows. A firm gets audited in year 0 and expects that the subsequent audit rate will be as in Figure 1 Panel A. This audit rate follows three main phases. In Phase 1, the re-audit rate is low and flat because the firm expects that the IRS

usually does not conduct another audit immediately during a few years after an audit. In phase 2, the audit rate starts increasing. In phase 3, the audit rate is high and flattens out again as the firm expects that the IRS does not have the resource to increase the audit rate further. This 3-phase trend is based on the bomb-crater effect discussed above.

The firm also expects that the IRS varies this 3-phase trend according to the type of evasion propensity that the IRS perceives about the firm, as shown in Panel B. If the IRS perceives that the firm has a high propensity to evade tax, it would assign the firm to type 5 and apply a high re-audit rate from the beginning. If the IRS perceives that the firm has a medium-high propensity, it would assign to type 4, and so on. type 1 includes firms with lowest propensity to evade and therefore will face the lowest re-audit rate. In this figure, there are five discrete types but in practice type can be continuous.

After the audit, the firm does not have a clear idea whether the IRS considers it as having a high propensity to evade tax or not. This is because the firm does not know how its audit fares relatively to the audits of other firms. Therefore, it has to form a perception about its type. Let's say initially the firm perceives it to be in type 5 in year 1 (Panel C). If the firm does not get audited in year 1, it updates that it may not face a high re-audit rate and perceives to be in type 4. If the firm does not get audited in year 2 again, it revises the future re-audit rate again, and so on. Toward the end of phase 1 (i.e. around year 5), the firm already perceives that it belongs to type 1 with a very low propensity. This type-updating process fades away in phase 2 and 3 since firms cannot lower its type further.

In phase 2, the overall re-audit rate increases for all types. Thus, the bomb-crater effect begins to dominate the type-updating effect that dominates in phase 1. Therefore, the firm perceives an overall increase in the re-audit rate. In phase 3, the re-audit rate is high and flattens out for all types. The firm perceives a high and stable re-audit rate. Note that both

type-updating and bomb-crater processes can be present in all three phases: phase 1 is dominated by type-updating perception; phase 2 is dominated by bomb-crater perception; and in phase 3 both processes diminish toward zero. As the result, the overall perceived trend of re-audit rate has a U-shaped as shown by the bold continuous curve in Panel C of Figure 1.

[Figure 1 about here]

2.2 Model of the transitory effect

The re-audit rate perceived by the firm is a function of: (i) the type τ that it perceives the IRS assigns it to; (ii) and the duration δ since the last audit:

$$P = P(\tau, \delta) \quad (1)$$

In turn, the type τ is also a function of the duration δ since the last audit. Given our discussion above, we make the following three assumptions.

First, when firm is perceived as of a type higher evasion propensity, the IRS will apply a higher re-audit rate:

$$\frac{dP}{d\tau} > 0 \quad (2)$$

Second, for every year passes without an audit, the Firm updates that it is considered to be lower evasion type by the IRS. This updating is most significant during phase 1 but becomes negligible after the Firm has reached the lowest evasion type in phases 2 and 3:

$$\begin{cases} \text{Phase 1} & : \quad \frac{d\tau}{d\delta} < 0 \\ \text{Phase 2 and Phase 3:} & \quad \frac{d\tau}{d\delta} \approx 0 \end{cases} \quad (3)$$

Third, the audit probability for each type increases during phase 2 and flattens out during phase 1 and 3:

$$\begin{cases} \text{Phase 2} & : \quad \frac{\partial P}{\partial \delta} > 0 \\ \text{Phase 1 and Phase 3:} & \quad \frac{\partial P}{\partial \delta} \approx 0 \end{cases} \qquad (4)$$

Having made these assumptions, we now can identify how the overall re-audit rate perceived by the firm changes with the duration since the last audit. The total derivative of P with respect to δ is:

$$\frac{dP}{d\delta} = \left(\frac{\partial P}{\partial \tau}\right)\left(\frac{d\tau}{d\delta}\right) + \left(\frac{\partial P}{\partial \delta}\right) \qquad (5)$$

The first term in (5) is the type-updating effect while the second is the bomb-crater effect. Using the three assumptions above, let us now see how (5) varies during the three phases.

$$\frac{dP}{d\delta} = \left(\frac{\partial P}{\partial \tau}\right)\left(\frac{d\tau}{d\delta}\right) + \left(\frac{\partial P}{\partial \delta}\right)$$

In Phase 1: $\frac{dP}{d\delta} = (>0)\ (<0) + (\approx 0) \quad <0 \quad (6)$

In Phase 2: $\frac{dP}{d\delta} = (>0)\ (\approx 0) + (>0) \quad >0 \quad (7)$

In Phase 3: $\frac{dP}{d\delta} = (>0)\ (\approx 0) + (\approx 0) \quad \approx 0 \quad (8)$

This indicates a U-shaped trend: perceived audit rate decreases during the first phase, then increases during the second phase, and finally flattens out in the third phase.

2.3 Model of the total effect

Having analyzed the transitory effect of an audit, we will now combine it with the permanent effect to identify the total impact of an audit on subsequent tax behavior. The effective tax rate ETR can be written as a function of perceived probability P and learned penalty π:

$$ETR = ETR(P, \pi) \quad (9)$$

To see how ETR changes over time, we take the derivative of (10):

$$\frac{dETR}{d\delta} = \left(\frac{\partial ETR}{\partial P}\right)\left(\frac{dP}{d\delta}\right) + \left(\frac{\partial ETR}{\partial \pi}\right)\left(\frac{d\pi}{d\delta}\right) \quad (10)$$

The first term in (11) is the transitory effect caused by changes in perceived probability while the second is the permanent effect caused by changes in learned penalty. Let us see how (11) varies through difference phases after an audit.

Prior to phases 1-3 discussed above, there is another important phase lasting from year 0 to year 1. Let us call this phase 0. During phase 0, the firm learns about the audit penalty, which can turn out to be either greater or smaller than its initial expectation. That means, $\frac{d\pi}{d\delta}$ can be either positive or negative. The theoretical prediction for ETR change in phase 0 depends on this parameter and is therefore ambiguous. During phases 1 through 3, the firm does not experience any further audit and therefore does not learn more about the penalty. As a result, the marginal permanent impact $\frac{d\pi}{d\delta}$ is zero for these phases.

Although the prediction for ETR change in phase 0 is ambiguous, we can infer something useful if empirically it turns out to be negative. In phase 1, the type-updating effect dominates the bomb-crater effect. In phase 2, it is the reverse. Since both of these effects are monotonous from phase 0 through phase 2, it must be that type-updating effect also dominates the bomb-crater effect during phase 0. In other words:

$$\frac{\partial P}{\partial \delta} < 0 \quad (11)$$

In the first term of (10), Allingham and Sandmo (1972) already show that firms will pay more tax if the audit rate increases. That is:

$$\frac{\partial ETR}{\partial P} > 0 \quad (12)$$

Therefore the first term of (10) must be positive. In other words, the transitory effect is positive since the type-updating effect dominates the bomb-crater effect. If the total impact on ETR in phase 0 is negative, then it must be that the permanent impact is negative. This implies that the experienced penalty should be lower than its expectation. We test for this in Section 4 of the paper.

Let us know examine how ETR changes during all the phases after an audit:

$$\frac{dETR}{d\delta} = \left(\frac{\partial ETR}{\partial P}\right)\left(\frac{dP}{d\delta}\right) + \left(\frac{\partial ETR}{\partial \pi}\right)\left(\frac{d\pi}{d\delta}\right)$$

In Phase 0:	$\frac{dETR}{d\delta} =$	(>0)	(>0)	+	(<0)	(<>0)	<>0	(13)
In Phase 1:	$\frac{dETR}{d\delta} =$	(>0)	(<0)	+	(<0)	(=0)	<0	(14)
In Phase 2:	$\frac{dETR}{d\delta} =$	(>0)	(>0)	+	(<0)	(=0)	>0	(15)
In Phase 3:	$\frac{dETR}{d\delta} =$	(>0)	(≈0)	+	(<0)	(=0)	≈0	(16)

During phase 0, ETR may fall or rise depending on the updating of both audit probability and penalty. During phases 1-3, the marginal permanent effect is $\frac{d\pi}{d\delta}$ zero and therefore the total impact depends completely on the transitional effect. Since (6), (7) and (8) show that perceived probability has a U-shaped trend, ETR must have a U-shaped trend.

In sum, this model predicts that: (i) After an audit, subsequent ETR will follow a U-shaped trend; and (ii) the height of this trend depends on the actual penalty learned during the last audit. This shape of is impact depends crucially on assumption (3) and (4). Reversing these assumptions may result in an inverse U-shaped or even monotonic trend. Insights from existing studies discussed in Section 1 suggest that assumptions (3) and (4) are most plausible and therefore our prime prediction is a U-shaped trend.

3. Data and statistics

3.1 Corporate audit, tax, and firm characteristics

Corporations with operations or income in the United States are required to file Form 1120, the U.S. Corporation Income Tax Form, annually. On this form, the corporation's tax preparer reports to the IRS the employer identification number (EIN) of the corporation, and the amount of income, deductions, taxable income, and tax owed for the corporation in that tax year, among other items. Corporations make quarterly estimated payments throughout the tax year and a final payment to settle any unpaid liability following the end of the tax year. Corporations may also file Form 720 for excise taxes due, as frequently as bimonthly. All of these returns are subject to audit by the IRS.

Our data primarily come from two sources within the IRS' Compliance Data Warehouse (CDW). The CDW houses the universe of tax returns (both corporate and individual) filed from 1996 onward. From the Business Returns Transaction File's 1120 database in the CDW, we draw corporate tax return information for each filer-year. This database allows us to capture important information reported on the return such as income and deduction items, the use of net operating loss carry-forwards, ownership information, and foreign income and operations on the corporation.

From the Audit Information Management System (AIMS) database, also housed in the CDW, we gather information on all C corporation audits from 1996-2011. The AIMS database contains detailed information on the all closed audits. These data include the time the audit was opened (i.e. when IRS agents started putting hours towards the audit), when the audit was closed, the amount by which the IRS recommends the filer's tax liability be adjusted, and other characteristics of the audit.

During the audit process, a team generally conducts an initial interview followed by a tour of the business. Subsequently, the audit team meets with the business to discuss the plan of the audit and the timeframe for the audit, request documents, and notify the business of proposed adjustments. The examiners then perform an investigation, and conclude whether any additional taxes and penalties are owed. If the team concludes additional amounts are owed, the taxpayer may either agree to pay the additional amounts, or submit an appeal. Once this is done, from the point of view of the audit team, the case is entered as being closed in the AIMS database. In selecting returns for audit, the IRS tries to effectively allocate its resources. Large firms, who account for the vast majority of corporate tax receipts, are audited most frequently. Indeed, IRS employees work side-by-side with the tax departments of the largest corporations. In addition, the IRS also uses other characteristics of a firm's tax return to flag it for audit. Many of these are incorporated into the IRS' Discriminant Information Function score (DIF score), which estimates the probability of a positive adjustment to tax liability following audit based on filer characteristics, and is used to select firms for audit.

To these data, we merge information from the Compustat North America and Compustat Global databases, which enable us to identify publicly traded firms.[4]

3.2 Data sample

We are interested in the tax paying behavior of C corporations, thus we make several sample cuts. First, we drop S corporations (which do not pay tax at the entity level), regulated investment companies (RICs), and real estate investment trusts (REITs) from our analysis, as these types of entities receive much different tax treatment than regular C

[4] Compustat Global covers approximately 98% of the world's market capitalization. As a result, there may be some firms that we wrongly consider as non-public, but the number is likely to be quite small.

corporations. Second, we exclude observations missing any variables used in the regression analysis.

Throughout, all nominal values are deflated to 2009$. To deal with outliers, all monetary variables are 90% Winsorized. Winsorization of the data is necessary to deal with outliers. The tax data we use are not edited in any way by IRS and thus data entry and calculation errors by the filers or the IRS agent keying in the data are not uncommon. In the CDW database, missing values are entered for firms which have not taxable income; we replace these with a value of zero.

3.3 Measuring Tax Aggressiveness

There are a number of ways in which researchers have measured tax aggressiveness. Waegenaere et al. (2011) (hereafter WSW) identify three type of measures. Those involving calculations of effective tax rates (ETRs), those looking at book-tax differences, and those considering uncertain tax benefits. WSW find that uncertain tax benefits are the best measure of tax aggressiveness if compliance with FIN 48 (a financial accounting regulation governing the reporting of uncertain tax benefits) is high. If it is not, then the corporation's ETR is the best measure of tax aggressiveness. Because FIN 48 has only been in place since 2006 and because information on uncertain tax positions are only available for public firms required to file financial statements, we use corporation ETRs are our measure of tax aggressiveness. Corporate ETRs have been used extensively in the literature studying the tax paying behavior of corporations. They are used to measure tax-planning effectiveness by Mintz (1999) and Rego (2003). \citetRSW2010} and Armstrong et al. (2012) both find that ETRs are used evaluate the performance of corporate tax directors. Further, Dyreng et al. (2008) and Dyreng et al. (2010) use ETRs to measure corporate tax avoidance.

In particular, following Plesko (2003), we use the firm's total taxes less credits (Form 1120, line 31), plus the value of net operating losses used (Form 1120, line 29a times the firm's statutory tax rate) divided by a firm's earnings before interest, taxes, and depreciation (Form 1120, line 28 + line 17 + line 18 + line 20).[5] Adding interest paid, taxes paid, and deprecation back to net income yields a measure of earnings that is not impacted by some commonly employed tax shields. For example, if interest paid were not added back to net income, then highly leveraged firms would wrongly be seen as less tax aggressive, with a higher ETR. Thus, by employing an adjusted measure of net income in the denominator of the ETR calculation, we are better able to measure tax aggressive behavior since our measure of income is not directly affected by some of the more prolific methods of tax avoidance.

3.4 Descriptive statistics

Table 1 presents sample means for the variables used in our regression analysis. The first column presents means for all companies in the sample, the subsequent columns present means for corporations sorted by quartile of total assets from smallest to largest. The mean effective tax rate for all firms is 5.9% of adjusted earnings. The average ETR generally increases with firm size, with firms in the 4th quartile having the highest averaged ETR at 7.16%. On average, corporations are audited less than once over the 12 year sample period. The average duration between audits is 4.7 years. As firm size increases, so does the mean number of audits, which is about ten times higher for the largest quartile firms than those in the smallest quartile. Firm size varies greatly, having an average of $145.9 million, but ranging between $8.8 million and $1.7 billion from quartile 1 to quartile 4. Audit Adjustments average 1.4% of total assets, but are on average larger for smaller firms

[5] Note that the CDW data do not contain the amounts deducted for amortization, so this measure of earnings is not the commonly used earnings before interest, taxes, depreciation and amortization (EBITDA) measure.

(measured by total assets) than for larger firms. Approximately 2.7% of all firms are foreign controlled, and 0.7% of all firms have multinational operations (indicated by claiming a foreign tax credit or ownership of a controlled foreign corporation on Form 5471). Retail trade and construction are the two most common industry classifications in our sample., representing 13% and 11% of firms, respectively.

[Table 1 about here]

Figure 2 explores graphically the trends in effective tax rates after an audit. The chart separates the trends of each quartile by firm's total assets. Firms in the top quartile seem to pay considerably higher ETR compared to other quartiles. However, all quartiles appear to share the same pattern: ETRs rise briefly upon the closure of an audit, and then fall gradually over four or five years before rising up again. Over time, for three of the four quartiles, there appears to be a negative effect of an audit on ETR.

[Figure 2 about here]

4. Empirical strategy and results

We are interested in learning how firms change their tax payment following an audit. It is likely that the simple trends of ETR and audit rate discussed in the previous section are misleading since many factors are not controlled for. In this section, we will present an empirical approach to estimate more precisely the pattern of firms' behavior after an audit.

To estimate the effect of an audit on subsequent tax behavior, we study the relationship between tax payment and the duration since the audit was closed. The simplest specification is to regress annual tax payment on that duration. However, in doing so we must assume a linear or certain functional form of this relationship. A more flexible

specification uses a series of duration dummies instead of a parametric duration variable. Thus, we estimate:

$$ETR_{it} = \sum_{j=0}^{T} \beta_j \, LastAuditEnded_{it-j} + \delta X_{it} + \eta_t + \varepsilon_{it}$$

where ETR_{it} denotes the effective tax rate of firm *i* in year *t*; $LastAuditEnded_{it-j}$ is the series of duration dummies, which equal 1 if the last audit closed *j* years ago. Because each observation has a particular duration, these duration dummies are mutually exclusive – only one of them can be 1 for any given firm-year observation. Finally, X_{it} denotes firm-specific control variables and η_t denotes year dummies intended to control for macroeconomic fluctuations or other factors that contemporaneous affect all firms.

The key challenge for our empirical exercise is that audits are not random, both across firms and years. First, IRS selects to audit certain firms because of certain characteristics of those firms. For example, the IRS may choose to audit firms with characteristics that are known to be associated with tax evasion. To address this firm selection issue, we include a firm fixed effect and estimate the change in ETR within the same firm over time.

Second, even within a firm, the IRS may select certain years for audit because the ETR for a particular firm is lower in those years than the firm's ETR in other years. If this were the case, then a drop in the effective tax rate that triggered an IRS audit would erroneously be attributed as an effect of the audit even when firm fixed effects are included. To account for this possibility, we also include a fixed effect for each audit of each firm. Specifically, we include a different firm fixed effect starting with the year on the most recent return that was audited. This firm*audit fixed effect controls for the level of effective tax rate that triggered the audit, and identification of the impact of an audit comes from

variation within an audit experience, indicating the extent to which the time since the closure of the audit impacts the subsequent effective tax rate.

Note that once we include this firm*audit fixed effect and the series of duration dummies starting from year 1 after the audit, then the comparison group (whose dummies are all zero) is the period from the last year whose return was audited to the year the audit is completed. That means the coefficients on duration dummies show how much ETR changes compared to this pre-audit-completion period.

In addition, we control for a number of other variables that may potentially affect ETR including the log of total assets, inventory as ratio of total assets, public firm status, foreign control status and multinational status. One important control variable is a dummy indicating whether the firm is has an ongoing audit at the time of tax filing. We allow for an ongoing audit to have a different impact of a closed audit because the two different states carry with them different information. If a firm is undergoing an audit, the firm knows that they are subject to heightened scrutiny, but they don't know what will be found, or what penalty (if any) may be enforced. Once the audit is closed, that uncertainty is resolved, since the firm knows what the auditor found, as well as any penalty that they will need to pay.

Results from the main specification are presented in Table 2. The dependent variable denotes a firm's effective tax rate in percentage points, with a sample mean of 5.9. Column 1 is a simple regression of ETR on the series of duration dummies. In this specification, a previous audit happening at any length of time in the past is positively associated with the effective tax rate, with an audit leading to an increase in the effective tax rate of between 0.88 and 2.33 percentage points.[6] In addition, a firm's effective tax rate is

[6] Because there are so few observations of firms who have audits closed nine or more years ago, we include only duration dummies for year one through eight and a single dummy variable for an audit having been closed nine of more years ago

estimated to be positively associated with the presence of an ongoing audit, with an ongoing audit associated with a 2.48 percentage point increase in the effective tax rate.

[Table 2 about here]

In Column 2, we account for several characteristics of the firm, including the firm's log total assets, the ratio of inventory to assets, and indicators for whether the firm is public, foreign controlled, or a multinational, as well as industry and year fixed effects. When this is done, the estimated coefficients decline in magnitude, but all are still positive and strongly statistically significant. Results in column 1 and 2 seem to suggest that audits have positive and U-shaped effect on subsequent ETR. This is consistent with the simple graph in Figure 2. This is also consistent with the commonly held belief that an audit should make firms to pay more tax for some period of time.

However, these results reverse in Column 3 when we include firm fixed effects to control for differences in the unobserved factors across firms. This is an important control to include, because our sample consists of a variety of types of firms with different long-run effective tax rates. A rational auditor with limited resources may choose to focus on those firms clearly at the top of the income distribution, and more rarely audit smaller firms.[7] When we include firm fixed effects, the coefficients on all of the duration dummies change sign and remain highly significant. This implies that firms with higher long-run effective tax rates (such as large firms) are more likely to experience an audit, and the results of columns 1 and 2 are simply reflecting this selection effect.

To further control for selection effects, Column 4 presents results with firm*audit fixed effects. These interactions will control for regime shifts in the tax-paying behavior of the firm that triggered an IRS audit. Recall that identification is now driven by differences in

[7] In fact, the largest corporations are audited every year.

ETRs in the years after an audit is closed and the years before an audit is closed but after the tax year most recently audited. The results are consistent with those found in Column 3, with a closed audit having a negative impact on the firm's ETR.

Figure 3 uses the results from Column 4 to present the main finding of our paper. Following an audit, firms immediately decrease their effective tax rate by 0.4 percentage points, which is equivalent to 7% of their average ETR. They further decrease their ETR for five years, with the ETR declining by an average of 1 percentage point five years after an audit is closed (an average decline of 17% in the firm's ETR). As time since audit extends beyond five years, we find that firms gradually increase their ETR , but it does not return to its pre-audit level. Rather, seven years after audit, their remains an effect similar in magnitude to that seen immediately following audit. In short, an audit has a negative and large effect on subsequent tax payments, with some of the changes appearing to be temporary and others more permanent in nature.

[Figure 3 about here]

In Column 5, we include the auditor's recommended adjustment to the firm's taxes owed in the firm's last audit, scaled by the total assets of the firm. This variable enters positively, suggesting that firms that upon audit are found to have underpaid taxes tend to pay higher amounts of taxes in subsequent years, resulting in higher effective tax rates. However, the impacts of ongoing and closed audits are still negative and significant, and have a similar magnitude to the results in the previous two columns. Finally, In Column 6, we examine whether the impact of a larger adjustment upon audit differs depending on the amount of time that passed since that audit. Looking across these coefficients, it suggests that the effect of tax adjustment found in an audit also fades away as time passes.

5. Evidence from subsample analyses

In the updating process, firms have to take into account firm-specific parameters such as relative size of the benefit and cost, sector audit frequency, and internal factors that influence tax aggressiveness. These parameters may vary among different subsamples, making them to react differently to audits. Comparing the patterns across certain subsamples can yield further insights into the impact of law enforcement on corporate behavior.

Subsamples by firm size. The IRS is known to prioritize its resources on auditing largest firms, where the bulk of government revenue comes from. As a result, these firms may invest more efforts in strategizing their tax behavior. If so, we should expect that the largest firms behave more closely to what a model of rational profit-maximizing entities predict than other firms do. To test for this prediction, we divide the population of firms into four quartiles and run the main specification in Section 4 on each of them. The results are reported in Table 3. Based on these results, Figure 4 shows that the largest quartile behaves distinctively from the three smaller quartiles. The largest quartile follows the U-shape pattern, while other quartiles do not. Small and medium-size firms seem to reduce ETR sharply after an audit and then return gradually over time towards the pre-audit level. They appear to pay little attention to the updating of firm risk profile in the first few years following an audit.

[Table 3 about here]

[Figure 4 about here]

Subsamples by audit frequency. One problem with our main specification is that if a firm is audited every few years, then we never observe what their effective tax rate is more than that few years after audit. As a result, the coefficients on the last audit happening la arger numbers of years ago will tend to reflect the impact of audits on firms that are infrequently

audited, while the coefficients on the last audit happening a smaller number of years ago will tend to reflect the impact of audits on frequently audited firms. To examine whether this phenomenon biases our base results, in Column 2 of Table 4, we cut the sample to include firms that were audited only once during our sample. Comparing these results to the results from the base specification in Column 1, the results appear to be qualitatively similar through the fifth year after audit, but the coefficients for time since last audit ended beyond six years do not exhibit the U-shaped patter. These results, however, may be reflecting these firms continually updating the probability of an audit downward as more and more time passes without a subsequent audit.

In Columns 3, we split the sample according to whether the firm is part of the Coordinated Industry Class (CIC) of firms. The CIC consists of the largest firms, and are audited every year. In Column 3, which excludes CIC firms, the results are similar to those in the full sample, suggesting that the presence of firms in the sample that are audited on a regular basis did not bias our main findings. The patterns of these two subsamples are presented in Figure 4 Panel A.

[Table 4 about here]

[Figure 4 about here]

Subsamples by tax adjustment. Columns 4 through 6 of Table 4 break out the sample depending on whether a positive adjustment to taxes was recommended upon audit, whether no adjustment was recommended, or whether a negative adjustment was recommended (in which the firm had overpaid their taxes with their return). These specifications only include firms for which there is at least one closed audit. Figure 4 Panel B shows that the patterns of these three groups are very similar, except for their magnitudes. The negative-adjustment firms are the ones who are most sure that IRS does not regard them as having high tax-

evasion potential. Expecting a low re-audit probability, these firms cut down their ETR drastically following the audit. Zero-adjustment firms, which are less sure than negative-adjustment firms, also cut the subsequent ETR but by a smaller extent.

The positive-adjustment firms are different from the zero-adjustment ones in two aspects. First, they are likely to perceive a higher re-auditing risk, which induce them to be more cautious after the audit. Second, they learn about the low penalty firsthand through paying the fine – an actual experience that the zero- and negative-adjustment firms do not have. These differences lead to two opposite effects: one increases while the other decreases subsequent ETR. Figure 4 Panel B shows that the latter effect dominates the former one. Note that the pre-audit ETRs of the three groups are likely to be different, and therefore the post-audit ETR may partly reflect the convergence over this initial gap.

6. Conclusion

Law enforcement relies on the deterrence effect of punishment risk ((Pogarsky & Piquero, 2003)). This stems from an influential doctrine in the deterrence literature arguing that punishment dissuades future illegal activities ((Gibbs, 1975), (Tittle, 1980)). However, several studies suggest that criminals are more likely to commit crimes again immediately following punishment ((Sherman, 1993), (Paternoster & Piquero, 1995), (Piquero & Paternoster, 1998); (Piquero & Pogarsky, 2002)). Recent lab studies also indicate that subjects increase tax evasion following an audit ((Guala & Mittone, 2005), \cn{Mittone2006}, (Maciejovsky et al., 2007), (Kastlunger et al., 2009)).

Using data on real behavior of U.S. corporations, our study shows that firms tend to pay less tax after an audit, become increasingly more tax aggressive for a few years, and then gradually raise their tax payments. In the long run, firms become more tax aggressive than

they were before the audit. This U-shape pathway exhibits several insights from the existing audit literature, especially the dynamic process of Bayesian updating that firms conduct. Note that the fact that firms increase their tax payments after a few years do not necessarily mean that firm misperceive the audit risk. Rather, this behavior can be a rational response given the firm's updating of its audit risk type. In an additional analysis not reported here, we find that the actual audit probability indeed increases with the duration since the last audit. This means that firms perceive, either correctly or coincidentally, the true audit risk trend.

In any case, the adverse effect of law enforcement robustly found in our paper urges for a serious reexamination of the effect of law enforcement on subsequent behavior not only in taxation but also in other areas. Having effective legal enforcement is of profound importance. Rethinking our enforcement policy, in both economic and non-economic sectors, may come as a result.

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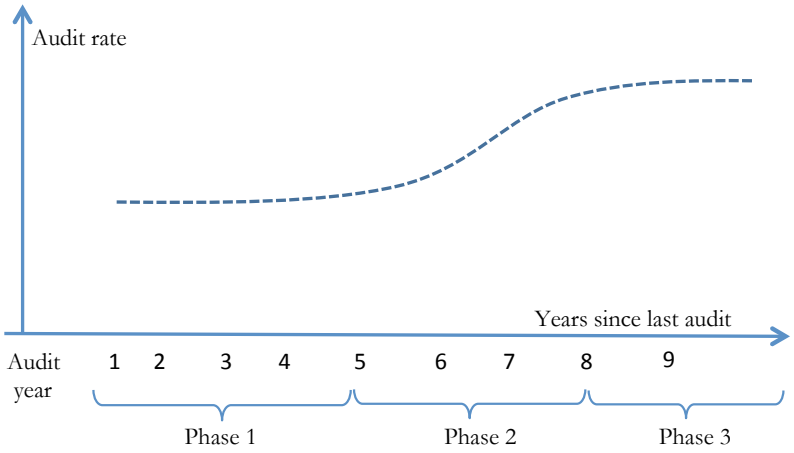
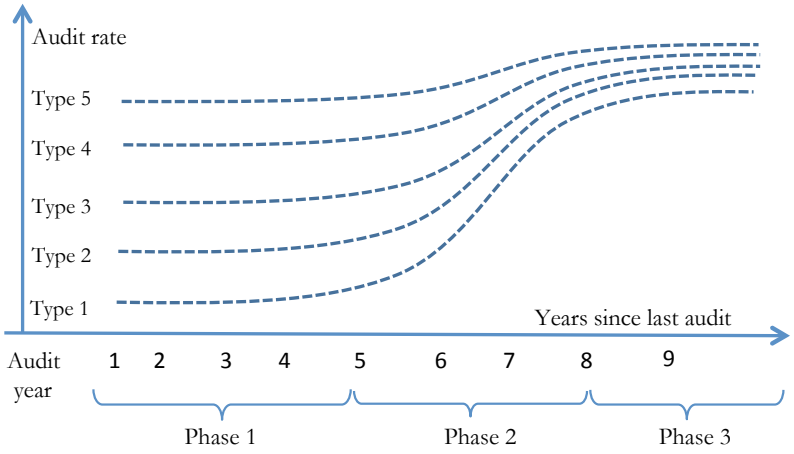
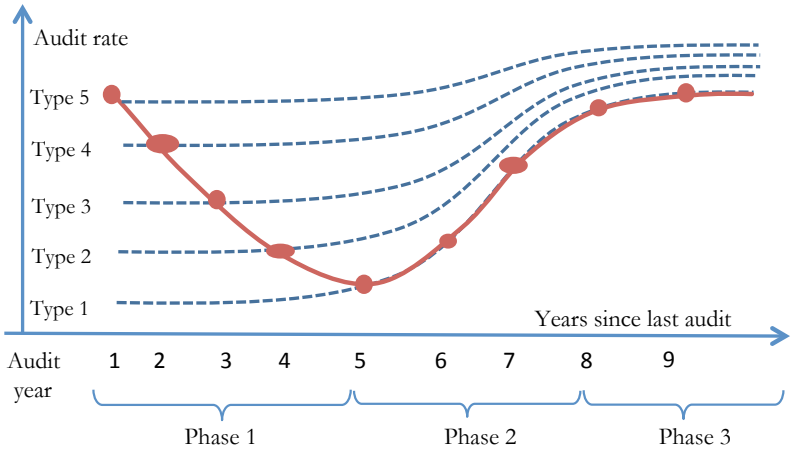
Figure 1. Audit rate perceived by firms



Panel A. Firms' perceived audit rate

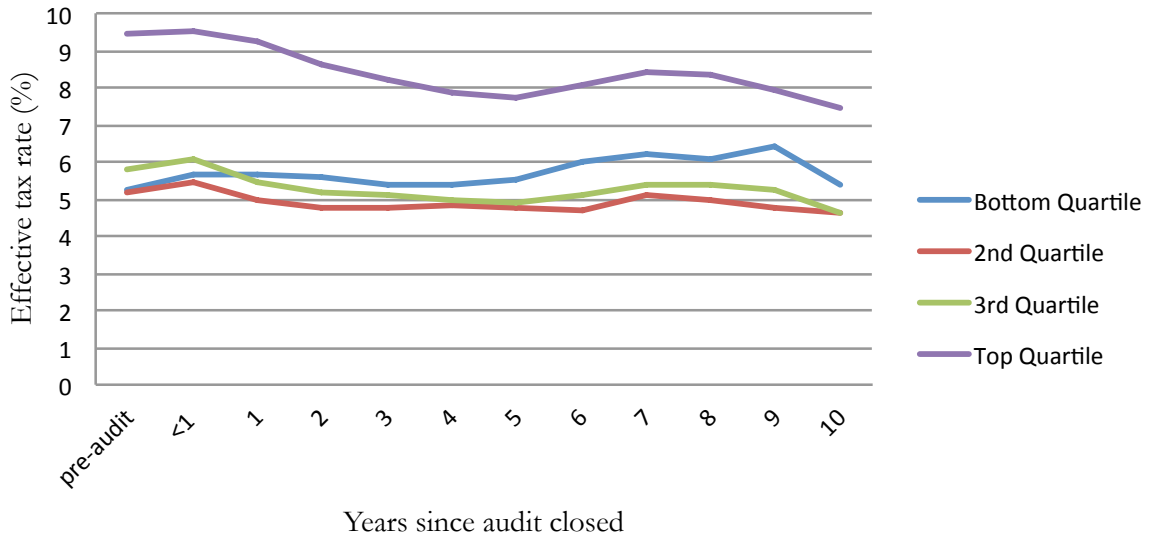


Panel B. Firms' perceived audit rate by types



Panel C. Firms' perceived audit rate with type updating

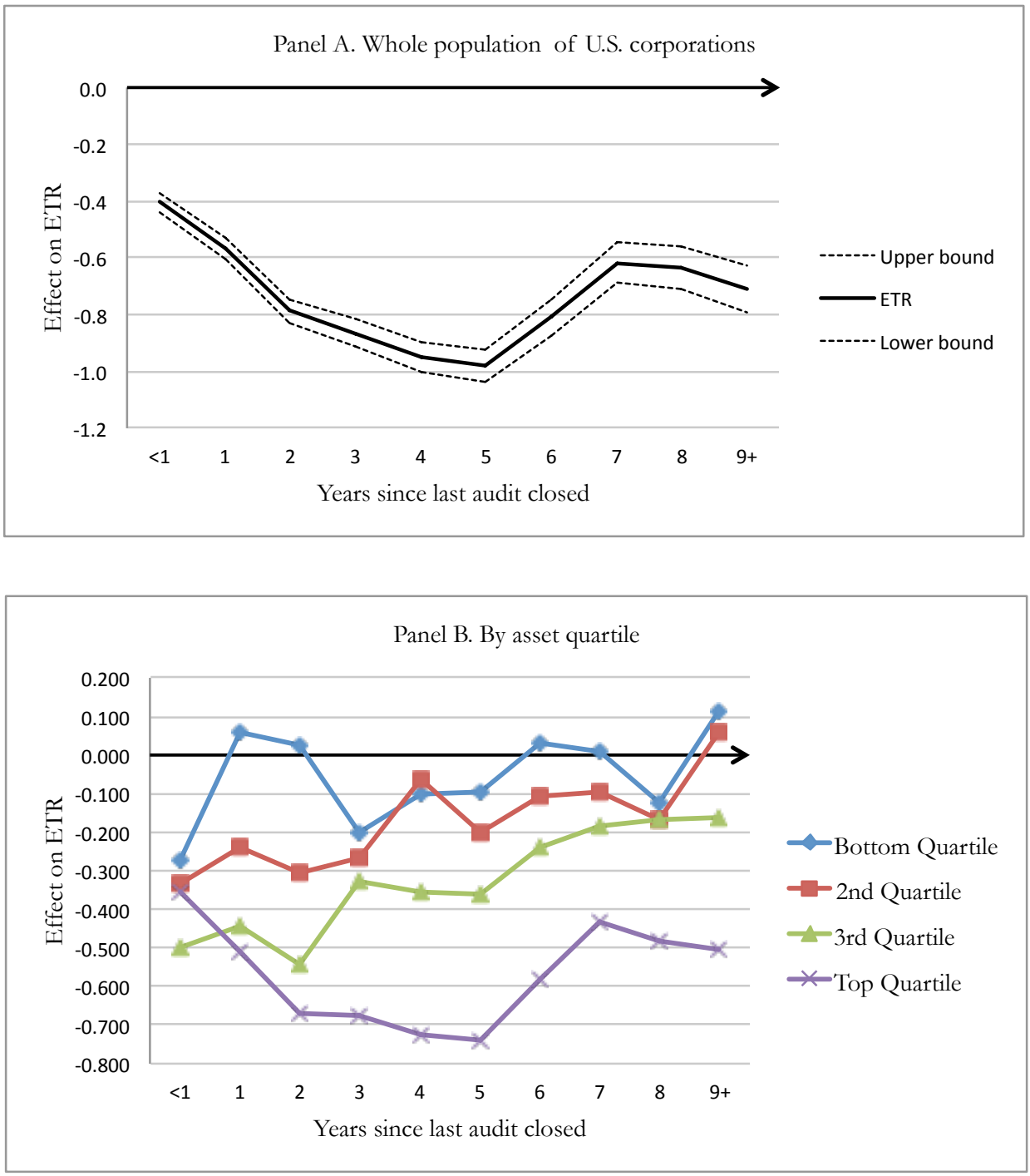
Figure 2. Effective tax rate vs Years Since Audit Closed
(by assets quartile)



Years since audit closed

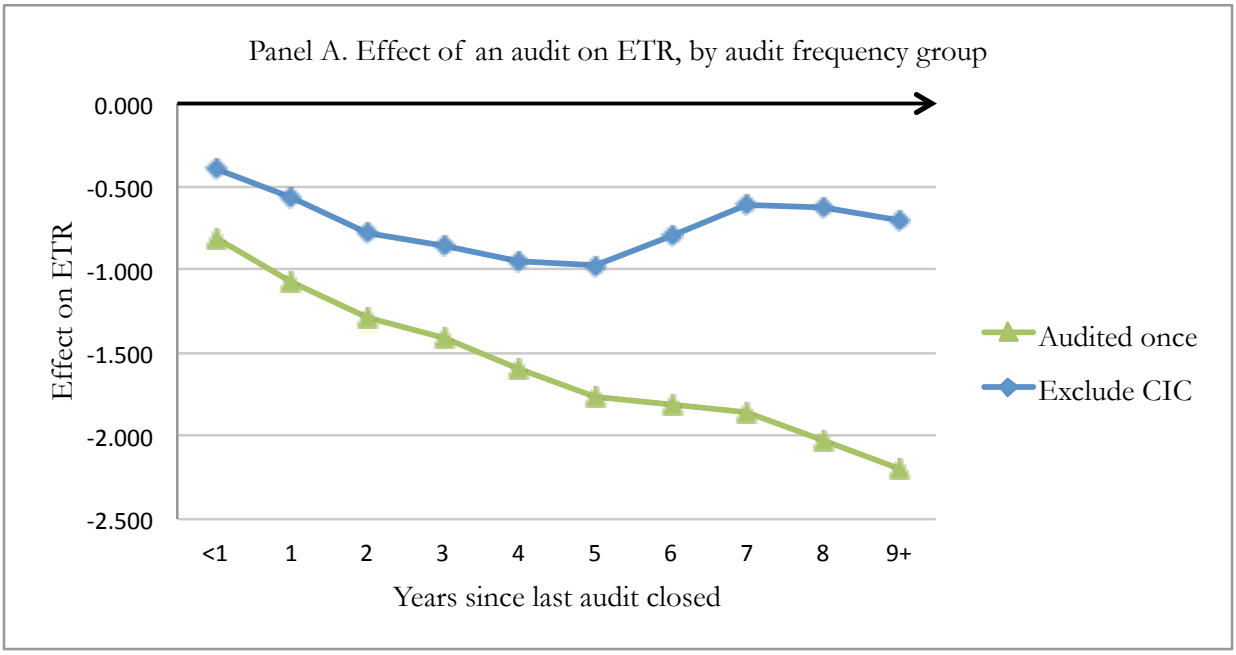
Notes: This figure shows describes the relationship between ETR and the time since the last audit was closed. This is descritive statistics and not based on regression results. Four lines represent four asset quartiles of firms. Data from 1996-2011 Audit Information Management System merged with corporate tax returns from 1996-2007. To deal with outliers, continuous variables have been 90% Winsorized.

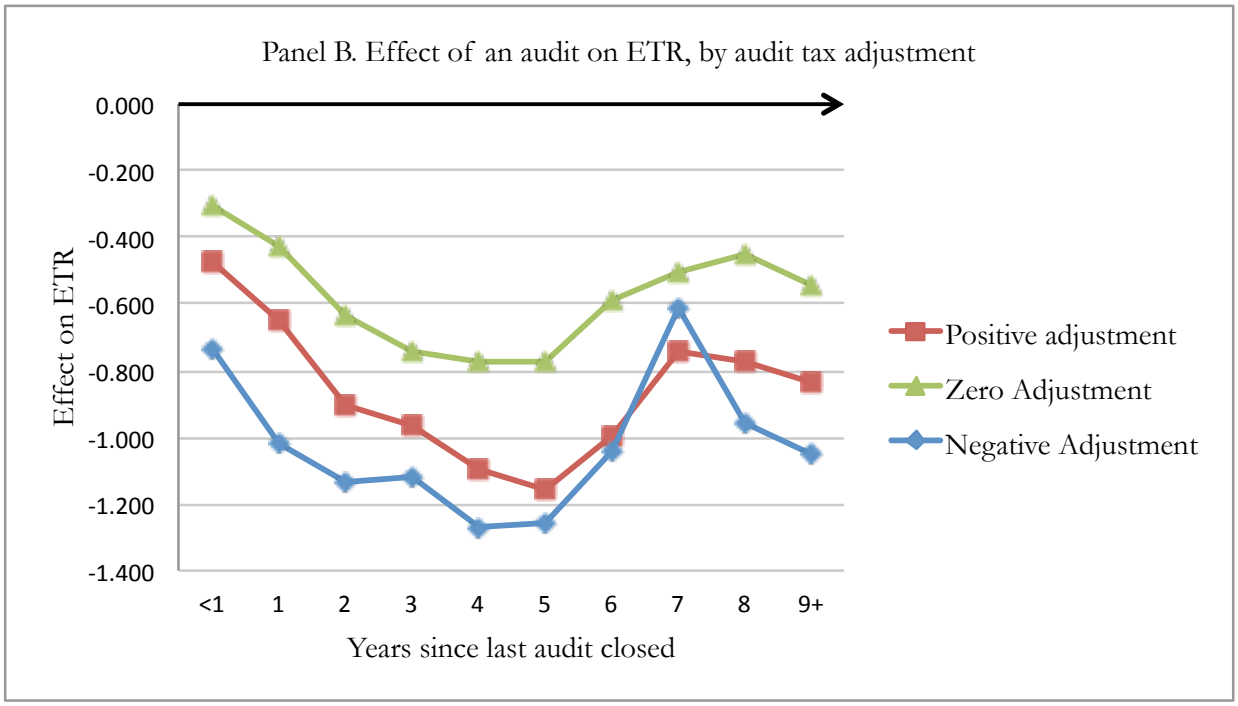
Figure 3. Effect of an audit on subsequent effective tax rate



Notes: This figure shows the effect of an audit on subsequent ETR. Panel A is based on Column 1 in Table 3. Panel B is based on columns 2-5 of the same table. Four lines in Panel B represent four asset quartiles of firms. Data from 1996-2011 Audit Information Management System merged with corporate tax returns from 1996-2007. To deal with outliers, continuous variables have been 90% Winsorized.

Figure 4. Effect of an audit on subsequent effective tax rate





Notes: This figure shows the effect of an audit on subsequent ETR. Panel A is based on column 2-3 in Table 4. Panel B is based on columns 4-6 in the same table. Three lines in Panel B represent firms with different tax adjustment found during the last audit. Data from 1996-2011 Audit Information Management System merged with corporate tax returns from 1996-2007. To deal with outliers, continuous variables have been 90% Winsorized.

Table 1. Mean of variables

		By Total Assets			
	All	Quartile 1	Quartile 2	Quartile 3	Quartile 4
ETR	5.896	5.724	5.222	5.479	7.160
Time Between Audits	4.711	4.055	4.666	5.040	5.083
Number of Audits	0.126	0.029	0.055	0.083	0.338
Audit Adjustment/Total Assets	1.413	5.649	0.001	0.001	0.001
Log of Total Assets	11.891	9.088	11.445	12.687	14.346
Inventories/Total Assets	0.099	0.048	0.085	0.115	0.150
Public firms per 1000	0.004	0.003	0.004	0.002	0.005
Foreign Controlled Corp.	0.027	0.012	0.014	0.021	0.062
Multinational	0.007	0.001	0.001	0.002	0.023
Industry					
Agriculture	0.034	0.014	0.024	0.048	0.052
Mining	0.008	0.005	0.006	0.008	0.011
Utilities	0.002	0.002	0.002	0.002	0.003
Construction	0.109	0.102	0.105	0.112	0.119
Manufacturing	0.067	0.032	0.046	0.069	0.124
Wholesale	0.075	0.044	0.054	0.077	0.126
Retail	0.129	0.071	0.131	0.167	0.147
Transport	0.033	0.035	0.036	0.033	0.029
Information	0.017	0.022	0.016	0.014	0.016
Finance	0.050	0.043	0.038	0.042	0.077
Real Estate	0.106	0.084	0.096	0.122	0.124
Professional Services	0.104	0.169	0.116	0.079	0.053
Administrative Services	0.023	0.035	0.026	0.020	0.012
Education	0.005	0.008	0.005	0.004	0.003
Health Services	0.081	0.125	0.119	0.061	0.020
Entertainment	0.016	0.023	0.016	0.013	0.011
Hopsitality	0.034	0.035	0.046	0.036	0.019
Other Services	0.054	0.072	0.065	0.052	0.025
Unclassified	0.052	0.079	0.055	0.043	0.029
Fraction with Zero Tax Liability	0.520	0.645	0.578	0.488	0.370
Fraction with Positive Net Income	0.692	0.632	0.660	0.709	0.768
Fraction in Coordinated Industry Classification	0.001	0.000	0.000	0.000	0.003
Number of Observations	16,974,244	4,243,600	4,243,539	4,243,552	4,243,553

Note: This table reports the means of all variables used in this research. Data are 1996-2007 corporate tax returns merged with Audit Information Management System data from 1996-2011. All dollar values are in constant 2009 dollars. To deal with outliers, all monetary variables have been 90% Winsorized. ETR is calculated as total taxes less credits, plus the tax value of net operating loses divided by earnings before interest, taxes, and depreciation.

Table 4: Relationship between tax aggressiveness and audits, by audit results

	Full Sample	Subsample		Separate Effects		
		Audited Once	Exclude CIC Firms	Postive Adjustment	Zero Adjustment	Negative Adjustment
	(1)	(2)	(3)	(4)	(5)	(6)
Last Audit End, 0-12 months ago	-0.405***	-0.805***	-0.395***	-0.471***	-0.307***	-0.732***
	(0.018)	(0.033)	(0.018)	(0.026)	(0.026)	(0.063)
Last Audit End, 1 yr ago	-0.567***	-1.067***	-0.557***	-0.650***	-0.431***	-1.017***
	(0.020)	(0.037)	(0.020)	(0.029)	(0.028)	(0.069)
Last Audit End, 2 yr ago	-0.788***	-1.287***	-0.782***	-0.903***	-0.637***	-1.134***
	(0.022)	(0.042)	(0.022)	(0.032)	(0.031)	(0.077)
Last Audit End, 3 yr ago	-0.864***	-1.405***	-0.856***	-0.966***	-0.740***	-1.122***
	(0.025)	(0.047)	(0.025)	(0.036)	(0.035)	(0.087)
Last Audit End, 4 yr ago	-0.951***	-1.589***	-0.946***	-1.095***	-0.773***	-1.269***
	(0.027)	(0.051)	(0.027)	(0.039)	(0.039)	(0.095)
Last Audit End, 5 yr ago	-0.980***	-1.760***	-0.973***	-1.157***	-0.775***	-1.256***
	(0.029)	(0.056)	(0.029)	(0.042)	(0.042)	(0.103)
Last Audit End, 6 yr ago	-0.807***	-1.812***	-0.801***	-0.997***	-0.592***	-1.044***
	(0.032)	(0.062)	(0.032)	(0.046)	(0.046)	(0.114)
Last Audit End, 7 yr ago	-0.616***	-1.864***	-0.609***	-0.745***	-0.501***	-0.615***
	(0.035)	(0.070)	(0.035)	(0.051)	(0.052)	(0.126)
Last Audit End, 8 yr ago	-0.634***	-2.019***	-0.628***	-0.775***	-0.453***	-0.956***
	(0.039)	(0.081)	(0.039)	(0.056)	(0.058)	(0.142)
Last Audit End, 9+ yr ago	-0.707***	-2.202***	-0.700***	-0.834***	-0.539***	-1.049***
	(0.041)	(0.099)	(0.041)	(0.058)	(0.062)	(0.159)
Audit Adjust of last audit	0.001***	0.002***	0.001***	0.001***		
(as fraction of total assets)	(0.000)	(0.001)	(0.000)	(0.000)		
On-going Audit	-0.090***	-0.458***	-0.085***	-0.098***		
	(0.019)	(0.035)	(0.019)	(0.019)		
Firm's characteristics	yes	yes	yes	yes	See Note	
Industry Dummies	yes	yes	yes	yes		
Year Dummies	yes	yes	yes	yes		
Firm*Audit Fixed Effects	yes	yes	yes	yes		
R-Squared	-0.255	-0.264	-0.255	-0.255		
N	16974244	692763	16962008	16974244		

Notes: This table reports the regression results of the firm's ETR on time since audit and firm characteristics, using the whole population of all firms. The time since the last audit is closed is measure by the series of Last Audit End dummies. Firm characteristics include Log of total assets, inventory as ratio of total assets, public status, foreign control status and multinational status. Data from 1996-2011 Audit Information Management System merged with corporate tax returns from 1996-2007. All dollar values are in constant 2009$. To deal with outliers, continuous variables have been 90% Winsorized. Audit adjustment amounts are per $100. Standard errors are in parentheses. The "Separate Effects" columns represent the results of a single regression in which the effect is allowed to differ by last adjustment type. * p<0.10, ** p<0.05, *** p<.01

Table 3: Estimation of relationship between tax aggressivness and time since audit, by firm size

	Full Sample	Subsample			
		1st Quartile	2nd Quartile	3rd Quartile	4th Quartile
	(1)	(2)	(3)	(4)	(5)
Last Audit End, 0-12 months ago	-0.405***	-0.271***	-0.335***	-0.496***	-0.354***
	(0.018)	(0.080)	(0.056)	(0.042)	(0.026)
Last Audit End, 1 yr ago	-0.567***	0.058	-0.240***	-0.443***	-0.512***
	(0.020)	(0.089)	(0.062)	(0.047)	(0.028)
Last Audit End, 2 yr ago	-0.788***	0.023	-0.307***	-0.545***	-0.670***
	(0.022)	(0.104)	(0.071)	(0.053)	(0.031)
Last Audit End, 3 yr ago	-0.864***	-0.200	-0.265***	-0.325***	-0.677***
	(0.025)	(0.127)	(0.083)	(0.059)	(0.034)
Last Audit End, 4 yr ago	-0.952***	-0.103	-0.061	-0.354***	-0.726***
	(0.027)	(0.144)	(0.095)	(0.065)	(0.037)
Last Audit End, 5 yr ago	-0.980***	-0.098	-0.200*	-0.360***	-0.739***
	(0.029)	(0.160)	(0.104)	(0.069)	(0.040)
Last Audit End, 6 yr ago	-0.808***	0.029	-0.105	-0.242***	-0.580***
	(0.032)	(0.175)	(0.113)	(0.075)	(0.044)
Last Audit End, 7 yr ago	-0.616***	0.011	-0.097	-0.185**	-0.431***
	(0.035)	(0.191)	(0.122)	(0.083)	(0.049)
Last Audit End, 8 yr ago	-0.634***	-0.124	-0.170	-0.169*	-0.483***
	(0.039)	(0.212)	(0.136)	(0.092)	(0.055)
Last Audit End, 9+ yr ago	-0.708***	0.112	0.059	-0.161*	-0.504***
	(0.041)	(0.224)	(0.144)	(0.097)	(0.059)
Last Audit End, 0-12 months ago*Audit Adjust	0.002***	0.002**	-8.204	-19.423	-131.121***
	(0.001)	(0.001)	(10.157)	(20.330)	(43.670)
On-going Audit	-0.090***	0.051	-0.242***	-0.266***	-0.132***
	(0.019)	(0.094)	(0.062)	(0.046)	(0.025)
ln(Total Assets)	-0.051***	0.026***	0.535***	0.704***	0.980***
	(0.001)	(0.003)	(0.010)	(0.011)	(0.012)
Inventory/Total Assets	-2.510***	-1.215***	-1.709***	-2.741***	-3.176***
	(0.018)	(0.043)	(0.041)	(0.038)	(0.041)
Public	0.269		-0.049	-3.341	0.231
	(1.307)		(3.708)	(3.294)	(1.708)
Foreign Controlled	0.170***	0.094	0.175***	0.186***	0.072*
	(0.023)	(0.070)	(0.061)	(0.051)	(0.037)
Multinational	0.452***	-0.410***	-0.057	0.558***	0.670***
	(0.025)	(0.146)	(0.100)	(0.064)	(0.031)
Last Audit End dummies*Audit Adjust	yes	yes	yes	yes	yes
Industry Dummies	yes	yes	yes	yes	yes
Year Dummies	yes	yes	yes	yes	yes
Firm*Audit Fixed Effects	yes	yes	yes	yes	yes
R-Squared	-0.255	-0.550	-0.450	-0.345	-0.248
N	16974244	4243600	4243539	4243552	4243553

Notes: This table reports the regression results of the firm's ETR on time since audit and firm characteristics, using the whole population of all firms. The time since the last audit is closed is measure by the series of Last Audit End dummies. Data from 1996-2011 Audit Information Management System merged with corporate tax returns from 1996-2007. All dollar values are in constant 2009$. To deal with outliers, continuous variables have been 90% Winsorized. Audit adjustment amounts are per $100. Standard errors are in parentheses. * p<0.10, ** p<0.05, *** p<.01

Table 4: Relationship between tax aggressiveness and audits, by audit results

	Full Sample	Subsample		Separate Effects		
		Audited Once	Exclude CIC Firms	Postive Adjustment	Zero Adjustment	Negative Adjustment
	(1)	(2)	(3)	(4)	(5)	(6)
Last Audit End, 0-12 months ago	-0.405***	-0.805***	-0.395***	-0.471***	-0.307***	-0.732***
	(0.018)	(0.033)	(0.018)	(0.026)	(0.026)	(0.063)
Last Audit End, 1 yr ago	-0.567***	-1.067***	-0.557***	-0.650***	-0.431***	-1.017***
	(0.020)	(0.037)	(0.020)	(0.029)	(0.028)	(0.069)
Last Audit End, 2 yr ago	-0.788***	-1.287***	-0.782***	-0.903***	-0.637***	-1.134***
	(0.022)	(0.042)	(0.022)	(0.032)	(0.031)	(0.077)
Last Audit End, 3 yr ago	-0.864***	-1.405***	-0.856***	-0.966***	-0.740***	-1.122***
	(0.025)	(0.047)	(0.025)	(0.036)	(0.035)	(0.087)
Last Audit End, 4 yr ago	-0.951***	-1.589***	-0.946***	-1.095***	-0.773***	-1.269***
	(0.027)	(0.051)	(0.027)	(0.039)	(0.039)	(0.095)
Last Audit End, 5 yr ago	-0.980***	-1.760***	-0.973***	-1.157***	-0.775***	-1.256***
	(0.029)	(0.056)	(0.029)	(0.042)	(0.042)	(0.103)
Last Audit End, 6 yr ago	-0.807***	-1.812***	-0.801***	-0.997***	-0.592***	-1.044***
	(0.032)	(0.062)	(0.032)	(0.046)	(0.046)	(0.114)
Last Audit End, 7 yr ago	-0.616***	-1.864***	-0.609***	-0.745***	-0.501***	-0.615***
	(0.035)	(0.070)	(0.035)	(0.051)	(0.052)	(0.126)
Last Audit End, 8 yr ago	-0.634***	-2.019***	-0.628***	-0.775***	-0.453***	-0.956***
	(0.039)	(0.081)	(0.039)	(0.056)	(0.058)	(0.142)
Last Audit End, 9+ yr ago	-0.707***	-2.202***	-0.700***	-0.834***	-0.539***	-1.049***
	(0.041)	(0.099)	(0.041)	(0.058)	(0.062)	(0.159)
Audit Adjust of last audit	0.001***	0.002***	0.001***	0.001***		
(as fraction of total assets)	(0.000)	(0.001)	(0.000)	(0.000)		
On-going Audit	-0.090***	-0.458***	-0.085***	-0.098***		
	(0.019)	(0.035)	(0.019)	(0.019)		
Firm's characteristics	yes	yes	yes	yes	See Note	
Industry Dummies	yes	yes	yes	yes		
Year Dummies	yes	yes	yes	yes		
Firm*Audit Fixed Effects	yes	yes	yes	yes		
R-Squared	-0.255	-0.264	-0.255	-0.255		
N	16974244	692763	16962008	16974244		

Notes: This table reports the regression results of the firm's ETR on time since audit and firm characteristics, using the whole population of all firms. The time since the last audit is closed is measure by the series of Last Audit End dummies. Firm characteristics include Log of total assets, inventory as ratio of total assets, public status, foreign control status and multinational status. Data from 1996-2011 Audit Information Management System merged with corporate tax returns from 1996-2007. All dollar values are in constant 2009$. To deal with outliers, continuous variables have been 90% Winsorized. Audit adjustment amounts are per $100. Standard errors are in parentheses. The "Separate Effects" columns represent the results of a single regression in which the effect is allowed to differ by last adjustment type. * p<0.10, ** p<0.05, *** p<.01