

Working Paper

An Empirical Examination of Corporate Tax Noncompliance

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Ross School of Business Working Paper Series
Working Paper No. 1025
June 24, 2005

This paper can be downloaded without charge from the
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<http://ssrn.com/abstract=891226>

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Revised draft

This paper was prepared for the conference on Taxing Corporate Income in the 21st Century, jointly sponsored by the Office of Tax Policy Research at the Stephen M. Ross School of Business at the University of Michigan and the Robert D. Burch Center for Tax Policy and Public Finance at the University of California, Berkeley, and held in Ann Arbor on May 5 and 6, 2005. We appreciate guidance on data questions from Richard Denesha, Donald Lee, John Miller and Dick Teed. We are grateful for comments on a presentation of preliminary results received from Charles Brown, James Hines, and other members of the University of Michigan public finance workshop, and for comments received at the conference from discussants Joe Bankman and Brian Erard, and several other participants.

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The Internal Revenue Service (IRS) provided confidential tax information to one of the authors 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 is disclosed in this treatise. Statistical aggregates were used so that a specific taxpayer cannot be identified from information supplied by the IRS. Information in this treatise that identifies specific companies was not provided by the IRS and came from public sources such as reports to shareholders.

An Empirical Examination of Corporate Tax Noncompliance

1. Introduction and Motivation

This paper examines the extent and nature of corporate tax noncompliance using previously undisclosed Internal Revenue Service (IRS) operational audits and appeals data merged with confidential tax return data. The extent of tax noncompliance is primarily measured as the level of proposed tax deficiencies under IRS audit, although we also investigate the amount of the proposed deficiencies that are upheld after taxpayer appeals. We examine the relation between corporate noncompliance and various corporate characteristics such as firm size, industry, multinationality, being publicly traded, the form of executive compensation arrangements and governance characteristics. In addition, we examine the relationship between corporate tax noncompliance and average or effective tax rates calculated based on publicly available data.

Our results are consistent with larger firms, firms in the large case audit program, and privately held firms having larger proposed audit deficiencies relative to the “true” tax liability. In general, we find that firms that are foreign controlled have a smaller deficiency than their purely domestic counterparts and that multinational firms have a greater deficiency relative to non-multinational firms. We find that both the percentage of annual compensation that is bonus and the level of equity incentives from exercisable stock options are positively related to the proposed deficiency, indicating that executive compensation may be associated with tax aggressiveness. Finally, we find no relation between a measure of governance quality and the proposed deficiency. We find little evidence that lower effective tax rates are related to deficiencies.

Understanding the extent and nature of tax noncompliance is important because it has potentially serious implications for both the equity and efficiency of the tax system. Tax noncompliance can change the distribution of the tax burden from what was intended or from what a reading of the tax law might suggest. In the case of individual taxation, the distributional pattern of personal income tax noncompliance could on average be offset by Congress adopting an appropriate level of the nominal progressivity of the personal tax rate schedule that delivers the desired after-noncompliance degree of progressivity.

The equity implications of corporate tax noncompliance are not as straightforward.¹ According to the economic theory of taxation, the incidence of corporation taxes must be traced back to which *people* ultimately bear the burden of taxation--be they the company's shareholders, managers, workers, or customers; from this perspective, it is not interesting or even meaningful to say *corporations* are worse off, or better off, as a result of a particular tax change. How the burden of the corporation income tax is distributed among these groups of individual people remains highly controversial. Note, though, that the theory of corporation income tax incidence addresses a tax policy that applies generally to all corporations. A particular act of noncompliance does not, by definition, apply to all corporations. Although a tax policy that facilitates noncompliance for *all* corporations might attract entry and thereby be shifted, for example, to customers through lower output prices, a successful act of noncompliance by one corporation will not be met by increased pressure from competitors. Thus, the windfall gains to those companies that successfully play the tax lottery by acting aggressively probably accrue to the shareholders in their role as residual claimants, shared to some extent with the corporate executives through incentivized compensation contracts.

If there are particular characteristics of corporations in certain sectors that facilitate noncompliance or abusive avoidance, such as the presence of corporate intangibles, the apparent gains that accrue to shareholders of firms in these sectors via a lower effective tax rate will be partially eroded to the extent that competitors have similar characteristics that facilitate noncompliance; in this case the noncompliance-facilitating characteristic will benefit some other constituency, notably this sector's customers. The same argument applies to the incidence of altering policy instruments related to deterrence, such as the penalties for detected noncompliance. The industrial organization of the tax shelter promoter business may also be a factor in determining how the tax savings are shared among the taxpayers and the tax shelter promoters. For example, if the promoter business is perfectly competitive with free entry, in the long run most of the gains from tax shelter "innovation" will accrue to the taxpayers; if not, some of the gain will accrue to the promoters via high fees.²

Tax noncompliance has efficiency as well as equity implications, because opportunities for tax noncompliance can distort resource allocation in a variety of ways. It can cause inter-

¹ These issues are discussed in greater detail in Slemrod (2004).

² See Gergen (2002) and Hines (2004) for related discussions.

sectoral distortions because, for example, companies that otherwise would not find it attractive might have a financial subsidiary, or set up operations in a tax haven, to facilitate or camouflage abusive avoidance or noncompliance. In general, resources flow more than otherwise to activities that facilitate tax noncompliance.

An important and fascinating question concerns the relationship between noncompliance and real corporate activity. Could cracking down on this behavior decrease corporate investment, because it eliminates what was essentially a do-it-yourself tax cut? The answer depends on the relationship between the marginal cost (if there were *no* cost, no tax would be paid) to the taxpayer of avoiding and the volume of investment it undertakes.³ If there is no relationship, then cracking down on noncompliance and thereby increasing its cost will not decrease investment. More likely, the private cost of a given (absolute, not relative) level of avoidance is lower when the scale of real operations is higher, so that there is an implicit subsidy to investment. For example, if the IRS effectively overlooks noncompliance that constitutes a constant fraction of true income, then this is equivalent to a reduction in the effective marginal tax rate on income-earning investment.⁴

This discussion of the policy relevance of corporate tax noncompliance raises a number of research issues:

- The relationship of noncompliance to size, because this sheds light on whether it is inframarginal or an implicit subsidy to investment.
- The relationship of noncompliance to sector, because this sheds light on to what extent the benefit is bid away via competition.
- The relationship of noncompliance to particular characteristics of companies, such as the presence of intangibles or multinationality, because this sheds light on whether the possibility of noncompliance affects the full cost of acquiring these characteristics.

2. Previous Literature

Most existing analysis of tax noncompliance in the United States is based on the IRS Tax Compliance Measurement Program, or TCMP, that featured intensive examinations of random

³ This reasoning is developed in Slemrod (2001).

⁴ The empirical relationship between corporate tax avoidance and the effectiveness of tax incentives to invest is examined in Slemrod, Dauchy, and Martinez (2005).

samples of tax returns. Although developed primarily to improve case-selection techniques, the data has been central to attempts to estimate an economy-wide measure of a corporate “tax gap”-the difference between taxes owed and taxes actually paid. The TCMP featured intensive examinations of a random sample of tax returns filed for tax years from the early 1960’s until 1988, and the current corporate tax gap measures are primarily based on simple extrapolations from TCMP studies done in 1977, 1980 and 1983 and on routine operational audits from the mid-1980’s.⁵ The estimates for the corporation income tax gap came from three sources. For small corporations, the IRS used TCMP data adjusted for underreporting unlikely to be detected by the TCMP. For medium-sized corporations, the gap was calculated by estimating, based on operational audits, how much tax revenue would have been generated if the IRS examined all these corporations’ tax returns. Finally, for large corporations, because the IRS routinely examines a high percentage of these companies, examination results of the type analyzed in this paper were used as the basis of estimates of the tax gap.⁶

The IRS has made corporate tax gap estimates for tax year 2001, but not later, based on a rough projection from the 15- to 20-year-old TCMP and other data, assuming that the compliance rates for each major component have not changed.⁷ Corporate underreporting in 2001 is estimated at \$29.9 billion, of which corporations with over \$10 million in assets make up \$25.0 billion.⁸ As a benchmark for comparison, estimated individual underreporting in 2001 is \$148.8 billion. Compared to estimated 2001 tax year receipts paid voluntarily and in a timely fashion of \$142.4 billion and \$930.1 billion for corporate and individual income tax collections, respectively, the estimated underreporting rate in 2001 (calculated as underreported tax divided by receipts plus underreported tax) was 17.4 percent and 13.8 percent for corporations and individuals, respectively.

The Bureau of Economic Analysis (BEA) also calculates an annual measure of corporate “misreporting,” in order to adjust the National Income and Product Accounts (NIPA) measure of

⁵ The IRS has recently issued updated estimates of components of the tax gap based on the TCMP successor project known as the National Research Program (NRP). However, the new estimates cover individual income tax and employment tax, and not the corporation income tax.

⁶ This description is based on U.S. General Accounting Office (1988).

⁷ The tax gap numbers are drawn from Internal Revenue Service (2004a). A data gathering effort known as the National Research Program has collected similar data for tax year 2001, which have been used to produce updated but preliminary estimates of the tax gap; this project has not, though, yet updated the corporate tax gap estimates.

⁸ Underreporting is only one of the three components of the total tax gap, which is estimated to be \$282.5 billion. The other two components are nonfiling and underpayment. There is no estimate for corporate nonfiling, and underpayment is a quite different issue.

corporate profits, which is based on data from corporate tax returns as filed.⁹ The BEA estimate for corporations reporting a profit is based on actual tax settlements--the change in income recommended by the IRS examination team reduced by the overall ratio of actual settlements to recommendations.¹⁰ For loss companies, the adjustment is calculated by multiplying total losses by an estimate of the percentage by which losses are reduced during audit. The BEA procedure calculates that in 2000 corporate tax misreporting as a percentage of misreporting plus total receipts less deductions (the tax-return-based measure that the BEA procedures begin from)¹¹ was 13.8 percent, compared to the 17.4 percent figure based on the IRS methodology that extrapolates from two-decades-old data assuming no change in compliance rates. The BEA series shows an increase in the misreporting rate since the mid-1990's, but puts the 2000 misreporting rate below the rates of the 1989 through 1992 period.

There has been very little analysis of the micro data underlying the TCMP-based corporate tax gap studies. One exception is Rice (1992), who studied the 1980 TCMP data of small (with assets between \$1 and \$10 million) corporations. This analysis found that compliance is positively related to being publicly traded and in a highly regulated industry, so that characteristics that assure public disclosure of information also tend to encourage better tax compliance.¹² Second, more profitable corporations are relatively less compliant. Finally, he finds that firm size and tax compliance are not positively related but instead that the reporting gap grows with the amount of a firm's value added (total revenue).

⁹ The BEA methodology is discussed in Petrick (2002, p. 7). The official BEA term is misreporting, although their description of their methodology uses the terms "misreport" and "evade" interchangeably.

¹⁰ In contrast, the IRS tax gap measures are based on the recommendations of the return audit, unadjusted for how much tax was ultimately assessed after any appeals process. This is defended in part as an approximate adjustment for the fact that IRS examiners do not detect all underreporting. Another methodological difference is that the BEA projects the average amount of recommended adjustment per return to all returns by multiplying this figure by the total number of returns, thus implicitly assuming that the examined returns are representative of all corporate returns. In contrast, the IRS tax gap methodology for mid-sized corporations (with assets between \$10 and \$100 million) projects the results of audited returns to the whole population with some acknowledgment that returns audited are not representative of the entire population, and indeed have higher unreported income than unexamined returns. The first methodological difference would make the BEA estimates of underreporting lower than the IRS tax gap measure, while the second methodological difference would make it higher. We are grateful to Alan Plumley and Eric Toder of the IRS for insights about these issues.

¹¹ Note that the NIPA table refers to misreported *income*, not understated *tax liability* as in the IRS corporate tax gap studies.

¹² Tannenwald (1993) argued that Rice's finding that publicly traded companies have higher compliance may have nothing to do with public disclosure, and instead might reflect the fact that publicly traded companies are more likely to have managers who are independent of its owners, and therefore are less fearful of commingling the owners' personal affairs with those of the corporation.

In a study of large-case audit firms (the Coordinated Industry Cases (CIC), formerly Coordinated Examination Program) in the manufacturing industry from 1982-1992, Mills (1998) studies the relation between tax deficiencies and book-tax differences. Using corporate tax return Schedule M-1 data, she finds that the excess of book income over taxable income is positively related to proposed audit adjustments. Cloyd (1995) finds that tax preparers believe that when book-tax differences are greater, audit probabilities increase and the probability of a successful defense against the IRS decreases.

A related literature investigates the level, variation, and determinants of effective tax rates (ETRs). To the extent that low effective tax rates, defined as total (or current) income tax expense divided by pre-tax earnings (from public financial statements), are a proxy for tax noncompliance or aggressive tax positions, variables that explain differences in ETRs may help explain tax deficiencies. The organization Citizens for Tax Justice (CTJ) has published several studies using effective tax rates to classify firms as tax aggressive. Their initial study was one of the factors causing additional inquiry into firms' tax practices that eventually led to the Tax Reform Act of 1986.¹³ In addition, in a study of the benefits of investments in tax planning, Mills, Erickson and Maydew (1998) find, using data from Slemrod and Blumenthal (1996), that corporate expenditures on tax planning are negatively associated with the worldwide current effective tax rate. They also find that corporate ETRs are decreasing in size and leverage (because their ETR denominator is pretax income before interest expense), but higher for firms with foreign assets.

3. Data

3.1. Details

This paper is the first to use operational data from the Voluntary Compliance Baseline Measurement (VCBLM) program compiled by the Large and Mid-Sized Business (LMSB) Research Division of the IRS to systematically examine the magnitude and nature of corporate tax noncompliance.¹⁴ The LMSB division contains CIC (Coordinated Industry Cases) and IC (Industry Cases) returns. Although LMSB handles all returns for taxpayers with assets exceeding

¹³ We note, however, that the CTJ makes several adjustments to the firms' reported ETRs and its calculations are not undisputed by the firms on which it reports.

¹⁴ Mills (1998) and Mills and Sansing (2000) use these data to investigate the relation between book-tax differences and audit adjustments. Mills and Newberry (2001) explain the determinants of book-tax differences. Gleason and Mills (2002) use proposed deficiencies to evaluate financial statement disclosures of contingent tax liabilities.

\$10 million dollars, about 1,200 taxpayers per year (in the 1990's) are placed in the CIC group due to their large size and complexity. The CIC is often referred to as the “large case audit program,” and nearly all of these cases are audited. The IC returns are audited with less regularity, especially as the size of the firm decreases, although IC returns are audited more frequently than small business (less than \$10 million of assets) and Schedule C businesses.

The VCBLM audit data include Audit Information Management System (AIMS) closed examinations from 1990 through 2003.¹⁵ These data include extensive information about the audit and any subsequent appeal, including the tax deficiency (if any) proposed by the examination team, the amount the taxpayer agrees to at examination, and the results of the appeals or in the IRS counsel process (court decisions or out-of-court settlements). Henceforth, we refer to the entire appeals and counsel process as simply “appeals.” The dataset records tax paid on the return as originally filed, ignoring amended returns and carryback claims.¹⁶

The initial dataset includes 114,257 firm-year observations, consisting of 37,995 unique employer identification numbers (EINs).¹⁷ It covers tax return periods from 1960 to 2002 (although most return years are between 1986 to 1999) for examinations closed between 1990 and 2003 (although most closures occurred between 1993 and 2001). Both public and private companies are covered.

We merge the VCBLM data with two separate sources of data. First, we match the VCBLM data with corporate tax return data recorded by the Statistics of Income (SOI) division of the IRS and extracted by the Large and Mid-Size Business-Research Division at the IRS. Merging the VCBLM audit data (114,257) with the SOI tax return data (545,021) by tax return period and employer identification number yields 45,121 merged observations. Because the SOI tax return data for non-CIC firms are not available to us until 1994, we are unable to make full use of approximately 60,000 observations for VCBLM data for tax return years before 1994.

¹⁵ Readers of this and other studies must remain alert to the use of the word “closed.” The AIMS data (which are also used in GAO (1995, p. 19)) are organized by year in which *examinations* are closed. Audit data do not enter the system until the examination team has released the return with the deficiency agreed in full, unagreed (in full or part), or released with other information (such as a change that does not generate a deficiency), or a no change audit. In the VCBLM data, however, the return is assigned a status of closed only if it has been settled through appeals, counsel and all claims that relate to the return-year. We refer to this as a closed “case.”

¹⁶ The VCBLM data do not contain information concerning the types of issues identified during the audit, although the IRS is developing an Issue Based Management Information System (IBMIS) that will track issue types for all exams.

¹⁷ Note that taxpayers can change EIN over the sample period, so we cannot say that there are only 37,995 companies.

Because the data are scarce in early years and include only relatively less complicated returns in the later years (an issue we discuss further below), we consider only the data for tax years from 1983 through 1998. Additional data requirements detailed in Appendix A reduce the sample to 29,141, which is the basis of our primary regressions.

We also merge this combined data with Standard and Poor's Compustat financial statement data, using the employer identification number recorded in Compustat as of the 2003 tape year. We are likely unable to match some observations because employer identification numbers (EINs) can change over time due to mergers and acquisitions and thus a public company in the VCBLM data may not match into Compustat because the Compustat data will have the new EIN of the merged company. Thus, some of the observations designated as private could actually be public, especially in the earlier return-years. Of the 29,141 observations in the sample, 12,100 (42 percent) of the return-years are designated as public.

3.2. Discussion

We will argue below that these operational data shed light on corporate tax noncompliance. This claim must be accompanied by several caveats. First, the deficiencies proposed by the examination team are not a perfect measure of actual noncompliance. Due to the many complexities of the tax law, exactly what is actual tax liability – and therefore what is actual tax noncompliance – is often not clear. Second, any given examination is not perfect. Some noncompliance may be missed, and there will also be mistakes in characterizing as noncompliance what is legitimate tax planning. For this reason, the data reflect not only the reporting behavior of the companies but also the enforcement behavior of the tax authority. Knowing that the resolution of the ultimate tax liability is often a long process of negotiation that may or may not involve the judicial system, the tax liability per the originally filed return, as well as the initial deficiency assessed by the examination team, may be partly a tactical “opening bid” that is neither party's best estimate of the “true” tax liability. Partly in response to this issue we also examine the amount of proposed adjustments that is sustained after the taxpayer exhausts any appeals. Whether the final settlement is a more accurate measure of noncompliance is an open question.

Another issue is that the proposed deficiency as reported in the VCBLM data does not necessarily capture the long-term effect of tax noncompliance on revenues collected. There are two situations that have opposite effects with respect to timing. First, some of the proposed tax

deficiency may involve temporary adjustments. As an example, consider a corporation that expensed an item, but the examination team decided that this item should have been amortized instead. The tax effect of a difference between the expense and the first-year allowable amortization would be recorded in the VCBLM as a deficiency; however, the repercussion in future years – that taxable income would be lower than otherwise – is not accounted for anywhere. The result is that the present value of the tax effects of this adjustment is likely to be substantially less than the first-year adjustment recorded in the VCBLM data. Unfortunately, we cannot tell what fraction of adjustments relates to temporary differences.

A related issue applies to adjustments made to the taxable income of corporations whose taxable income in the examination year is negative and that could not carry back these losses against earlier years' positive taxable income. In this case an upward adjustment of taxable income (from a negative number to a smaller – in absolute value -- number) would not increase that year's tax liability. The adjustment would, though, in general increase the present value of tax liability to the extent that it reduces the expected amount of further carryforward of losses. The VCBLM data record an estimate of the tax effect of adjustments as "revenue protection" with no discounting, but only for companies in the CIC program. Valuing the revenue protection amounts the same as other adjustments presumes that the expected present value of a dollar of reduced carryforward is exactly a dollar. In fact, that fraction will vary depending on the expected pattern of future taxable income amounts. Compared to the treatment of temporary adjustments, treating revenue protection amounts as worth a full dollar in present value terms represents the opposite extreme of methodologies. Largely because of the limited data availability, in what follows we have not included revenue protection amounts in our calculations of proposed deficiency.

There is one other important qualification to keep in mind in interpreting the results we present below. We examine the outcomes of tax filings for tax years between 1983 and 1998 that were included in an IRS extract of audit data for AIMS closed cases from 1990 to 2003. Over this time period the coverage of the data changes, most notably but not only because we only have tax return data that include non-CIC companies beginning in return-year 1994. Because it can be several years before the audit and especially the appeals process is completed, for some of the tax returns the appeals process has not been completed: the "case" has not been closed. For these returns we can measure the deficiency as per the audit, but not how much of

the disputed tax liability was upheld by the appeal process. The likelihood that a tax return case is still “open” is higher the later is the tax return year and, holding the tax return year constant, the more substantive and complex are the tax issues that are disputed for the open cases. For this reason presenting a time series of our noncompliance measures would probably not reveal anything about true trends in corporate reporting behavior (or tax enforcement vigilance), and we have refrained from reporting such a time series; we do, though, include a year dummy in the regression analysis to control for possible time trends, either real or due to sample selection. This caveat also applies to the time-aggregated figures that we do report. The returns that are closed are by no means a random sample of all returns—they are more likely to pertain to earlier tax years and to less complicated and less disputed tax returns. When this issue is especially pertinent below, we note its implications for how to interpret the results.

We make two adjustments to the data as compiled by IRS in constructing the VCBLM data. First, the dataset records \$1 in the deficiency field to represent the presence of a change (such as shrinking a tax loss) that did not actually increase tax due. We re-code the deficiency to zero, removing this tag. Second, where taxpayer agreed amounts (in exam, appeals or counsel) exceeded the deficiency, we constrained the settlement to the deficiency, essentially capping the settlement percentage on a firm-year basis at 100 percent.

4. Patterns of Proposed Deficiency, Agreements, and Appeal Results

4.1. Aggregate

Table 1 presents some summary statistics based on the VCBLM data. We present statistics for the full sample (29,141 observations) and for a sub-sample of observations for which the tax after proposed deficiency (i.e., reported tax plus the proposed deficiency, or proposed tax) is positive (25,266 observations). In the full sample, 55 percent of the observations have a proposed deficiency and in aggregate the deficiency is 0.17 percent of aggregate assets and 0.22 percent of total sales.¹⁸ For the sub-sample of observations for which the tax after proposed deficiency is positive, the aggregate proposed deficiency is 13.6 percent of the tax reported plus deficiency (henceforth the “proposed deficiency rate”). Thus, the aggregate

¹⁸ In calculating this and all subsequent aggregate ratios, we report the ratio of the sum of the numerators to the sum of the denominators, and not the mean of the ratios. The deficiency-to-assets ratio is higher than found by Mills (1998) or Mills and Sansing (2000). When we constrain our sample to approximate the same years and other data constraints (e.g. manufacturing, book-tax differences), we obtain qualitatively similar results.

deficiency rate we measure is similar, but slightly below the lower of the 13.8 and 17.4 percent figures discussed earlier, that have been calculated by the BEA and IRS, respectively. Of the total proposed deficiency, just under one-third, or 32.0 percent, was agreed to by the taxpayer at the examination.

We separately analyze the 22,552 firm-years for which the return-year has closed in our data, meaning that all appeals and court disputes are settled, and the 2,714 firm-years for which the return was still open. We find that the amount of the proposed deficiency agreed to by the taxpayer at the time of the exam varies sharply between open and closed cases—48.7 percent for the closed cases, but only 19.3 percent for the open cases. This difference is not surprising, and reflects the fact that it is precisely when the discrepancy between the proposed deficiency and the tax liability agreed to by the taxpayer is large that the case is likely to be subject to a protracted appeals process. For the closed cases only, we can measure the ultimate resolution of the unagreed deficiencies. The data indicate that another 11.3 percent of the proposed deficiency, or 22.0 percent of the unagreed amount ($.113/(1-.487)$), was sustained. . All in all, 60.0 percent of the proposed deficiency was either agreed to by the taxpayer or upheld at a later stage. This 60 percent sustention rate is almost certainly an upper bound estimate of the rate for all companies, because it excludes the tax return years that had not been closed when the data set was compiled. Because taxpayers are more likely to agree to smaller and less controversial proposed deficiencies and will fight longer and harder against larger and more controversial proposed deficiencies, the overall average including the still-open returns will likely be lower than 60 percent.

Consistent with taxpayers fighting larger deficiencies more, Table 1 shows that on average the open returns in our sample have a proposed deficiency/proposed tax of 20.7 percent compared to the closed returns which have an analogous rate of only 9.4 percent. In untabulated computations of the aggregate proposed deficiency for our sample firms, a disproportionate amount of the deficiency is related to open returns. Although the open returns represent only 10.7 percent of the number of return-years in the sample, 57 percent of the proposed deficiency is related to the open returns.

4.2. Firm Size

Table 2 presents the audit data by size of the firm. We divide the sample into seven groups by the amount of year-end assets reported on the tax return. The largest companies (those with assets greater than \$5 billion) have the greatest percentage of firms with a deficiency (74 percent) and for those with a positive proposed tax (reported tax plus deficiency), the highest proposed deficiency rate (14.6 percent, versus a range of 9.9 percent to 13.4 percent for the other six groups). The same pattern appears when the proposed deficiency is scaled by sales. (Although the reverse pattern appears when the scaling factor is assets, this pattern is probably spurious and caused by the fact that the returns in this table are categorized by the denominator of the deficiency rate (i.e., assets); to the extent that asset size mismeasures the ideal scaling factor, this will induce a negative association between assets and the deficiency-assets ratio.)

Panel B shows that the largest firms were also much less likely to have had their returns closed over our observation period: 36.2 percent (820/2,266) were open, compared to only 8.2 percent (1,894/23,000) for all other companies. As already noted, because a return is not closed until it is through both audit and appeals, it is not surprising that the returns of large and complex taxpayers remain open longer.

Although the largest companies were much more likely to have open returns, the proposed deficiency *rate* in those open cases was much less than for smaller companies, just 18.8 percent compared to rates ranging from 25.1 percent to 46.5 percent for the other asset size classes. This pattern is consistent with the existence of a fixed cost of fighting a proposed deficiency, so that small firms will contest only proposed deficiencies that are relatively large relative to the size of their operations. Among closed returns, the proposed deficiency rate was slightly higher than average for the largest companies, and the fraction of these proposed deficiencies agreed to at exam shows no linear size-related pattern.

In interpreting these data, one must keep in mind two potentially confounding factors—that the probability of audit and the intensity of audit, conditional on audit, may be related to the size of the company. This issue applies more generally to any characteristic that is correlated with the probability or conditional intensity of an audit. If the IRS is good at choosing for audit those companies with a higher probability of being noncompliant, then our data on audited firms will overstate the noncompliance rate among all firms, audited or not. This issue does not, however, apply to the approximately 1,200 companies in the CIC program, who are mostly

audited at some level of intensity every year. For this group, the sample averages are much closer to the population characteristics.

For the (generally smaller) non-CIC companies, to the extent that the audit selection rules are effective at identifying those companies with higher tax deficiencies, the sample population of audited companies should have a higher proposed deficiency rate than a random sample of companies would have had, if subject to audit. Thus we might draw an incorrect inference as to the relationship between size and noncompliance.

To investigate this issue further, in Panels C and D of Table 2 we repeat the cross-tabs for only the CIC companies. The data reveal that, similar to the full sample, the largest companies have the greatest percentage of firms with a deficiency (75 percent versus a range of 51 to 68 percent for smaller size groupings), are much more likely to have had their returns remain open over our sample period (36.4 percent (777/2,136)) as compared to 13.1 percent (879/6,726) for all other companies). As before, the largest CIC taxpayers have a lower deficiency rate in the open years than the smaller companies (18.9 percent vs. a range of 25.6 to 77.0 percent). However, in contrast to the full sample results described above, the largest firms within the CIC group do not have the highest deficiency rate for all returns (closed and open). For firms with a positive proposed tax, the largest firms' deficiency rate is 14.8 percent while the smaller firms' rate ranges from 13.4 to (a notable outlier value of) 34.0 percent. Thus, the result that the largest firms in the full sample have the highest deficiency rate is apparently largely driven by the difference in the proposed deficiency rate between (large) CIC firms and (generally smaller) non-CIC firms.

The second confounding factor is the possibility that the intensity of an examination—and therefore the likelihood of uncovering a deficiency--depends on the reported tax situation of the company. It is not clear how, if at all, this biases the interpretation of the size-deficiency relationship. If there are economies of scale in examining big companies, then audit intensity of an audit might be larger for larger companies. On the other hand, like the independent auditors who certify financial statements, the Internal Revenue Service can only sample the transactions of a complex multinational taxpayer, so that the possibility of undetected noncompliance may increase.

Panels E and F complete the picture by detailing results for non-CIC firms. Again, the largest asset grouping has the highest percentage of firms with positive deficiency, the highest

deficiency rate relative to other asset classes (10 percent versus a range of 6.2 percent to 9.8 percent), a much higher proportion of open returns (33 percent vs. 6 percent for all other asset groups), and the lowest deficiency rate when considering only open returns (13 percent vs. a range of 20.5 percent to 45.7 percent for the other groups).

4.3. Other Firm Characteristics

Table 3 presents audit data across partitions of firm characteristics other than size. The first comparison is private versus public companies. Considering only firms with a positive proposed tax (reported tax plus proposed deficiency), the data reveal that private companies have higher proposed deficiency rates than public companies (17.1 percent versus 12.5 percent), even though private companies have a lower proportion of firms with tax deficiencies (62 percent versus 65 percent).¹⁹ The first result is consistent with Cloyd (1995) and Cloyd et al.'s (1996) survey results that privately-held firms are more tax aggressive because they are less constrained by financial reporting incentives (i.e., they have fewer capital market pressures and thus can sacrifice reporting high financial accounting earnings and take more aggressive tax positions.)

Panel B shows that public companies are much more likely to have their returns still open, with the percentage of open returns in our sample being 15.1 (1,636/10,856) percent versus 7.5 percent (1,078/14,410) for private companies. This is probably because the public companies are generally larger and have a greater ability to contest the IRS proposals.

The next partition of Table 3 compares foreign-controlled companies (FCCs) and domestic companies. We classify a firm as foreign controlled if the firm declares that its ownership is 25 percent or more foreign.²⁰ The data reveal that FCCs have a much greater aggregate deficiency ratio than domestic companies, even though a lower fraction of FCCs have a deficiency. For the sub-sample of observations that includes only firms with a positive proposed tax (the 25,266 observations), the FCCs have more than double the proposed deficiency rate as domestic companies, 25.4 percent versus 12.5 percent.²¹ These results are consistent with Grubert et al. (1993) and Grubert (1998), which find that FCCs on average have lower rates of return (and thus lower tax liabilities) than U.S.-owned corporations. Although

¹⁹ The private firms also have a larger aggregate deficiency over assets measure (0.19% versus 0.15 % for public firms) and a slightly larger aggregate deficiency over sales measure (0.22% versus 0.21 percent).

²⁰ This comes from the answer to question 7 on Schedule K of Form 1120.

²¹ The FCCs also have higher proposed deficiencies than domestic companies as a fraction of either sales or assets.

much of the lower relative rate of return can be explained by cross-sectional variables such as age, investment income, reliance on outside suppliers, dividends, and depreciation and interest expense differentials, Grubert (1998) suggests that between a quarter and a half of the difference cannot be explained by economic factors and may be due to more aggressive tax reporting (e.g., transfer pricing and income shifting). Mills and Newberry (2004) find that taxable income reported by FCCs is related to the incentives to shift in or out of the U.S. in response to the difference between the U.S. and the worldwide effective tax rate, consistent with FCCs responding to income shifting opportunities.

The separate analysis of open and closed returns in Panel B reveals that much of the difference between the FCCs and domestic firms can be attributed to the large difference in the proposed deficiency rate for the returns that are still open. Among this group of companies, the proposed deficiency rate is 43.8 percent for FCCs compared to the deficiency rate for open domestic firms of 18.3 percent.

The next partition of data compares multinational firms to domestic firms. We classify a company as multinational if it claimed a foreign tax credit or filed a Form 5471 (indicating that it has a foreign subsidiary). Panel A of Table 3 reveals that for the sub-sample of firms with a positive proposed tax, a slightly higher percentage of multinational firms have a deficiency (64 percent) compared to domestic firms (62 percent). For this same sample, the aggregate proposed deficiency rate is only slightly higher for multinational firms (13.7 percent) versus domestic firms (13.5 percent) and multinational firms appear to settle at higher agreement percentages (33.3 percent) than domestic firms (28.6 percent).

We next partition the data between CIC firms and non-CIC firms. Consistent with the discussion above, the data reveal that for the sub-sample of firms with a positive tax, CIC firms have a higher proportion of firms with a deficiency (72 percent) relative to the non-CIC firms (58 percent), a higher deficiency rate (14.7 percent versus 8.1 percent), are less likely to agree to the deficiency upon exam (CIC firms agree on average with 30.6 percent of proposed deficiency whereas the non-CIC firms agree to 45.3 percent). Finally, a much higher percentage of CIC returns are still open during our sample period (18.7 percent (1,656/8,862)) compared to the non-CIC firms (6.5 percent (1,058/16,404)).²²

²² Our finding that for non-CIC companies 45.3 percent of the proposed deficiency is agreed to by the taxpayer at the exam stands in apparent contrast to the findings of GAO (1995) that estimates in Table II.9 that for non-CIC

Table 3 also shows how the aggregate results differ by industry sector, for 8 single-digit North American Industry Classification System (NAICS) codes. While strong patterns do not emerge from this analysis, it appears that in aggregate, firms in the manufacturing industry, the trade, transportation and warehousing industry, and the education, healthcare, and social assistance industry have a higher proposed deficiency rate and a lower proportion of deficiency agreed to upon exam relative to the other groups. As a result we include industry effects in the regression analysis below.

5. The Determinants of Corporate Tax Noncompliance: Regression Analyses

5.1 Baseline Model and Variable Definitions

The cross-tabs presented in Tables 2 and 3, while suggestive, cannot provide a sense of the relationship between the proposed deficiency measures and any given company characteristic, holding other characteristics constant. For example, on average public companies are bigger than private companies, so the public-private and size breakdowns may reveal a mixture of the association with size and being public. To sort out the partial relationships, we turn to a multivariate regression analysis.

In so doing, we must address the potential problem that non-random sample selection may bias the regression results. One approach to this problem is to first estimate on the universe of companies the probability that a given company will be audited and then, from the probit equation, construct an inverse Mills' ratio that is added to the equation that estimates noncompliance conditional on being audited. However, this method is unlikely to be convincing because it is difficult to identify independent variables that affect the probability of audit but do not affect the amount of noncompliance.

companies whose returns were examined between 1988 and 1994, 25 percent of the proposed deficiency is agreed to at exam. (The GAO report also includes an estimated "assessment rate," which apparently tracks the resolution of the appeals of unagreed amounts; however, because it does so only until 1994, it excludes many unresolved cases and thus suffers from a potentially severe sample selection bias, as we understand the compilation of the AIMS case data.) One reason why our estimates differ from those of the GAO is that the GAO study uses data on returns for which the audits (not the cases) were completed between 1988 and 1994, while we examine data for non-CIC firms that begin with the 1994 tax year; because the two samples do not overlap, our estimates will differ from GAO's to the extent that IRS or taxpayer behavior changed over this period. Indeed, the same GAO report indicates that the fraction of returns for which the taxpayer agreed to the proposed deficiency increased continually from 39 percent in 1988 to 51 percent in 1994; the percentage of the dollar amount agreed to by the taxpayer upon exam changed discontinuously over the period, but was highest in 1994, when it reached 34 percent compared to the period average of 25 percent.

Rather than pursue this approach, we instead perform all the regression analyses both on the whole sample and then separately only on the CIC sample. For reasons already discussed, a large percentage of the CIC companies are audited every year, so the sample selection issue is not likely to be quantitatively important for the CIC sub-sample.²³ We estimate Tobit specifications, beginning with the same set of explanatory variables discussed in the previous section and some other variables that are discussed below.

Our dependent variable is the proposed deficiency upon IRS audit scaled by one of two alternative measures of the size of the corporation, assets and sales.²⁴ We estimate the following model:

$$\text{Deficiency/Scale} = \alpha_0 + a_1 \text{LogAssets (or LogSales)} + \alpha_2 \text{CIC} + \alpha_3 \text{Public} + \alpha_4 \text{FCC} + \alpha_5 \text{Multinational} + \alpha_6 - \alpha_{12} \text{Sector} + \varepsilon$$

where

- Deficiency* = the proposed tax deficiency, as recorded in the VCBLM database of the Internal Revenue Service,
- Scale* = total year-end assets or sales per the tax return,
- LogAssets (or LogSales)* = the natural logarithm of millions of dollars of total year-end assets or sales per the tax return,
- CIC* = one if the taxpayer is a member of the Coordinated Industry Cases or its predecessor, the Coordinated Examination Program; zero otherwise,
- Public* = one if the taxpayer's EIN matches to a company in the Compustat database for whom total assets is present; zero otherwise,
- FCC* = one if the IRS designates the company as a U.S. foreign controlled corporation based on answering yes to question 7 in Schedule K of

²³ Although, note that Mills (1998) uses a Heckman two-stage test to control for sample selection bias even within the Coordinated Industry Cases, finding that size and profitability are the best predictors of full audits (versus surveyed returns). That is, tax returns with losses and smaller taxpayers are less frequently audited, even within the "large-case" audit population.

²⁴ We do not use the proposed deficiency rate (proposed deficiency/(tax reported + proposed deficiency)) as the dependent variable for two reasons. First, this ratio can be undefined when the reported tax and proposed deficiency are both zero and it is not clear that we want to exclude these firms (i.e. we may overstate the rate of noncompliance if we leave them out of the analysis). Second, when the reported tax is zero but there is a proposed deficiency of any magnitude the proposed deficiency rate becomes 100%, not distinguishing between firms that underreport \$10 of tax and those that underreport \$1 million of tax.

| | |
|----------------------|---|
| | Form 1120, indicating that 25 percent or more of ownership is by a foreign person; zero otherwise, |
| <i>Multinational</i> | = one if the taxpayer claims a foreign tax credit or files a Form 5471, which must be filed by U.S. individuals, partnerships, corporations, and trusts with five percent or more stock ownership in a foreign corporation; zero otherwise, |
| <i>Sector</i> | = one if the company is the relevant one-digit North American Industry Classification System (NAICS) codes from two through eight, omitting zero and nine; zero otherwise. |
| <i>Year</i> | = one if the return is in a particular return-year; zero otherwise. |

Prior to estimating the regression model above, we winsorize the continuous variables at the 1 percent and 99 percent values of their distributions by setting values outside those ranges to the values at those percentiles. Table 4 provides summary statistics for the winsorized regression variables and other variables of interest.

In order to minimize the spurious negative bias to the estimated effect of scale that results from errors in measuring the true scale variable, we use sales as the size measure when the dependent variable is scaled by assets and assets as the size measure when the dependent variable is scaled by sales.

5.2 Baseline Regression Results

Table 5 presents results for the baseline Tobit regressions, with and without the indicator variable for membership in the CIC, and for the CIC sub-sample only. The effect of size on the level of deficiency is positive and significant in the specifications that do not include the CIC variable separately, consistent with the CIC also proxying for size. Thus, on average, larger firms are more noncompliant than smaller firms, consistent with the reasonable explanation that larger, more complex firms have more opportunities for tax noncompliance (that is detected by the IRS) and consistent with the tendency noted in Table 2. In addition, we note that size remains positive and significant (at least at $p=0.10$ for a two-tailed test) even when the model is estimated over only CIC firms, which suggests that size is more likely a determinant of noncompliance rather than just a determinant of being audited. The variable indicating that the firm is part of the

CIC program is positive and significant after controlling for size. Thus, firms in the CIC have a greater deficiency on average than firms of the same size not in the CIC. This may be due to greater noncompliance or a higher intensity of audit for these firms.

As in the cross-tabulations of Table 3, public firms have smaller scaled deficiencies in the full sample. This result is consistent with Cloyd (1995), Cloyd et al. (1996) and Mills and Newberry's (2001) findings that private firms are less constrained by financial reporting incentives in their choices to be tax-aggressive. However, within the CIC sub-sample, controlling for other factors, public ownership does not explain deficiency when deficiency/sales is the dependent variable.

Within the full sample, after controlling for other factors, being a foreign-controlled corporation is negatively related to the tax deficiency. Note this is the opposite of the finding reported in Table 3 where it appears that in aggregate the FCCs have a greater deficiency rate (in terms of assets, sales, and proposed deficiency rate) than domestic firms. This suggests that the FCCs are notably different than domestic companies with respect to other characteristics that are associated with our measure of noncompliance. Indeed, in untabulated results, we find that FCCs are on average smaller, have a greater percentage of zero deficiencies, and have a greater percentage of zero tax paid on the return. Again, within the CIC sub-sample, controlling for other factors, FCC does not explain deficiency when deficiency/sales is the dependent variable.

The results for the multinationality variable are generally consistent with multinational firms having greater deficiencies. In the full sample, being a multinational firm is significantly positively associated with the level of deficiency. In the CIC-only sub-sample, the estimated coefficient on multinationality is also positive and significant, indicating that within the firms of the CIC program the multinational firms have a greater deficiency rate.

Although not presented in the interest of brevity, we note that in some specifications (specifically when deficiency/assets is the dependent variable) the industry effects are significant and that the year effect coefficients are generally significant as well. In all cases the model Chi-squared statistic is higher if the industry and year effects are included.²⁵

²⁵ Because Mills (1998) finds that loss firms are audited less frequently than firms with positive taxable income, we also estimate a model that includes the variable reported tax/scale to control for the revenue potential of the firm. We expect that the IRS is more likely to audit high tax firms more than low tax firms. In untabulated results we find that, consistent with our conjecture, this variable is highly positively significant in all specifications. The other estimated coefficients are not greatly affected, although size becomes more significantly positive and multinationality becomes significantly negative in the model that does not include a CIC dummy variable.

5.3 Additional Variable Definitions: Intangibles, Executive Compensation, and Governance

In this section, we add measures of intangible intensity, executive compensation and equity incentives, and governance quality as explanatory variables into the regression specification above to expand our understanding of the determinants of tax noncompliance as measured by proposed deficiency rates. These variables are only available for publicly traded firms with data available on Compustat and/or Execucomp. Those variables are defined as follows:

Advertising/Scale = advertising expense (Compustat data item #45) / Assets (#6) or Sales (#12),

R&D Expense/Scale = research and development expense (Compustat data item #46) scaled by Assets (#6) or Sales (#12). If R&D expense is missing we reset the value to zero,

Market-to-Book = market value of the firm at the end of the year (Price per share, Compustat data item #199 * Common shares outstanding, #25), divided by book value of equity (#60),

Bonus Percentage = proportion compensation that is bonus. Calculated as the sum over the five most highly paid executives of the annual bonus in the year prior to the year for which the tax deficiency is assessed scaled by the sum of the bonus, salary, and the Black-Scholes value of the stock option grants for the five most highly paid executives in the year prior to the year for which the tax deficiency is assessed,

Exercisable Option

Sensitivity = the sensitivity of the holdings of exercisable (vested) executive stock options to a 1 percent change in stock price. This is the sum for the five most highly paid executives of the firm and holdings are measured in the year prior to the year for which the deficiency is assessed (The computation of sensitivity is explained in more detail below.),

Vested Holdings

Sensitivity = the sensitivity of the holdings of exercisable executive stock options and unrestricted stock to a 1 percent change in stock price. This is the sum for the five most highly paid executives of the firm and holdings are measured in the year prior to the year for which the deficiency is assessed (The computation of sensitivity is explained in more detail below.),

Total Equity

Sensitivity = the sensitivity of the holdings of all stock options, all unrestricted stock, and all restricted stock to a 1 percent change in stock price. This is the sum over the five most highly paid executives of the firm and holdings are measured in the year prior to the year for which the deficiency is assessed (The computation of sensitivity is explained in more detail below.),

Governance Index

= measure of governance developed by Gompers et al (2003). It is an index of shareholder rights that ranges from 1 to 24, a low value indicates high quality governance. Set to zero in regression when missing.

Governance Index

Missing = indicator set equal to one if Governance Index is missing, and zero otherwise.

The calculation of the sensitivity of executive equity holdings to a change in stock price warrants further explanation. The expected wealth change from stock is estimated by multiplying the market value of the stock holdings at year-end (the year prior to the alleged accounting fraud for the alleged fraud firms) by one percent. For stock options, we use the method of calculating their sensitivity to stock price as described by Core and Guay (2002). Although detail such as the number of options, exercise price, and time to maturity is available from Execucomp or the current year proxy statement for current year grants, much of these data are unavailable in the current year proxy statement for prior grants. The one-year approximation method described in Core and Guay (1999, 2002) requires information only from the most recent proxy statement to

estimate the sensitivity of the option portfolio to a change in stock price. The sensitivity to stock price for each option held is estimated as

$$[\partial(\text{optionvalue})/\partial(\text{price})]*[\text{price}*0.01] = e^{-dT} N(Z) * [\text{price}*0.01]$$

where d is the natural logarithm of expected dividend yield over the life of the option, T is the time to maturity of the option in years, N is the cumulative normal probability function and Z is $[\ln(S/X) + T(r - d + \sigma^2/2)]/\sigma T^{1/2}$, where S is the price of the underlying stock, X is the exercise price of the option, r is the natural logarithm of the risk-free interest rate, and σ is the expected stock-return volatility over the life of the option.

5.4 Results for Additional Variables

In Table 6, we introduce proxies for the tax planning opportunities afforded by firms that develop intangible assets, proxies for executive compensation contracts and equity holding incentives, and proxies for the governance quality at the firm. We present results only for the specifications in which the deficiency/sales ratio is the dependent variable. (In untabulated regressions using deficiency/assets as the dependent variable, the results are qualitatively similar except where noted.) We first re-estimate the baseline regression over only those observations having the additional variables to confirm that the results from Table 5 hold for this sub-sample. This analysis is presented in the first column of Table 6. The results are qualitatively similar to Table 5. We also find that the results for our baseline variables are consistent with those reported in Table 5 when the new variables are included, indicating they are not omitted correlated variables for our main variables of interest.

5.4.a. Intangible Assets

For intangible asset proxies we use three variables; 1) the ratio of research and development expense (R&D expense) to the scale measure (assets or sales) 2) the ratio of advertising expense to the scale measure and 3) the market-to-book ratio. We predict that firms with more intangible assets will have greater opportunities for tax planning, consistent with Grubert and Slemrod's (1998) finding in the context of Puerto Rico subsidiaries of U.S. parents that the presence of intangible assets facilitates transfer pricing.

The coefficients on R&D expense and the market-to-book ratio are significantly positive, indicating that the greater the intangible assets of the firm, the greater the tax deficiency, consistent with these firms having greater tax planning opportunities. However, the results for advertising expense are marginally negatively significant, which is inconsistent with this explanation. One explanation is that firms with more advertising expense are more likely to be consumer products firms. As a result, these firms may be more compliant in efforts to avoid negative publicity from being a “bad” corporate citizen.

5.4.b. Executive Compensation

Executive compensation contracts may be set to induce or prevent tax avoidance activities on the part of firm management. In discussing the incentives that affected Enron, the Joint Committee on Taxation noted that Enron’s tax department was viewed as a profit center by the firm. This observation is consistent with increasing pressure of firms to report a relatively low effective tax rate during the 1990s.²⁶ Phillips (1999) provides evidence consistent with firms whose managers’ bonus payments are based on after-tax income reporting lower effective tax rates. In other work, Desai and Dharmapala (2005) investigate the relationship between incentive compensation and proxies for tax sheltering. To examine the association between the form of executive compensation and tax noncompliance, we include measures of executive compensation in our regressions.

For compensation we include four different proxies each in a separate regression; 1) bonus percentage, 2) exercisable option sensitivity, 3) vested holding sensitivity, and 4) total equity sensitivity, all defined above.²⁷ Table 6 shows that only total vested holdings sensitivity is insignificant ($p=0.101$), with the other three variables being positively related to the amount of tax deficiency, providing preliminary evidence that executive compensation is positively related to tax noncompliance.²⁸

²⁶ For example, the Council for International Tax Education, Inc. previously publicized seminars designed to help corporations plan for lowering effective tax rates. However, as of 2005, the programs on their web site (<http://www.citeusa.org/programs/index.html>) are more concerned with tax, financial reporting and Sarbanes-Oxley compliance. Their SFAS109 course still includes a bullet "Using Export Sales to Reduce the Effective Tax Rate."

²⁷ See Erickson, Hanlon and Maydew (2005) for a full discussion of how these variables relate to management incentives and may affect accounting aggressiveness.

²⁸ We recognize that the choice of compensation contract is endogenous in this regression. We include some likely controls for why this type of compensation is given such as book-to-market and research and development which proxy for investment opportunity set. We leave a more detailed analysis of compensation more formally dealing with the endogeneity issue for future research.

5.4.c. Governance Quality

Finally, we investigate whether the governance characteristics of the firm affect the level of noncompliance. To do so we include the governance index compiled by Gompers et al. (2003). This index is a score ranging from 1 to 24 that combines data from the Investor Responsibility Research Center (IRRC) on firms' takeover defenses with information on antitakeover provisions in state statutes to calculate an index that reflects the extent to which the firm is protected from hostile takeovers. A lower value of the index indicates a better quality of governance (see Gompers et al. (2003) for more details). If better-governed firms take fewer aggressive positions, we expect that better-governed firms will have lower tax deficiencies.

Table 6 shows that governance is not associated with the tax deficiency, indicating that governance quality of the firm does not alter the level of tax aggressiveness. However, because our sample period is prior to the passage of the Sarbanes-Oxley Act, we cannot test whether this relation became more important after its passage.²⁹

6. Correlations among Measures of Tax Aggressiveness

The data examined in this paper are one indicator of a company's tax aggressiveness. This indicator has the advantage of being based on extensive audits of a company's tax filings (and any subsequent appeals of the examination results) but, for reasons we have already discussed, it is not perfect. Because these data are confidential, past researchers have for the most part relied on other indicators of tax aggressiveness that can be constructed from publicly available data. The most common of such indicators include the firm's effective tax rate (ETR), measured in a variety of ways and the firm's book-tax differences, perhaps adjusted for known differences in these concepts that are not indicative of tax aggressiveness (see Plesko 2003 and

²⁹ Desai and Dharmapala (2005) develop a model, and provide supporting empirical evidence based on book-tax differences from financial statements as a measure of tax aggressiveness, in which increasing the extent of incentive compensation can decrease the level of tax sheltering for firms with relatively poor governance. To investigate the interaction between governance and incentive compensation, we estimate a model including an indicator variable for well governed firms (those with a governance score of 7 or below, consistent with DD), by itself and interacted with the compensation variables in Table 6. We find some evidence consistent with their premise in that well governed firms have a more positive association between vested option sensitivity and our measure of deficiency meaning well governed firms engage in more avoidance when their compensation incentives are high relative to poorly governed firms. However, overall the results are mixed because in the other two equity incentive specifications the interaction term is insignificant and, in the bonus regression (not tested by DD), the interaction term is negative, meaning managers in well-governed firms avoid fewer taxes when the bonus is higher.

Desai and Dharmapala 2005 for examples). In this section we examine whether effective tax rates are associated with the audit-based measure studied in this paper. In other words, does the tax aggressiveness that results in high audit deficiencies result in a low effective tax rate for the firm?

Effective tax rate measures based on financial statement information may not provide a good proxy for tax noncompliance. Depending on how it is defined, the numerator, total taxes, may reveal little about actual tax liability because it includes the effect of deferred taxes (i.e., future deductible and future taxable amounts). Moreover, even if one defines the numerator to include only current taxes payable, this will not in many cases approximate the actual tax liability of the firm.³⁰ One important reason for this difference for our purposes is that when firms take an aggressive tax reporting position that they expect is probable (literally “more likely than not”) of being denied, they are required for financial accounting purposes to accrue the estimated loss in the current period even though the tax is not being paid currently.³¹ Thus, the aggressive position would not be fully reflected as a decrease in the firm’s effective tax rate. As a result, it is an empirical question as to the association of tax deficiency and ETR.

Further, one must be cautious about how to interpret any observed correlation between ETR and proposed deficiency. For example, it is possible that the level of reported ETR affects the intensity of the audit examination and therefore the amount of deficiency uncovered because a low ETR may be a signal to the IRS that the company has taken aggressive positions (even though the company is aware that a low ETR provides this signal, and the IRS is aware that the company is aware, etc.).³² Conversely, as discussed above, it may be that the IRS is more likely to intensively examine companies that already have a substantial positive tax liability. In the extreme, uncovering an income understatement by a company making losses and that has exhausted its loss carry back capacity is unlikely to generate much revenue in a present value

³⁰ See Hanlon (2003) for a detailed explanation of why a firm’s financial statements cannot be used to infer tax liabilities or taxable income in many cases. One material example is the effect of stock options.

³¹ See Financial Accounting Standard No. 5, *Accounting for Contingencies*. In addition, see the Financial Accounting Standards Board’s recent proposal (available at www.FASB.org) to issue an Interpretation of Financial Accounting Standard No. 109, *Accounting for Income Taxes*, which would require a higher probability of success for a tax position for the firm not to accrue the tax related to the aggressive position. Gleason and Mills (2002) discuss how little taxpayers disclose to shareholders about large tax deficiencies, even when they appear to be material.

³² Mills and Sansing (2000) adopt such a game-theoretic approach to analyzing the effect of book-tax differences on audit outcomes.

sense. More generally, the more profitable a firm is, the more likely is it to be true that uncovering a taxable income understatement will lead to a recovery of unpaid taxes.

We calculate a firm's effective tax rate using U.S. current tax expense divided by the firm's U.S. pretax income (U.S. Current ETR). Because the audit data is U.S. only, we use the U.S. based measure rather than the world-wide measure.³³ We delete observations for which the denominator of the ETR measure is negative, because the ratio becomes uninterpretable. In addition, to ensure that our results are not unduly influenced by outliers, we reset any values greater than 75 percent to 75 percent and any values less than zero to zero.

We first present in Table 7 simple correlations between the deficiency/proposed tax, deficiency/assets or deficiency/sales ratios and the ETR measure. The correlation between the ETR and deficiency/proposed tax is negative, consistent with lower ETRs representing more tax aggressive behavior, although this correlation could be caused by a small-denominator problem. If a zero-ETR corporation pays no tax on the return as originally filed, but has one dollar (or any amount) of tax deficiency, the ratio of deficiency/proposed tax is its maximum value of 100 percent. In contrast, we find that the correlations between the ETR measure and our tax deficiency/assets and tax deficiency/sales measures are positive. This is not consistent with the tax aggressiveness reflected in the deficiency measure causing the firm to have a low effective tax rate.

To examine whether there is a relation between a firm's ETR and its proposed deficiency rate, holding other influencing factors constant, we next estimate a regression of each ETR measure on the tax deficiency measure and other controls. We first estimate the regression over all firms, and then we delete observations with negative or zero taxable income (Form 1120, Line 28) in order to eliminate the effect of loss firms.

The regression results, presented in Table 8, Column 1, reveal that the tax deficiency/sales variable is significantly positively related to the ETR measure when all return-years are included. Thus, consistent with the univariate correlations, we find that the greater the tax deficiency (the more tax aggressive the firm) the higher the ETR, inconsistent with the ETR being an indicator of tax aggressiveness as measured by the proposed tax deficiency. This result could occur if high ETR attracts a more intense audit if the IRS believes the revenue gains are

³³ Although using a world-wide measure (untabulated) we find similar relationships between deficiency and the world-wide ETR as described above for the U.S. Current ETR.

greatest for these firms. Another explanation is that tax-aggressive firms will record a tax cushion in order to provide an accounting reserve for its tax aggressive position. While this would not explain the positive relation, it does explain why a negative relation is not observed.

In Table 8, Column 2, where the loss firms are eliminated, the relation of the deficiency rate to the U.S. Current ETR is insignificant, again providing no evidence consistent with financial statement ETRs reflecting the same noncompliance as shown in the deficiency rates from our data.

7. Conclusions

This paper offers some exploratory analysis of an extraordinarily rich data set of audit and appeals records, matched with tax returns and financial statements, of several thousand corporations. As with any exploratory analysis, it has raised at least as many questions as it has provided definitive answers. But it has provided preliminary answers to several important questions.

First, it has confirmed that corporate tax noncompliance, at least as measured by deficiencies proposed upon examination, amounts to approximately 13 percent of “true” tax liability. That estimate is in line with official IRS tax gap measures, which in one way is not surprising because the tax gap measures were largely based on audit data, but provides new information because the official IRS measures are in part based on nearly two-decade old data.

Second, noncompliance is generally a progressive phenomenon, meaning that noncompliance as a fraction of a scale measure increases with the size of the company. Combined with other information that the noncompliance rate among very small businesses is significantly higher than 13 percent, this suggests that business tax noncompliance relative to scale is U-shaped, with medium-sized businesses having the lowest rate of noncompliance. This pattern is not consistent with noncompliance being an inframarginal benefit to doing business, and implies that the opportunity for noncompliance provides some implicit subsidy to achieving greater scale through investment.

Third, noncompliance is related to some observable characteristics of companies, including sector and two measures of the presence of intangible assets. This suggests that the private benefits of successful tax noncompliance by any given firm are to some extent competed away because similar firms find tax noncompliance to be similarly available. Being a private

company is also associated with higher noncompliance, corroborating the common suspicion that private companies are less affected by the financial reporting incentives to publicly report high earnings, which in turn constrains the ability to report low earnings to the IRS.

Fourth, we find some evidence that incentivized executive compensation schemes are associated with more tax noncompliance. We find no relation between a commonly-studied measure of the quality of corporate governance and the extent of proposed (scaled) tax deficiency.

Finally, we find that there is no consistent simple or partial negative association between our measure of tax noncompliance and measures of the effective tax rate calculated from financial statements. This might mean that the financial statements are uninformative about tax aggressiveness in part because of the tax cushion for future adverse judgments that is included in the tax expense amount on the financial statements. In addition, it may be that publicly available effective tax rate measures affect the aggressiveness with which the IRS pursues tax noncompliance.

There are many reasons why we offer these conclusions with such tentativeness; we close by mentioning two. One is that our central measure of tax noncompliance is in fact the result of an imperfect and perhaps systematically intense audit of a tax return declaration that may itself be the opening bid in what is expected, often correctly, to be an intense negotiation and formal appeals process. Second, the causal links among tax aggressiveness, executive compensation, and corporate governance are potentially complex, and the analysis presented here at best establishes statistical associations, but certainly does not establish causal relations. Answering these, and other, questions, in future research should help to clarify the magnitude and nature of corporate tax noncompliance as well as its economic and policy implications.

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TABLE 1- Sample Statistics

| | <u>All Returns</u> | <u>Closed Returns</u> | <u>Open Returns</u> |
|------------------------------------|--------------------|-----------------------|---------------------|
| Total Observations | 29,141 | | |
| % with Deficiency > 0 | 55% | | |
| Deficiency / Assets | 0.0017 | | |
| Deficiency / Sales | 0.0022 | | |
| Observations with Proposed Tax > 0 | 25,266 | 22,552 | 2,714 |
| % with Deficiency > 0 | 63% | | |
| Deficiency / Proposed Tax | 0.136 | 0.094 | 0.207 |
| Agreed to at Exam / Deficiency | 0.320 | 0.487 | 0.193 |
| Agreed to at Appeals/ Deficiency | | 0.113 | NA |
| Agreed/ Final Tax | | 0.059 | NA |

Notes to Table 1:

The data come from the Voluntary Compliance Baseline Measurement Program (VCBLM) for return-years between 1983 and 1998 as shown in Appendix A, based on an IRS (Large and MidSize Business Research division) extract in 2004 of AIMS closed-case data from 1990-2003. *Deficiency* is the proposed tax deficiency. *Proposed Tax (Prop. Tax)* is the sum of *Tax On Return* plus *Deficiency*. *Tax On Return* is the total tax after credits from the U.S. Corporation Form 1120. *Agreed to at Exam* is the payments posted to the taxpayer's account, field X300R, during the examination process with respect to that return-year's examination. *Agreed to at Appeals* is the sum of payments posted to the taxpayer's account during the appeal (A300R) or counsel (C300R) processes with respect to that return-year's examination. *Final Tax* equals *Tax On Return* plus *Agreed to at Exam* plus *Agreed to at Appeals*. *Agreed* is the total amount of *deficiency* agreed to by the taxpayer when the case is closed through appeals and counsel . We limit the amounts *Agreed* to the *Deficiency*. In the VCBLM dataset, deficiencies are coded at \$1 if there is a change that did not increase tax. We restore these observations to zero deficiency. *Assets* is the total year-end assets from Form 1120, Schedule L. *Sales* is the gross receipts from Form 1120, page 1, Line 1.

TABLE 2 – Audit Results by Asset Class

Panel A – Full Sample, All Returns

| <i>Asset Class</i> | <i>Obs.</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Assets</i> | <i>Deficiency/ Sales</i> | <i>Obs. w/ Prop. Tax >0</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
|--------------------|---------------|-----------------------------------|-------------------------------|------------------------------|--|-----------------------------------|----------------------------------|--|
| A(assets)<\$100M | 11,196 | 49% | 0.0027 | 0.0015 | 9,280 | 59% | 0.099 | 0.457 |
| \$100M≤A<\$250M | 4,198 | 48% | 0.0028 | 0.0019 | 3,530 | 57% | 0.117 | 0.293 |
| \$250M≤A<\$500M | 3,032 | 53% | 0.0025 | 0.0017 | 2,629 | 61% | 0.115 | 0.329 |
| \$500M≤A<\$1B | 3,067 | 56% | 0.0023 | 0.0018 | 2,737 | 63% | 0.109 | 0.345 |
| \$1B≤A<\$2B | 2,746 | 62% | 0.0023 | 0.0020 | 2,479 | 69% | 0.121 | 0.281 |
| \$2B≤A<\$5B | 2,519 | 66% | 0.0021 | 0.0021 | 2,345 | 71% | 0.134 | 0.314 |
| A>\$5B | 2,383 | 74% | 0.0014 | 0.0024 | 2,266 | 78% | 0.146 | 0.323 |
| TOTALS | 29,141 | 55% | 0.0017 | 0.0022 | 25,266 | 63% | 0.136 | 0.320 |

Panel B – Full Sample, Closed versus Open Returns

| <i>Asset Class</i> | <i>Closed Returns</i> | | | | | <i>Open Returns</i> | | |
|--------------------|-----------------------|----------------------------------|--|---|------------------------------|---------------------|----------------------------------|--|
| | <i>Obs.</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> | <i>Agreed to at Appeals/ Deficiency</i> | <i>Agreed/ Final Tax</i> | <i>Obs.</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
| A(assets)<\$100M | 8,898 | 0.073 | 0.611 | 0.059 | 0.050 | 382 | 0.465 | 0.104 |
| \$100M≤A<\$250M | 3,336 | 0.086 | 0.403 | 0.076 | 0.043 | 194 | 0.443 | 0.067 |
| \$250M≤A<\$500M | 2,423 | 0.086 | 0.435 | 0.082 | 0.046 | 206 | 0.336 | 0.124 |
| \$500M≤A<\$1B | 2,476 | 0.083 | 0.479 | 0.096 | 0.050 | 261 | 0.272 | 0.084 |
| \$1B≤A<\$2B | 2,134 | 0.080 | 0.441 | 0.106 | 0.046 | 345 | 0.290 | 0.097 |
| \$2B≤A<\$5B | 1,839 | 0.091 | 0.471 | 0.134 | 0.057 | 506 | 0.251 | 0.159 |
| A>\$5B | 1,446 | 0.104 | 0.510 | 0.115 | 0.068 | 820 | 0.188 | 0.221 |
| TOTALS | 22,552 | 0.094 | 0.487 | 0.113 | 0.059 | 2,714 | 0.207 | 0.193 |

TABLE 2 – Audit Results by Asset Class (continued)

Panel C –Coordinated Industry Cases (CIC) only, All Returns

| <i>Asset Class</i> | <i>Obs.</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Assets</i> | <i>Deficiency/ Sales</i> | <i>Obs w/ Prop. Tax>0</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
|--------------------|--------------|-----------------------------------|-------------------------------|------------------------------|----------------------------------|-----------------------------------|----------------------------------|--|
| A(assets)<\$100M | 85 | 51% | 0.0054 | 0.0026 | 74 | 58% | 0.147 | 0.227 |
| \$100M≤A<\$250M | 476 | 58% | 0.0105 | 0.0057 | 415 | 66% | 0.340 | 0.135 |
| \$250M≤A<\$500M | 1,123 | 63% | 0.0044 | 0.0029 | 1,020 | 70% | 0.192 | 0.246 |
| \$500M≤A<\$1B | 1,648 | 63% | 0.0029 | 0.0023 | 1,524 | 68% | 0.134 | 0.318 |
| \$1B≤A<\$2B | 1,861 | 67% | 0.0028 | 0.0023 | 1,728 | 72% | 0.137 | 0.258 |
| \$2B≤A<\$5B | 2,084 | 68% | 0.0023 | 0.0023 | 1,965 | 73% | 0.140 | 0.316 |
| A>\$5B | 2,230 | 75% | 0.0015 | 0.0024 | 2,136 | 78% | 0.148 | 0.314 |
| TOTALS | 9,507 | 67% | 0.0017 | 0.0024 | 8,862 | 72% | 0.147 | 0.306 |

Panel D - Coordinated Industry Cases (CIC) only, Closed versus Open Returns

| <i>Asset Class</i> | <i>Closed Returns</i> | | | | | <i>Open Returns</i> | | |
|--------------------|-----------------------|----------------------------------|--|---|------------------------------|---------------------|----------------------------------|--|
| | <i>Obs</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> | <i>Agreed to at Appeals/ Deficiency</i> | <i>Agreed/ Final Tax</i> | <i>Obs</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
| A(assets)<\$100M | 70 | 0.084 | 0.433 | 0.142 | 0.050 | 4 | 0.770 | 0.003 |
| \$100M≤A<\$250M | 388 | 0.266 | 0.170 | 0.118 | 0.095 | 27 | 0.669 | 0.074 |
| \$250M≤A<\$500M | 950 | 0.149 | 0.327 | 0.098 | 0.069 | 70 | 0.443 | 0.086 |
| \$500M≤A<\$1B | 1,390 | 0.107 | 0.425 | 0.110 | 0.060 | 134 | 0.334 | 0.075 |
| \$1B≤A<\$2B | 1,500 | 0.095 | 0.387 | 0.117 | 0.050 | 228 | 0.303 | 0.102 |
| \$2B≤A<\$5B | 1,549 | 0.098 | 0.469 | 0.130 | 0.061 | 416 | 0.256 | 0.156 |
| A>\$5B | 1,359 | 0.105 | 0.491 | 0.119 | 0.067 | 777 | 0.189 | 0.221 |
| TOTALS | 7,206 | 0.104 | 0.459 | 0.120 | 0.063 | 1,656 | 0.207 | 0.198 |

TABLE 2 – Audit Results by Asset Class (continued)

Panel E –NON-Coordinated Industry Cases (non-CIC) only, All Returns

| <i>Asset Class</i> | <i>Total Obs.</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Assets</i> | <i>Deficiency/ Sales</i> | <i>Obs w/ Prop. Tax>0</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
|--------------------|-------------------|-------------------------------|---------------------------|--------------------------|------------------------------|-------------------------------|------------------------------|--------------------------------------|
| A(assets)<\$100M | 11,111 | 49% | 0.0026 | 0.0015 | 9,206 | 59% | 0.098 | 0.464 |
| \$100M≤A<\$250M | 3,722 | 47% | 0.0016 | 0.0011 | 3,115 | 56% | 0.071 | 0.447 |
| \$250M≤A<\$500M | 1,909 | 46% | 0.0013 | 0.0009 | 1,609 | 55% | 0.062 | 0.510 |
| \$500M≤A<\$1B | 1,419 | 49% | 0.0015 | 0.0013 | 1,213 | 57% | 0.074 | 0.410 |
| \$1B≤A<\$2B | 885 | 52% | 0.0011 | 0.0012 | 751 | 61% | 0.073 | 0.404 |
| \$2B≤A<\$5B | 435 | 56% | 0.0012 | 0.0013 | 380 | 64% | 0.092 | 0.297 |
| A>\$5B | 153 | 61% | 0.0009 | 0.0017 | 130 | 72% | 0.100 | 0.645 |
| TOTALS | 19,634 | 49% | 0.0013 | 0.0013 | 16,404 | 58% | 0.081 | 0.453 |

Panel F - NON-Coordinated Industry Cases (non-CIC) only, Closed versus Open Returns

| <i>Asset Class</i> | <i>Closed Returns</i> | | | | | <i>Open Returns</i> | | |
|--------------------|-----------------------|------------------------------|--------------------------------------|---|--------------------------|---------------------|------------------------------|--------------------------------------|
| | <i>Obs</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> | <i>Agreed to at Appeals/ Deficiency</i> | <i>Agreed/ Final Tax</i> | <i>Obs</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
| A(assets)<\$100M | 8,828 | 0.073 | 0.614 | 0.057 | 0.050 | 378 | 0.457 | 0.108 |
| \$100M≤A<\$250M | 2,948 | 0.054 | 0.606 | 0.040 | 0.036 | 167 | 0.314 | 0.058 |
| \$250M≤A<\$500M | 1,473 | 0.044 | 0.678 | 0.045 | 0.032 | 136 | 0.224 | 0.204 |
| \$500M≤A<\$1B | 1,086 | 0.051 | 0.634 | 0.056 | 0.036 | 127 | 0.205 | 0.099 |
| \$1B≤A<\$2B | 634 | 0.040 | 0.789 | 0.039 | 0.034 | 117 | 0.241 | 0.072 |
| \$2B≤A<\$5B | 290 | 0.046 | 0.496 | 0.185 | 0.032 | 90 | 0.220 | 0.181 |
| A>\$5B | 87 | 0.089 | 0.891 | 0.041 | 0.083 | 43 | 0.130 | 0.217 |
| TOTALS | 15,346 | 0.055 | 0.688 | 0.062 | 0.042 | 1,058 | 0.213 | 0.138 |

Notes to Table 2:

Asset classes are based on total ending assets from the Form 1120, Schedule L. All variables are as defined in Table 1.

TABLE 3 -Audit Results for Full Sample by Firm Characteristic

Panel A - All Returns

| | <i>Total Obs.</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Assets</i> | <i>Deficiency/ Sales</i> | | <i>Obs. w/ Prop. Tax>0</i> | <i>% with Deficiency>0</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> |
|--------------------|-----------------------|-----------------------------------|-------------------------------|------------------------------|--|-----------------------------------|-----------------------------------|----------------------------------|--|
| Private | 17,041 | 52% | 0.0020 | 0.0025 | | 14,410 | 62% | 0.171 | 0.265 |
| Public | 12,100 | 58% | 0.0015 | 0.0021 | | 10,856 | 65% | 0.125 | 0.345 |
| Domestic | 23,892 | 56% | 0.0016 | 0.0021 | | 21,054 | 64% | 0.125 | 0.343 |
| Foreign-Controlled | 5,249 | 47% | 0.0023 | 0.0027 | | 4,212 | 59% | 0.254 | 0.202 |
| Domestic | 16,676 | 52% | 0.0013 | 0.0018 | | 13,919 | 62% | 0.135 | 0.286 |
| Multinational | 12,456 | 58% | 0.0018 | 0.0025 | | 11,347 | 64% | 0.137 | 0.333 |
| Non-CIC | 19,634 | 49% | 0.0013 | 0.0013 | | 16,404 | 58% | 0.081 | 0.453 |
| CIC | 9,507 | 67% | 0.0017 | 0.0024 | | 8,862 | 72% | 0.147 | 0.306 |
| Agriculture | 229 | 45% | 0.0010 | 0.0013 | | 172 | 59% | 0.096 | 0.413 |
| Mining & Utilities | 2,975 | 59% | 0.0010 | 0.0023 | | 2,694 | 65% | 0.090 | 0.285 |
| Manufacturing | 12,765 | 56% | 0.0020 | 0.0026 | | 11,289 | 63% | 0.162 | 0.308 |
| Trade & Transport. | 7,192 | 55% | 0.0016 | 0.0014 | | 6,182 | 64% | 0.133 | 0.319 |
| Insurance & Other | 4,250 | 50% | 0.0012 | 0.0024 | | 3,530 | 60% | 0.087 | 0.421 |
| Education & Health | 676 | 45% | 0.0031 | 0.0048 | | 527 | 58% | 0.221 | 0.275 |
| Arts & Food Serv. | 837 | 52% | 0.0016 | 0.0020 | | 700 | 62% | 0.114 | 0.446 |
| Other Services | 216 | 43% | 0.0012 | 0.0015 | | 171 | 54% | 0.068 | 0.442 |
| TOTALS | 29,141 | 55% | 0.0017 | 0.0022 | | 25,266 | 63% | 0.136 | 0.320 |

TABLE 3 -Audit Results for Full Sample by Firm Characteristic (continued)

Panel B - Closed versus Open Returns

| | <i>Closed Returns</i> | | | | | <i>Open Returns</i> | | |
|--------------------|-----------------------|----------------------------------|--|---|------------------------------|---------------------|----------------------------------|---|
| | <i>Obs.</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/ Deficiency</i> | <i>Agreed to at Appeals/ Deficiency</i> | <i>Agreed/ Final Tax</i> | <i>Obs.</i> | <i>Deficiency/ Prop. Tax</i> | <i>Agreed to at Exam/Deficiency</i> |
| Private | 13,332 | 0.100 | 0.470 | 0.098 | 0.060 | 1,078 | 0.335 | 0.122 |
| Public | 9,220 | 0.092 | 0.495 | 0.119 | 0.058 | 1,636 | 0.175 | 0.228 |
| Domestic | 18,739 | 0.091 | 0.487 | 0.115 | 0.057 | 2,315 | 0.183 | 0.222 |
| Foreign-Controlled | 3,813 | 0.129 | 0.493 | 0.095 | 0.080 | 399 | 0.438 | 0.077 |
| Domestic | 12,798 | 0.104 | 0.394 | 0.106 | 0.055 | 1,121 | 0.202 | 0.168 |
| Multinational | 9,754 | 0.089 | 0.535 | 0.116 | 0.060 | 1,593 | 0.208 | 0.201 |
| Non-CIC | 15,346 | 0.055 | 0.688 | 0.062 | 0.042 | 1,058 | 0.213 | 0.138 |
| CIC | 7,206 | 0.104 | 0.459 | 0.120 | 0.063 | 1,656 | 0.207 | 0.198 |
| Agriculture | 155 | 0.066 | 0.499 | 0.156 | 0.044 | 17 | 0.413 | 0.267 |
| Mining & Utilities | 2,340 | 0.082 | 0.349 | 0.111 | 0.039 | 354 | 0.107 | 0.188 |
| Manufacturing | 10,028 | 0.104 | 0.520 | 0.123 | 0.069 | 1,261 | 0.257 | 0.171 |
| Trade & Transport. | 5,698 | 0.091 | 0.414 | 0.095 | 0.048 | 484 | 0.234 | 0.231 |
| Insurance & Other | 3,092 | 0.074 | 0.592 | 0.086 | 0.051 | 438 | 0.101 | 0.284 |
| Education & Health | 465 | 0.105 | 0.528 | 0.049 | 0.063 | 62 | 0.331 | 0.199 |
| Arts & Food Serv. | 622 | 0.092 | 0.529 | 0.169 | 0.066 | 78 | 0.223 | 0.281 |
| Other Services | 151 | 0.047 | 0.595 | 0.085 | 0.032 | 20 | 0.224 | 0.201 |
| TOTALS | 22,551 | 0.094 | 0.487 | 0.113 | 0.059 | 2,714 | 0.207 | 0.193 |

Notes to Table 3.

Public includes those taxpayers whose Employer Identification Number (EIN) on the Form 1120 matches the firm-year EIN on S&P Compustat, and for which total financial statement assets (Data #6) is nonmissing. If no EIN match is found for the firm on Compustat, the firm is classified as *Private*. Firms are classified as a Foreign Controlled Corporation (*FCC*) if the answer to Question 7 on Form 1120 Schedule K is yes (the question asks whether during any time of the year one foreign person owned at least 25% of the stock of the company). If the answer to Question 7 is no, the firm is classified as *Domestic*. Firms are classified as being *Multinational* if they claim a foreign tax credit on Form 1120 or file a Form 5471, indicating they owned a foreign subsidiary. If the firm does not claim a FTC or file a Form 5471, the firm is classified as *Domestic*. The CIC grouping of firms includes those firms that are part of the IRS's Coordinated Industry Cases (large case audits). All other firms are labeled non-CIC firms. Industry classifications are taken from the North American Industrial Classification System (*NAICS*) codes which are recorded in the IRS data for each return-year.

TABLE 4 – Descriptive Statistics

| Variable | Obs. | Mean | Std Dev | Lower Quartile | Median | Upper Quartile |
|--------------------------------|--------|-----------|-----------|----------------|---------|----------------|
| Deficiency/Assets | 29,141 | 0.0020 | 0.0055 | 0.0000 | 0.0001 | 0.0013 |
| Deficiency/Sales | 29,141 | 0.0022 | 0.0068 | 0.0000 | 0.0001 | 0.0012 |
| Log(Assets) | 29,141 | 5.499 | 1.996 | 3.894 | 5.328 | 6.995 |
| Log(Sales) | 29,141 | 5.529 | 1.946 | 4.104 | 5.480 | 6.943 |
| Assets (\$Millions) | 29,141 | 1,623.500 | 4,244.680 | 49.116 | 206.001 | 1,091.340 |
| Sales (\$Millions) | 29,141 | 1,305.120 | 2,989.250 | 60.561 | 239.888 | 1,035.440 |
| Coordinated Industry Cases | 29,141 | 0.326 | 0.469 | 0 | 0 | 1 |
| Public | 29,141 | 0.415 | 0.493 | 0 | 0 | 1 |
| FCC | 29,141 | 0.180 | 0.384 | 0 | 0 | 0 |
| Multinational | 29,141 | 0.428 | 0.495 | 0 | 0 | 1 |
| U.S. Current ETR | 11,207 | 0.289 | 0.206 | 0.152 | 0.287 | 0.369 |
| Advertising/Assets | 11,515 | 0.013 | 0.033 | 0 | 0 | 0.006 |
| R&D Expense/Assets | 11,515 | 0.025 | 0.047 | 0 | 0 | 0.028 |
| Market-to-Book Ratio | 11,515 | 2.508 | 2.272 | 1.292 | 1.918 | 3.017 |
| Bonus Percentage | 3,875 | 0.228 | 0.151 | 0.112 | 0.226 | 0.328 |
| Exercisable Option Sensitivity | 3,842 | 0.110 | 0.182 | 0.011 | 0.044 | 0.125 |
| Vested Holdings Sensitivity | 3,869 | 0.648 | 1.388 | 0.076 | 0.204 | 0.547 |
| Total Equity Sensitivity | 3,875 | 0.768 | 1.466 | 0.116 | 0.291 | 0.728 |
| Governance Index | 3,875 | 7.283 | 4.685 | 4 | 8 | 11 |

Notes to Table 4:

All variables are winsorized at 1% and 99% and ETRs are limited to be between 0% and 75%. *Coordinated Industry Cases*, *Public*, *FCC*, and *Multinational* are indicator variables set equal to one if the firm is identified as part of these groups (defined in Table 3), and set equal to zero otherwise. *U.S. Current ETR* is the firm's effective tax rate calculated as the U.S. portion of current tax expense divided by US pre-tax book income (Compustat data item 63/data item 272). *Advertising* is the firm's advertising expense from their financial statements (Compustat data item 45). *R&D Expense* is the firm's research and development expense from their financial statements (Compustat data item 46). *Market-to-Book* is the firm's market value of equity divided by the book value of equity ((data item 99 X data item 25)/data item 60). *Bonus percentage* is the proportion of compensation that is bonus. It is calculated as the sum over the five most highly paid executives of the annual bonus in the year prior to the year for which the tax deficiency is assessed scaled by the sum of the bonus, salary, and the Black-Scholes value of the stock option grants for the five most highly paid executives in the year prior to the year for which the tax deficiency is assessed. *Exercisable Option Sensitivity* is the sensitivity of the holdings of exercisable (vested) executive stock options to a 1% change in stock price. This is the sum for the five most highly paid executives of the firm and holdings are measured in the year prior to the year for which the deficiency is assessed. *Vested Holdings Sensitivity* is the sensitivity of the holdings of exercisable executive stock options and unrestricted stock to a 1% change in stock price. This is the sum for the five most highly paid executives of the firm and holdings are measured in the year prior to the year for which the deficiency is assessed. *Total Equity Sensitivity* is the sensitivity of the holdings of all stock options, all unrestricted stock, and all restricted stock to a 1% change in stock price. This is the sum over the five most highly paid executives of the firm and holdings are measured in the year prior to the year for which the deficiency is assessed. *Governance Index* is a measure of governance developed by Gompers et al (2003). It is an index of shareholder rights that ranges from 0-24, a low value indicates high quality governance. The index is set to zero in regression when missing. *Governance Index Missing* is an indicator set equal to one if Governance Index is missing, and zero otherwise. All other variables are as defined in Tables 2 and 3.

TABLE 5 – Baseline Tobit Regressions

| | Full Sample | | CIC only | Full Sample | | CIC only |
|----------------------|---------------------------|----------------|-----------------|----------------------------|----------------|-----------------|
| Dependent variable: | <i>Deficiency / Sales</i> | | | <i>Deficiency / Assets</i> | | |
| <i>Intercept</i> | -0.0053 | -0.0041 | -0.0078 | -0.0041 | -0.0032 | -0.0048 |
| | -4.74 | -3.66 | -3.52 | -4.46 | -3.49 | -2.82 |
| <i>Log (Size)</i> | -0.0000 | 0.0002 | 0.0002 | 0.00004 | 0.00019 | 0.0001 |
| | -0.67 | 5.05 | 2.52 | 0.99 | 5.08 | 1.70 |
| <i>CIC</i> | 0.0032 | <i>dropped</i> | <i>n/a</i> | 0.0020 | <i>dropped</i> | <i>n/a</i> |
| | 11.24 | | | 8.78 | | |
| <i>Public</i> | -0.0011 | -0.0011 | -0.0002 | -0.0013 | -0.0013 | -0.0004 |
| | -6.98 | -6.57 | -0.87 | -10.39 | -9.72 | -2.17 |
| <i>FCC</i> | -0.0009 | - | -0.0002 | -0.0013 | -0.0013 | -0.0005 |
| | -4.89 | -5.12 | -0.65 | -8.49 | -8.36 | -1.76 |
| <i>Multinational</i> | 0.0004 | 0.0005 | 0.0016 | 0.0002 | 0.0003 | 0.0013 |
| | 2.75 | 3.08 | 6.81 | 1.97 | 2.43 | 7.25 |
| Return_yr dummies | Untabulated | | | | | |
| 1-digit NAICS codes | Untabulated | | | | | |
| Observations | 29,141 | 29,141 | 9,507 | 29,141 | 29,141 | 9,507 |
| L.R. Chi-squared | 810.56 | 684.63 | 163.12 | 660.47 | 583.67 | 170.45 |

Notes to Table 5: Variables are as defined in Tables 2-4.

TABLE 6 – Tobit Regression with Additional Variables
Dependent Variable: Deficiency/Sales

| <i>Compensation variable:</i> | <i>Baseline Regression</i> | <i>Bonus Percentage</i> | <i>Exercisable Option Sensitivity</i> | <i>Vested Holdings Sensitivity</i> | <i>Total Equity Sensitivity</i> |
|---------------------------------------|----------------------------|-------------------------|---------------------------------------|------------------------------------|---------------------------------|
| <i>Intercept</i> | -0.0073 | -0.0102 | -0.0080 | -0.0095 | -0.0095 |
| | -3.22 | -4.35 | -3.44 | -4.10 | -4.08 |
| <i>Log (Assets)</i> | 0.0002 | 0.0003 | 0.0002 | 0.0003 | 0.0003 |
| | 1.35 | 2.29 | 1.61 | 2.23 | 2.06 |
| <i>CIC</i> | 0.0026 | 0.0021 | 0.0022 | 0.0021 | 0.0021 |
| | 7.45 | 6.07 | 6.31 | 6.19 | 6.08 |
| <i>FCC</i> | -0.0031 | -0.0035 | -0.0034 | -0.0035 | -0.0034 |
| | -2.78 | -3.12 | -3.03 | -3.12 | -3.11 |
| <i>Multinational</i> | 0.0010 | 0.0005 | 0.0006 | 0.0006 | 0.0006 |
| | 2.94 | 1.53 | 1.70 | 1.77 | 1.71 |
| <i>R&D Expense/Assets</i> | | 0.0173 | 0.0150 | 0.0164 | 0.0161 |
| | | 5.63 | 4.88 | 5.39 | 5.29 |
| <i>Advertising/Assets</i> | | -0.0073 | -0.0078 | -0.0077 | -0.0080 |
| | | -1.89 | -2.05 | -2.03 | -2.09 |
| <i>Market-to-Book</i> | | 0.0004 | 0.0004 | 0.0004 | 0.0004 |
| | | 6.81 | 6.14 | 6.39 | 6.19 |
| <i>Compensation Variable</i> | | 0.0024 | 0.0018 | 0.0002 | 0.0002 |
| | | 2.82 | 2.33 | 1.64 | 2.60 |
| <i>Governance index missing</i> | | -0.0012 | -0.0012 | -0.0011 | -0.0010 |
| | | -2.02 | -2.05 | -1.78 | -1.67 |
| <i>Governance index(0 if missing)</i> | | -0.0001 | -0.0001 | -0.0001 | -0.0000 |
| | | -1.37 | -1.28 | -1.09 | -0.95. |
| <i>Return_yr dummies</i> | Untabulated | | | | |
| <i>1-digit NAICS codes</i> | Untabulated | | | | |
| | | | | | |
| <i>Observations</i> | 3,875 | 3,860 | 3,830 | 3,857 | 3,860 |
| <i>L.R. Chi-squared</i> | 187.85 | 293.78 | 292.19 | 288.14 | 292.56 |

Notes to Table 6: Variables are as defined in Tables 2-4.

TABLE 7 -Correlation Matrix of Deficiency-Based Measures and ETRs

| Panel A – All observations | Deficiency/ Prop. Tax | Deficiency/ Assets | Deficiency/ Sales |
|----------------------------|--------------------------|-----------------------|----------------------|
| U.S. Current ETR | -0.095 | 0.027 | 0.055 |
| p-value | <i>0.0000</i> | <i>0.0034</i> | <i>0.0000</i> |
| observations | 10,545 | 11,778 | 11,778 |

| Panel B – Observations With positive Taxable Income (L.28) | Deficiency/ Prop. Tax | Deficiency/ Assets | Deficiency/ Sales |
|--|--------------------------|-----------------------|----------------------|
| U.S. Current ETR | -0.055 | -0.005 | 0.022 |
| p-value | <i>0.00</i> | <i>0.6412</i> | <i>0.0268</i> |
| observations | 9,737 | 9,776 | 9,776 |

Notes to Table 7: Variables are defined as in Tables 3 and 4.

TABLE 8 – ETR Regressions

| | Tobit over all available observations (1) | Tobit positive taxable inc. (L.28) (2) |
|--|--|--|
| <i>Dependent variable (ETR) defined as</i> | USCurETR | USCurETR |
| <i>Intercept</i> | 0.0205 <i>0.47</i> | 0.0431 <i>1.10</i> |
| <i>Deficiency/Sales</i> | 0.8502 <i>2.27</i> | -0.4339 <i>-1.39</i> |
| <i>Log (Assets)</i> | 0.0032 <i>1.86</i> | -0.0007 <i>-0.45</i> |
| <i>CIC</i> | 0.0022 <i>0.27</i> | -0.0037 <i>-0.54</i> |
| <i>FCC</i> | -0.0390 <i>-2.94</i> | -0.0110 <i>-0.92</i> |
| <i>Multinational</i> | 0.0638 <i>12.6</i> | 0.0261 <i>5.84</i> |
| <i>R&D Expense/Assets</i> | 0.0748 <i>1.43</i> | 0.3823 <i>8.04</i> |
| <i>Advertising/Assets</i> | 0.0382 <i>0.56</i> | 0.1589 <i>2.74</i> |
| <i>Market-to-Book</i> | 0.0059 <i>5.68</i> | -0.0020 <i>-2.11</i> |
| Return_yr dummies | <i>Untabulated</i> | |
| 1-digit NAICS codes | <i>Untabulated</i> | |
| Observations | 11,208 | 9,346 |
| L.R. Chi-squared | 461.01 | 408.29 |

Notes to Table 8: Variables are defined as in Tables 3 and 4.

APPENDIX A - Sample Selection Details

| | | Observations |
|---|---------|--------------|
| VCBLM audit data | 114,257 | |
| SOI tax return data | | |
| LMSB 1994-2002 | 526,610 | |
| CIC 1981-1993 | 18,411 | |
| Merge VCBLM, SOI | | 45,121 |
| Drop observations where: | Drop | Subtotal |
| Year <1983, >1998 | 6,207 | 38,914 |
| Financial Services Industry | 8,720 | 30,194 |
| Status code < 80 (exam not finished) | 215 | 29,979 |
| Industry code missing | 4 | 29,975 |
| Tax deficiency < 0 | 312 | 29,663 |
| Total ending assets =0 | 248 | 29,415 |
| Total sales =0 | 274 | 29,141 |
| | | |
| Final Sample | | 29,141 |