Long-Run Corporate Tax Avoidance

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Abstract

How prevalent is long-run corporate tax avoidance? Surprisingly, there appears to be no published academic work addressing this basic question. We define tax avoidance based on the ability to sustain a cash effective tax rate (the ratio of cash taxes paid to pretax income) below the statutory tax rate. It is important to note that avoiding taxes does not imply that a firm has done anything improper. There are numerous provisions in the tax code that allow or encourage firms to reduce their taxes. We investigate the extent to which firms are able to engage in corporate tax avoidance over periods as long as ten years. We find that 437 firms, comprising 22 percent of our sample, were able to sustain a cash effective tax rate of less than 20 percent over a ten year period. An initial examination of the characteristics of successful long-run tax avoiders shows that they are spread across industries but cluster somewhat in certain industries such as oil and gas extraction, insurance, and real estate. Other characteristics associated with long-run tax avoidance include having large firm size, being incorporated in a tax haven, having high ratios of property, plant and equipment to assets, being intangible intensive, and being highly levered.

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1. Introduction

Are firms able to avoid corporate income taxes successfully over long periods of time? If so, how prevalent is long-run tax avoidance? What are the characteristics of firms that successfully avoid income taxes over long periods? Surprisingly, we are aware of no published academic research that directly addresses these basic questions. Prior tax research has made great strides in understanding how taxes affect specific decisions that firms make (e.g., how much leverage to use, Graham, 2000). Much less is known about firms' overall tax avoidance over short periods, let alone their ability to avoid taxes over long periods of time.[1]

Corporate tax avoidance has received much attention throughout the last twenty-five years. For example, evidence of corporate tax avoidance led to the Tax Reform Act of 1986, the largest overhaul of the U.S. tax code in history. More recently, a number of commentators have perceived resurgence in corporate tax avoidance activities (e.g., Bankman, 2004). Researchers have employed a number of approaches to shed light on tax avoidance, including examining book-tax differences for the aggregate corporate sector (U.S. Treasury, 1999), in publicly-traded firms (Plesko, 2000; Manzon and Plesko, 2002; Desai, 2003; Yin, 2003; Hanlon and Shevlin, 2005; and Hanlon, Kelley and Shevlin, 2005) and using tabulated tax return data (Mills et al., 2002; Plesko, 2002; Plesko, 2004). What is common to these prior studies is that they focus on annual measures of avoidance. Thus, we do not know if the same firms are avoiding taxes year after year or whether tax avoidance is more of a transitory phenomena based on a particular set of circumstances (e.g., divesting a line of business in a tax-favored manner).

[1] Shackelford and Shevlin (2001) review tax research including research on the role of taxes in decision-making. A sampling of studies of short-run tax avoidance or particular tax avoidance strategies includes: Graham and Tucker (2005), Edwards (2005), Rego (2003), Engel, Erickson and Maydew (1999), Erickson (1998), Mills, Erickson and Maydew (1996), and Matsunaga, Shevlin and Shores (1992).

The primary research question that we ask is: how prevalent is long-run corporate tax avoidance? We define tax avoidance as the ability to pay a low amount of cash taxes (as opposed to GAAP tax expense that one would find in a firm's tax footnote) relative to corporate earnings. Thus, we define the cash effective tax rate (hereafter the *CASH ETR*) as the ratio of cash taxes paid to pretax financial accounting income. We measure the *CASH ETR* for firms over periods ranging from one to ten years (i.e., the ten year measure is the sum of cash taxes paid over ten years divided by the sum of pre-tax book income over those same ten years) and label these multi-year rates as long-run cash effective tax rates.

Our examination of long-run cash effective tax rates reveals 437 publicly-traded firms, representing approximately 22 percent of our sample, that have *CASH ETRs* below 20 percent during a period when the statutory U.S. corporate tax rate has been 35 percent. Recall that these are not one-year anomalies; the *CASH ETRs* referred to above are measured over a ten year period.[2] This evidence suggests that a significant fraction of publicly-traded firms appear to have the ability to avoid corporate income taxes over long periods of time. It is important to emphasize that our measure of tax avoidance does not imply that firms are engaging in anything improper. There are numerous provisions in the tax code that allow or encourage firms to reduce their taxes.

As a rough benchmark of the economic magnitude of tax avoidance, we estimate that had these successful long-run tax avoiders been subject to the statutory tax rate on their financial accounting income they would have paid in aggregate $453 billion in taxes over the prior 10 years. Instead, these firms received tax refunds in aggregate totaling $205 billion, according to the cash tax paid number disclosed in their financial statements. To put that number in

[2] We chose a ten-year period so that our data period begins after the implementation for Statement of Financial Accounting No. 109, Accounting for Income Taxes, which facilitate comparison with GAAP effective tax rates. In addition, the corporate statutory tax rate is stable during the post SFAS 109 at 35 percent.

perspective, total federal income taxes for the entire corporate sector totaled $1.9 trillion during that same period.

While some firms are successful at long-run tax avoidance, the average ten-year *CASH ETR* for our sample of firms is 29.9%, suggesting that tax avoidance is concentrated in a subset of corporations. We take a first step at examining the characteristics and attributes of successful long-run tax avoiders to determine what distinguishes them from the rest of the population of publicly-traded firms. We find that successful tax avoiding firms come from a variety of industries, though there is some clustering in certain industries such as oil and gas extraction (SIC 13), insurance (SIC 63), and real estate (SIC 65). Low long-run *CASH ETRs* are associated with being a large firm, being incorporated in a tax haven, having a high ratio of fixed assets to total assets, being highly levered, having a lot of intangible assets, and reporting large special items. Employee stock option intensity is also included as a control variable and is significant in the predicted direction -- the higher the option exercises of the firm the lower the *CASH ETR*. In the end, however, the observable factors are only able to explain a fraction (at most 22.6%) of the cross-sectional variation in long-run cash effective tax rates, suggesting there is plenty of room for future research on the determinants of successful tax avoidance, not to mention the consequences of successful tax avoidance.

For comparison, we also compute firms' effective tax rates as measured under Generally Accepted Accounting Principles (GAAP). GAAP effective tax rates are reported in the tax footnote and are the ratio of tax expense to pretax income, both measured on continuing operations. There are two main advantages of our approach relative to using annual effective tax rates measured under (GAAP). The first advantage of our approach is that it focuses on the long-run tax avoidance ability of the firm. It takes years for the IRS to audit large corporate returns,

challenge positions, and if necessary litigate them. Years after taking a position on its tax return, the firm may have to pay additional taxes. This, as well as other factors, can cause annual effective tax rates to be highly variable and not reflect the long-run tax avoidance ability of the firm.

The second advantage of our measure of tax avoidance is that it is based on the cash taxes paid by the firm rather than the more conventional GAAP measure of tax expense. It is well-known that GAAP tax expense and cash tax paid can be very different numbers even over long horizons (Hanlon, 2003; McGill and Outslay, 2004). Moreover, whole classes of tax avoidance activities have no effect on GAAP effective tax rates (e.g., a strategy that accelerates tax deductions on equipment can reduce cash taxes in the early years but have no effect on GAAP effective tax rates). Moreover, there can be large swings in single-year GAAP effective tax rates that have nothing to do with tax avoidance (e.g., changes in financial accounting tax reserves and valuation allowances that affect the firms' tax expense but not their actual taxes paid). Indeed, there is some evidence that firms use the valuation allowance as an earnings management device (Miller and Skinner, 1998; Dhaliwal, Gleason and Mills, 2004).

The paper proceeds as follows. Section 2 provides a definition of tax avoidance and discusses prior related research. Section 3 describes our measure of tax avoidance in detail and discusses the advantages of our measure over traditional effective tax rates from firms' financial statements. Section 4 provides a description of our sample, tests and results while section 5 provides a caveat to the study. Section 6 concludes.

2. Background

2.1. Tax Avoidance Distinguished from Tax Shelters and Tax Aggressiveness

Avoiding taxes does not imply anything improper. Indeed, firms (and individuals) can avoid Federal income taxes through means as simple as holding municipal bonds that generate tax-exempt interest income. Even in more complicated settings, the courts have long ruled that there is nothing wrong with reducing one's taxes as long as it is in compliance with the tax code. An often-cited quote in this regard comes from the famous tax case of Helvering v. Gregory, in which Judge Learned Hand wrote: "Any one may so arrange his affairs that his taxes shall be as low as possible; he is not bound to choose that pattern which will best pay the Treasury; there is not even a patriotic duty to increase one's taxes."[3]

Moreover, this is not a paper about tax shelters or aggressive tax planning *per se*.[4] Though used frequently, at this time neither "tax shelter" nor "aggressive tax planning" has a well-accepted definition. The term "tax shelter" in particular has different meanings to different users. Some people appear use the term tax shelter to refer to any tax planning that saves taxes. Others use the term to refer to tax planning that both saves taxes but in ways counter to what Congress intended, while still others use the term to refer to tax planning that involves no substantial non-tax "business purpose" or has no non-tax "economic substance." "Tax aggressive" most often is used to describe taking a position on a tax return that is in the grey area between legal and illegal. It is not uncommon for complex corporate transactions to fall somewhere in the grey area or to have grey area aspects to them. To be sure, our measures of tax avoidance will capture and reflect sheltering and aggressive tax planning but they will also reflect activities and situations that many experts would not consider tax shelters such as

[3] *Helvering v. Gregory*, 69 F.2d 809.
[4] Neither is this a paper about tax evasion, which is commonly defined as tax reduction through illegal means.

obtaining a tax credit for research and development expenditures or investing in tax-exempt municipal bonds.[5] Rather, our paper examines the net effect of a firm's traits and decisions on its long-run tax avoidance. Specifically, we define tax avoidance as the ability to pay a low amount of tax per dollar of reported pre-tax financial accounting income.

2.2. Research Related to Tax Avoidance

There are three lines of research that are highly relevant for this paper. The first consists of studies that have examined specific instances of tax planning or tax shelters. These papers include Graham and Tucker (2005), Engel, Erickson and Maydew (1999), Erickson, Goolsbee and Maydew (2003), Seida and Wempe (2004), and Desai and Hines (2002), to name a few. The second examines variation in annual effective tax rates. These papers include Rego (2003), Mills, Erickson and Maydew (1998) and Collins and Shackelford (1995). The third area of research investigates the causes and consequences of book-tax differences. These papers include Hanlon (2005), Mills (1998), Guenther, Maydew and Nutter (1997), Manzon and Plesko (2002) and others.

The studies that examine specific instances of tax planning are useful to us for two reasons. First, those studies provide information about typical tax planning strategies, which is helpful for thinking about how tax planning would impact various measures of effective tax rates. Second, they provide information about the characteristics of firms likely to engage in tax planning. We draw on this information later in the paper when we conduct preliminary tests to determine the characteristics of successful long-run tax avoiding firms.

[5] Even municipal bonds can be subject to IRS scrutiny. In particular, there can be questions of whether the firm is engaging in tax arbitrage in which tax-exempt investments are financed with debt that generates tax deductible interest expense. See Erickson, Goolsbee and Maydew (2003).

There is a small set of research that examines variation in annual effective tax rates. For example, Rego (2003) examines the tax avoidance activities of U.S. multinational corporations by regressing effective tax rates (defined as the income taxes currently payable divided by pre-tax accounting income) on independent variables such as size, pre-tax income, the extent of foreign operations, whether the firm is a multinational corporation, interactions of multinational and size and income, location of the firm and industry indicators. Rego (2003) finds that larger firms have higher effective tax rates and firms with higher pre-tax income have lower effective tax rates, ceteris paribus. Rego (2003) also finds that multinational corporations are able to avoid more taxes than domestic only corporations. Mills, Erickson and Maydew (1998) examine firms' investments in tax planning and as part of their analyses they investigate the returns to firms' investments. They regress the firm's ETR (defined as the three year sum of current taxes to the three year sum of pre-tax book income) on independent variables including 1) the investment in tax planning (i.e., sum of tax department salaries and outside tax fees), 2) firm size, 3) an indicator variable set equal to one if the firm has foreign assets, 4) a leverage variable (the firm's long-term debt divided by total assets), 5) the level of fixed assets, and 6) the inventory intensity of the firm. They find that the greater the investment in tax planning and the higher the leverage the lower the firm's effective tax rate. They also find that foreign assets are associated with higher effective tax rates.

Finally, our paper is related to the extensive literature on book-tax differences. Firms successful at long-term tax avoidance are likely, though not necessarily, also firms that are able to sustain large differences between GAAP income and taxable income. Book-tax differences and tax avoidance are not exactly the same because tax avoidance can take place in many forms,

including generating tax credits and shifting income to low tax jurisdictions. Nevertheless, we expect an association between tax avoidance and book-tax differences.

We note that just as we are aware of no prior study of long-run tax avoidance, we are aware of no study of long-run book-tax differences. There have been a number of studies that investigate causes and consequences of book-tax differences. For example, Manzon and Plesko (2002) examine the relation between financial accounting income and taxable income measures over time. They identify a set of variables that they argue explain a large percentage of the variation in the book-tax spread across firms. Conceptually, these explanatory items are 1) demand for tax-favored investment and financing (using profitability, the presence of NOLs, and the change in sales as proxies), 2) direct sources of investment related timing differences (using property plant and equipment and other assets which are systematically written off and post-retirement benefits as proxies), 3) permanent differences (using pre-1993 goodwill as a proxy) and 4) noise factors (using the change in NOLs, the extent of foreign operations, size, and lagged spread as proxies). They find in a fixed effects regression these variables explain 28% of the spread (and 69% of the adjusted spread, calculated by adjusting the spread between book and taxable incomes by items that are deductible for tax purposes and by income that is not taxable). However, Manzon and Plesko (2002) use annual data and do not investigate the long-run tax avoidance ability of the firm.

Other studies use the unexplained portion of the book-tax difference as a measure of potential tax sheltering. Desai and Dharmapala (2005) investigate whether firms with greater equity incentives engage in more tax avoidance activities. They measure tax avoidance as the residual from a regression of book-tax differences (estimated by grossing up current Federal tax expense to obtain an estimate of taxable income and then subtracting this from the firm's

domestic financial statement income) on a firm's total accruals (their proxy for earnings management activities). However, rather than include numerous variables which may explain tax avoidance activities, Desai and Dharmapala (2005) include only their measures of incentive compensation and governance variables and estimate firm fixed effects models to attempt to control for other factors in their analysis.

Frank et al. (2005) use an estimate of a firm's permanent differences as a measure of tax reporting aggressiveness in their investigation of whether firms are simultaneously aggressive for tax reporting and financial reporting. Some of the variables that they include as independent variables are 1) a measure of intangibles, 2) one year lagged permanent differences, 3) one year lagged market to book ratio for the firm, and 4) the long term debt of the company. The residual from a regression of permanent differences on these variables (and others) is their measure of "discretionary permanent differences." By estimating residuals in this manner, Frank et al. (2005) focus on measuring the part of tax aggressiveness that cannot be explained by observable firm characteristics, whereas we are trying to investigate what firm characteristics are associated with tax avoidance—more in the spirit of Manzon and Plesko above.

Finally, we note that many recent papers provide evidence consistent with book-tax differences also containing information about financial accounting earnings quality (i.e., earnings management) and not just tax aggressiveness (see Mills and Newberry, 2001; Phillips, Pincus and Rego 2003; Hanlon 2005). We discuss the implications of earnings management for our measure of long-run tax avoidance, the *CASH ETR*, below.

3. Measures of Tax Avoidance

3.1. Problems with Traditional Effective Tax Rates

We begin with the traditional GAAP effective tax rate and then modify it to better fit the goal of our study.[6] To understand the modifications it is important to first understand what the effective tax rate does and does not capture. The effective tax rate, which firms are required to disclose in the footnotes to their financial statements, is the ratio of tax expense to pretax income. Thus, the traditional effective tax rate for a given firm i for year t (ETR_{it}) is given by:

$$ETR_{it} = \frac{Tax\ expense_{it}}{Pretax\ Income_{it}} \tag{1}$$

Both tax expense and pretax income are based on GAAP. In Compustat, *Pretax Income* is data item 170 and *Tax Expense* is data item 16. Under Statement of Financial Accounting Standards 109, *Accounting for Income Taxes*, tax expense is composed of the sum of current tax expense and deferred tax expense. In terms of measuring a firm's tax avoidance, using GAAP tax expense presents a number of problems.

The first and most obvious is that the GAAP tax expense measure includes both current and deferred taxes. Deferred taxes represent the future tax effects from current transactions. Thus, these are future taxes to be paid (or refunded) not taxes paid in the current period.

However, even using only the current tax expense portion of the tax expense from the financial statements presents considerable challenges. First, because the current tax expense is a financial accounting, accrual-based measure of an expense it does not represent the actual taxes paid during the period. For example, if a firm takes a tax position on its return that may hold up under IRS scrutiny in the future, under certain conditions firms will accrue an the expense for

[6] We use the effective tax rate as our beginning and comparison rate to our measure because this is the highlighted rate in the financial statements. We recognize, of course, that many researchers are aware of the problems with this measure in estimating current tax liabilities.

those taxes even though it is not paying them currently and may never pay them. This overstates the current tax expense relative to the actual taxes paid by the firm.[7]

A second problem arises because of the accounting for the tax benefits of stock options. During our sample period, there was no financial accounting expense for the granting of stock options required. For tax purposes, however, firms were entitled to a deduction for the difference between the market value of the stock and the strike price of the option when the employees exercised the options. Thus, for tax purposes there was a deduction for employee stock options but no expense for financial accounting—a permanent difference. However, under the accounting rules the tax benefits for the deduction were added directly to equity rather than accounted for as a book-tax difference that would reduce the current tax expense. As a result, the current tax expense was overstated relative to the taxes actually paid for firms with stock option deductions.[8]

3.2. Building a Better Effective Tax Rate

To overcome the limitations of traditional effective tax rates, we make two key modifications. First, we measure effective tax rates over periods ranging from one year to ten years. This is not the same as simply averaging a series of single-year effective tax rates. Such averaging would still tend to overweight the effects of years with unusually large or small (even negative) effective tax rates. Instead, we sum a firm's total taxes over five and ten year periods and divide that by the sum of its total pretax income over the same five and ten year periods.

[7] This is known in the industry as the "tax cushion" or the tax contingency reserve. Practice regarding when and how to record tax cushions has varied across firms, leading to a recent FASB Exposure Draft on "Uncertain Tax Positions."

[8] See Hanlon (2003) for a more complete discussion of these and other issues. We note that the tax credit issue mentioned there is not a problem here because we are not measuring taxable income but a ratio of taxes paid relative to financial accounting income.

This produces an effective tax rate which we believe more closely tracks the firm's tax burden over the long-run.

Our second improvement is that we measure effective taxes using cash taxes paid rather than GAAP tax expense. As discussed in the prior section, GAAP tax expense can differ in a number of ways from actual taxes paid. Cash effective tax rates are not affected by changes in estimates such as the valuation allowance or tax cushion. Finally, CASH *ETRs* take into account the tax benefits of employee stock options, whereas traditional effective tax rates (using total tax expense or only current tax expense) do not. In the empirical section of the paper, we compare the properties of cash effective tax rates with those of traditional effective tax rates.

We recognize that using cash taxes paid over one year periods introduces other problems not present when using current tax expense. The cash taxes paid can include payments to the IRS upon settling an audit which may be for several years ago. In addition, the cash taxes paid includes actual taxes paid during the year rather than taxes paid *on* the year's income. However, because our focus is on successful long-term tax avoidance we intend for these items to be included, and in the long-run they are not problematic. For example, because we want to examine *successful* long-run tax avoidance, the inclusion of payments to the IRS in subsequent periods is appropriate—if the firm has to pay the IRS back taxes they were not successful in avoiding the tax. In addition, the timing of the estimates versus the tax due for the year is not an issue since we are summing the taxes paid over a period of five or ten years rather than focusing on one year rates.

Our resulting cash effective tax rate for firm i measured over the period t=1 to N (*CASH* ETR_i) is:

$$CASH\ ETR_i = \frac{\sum_{t=1}^{N} Cash\ Tax\ Paid_{it}}{\sum_{t=1}^{N} Pretax\ Income_{it}} \quad (2)$$

We vary N from one year to as long as ten years. Cash tax paid is Compustat data item 317. Cash tax paid can be found in the financial statements as a supplemental disclosure at the bottom of the statement of cash flows or in the notes to the financial statements. Though firms are required to disclose cash tax paid, it is sometimes missing in Compustat. In those cases (8.25 percent of the firm years), we use current tax expense rather than lose the firm from the sample. The tenor of our results is not affected if we restrict the sample to only those observations that have an unbroken string of cash tax paid on Compustat for the years in question, though the resulting sample is smaller[9]

4. Empirical Evidence

4.1. Sample Selection

We impose minimal requirements on our sample in order to maximize our coverage. We begin with all firm years on Compustat during the years 1995 – 2004 that report ten years of non-missing cash taxes paid or non-missing current tax expense and non-missing pre-tax income.[10] This produces 35,720 firm-year observations, corresponding to 3,572 firms. Next, we remove observations that pertain to entities not taxed as corporations (e.g., limited partnerships, REITs,

[9] We have also experimented with building time value of money considerations into our cash effective tax rate measures, in the same spirit that Shevlin (1990) and Graham (1996) incorporate time value of money into their estimates of marginal tax rates. Specifically, we assigned each firm an arbitrary discount rate of 10 percent and re-estimated (2) by discounting the amounts in both the numerator and denominator values back to year 1.

[10] We also require some data in 1994 when running the tests in tables 4 and 5. This requirement eliminates an additional 211 firms, as noted in sub-section 4.4.

Trusts), which reduces the sample to 33,540 observations (3,354 firms).[11] We also remove utilities (SIC 49) from our sample as they are typically rate-regulated and may face different incentives to avoid taxes than do firms that are not rate-regulated, reducing our sample to 31,080 observations (3,108 firms). Finally, we remove foreign firms except those that are foreign by virtue of being incorporated in a tax haven. For example, DiamlerChrysler (Germany) and Nortel (Canada) are excluded from the sample whereas Carnival (Panama) and Tyco (Bermuda) are included in the sample. We define tax haven countries as the union of the countries identified by the Office of Economic Cooperation and Development (OECD) as havens and those countries identified as havens in Hines (2004) for which Compustat has a country of incorporation code.[12] Imposing this last requirement results in a sample of 29,090 firm-years, corresponding to 2,909 unique firms that have an unbroken string of cash taxes paid or current tax expense and pretax income.

Most of our tests require firms to have positive aggregate pretax income over the ten year period. This requirement reduces the sample to 19,470 firm years, corresponding to 1,947 firms. We primarily focus on these 1,947 firms to improve comparability across effective tax rate measures (so we aren't both changing the measure and the sample), and to enhance interpretation of the effective tax rate measure (giving a meaningful effective tax rate number). However, to aide in the illustration of our effective tax rate measures, we also retain a sample of *all* firm years including those that do not have ten consecutive years of non-missing data for the effective tax rate variables. This full sample is analyzed in table 1, and compared with our balanced (restricted) sample in table 2. The remainders of the tests utilize firms in our balanced sample.

[11] Specifically, we omit firms with names ending in "-LP" containing "TRUST" and firms with six digit CUSIPs ending in "Y" or "Z."

[12] The Compustat industrial file, from which we draw our sample, does not have country codes for all of the tax haven countries identified from these two sources. Thus, a haven firm is one identified by the OECD or Hines (2004) and with a Compustat country code.

While there are only 1,947 firms that have meaningful effective tax rate data for the ten year period, these firms represent 83 percent of the total market capitalization of all Compustat firms as of the end of our sample period (the year 2004). Moreover, the sample of firms that have ten years of Compustat data is tilted towards mature firms that also tend to be the heaviest taxpayers among corporations. In fact, the 1,947 firms that have continuous data since 1995 reported $129 billion in current federal income taxes in 2004, representing 56 percent of all corporate taxes collected by the IRS that year (a figure that includes taxes paid by privately held firms).[13]

4.2. The Distribution of Effective Tax Rates

Table 1 presents distributional characteristics of traditional effective tax rates and cash effective tax rates, each measured over periods ranging from one year to ten years for a sample of all Compustat firm years with non-missing ETR data in any one year. *ETR1* refers to a traditional effective tax rate (*ETR* from equation (1)) measured over a one-year period. *ETR5* and *ETR10* refer to the same but measured over a five year and ten year period, respectively. *CASH ETR* refers to cash effective tax rates as given in equation (2). The underlying sample in table 1 is allowed to vary across columns to illustrate issues related aggregation of data across time. Table 2 presents the same measures as table 1, but the panel is balanced across time, and is composed of the firms that have non-missing data over the ten year period (29,090 firms-year observations representing 2,909 firms).

Table 1, Panels A and B demonstrates the frequency of non-meaningful effective tax rates. Effective tax rates are hard to interpret when the denominator (pretax income) is negative

[13] For this calculation we use current federal income taxes because we are comparing to IRS data, which obviously do not include taxes paid to foreign governments or U.S. states. Our other tests generally strive to include all income taxes paid regardless of the jurisdiction to which they are paid.

and researchers often classify such observations as undefined. Across all 70,469 firm-years in the full sample, only 38,422 have positive pretax income. Thus, for a typical year about 45 percent of the sample would have an undefined effective tax rate if it were based on a single year of data. The frequency of negative denominators declines as the aggregation period lengthens, though not as sharply as one might expect. Over a five-year period, approximately 42 percent of firms report negative pretax income. Surprisingly, 33 percent of firms have an aggregate pretax income that is negative even when measured over a ten year period.

As noted earlier, table 2 requires that firms have ten years of consecutive tax data. Repeating the same tests shows that the stricter data requirements effectively reduce the number of negative pre-tax income firm-years. As with table 1, a surprising finding in table 2, panel B is that the percentage of firms with negative pre-tax income fails to drop as the aggregation period increases. This could be due to firms reporting a loss in any one year being likely to report losses in other years so that their ten year average remains negative. It is also possible that firm has a very bad year, perhaps due to a massive write-down, such that the losses they report in the years they report a loss are so large it wipes out their earnings in their profitable years.

Even when pretax income is positive, non-meaningful effective tax rates can arise when taxes paid are negative (causing a negative effective tax rates) or are so high as to exceed pretax income (causing an effective tax rate greater than 100 percent). The frequency of effective tax rates that fall outside the band from 0 to 1 range from nearly eight percent for one-year effective tax rates to around five percent for ten-year cash effective tax rates. In order to make the effective tax rates more interpretable, we reset any value greater than 1 to 1 and any value less than zero to zero.

Panel C in table 2 examines the distribution (winsorized at 0 and 1) of effective tax rates, both cash and traditional, with positive denominators. Several observations are noteworthy here. First, *CASH ETRs* are consistently lower than traditional effective tax rates for each of the measurement periods at both the means and medians. For example, the mean *ETR1* is 32.8 percent balanced sample, whereas the mean *CASH ETR1* is 25.1 percent.

Second, for both traditional and cash effective tax rates, the mean increases as the measurement period lengthens. For example, the mean cash effective tax rate increases from 25.1 percent over a one-year period, to 29.0 percent over a five-year period, to 29.8 percent over a ten year period. The same pattern holds at the medians. Interestingly, by ten years, the cash effective tax rate is still several percentage points below the federal statutory tax rate of 35 percent during this period.

Third, there is significant variation around the mean and median effective tax rates. At the 5th percentile *CASH ETR1* is zero and at the 25th percentile, *CASH ETR1* is only 10.3 percent. Such low effective tax rates are not as easy to sustain for longer time periods. Over ten year periods, the *CASH ETR* at the 5th percentile is 6.6 percent and at the 25th percentile it is 21.0 percent. In addition, even over a ten year period, both the mean and median of the cash tax measure indicate that a significant number of firms do not pay taxes at the statutory tax rate. Thus, there appears to be evidence that some firms are successful a tax avoidance even over relatively long periods of time.

Finally, we note a small set of firms that appear to face unusually heavy tax burdens in both samples. It would not be uncommon for a firm to face a combined federal and state tax rate of approximately 40 percent. Moreover, if the firm did business in high tax foreign jurisdictions the rate could be even higher. However, even at the 75th percentile firms appear to

be paying only about 37 percent of pretax income in taxes to all jurisdictions. Only when reaching the highest percentiles of the distribution does *CASH ETR10* surpass what one might consider a reasonable range for the statutory rate.

Focusing on the balanced panel, Figure 1 presents histograms of cash effective tax rates over one, five and ten year measurement periods for firms with positive denominators. It is clear that the distribution tightens as the measurement period increases. With a one-year measurement period, cash effective tax rates are fairly evenly spread across tax rate categories ranging from zero to 40 percent. Only about 20 percent of the sample has one-year cash effective tax rates between 30 and 40 percent. With a ten-year measurement period slightly over 30 percent of the sample has cash effective tax rates between 30 and 40 percent.

Figure 2 focuses on those firms that are successful at long-run tax avoidance, those with ten year cash effective tax rates of 20 percent or less. There are 437 such firms and they comprise approximately 22 percent of the sample with meaningful *CASH ETR10* (untabulated). Figure 1 shows these 437 firms as the shaded blocks and for convenience we refer to these firms as the "long-run tax avoiders." Figure 2 takes the 437 long-run tax avoiders and examines the distribution of their *one-year* cash effective tax rates. This figure shows that over 50 percent of the meaningful firm year CASH ETRs are less than 10 percent of pretax income. In fact, approximately 75 percent of all firm year *CASH ETR* observations fall in the range we consider as denoting a successful tax avoider (rate < 20%).

While these firms do appear to be consistently successful at avoiding taxes, the fact that in approximately 25% of years these firms will appear to have a rate greater than 20% (and in approximately 13% of the years have an annual cash effective tax rate of greater than 30%) demonstrates the risks of measuring effective tax rates calculated over just one year. Using

annual *CASH ETR* observations would result in the misclassification of successful avoider firms as non-avoider firms somewhere between 13 percent to 25 percent of the time.

Figure 3 examines how quickly firms with extreme one-year cash effective tax rates mean revert. We split firm-years into seven groups based on their one-year cash effective tax rates. The graphs on the left (right) side include firms that report unusually low (high) cash effective tax rates in year 0 (meaning firms in the lowest decile in any year from 1995-2000). The pattern that emerges is that firms with unusually low cash effective tax rates in a given year mean revert much more slowly than do firms with unusually high cash effective tax rates. Of the firms that were in the lowest group of year 0 cash effective tax rates, over 40 percent are still in the lowest group as of year +4. By contrast, only about 9.84 percent of the firms that were in the highest cash effective tax rate group in year 0 were still in that group by year +4.

4.3. Industries and Firms with Consistently Low Effective Tax Rates

There is some evidence of industries that have consistently low cash effective tax rates. Table 3 presents industry average cash effective tax rates for measurement periods ranging from one to ten years, calculated by taking the mean of the effective tax rate measures across firms within a given industry. The ten two digit sic code industries with the lowest mean ten-year cash effective tax rates are presented in table 3. The industry with the lowest cash effective tax rate is SIC 40, railroad transportation, with an average ten-year cash effective tax rate of just 15%. This industry represents less than one percent of the total sample but 2.3 percent of the long-run tax avoiders. Other low tax industries are oil and gas extraction (*CASH ETR10* = 17.3%), real estate (*CASH ETR10* = 21.4%), trucking and warehousing (*CASH ETR10* = 22.3%), amusement and recreation services (*CASH ETR10* = 22.4%), insurance carriers (*CASH ETR10* = 24.2%),

Automotive Dealers and service stations (*CASH ETR10* = 24.6%), petroleum and coal products (*CASH ETR10* = 24.6%), non-depository institutions (*CASH ETR10* = 27.4%), and water transportation (*CASH ETR10* = 28.1%).

However, considering that the mean *CASH ETR10* rate across the entire sample is 29.8 percent (table 2), many of these low tax industries do not appear all that out of the ordinary. Only two industries, railroads (SIC 40) and oil and gas extraction (SIC 13) have average ten-year cash effective tax rates lower than 20 percent. Collectively, these ten industries constitute 16 percent of the total sample and 36 percent of the long-run tax avoiders. In short, there is some evidence of industry clustering of long-run tax avoiders, but there is also plenty of firm-specific variation (i.e., 64 percent of long-run tax avoiders come from industries that have average sixteen year cash effective tax rates that exceed 28.1 percent).

To get a sense of the identities of long-run tax avoiders, we sort firms by market value as of the end of 2004 and then rank the largest 100 firms by *CASH ETR*. Table 4 reports data for the 25 firms from this group of 100 with the lowest ten-year *CASH ETRs*. We focus on the 100 largest firms so that readers will be familiar with the firms.

For comparison, we also present the traditional effective tax rates for these firms also measured over the same ten year period. The traditional effective tax rates are much higher than the cash effective tax rates. For firms that are heavy issuers of employee stock options this is understandable. The tax benefit from employee stock options was reported outside of tax expense during this period and as a result, the GAAP tax expense far overstated the actual tax burden faced by a firm with large use of employee stock options. However, stock options do not appear to be able to explain the entire difference between the cash effective tax rates and the traditional effective tax rates. All of the firms on this list have cash effective tax rates lower than

15 percent, but only Carnival and Hartford Financial Services Group have traditional effective tax rates that are less than 15 percent.

Also of interest is the comparison between rankings based on *CASH ETR10* and *ETR10*. Table 4 illustrates that less than half of the top twenty five would have made the list if *ETR10* were used. Several of those not making the list would have been far from the top twenty five, including Dell (ranked 34th), Cendant (ranked 39th), Qualcomm (ranked 68th), and Occidental Petroleum (ranked 90th). While General Electric (ranked 15th in terms of *ETR10*) and Devon Energy (ranked 25th) would have fallen in the upper quartile of the most successful tax avoiders, they both exhibit a large a disparity of over 15% between *ETR10* and *CASH ETR10*.

For some of these firms the source of the low *CASH ETR* can be discerned from examining their SEC filings. Among the largest corporations, Carnival is clearly the leader in long-run tax avoidance, with a ten-year cash effective tax rate of 0.7 percent. For example, in FYE 2004 Carnival reported approximately $1.9 billion of pretax income but just $47 million of tax expense, for a GAAP effective tax rate of approximately 2.5 percent. Carnival's actual cash tax paid in 2004 was $8 million, for a 2004 cash effective tax ate of approximately 0.4 percent. How does Carnival achieve such tax savings? Carnival is headquartered in Miami but is incorporated in Panama, a country classified as a tax haven by the OECD.[14] Under Section 883 of the Internal Revenue Code, income derived by a foreign corporation from the international operation of ships or aircraft is, under certain conditions, excluded from U.S. taxation. As a Panamanian corporation, Carnival is a foreign corporation for U.S. tax purposes. Not all of

[14] In 2003, Carnival and the former parent of Princes Cruise lines engaged in a sort-of synthetic merger to form a "dual listed company" (not to be confused with cross-listing). This was a highly complex transaction but can be briefly described as follows. In the dual listed company structure, both parent companies are tied together contractually and through amendments to their corporate charters, but continue to have separate boards of directors and remain incorporated in their respective countries (Panama for the historic Carnival parent, England and Wales for the historic Princess parent).

Carnival's income is exempt under Section 883; it is subject to U.S. tax on non-shipping income such as the operation of hotels.

Tyco also achieves tax savings from being incorporated in a tax haven, in its case Bermuda, rather than being incorporated in the U.S. Tyco is not able to avoid taxes to the extent of Carnival, however. In FYE 2004, Tyco reported approximately $4.159 billion of income from continuing operations before taxes and minority interest, approximately $1.14 billion of GAAP tax expense, and $550 million of cash income taxes paid, net of refunds. Thus, Tyco's GAAP effective tax rate for 2004 was approximately 27.4 percent, whereas its cash effective tax rate was approximately 13.2 percent.

The tax advantage of being incorporated outside the U.S. is two-fold. First, it removes non-U.S. income from the U.S. tax system. U.S. incorporated multinationals eventually face U.S. tax on their worldwide income and have to rely on foreign tax credits to mitigate double-taxation. Companies with income in low-tax foreign countries find that particularly onerous, as the U.S. approach to taxation results in foreign earnings being taxed at the greater of the foreign rate and the U.S. rate. By incorporating in a tax haven, firms avoid having to subject their foreign income to U.S. corporate income taxes. Second, some have alleged that firms incorporated in tax havens are able to shift income from high tax jurisdictions to low- or no-tax jurisdictions through transfer pricing, inter-company debt, and transfers of intangible assets. These issues are discussed in detail by Desai and Hines (2002) among others.

The firms on this list illustrate that there are many potential causes of a low cash effective tax rates. A cluster of companies like Dell, Microsoft and Cisco are likely on the list at least in part due to heavy use of employee stock options during this period. Because employee stock

options were generally not expensed for financial reporting purposes during this period but did generate tax deductions, they tend to reduce *CASH ETRs*.

Boeing, one of the United States' largest exporters, experienced tax savings due to a combination of factors, including tax provisions that Congress enacted that are favorable to exporters (i.e., the FSC and ETI provisions, since repealed under pressure due to perceived conflicts with GATT), tax credits for engaging in research and development, and charitable contributions.

Hartford Financial Services Group, an insurance company, has investments that generate large amounts of tax-exempt interest income as well as dividend income from other companies, which is subject to the dividends received deduction. Other insurance companies on the list include American International Group, St. Paul Travelers, and Allstate. In sum, an examination of individual companies shows there are many paths to low long-run cash effective tax rates. Some of these may be firm-specific and idiosyncratic. The next section examines whether there are general factors associated with long-run tax avoidance across a broad set of firms.

4.4. Explaining Cross-Sectional Variation in Long-Term Tax Avoidance

In this section, we present a first step at explaining the characteristics associated with long-run tax avoidance. Table 4 presents descriptive statistics for variables that we use in the regression analysis. We draw many of these variables directly or indirectly from prior studies that have examined variation in one-year effective tax rates. We hasten to add that these tests are merely exploratory and cannot be used to infer causality as the variables are endogenously determined.

The factors we use to explain the cross-sectional variation in *CASH ETR10*, our measure of long-term tax avoidance are: (1) property, plant and equipment, (2) estimated employee stock option expense, (3) intangible assets, (3) incorporation in a tax haven, (4) foreign pretax income, (5) foreign assets, (6) leverage, (7) advertising expense (8) an indicator for net operating loss at the beginning of the sample period, (9) the change in the net operating loss balance, (10) special items, (11) equity in earnings, (12) research and development expense, and (13) size. We hypothesize these factors are either directly related to long term tax avoidance through provisions in the tax code that make them tax favored activities (or proxies for such activities), or indirectly related through a business structure which allows for more efficient tax avoidance.

Property, plant and equipment is included in our analysis for two reasons. First, Mills et al. (1998) argue that capital intensive firms potentially have more avenues for tax planning. These avenues include decisions of whether an asset is purchased or leased, timing of purchases and dispositions of assets. Second, to the extent fixed assets are purchased at a greater rate than they are disposed, book-tax differences will arise do to favorable depreciation rates for tax purposes. Although aggregating over ten years will mitigate a great portion of these temporary differences, we nevertheless expect the change in the level of property plant and equipment to be associated negatively associated with tax avoidance. We measure property plant and equipment as the average level of property plant and equipment over the sample period (((PP&E in 1994/Assets in 1994 + PP&E in 2004/Assets in 2004)/2); Compustat data item #8)

Stock options generate a tax deduction for the firm equal to the intrinsic value of the option on the date of exercise. This deduction reduces cash payments for income taxes. We estimate a firm's stock option expense using data from Execucomp assuming all option holders exercise on a schedule similar to the executives listed in the Execucomp database, that the value

of non-executive exercises is proportional to the executive exercises, and that the proportion of exercises during the year by executives versus non-executive employees is the same as the proportion of new grants to executives versus non-executive employees. Specifically, we gross up the value of executives' exercises (Execucomp variable *SOPTEXER*) by the percentage of total options granted that were granted to the executives (Execucomp variable *PCTTOTOP*). Thus, if executives exercise options with an intrinsic value of $100, and were granted 50% of the options granted in the current year, we assume the total intrinsic value for all options exercised is $200.[15] Based on this calculation, we expect option expense (*EST_OPT_EXPENSE*) to be negatively related to the cash effective tax rate.

We include the average level of intangible assets (*INTANGIBLES*) as a proxy for a firm's ability to easily shift income (Grubert and Slemrod (1998) and Hanlon, Mills and Slemrod (2005). A firm without physical assets can more easily locate income in a jurisdiction that is tax-favored, without the burdens that would accompany a firm with fixed assets. Thus, we expect the average level of intangibles to be inversely related to the rate of cash taxes paid. We measure *INTANGIBLES* as the average level of booked intangibles over the sample period (((*INTANGIBLES* in 1994/Assets in 1994 + *INTANGIBLES* in 2004/Assets in 2004)/2); Compustat data item #33).

We include an indicator variable for firms that are incorporated in a tax haven country (*HAVEN*), defined as countries identified as havens by the Organization for Economic Co-operation and Development (OECD) or those listed in Hines (2004). We expect firms that are located in haven countries to be more proficient at sheltering income from taxes, and therefore expect a negative coefficient on *HAVEN*.

[15] We follow Desai (2003) in this estimation procedure. We recognize that this method is merely an estimate and is based on several underlying assumptions.

We include average foreign income (Compustat data item # 273) divided by average total assets (data item # 6) (*FI*) as proxy for the extent to which a firm's income is not earned in the United States. While the United States taxes worldwide income, a variety of provisions in the tax code and treaties with foreign countries allow firms to defer the repatriation of earnings, or effectively offset tax liabilities from low tax countries with excess taxes paid in high tax countries. In addition, Rego (2003) uses a measure of foreign income to predict one year world wide effective tax rates, and finds a significant, negative coefficient on the variable. Similar to Rego (2003), we expect firms with more foreign income to be have more tax avoidance opportunities, and therefore predict a negative coefficient on *FI*.

Rego (2003) also predicts that a greater foreign presence results in a greater ability to avoid taxes. She utilizes foreign assets as a proxy for the extent of a firm's foreign operations. She also includes a quadratic term, and finds that ETRs are decreasing at a decreasing rate with respect to foreign operations. Following Rego (2003), we also include foreign assets as both a linear (*FOR_ASSETS*) and quadratic term (FOR_ASSETS^2) in our analysis. Total foreign assets are estimated by summing the *AT* variable from the Compustat business segment files across all non-US segments. We compute these variables as the average ratio of foreign assets to total assets over our sample period (foreign assets in 1994/total assets in 1994 + foreign assets in 2004/total assets in 2004)/2).

Following Mills, Erickson and Maydew (1998), we include leverage (*LEV*) as a proxy for financial sophistication. If leverage is a good proxy for financial sophistication, we predict a negative coefficient. We compute leverage as the average long-term debt to total asset ratio over our sample period (data9 in 1994/data6 in 1994 +data9 in 2004/data6 in 2004)/2).

Anecdotal evidence suggests firms that are more visible in the public eye are less likely to engage in aggressive tax positions. We include average advertising expense (*ADVERTISING*; Compustat data item #45) over the ten year period, scaled by average total assets(Compustat data item #6) as a proxy for public visibility, and predict a positive coefficient.

We also control for net operating losses. Firms are drawn into our sample period with a variety of conditions that may make taxes paid during the period vary, regardless of tax avoidance activities during the period. In particular, if a firm has a net operating loss carryforward balance at the beginning of the sample period, it will have opportunity to utilize that deduction in a future period. This balance, however, is a result of actions taken outside the sample period. To capture this effect we include an indicator variable for whether a firm has an operating loss carryforward (Compustat data item #52) at the beginning of the sample period (*NOL_DUMMY*), and expect firms with such a balance to pay lower rates of taxes in the sample period. Therefore, we predict a negative coefficient on *NOL_DUMMY*. We also measure the change in the operating loss balance. A decreasing operating loss over the sample period would indicate the firm has utilized some of the deductions during the sample period to avoid taxes. Thus we include a variable that captures the change in the net operating loss balance (*NOL*) and expect to find a positive coefficient (calculated as ((data52 in 2004 – data52 in 1994)/(data6 in 2004-data6 in 1994))).

Special items are included in the pre-tax earnings we used in the denominator of our dependent variable, *CASH ETR10*. Special items typically generate a book-tax difference. This difference can be either temporary or permanent. If a negative (positive) permanent difference, the special item would decrease (increase) book income but not taxable income resulting in a high (low) *CASH ETR*. If the difference is a negative (positive) temporary difference (such as

severance pay and restructuring charges), it would decrease financial accounting income in a year prior to when the deduction could be taken. If all differences were temporary and our time period captured all expenses for financial accounting and deductions for taxable income (i.e, captured the reversals) we would expect no effect from special items on our variable. However, because some of these items are permanent in nature and our time period will not capture all reversals we predict a negative relation (i.e., the more negative the special item the higher the *CASH ETR*).

We include equity in earnings (*EQUITY_EARN*) to control for the book-tax difference that is created by including earnings consolidated using the equity method for book purposes. Entities owned 20% or more and 50% or less are accounting for using the equity method of accounting for financial accounting. In this case the proportion of earnings of the subsidiary attributable to the parent are included in the income of the parent. For tax purposes, however, these earnings are not included in taxable income and instead only dividends received are included and are subject to the dividends received deduction. As a result, we expect that the greater the equity earnings the lower the *CASH ETR* because the denominator will increase but the cash taxes paid will not increase proportionately.

We include average research and development expense (*R&D;* Compustat data item #46, reset it to zero if missing) scaled by average total assets (Compustat data item #6) as a proxy for the level of intangibles which may allow the firm more opportunities to engage in tax planning (Grubert and Slemrod 1998 and Hanlon, Mills and Slemrod 2005) as well as to take into account the effect of any potential R&D tax credit which may lower the *CASH ETR10*.[16] We expect the coefficient on *R&D* to be negative.

[16] However, the full effect of the tax credit may not be captured since the credit calculation is based on incremental research and developmental expenditures and is not a simple calculation.

Finally, we include the log of average total assets (*SIZE*) as a proxy for size. Prior research (Rego (2003), Mills et al. (1998)) finds that firms enjoy economies of scale in the tax planning arena. Therefore, we expect (*SIZE*) to be negatively related to *CASH ETR10*.

After computing each of the variables mentioned above, 211 firms are lost due to missing data in 1994 (needed to compute the beginning of the period values). This reduces our sample from 1,947 firms to 1,736 firms.

Table 6 presents the regression results. The dependent variable in each regression is the ten year cash effective tax rate.[17] While many of the variables can explain cross-sectional variation in the ten year effective tax rates, there is much left to be explained (the highest R^2 across the models is 22.6%).

Several patterns emerge in the data. There is consistent evidence that fixed asset intensive firms (as measured by the variable *PP&E*) have lower cash effective tax rates. Using model 8's coefficient, a ten percent increase in the proportion of the firm's assets that are comprised of property, plant and equipment translates into a 1.1 percent lower cash effective tax rate. This is consistent with the tax laws favoring investments in tangible assets through rapid depreciation.

As expected, estimated option expense is negative and significant. The coefficient in model 8 suggests that increasing options expense by 10% of assets (which would be a very large increase in employee stock options) would result in a decreased cash effective tax rate of nearly 8%.

Firms with more intangible assets appear more successful at avoiding cash taxes over the long run. In particular, a 10% increase in intangible assets would result in a decrease in the rate of cash taxes paid just over one percent.

[17] We de-mean all variables to aid in the interpretation of the industy fixed effects.

Firms that report foreign income in their financial statements do not appear to have lower cash effective tax rates than other firms. However, firms locating in haven countries have on average a cash effective tax rate nearly 7% lower than other firms (per model 8). Conversely, the presence of foreign assets (as opposed to foreign income) is associated with higher income taxes, although the effect is increasing at a decreasing rate as the quadratic term loads negatively and significant. Taking these three findings together suggests that merely having foreign operations is not associated with tax avoidance, but reporting foreign income that is out of proportion with foreign assets is associated with tax avoidance. In addition, foreign operations located in a tax haven country particularly enhance the firm's ability to avoid cash tax payments.

Interestingly, the results on *FOR_ASSET* and FOR_ASSET^2 are opposite of what Rego (2003) finds. This difference could be due a variety of factors that set our analysis apart from Rego (2003). In particular, our dependent variable is measured over ten years and uses cash tax paid, not current tax expense. Additionally, while we include many of the same explanatory variables as Rego, we also have variables that Rego doesn't include, including *EST_OPT_EXPENSE*, *LEV*, and *INTANGIBLES*, among others.

The data indicate that large firms appear better able to avoid taxes than smaller firms. The coefficient on the log of the firm's assets, *SIZE*, is negative and significant across each of the specifications. We also find that the presence of special items is associated with lower cash effective tax rates.

The presence of an NOL carryforward balance at the beginning of the period, *NOL_DUMMY* is associated with lower cash effective tax rates, consistent with firms using up a carryforward which reduces their tax rate during those years. The change in the NOL carryforward, *NOL*, is positively associated with cash effective tax rates, indicating that a

decrease in an NOL decreases taxes during the period (the firm is applying the NOL carryforward) and an increase in an NOL increases tax rates consistent with firms with an increasing NOL not being able to utilize the carryforward during the period (perhaps because of IRC §382).

Models 2, 4, 6, and 8 contain industry fixed effects; only those industries with significant coefficients are presented for the sake of brevity. The coefficients on the industry fixed effects can be interpreted as the incremental mean effect of factors constant within an industry, over and above the sample mean effective cash tax rate. SIC 67, holding and other investment offices, and SIC 65, real estate, are the two industries with the lowest cash effective tax rates in the presence of the other explanatory variables. These results are generally consistent with table 3, which showed the 10 industries with the lowest effective tax rates. However, only three of the 10 industries in table 3 have significant fixed effects (SIC 13, oil and gas extraction; SIC 63, insurance carriers; and SIC 65, real estate). None of the other 7 industries on the list have significant fixed effects, suggesting that their low tax status is not due to industry *per se*, but rather due to other factors associated with industry that are captured by the other explanatory variables.

Several industries show up as being heavily taxed. Among the most heavily taxed are Those are SIC 27, printing and publishing, and SIC 48, communication, and SIC 31, leather and leather products.

While completely understanding a firm's tax position would require a case study of the firm, and would likely require private information as well, this analysis demonstrates the ability to tease out some general patterns from the publicly-available data.

5. Caveats

It is important to note that we are measuring explicit taxes and not implicit taxes (in the sense of Scholes et al., 2005). Explicit taxes are taxes paid directly to a taxing authority. Implicit taxes are taxes indirectly paid to issuers of tax favored assets by accepting a lower pretax rate of return. The canonical example of implicit taxes involves municipal bonds, which are exempt from federal income taxes. It is well documented that municipal bonds have lower pretax returns than fully taxable corporate bonds of equivalent risk and duration (Chalmers, 1998; Poterba, 1986).

Say, for example, that corporate bonds yield a pretax return of 10 percent and otherwise similar municipal bonds yield a pretax return (and after-tax, as they are tax exempt) of 6.5 percent. Then the municipal bonds are said to bear an implicit tax of 3.5 percent or equivalently be subject to an implicit tax at a rate of 35 percent [(10% – 6.5%) / 10%].[18] Consider two firms that each owns a single asset. The first firm owns corporate bonds, does no tax planning, and pays tax at the 35 percent corporate tax rate. That firm would have an effective tax rate of 35 percent by our measure. The second firm own municipal bonds and does no other tax planning. That firm would have an effective tax rate of zero by our measure and in fact would be a successful avoider of explicit taxes, though it would bear a 35 percent implicit tax burden. In terms of maximizing after-tax shareholder wealth, however, both firms would be in the same position. This means that while we can measure explicit tax avoidance, we cannot and do not claim that tax avoidance directly translates into shareholder wealth, because avoiding explicit taxes can, in some cases, result in an increase in implicit taxes.

[18] In practice, the yield spread between municipal bonds and fully taxable but otherwise similar corporate bonds is smaller than would be implied by statutory tax rates, a condition known as the "muni bond puzzle." For discussions of the muni bond puzzle, see Chalmers (1998) and Poterba (1986).

There is no reason to expect that implicit taxes are limited to municipal bonds and, in fact, there is some evidence of implicit taxes in other tax-favored investments such as preferred stock (Erickson and Maydew, 1998) in ESOPs (Shackelford, 1991), and research and development expenditures (Berger, 1993). Apart from a few documented cases of implicit taxes, however, we know little about them because they are so difficult to measure. Essentially, to directly measure implicit taxes one has to find settings whether two assets have different tax treatments but are otherwise identical. Such settings are exceedingly rare. Another approach is to attempt to indirectly measure implicit taxes by controlling for risk and other priced non-tax differences between assets, but the resulting implicit tax estimates are only as good as our ability to precisely measure how risk and other attributes map into expected returns.[19]

6. Conclusions

Despite decades of tax research, little is known about firms' ability to avoid income taxes over long periods of time. The purpose of this study is to shed some initial evidence on this question. We find a significant fraction of firms that appear to be able to successfully avoid large portions of the corporate income tax over sustained periods of time. Using a ten-year measure of tax avoidance we find 437 firms, comprising 22 percent of our sample, which are able to maintain a cash effective tax rate of 20 percent or less. At the same time, the mean firm is not much of a tax avoider, with a ten-year cash effective tax rate of approximately 30 percent. This suggests that tax avoidance is concentrated in a subset of long-run tax avoiders.

[19] Nevertheless, one avenue of future research that we are exploring is whether there is evidence of implicit taxes at the firm-level that are inversely related to the explicit taxes that we document in this paper. It is possible that firms that show up as successful long-run tax avoiding firms do so at the expense of sacrificing pretax rates of return; that is they may bear implicit taxes that partially or fully offset the reductions they have achieved in their explicit taxes.

Industry explains a modest amount of long-run tax avoidance. While we find some evidence of industry clustering of long-run tax avoiders (e.g., oil and gas extraction, insurance and real estate), those industries only account for a fraction of all long-run tax avoiders. Low long-run cash effective tax rates are associated with being a large firm, being incorporated in a tax haven, having a high ratio of property, plant and equipment to assets, being intangible intensive, and being highly levered. Controlling for employee stock option use also helps to explain variation on cash effective tax rates.

There are a number of unanswered questions regarding long-run tax avoidance. First, is long-run tax avoidance valued by the market? There are reasons why it might not be. Under certain conditions, avoidance of explicit taxes comes at the price of bearing implicit taxes – reductions in pretax rates of return. Implicit taxes are notoriously difficult to measure, so examining this possibility may not be feasible. Second, what causes firms from the same industry that otherwise look fairly similar to diverge when it comes to apparent tax avoidance? Third, do firms that exhibit long-run tax avoidance appear to suffer any tax consequences such as increased litigation for alleged tax shelters? Finally, is there any connection between long-run tax avoidance and symptoms of governance breakdowns such as accounting fraud, as would be suggested by Desai and Dharmapala (2005)?

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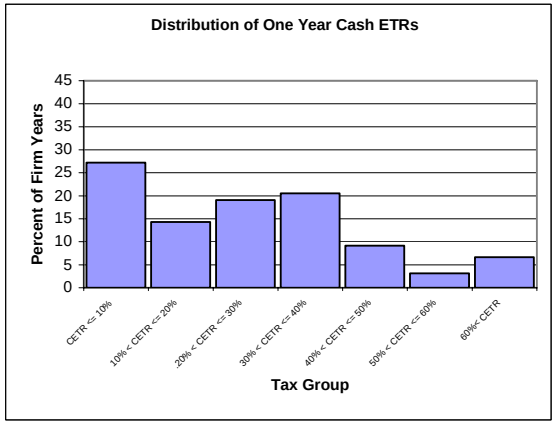
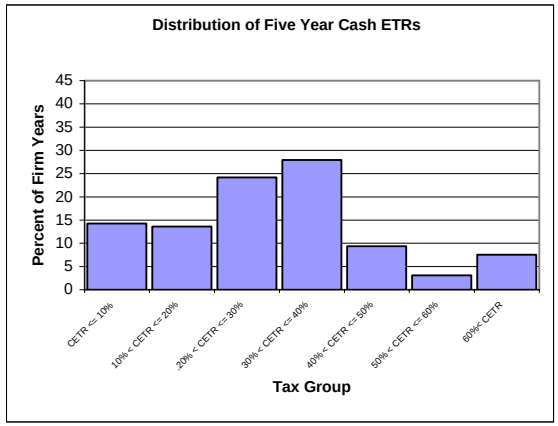
Figure 1

Histograms of Cash ETRs at Different Levels of Aggregation





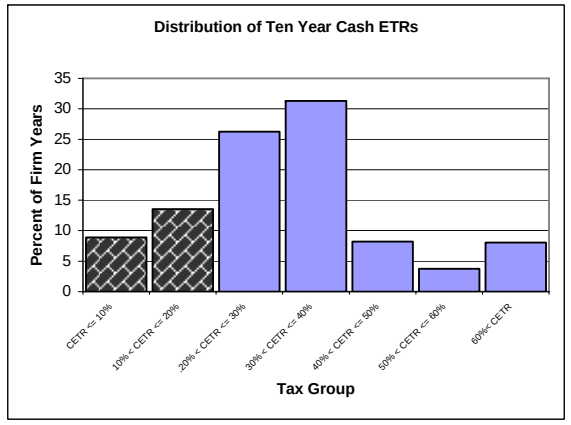
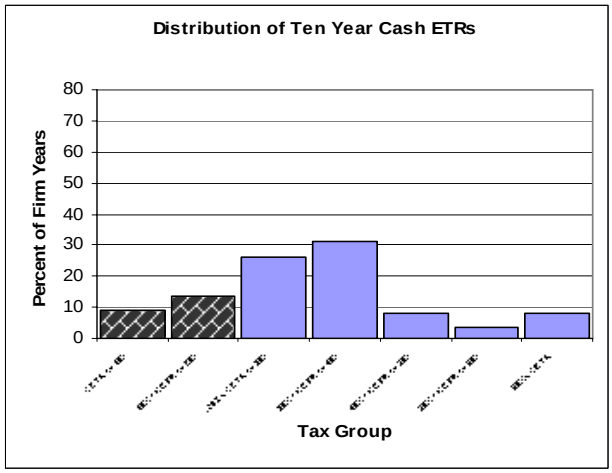


Figure 2

Histograms of Cash ETRs at Different Levels of Aggregation



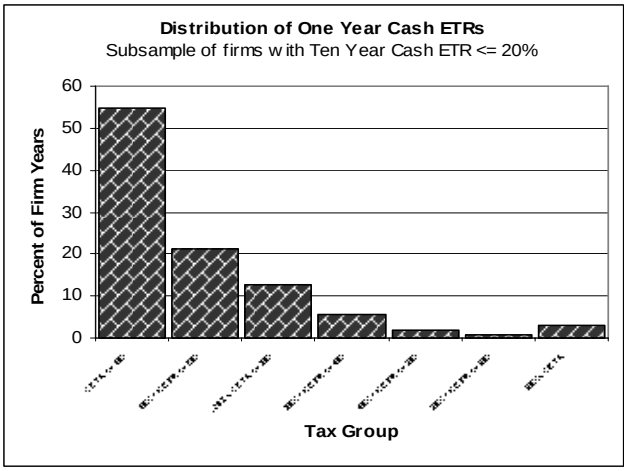


Figure 3

Yearly Cash ETRs after realizing an observation in an extreme tax group in year 0

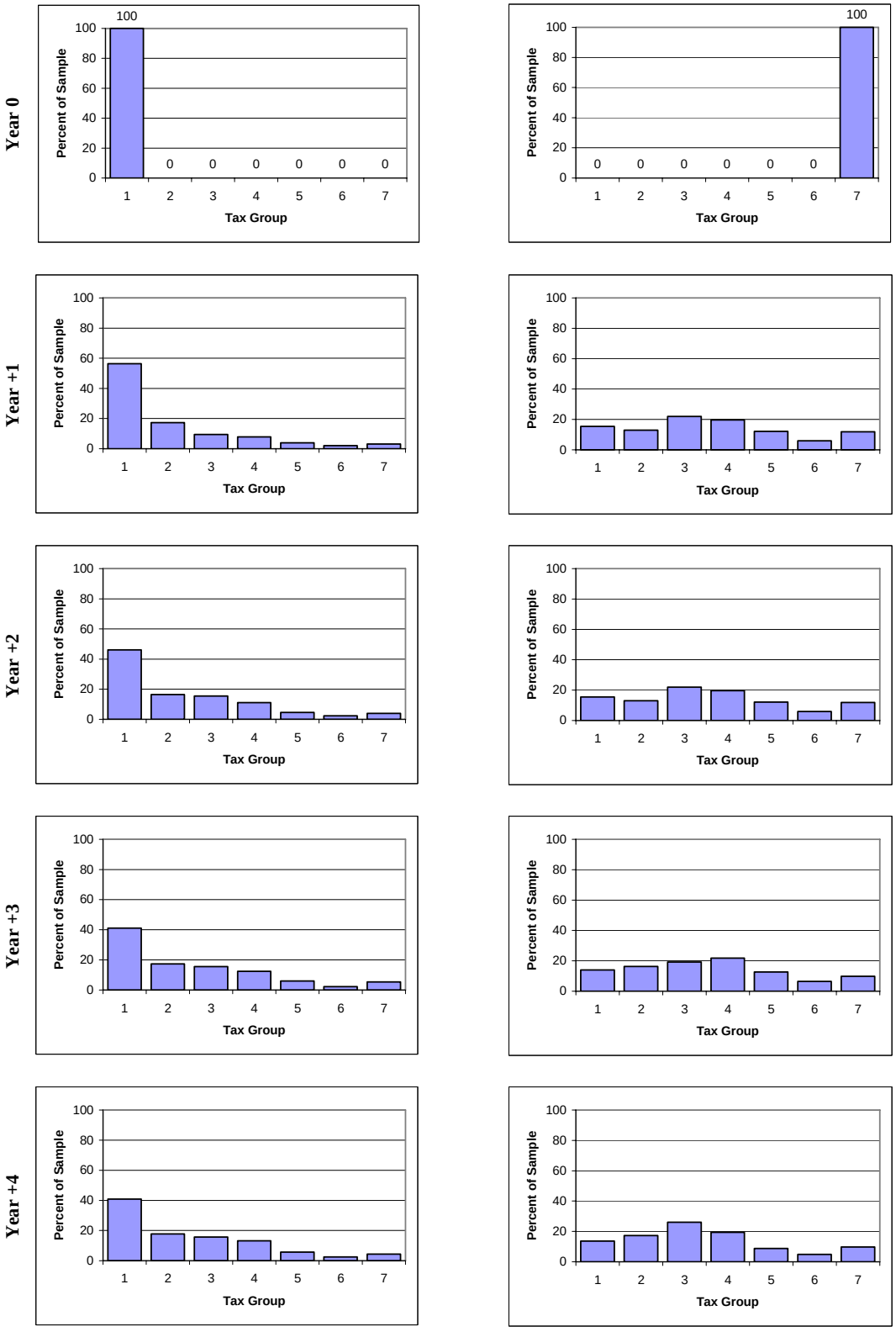


Table 1

Distributional Charicteristics of Traditional and Cash Based ETRs at Different Horizons

-- All Available Compustat Firm Years --

	CASH ETR1	*CASH ETR5*	*CASH ETR10*	*ETR1*	*ETR5*	*ETR10*
Panel A: Firms and Firm Years						
Unique Firms	11,466	6,657	2,931	11,466	6,638	2,909
Firm Observations	70,469	9,589	2,931	70,454	9,547	2,909
Firm Observations with Denominator > 0	38,422	5,499	1,956	38,407	5,487	1,947
Panel B: Percent of Obs with non-meaningful interpretations						
%Firm Obs with Denominator <= 0	45.48%	42.65%	33.27%	45.49%	42.53%	33.07%
%Firm Obs outside [0,1], excluding Denominator <= 0	7.83%	6.02%	5.11%	6.68%	7.53%	5.65%
Panel C: Distributional Characteristics (winsorized at 0 and 1) and excluding Denominator <= 0						
Mean	0.241	0.292	0.299	0.321	0.354	0.362
Std Dev	0.193	0.172	0.148	0.150	0.126	0.120
5th Pctl	0.000	0.025	0.065	0.000	0.117	0.155
25th Pctl	0.066	0.182	0.209	0.278	0.311	0.318
Median	0.234	0.292	0.298	0.362	0.367	0.367
75th Pctl	0.360	0.374	0.366	0.396	0.399	0.397
95th Pctl	0.579	0.599	0.562	0.493	0.541	0.546

ETR1, ETR5, ETR10 (*CASH ETR1, CASH ETR5, CASH ETR10*) are traditional (cash) effective tax rates, calculated by summing income tax expense (cash tax paid) over 1, 5, and 10 years, respectively, divided by pretax income summed over 1, 5, and 10 years, respectively. When cash tax paid is missing, current tax expense is substituted.

Table 2

Distributional Charicteristics of Traditional and Cash Based ETRs at Different Horizons

-- Balanced Panel --

	CASH ETR1	*CASH ETR5*	*CASH ETR10*	*ETR1*	*ETR5*	*ETR10*
Panel A: Firms and Firm Years						
Unique Firms	2,909	2,909	2,909	2,909	2,909	2,909
Firm Observations	29,090	5,818	2,909	29,090	5,818	2,909
Firm Observations with Denominator > 0	19,698	3,883	1,947	19,698	3,883	1,947
Panel B: Percent of Obs with non-meaningful interpretations						
%Firm Obs with Denominator <= 0	32.29%	33.26%	33.07%	32.29%	33.26%	33.07%
%Firm Obs outside [0,1], excluding Denominator <= 0	7.52%	5.18%	5.14%	5.75%	6.64%	5.65%
Panel C: Distributional Characteristics (winsorized at 0 and 1) and excluding Denominator <= 0						
Mean	0.251	0.290	0.298	0.328	0.350	0.362
Std Dev	0.180	0.166	0.147	0.132	0.117	0.120
5th Pctl	0.000	0.033	0.066	0.015	0.131	0.155
25th Pctl	0.103	0.188	0.210	0.298	0.311	0.318
Median	0.251	0.290	0.298	0.361	0.364	0.367
75th Pctl	0.359	0.369	0.365	0.392	0.395	0.397
95th Pctl	0.553	0.580	0.558	0.466	0.502	0.546

ETR1, ETR5, ETR10 (*CASH ETR1, CASH ETR5, CASH ETR10*) are traditional (cash) effective tax rates, calculated by summing income tax expense (cash tax paid) over 1, 5, and 10 years, respectively, divided by pretax income summed over 1, 5, and 10 years, respe

Table 3

Mean Industry *CASH ETR10*

Rank	SIC	Industry	*CASH ETR10*	% Sample	%LowTax
1	40	RAILROAD TRANSPORTATION	0.150 (13)	0.668	2.320
2	13	OIL AND GAS EXTRACTION	0.173 (69)	3.544	12.113
3	65	REAL ESTATE	0.214 (19)	0.976	2.577
4	42	TRUCKING AND WAREHOUSING	0.223 (23)	1.181	2.320
5	79	AMUSEMENT & RECREATION SERVICES	0.224 (20)	1.027	2.062
6	63	INSURANCE CARRIERS	0.242 (101)	5.187	8.505
7	55	AUTOMOTIVE DEALERS & SERVICE STATIONS	0.246 (10)	0.514	0.773
8	29	PETROLEUM AND COAL PRODUCTS	0.246 (15)	0.770	1.289
9	61	NONDEPOSITORY INSTITUTIONS	0.274 (33)	1.695	2.320
10	44	WATER TRANSPORTATION	0.281 (11)	0.565	1.546
SUM of 10 Lowest Ten Year Mean Cash ETR Industries				16.127	35.825

CASH ETR10 is defined in Table 1. Industries are two digit sic code subheadings. The 10 lowest ten year mean *CASH ETR10* industries are presented. If an industry has fewer than 10 valid observations for *CASH ETR10,* the firms in that industry are placed

Table 4

Twenty Five Lowest Long Term Cash ETR Firms

Company Name	*CASH ETR10*	ETR10	*CASH ETR10* 100 Largest Rank	*ETR10* 100 Largest Rank	*CASH ETR10* Total Sample Rank	*ETR10* Total Sample Rank	SIC	Industry
CARNIVAL CORP	0.007	0.004	1	1	40	61	44	WATER TRANSPORTATION
CENDANT CORP	0.055	0.313	2	39	89	482	65	REAL ESTATE
HARTFORD FINL SVCS GRP INC	0.078	0.120	3	2	130	111	63	INSURANCE CARRIERS
BOEING CO	0.097	0.207	4	5	167	178	37	TRANSPORTATION EQUIPMENT
DELL INC	0.100	0.302	5	34	173	416	35	INDUSTRIAL MACHINERY AND EQUIPMENT
GENERAL ELECTRIC CO	0.102	0.257	6	15	177	271	0	OTHER
QUALCOMM INC	0.104	0.361	7	68	187	873	36	ELECTRONIC & OTHER ELECTRIC EQUIPMENT
FORD MOTOR CO	0.107	0.248	8	8	198	240	37	TRANSPORTATION EQUIPMENT
EMC CORP/MA	0.131	0.249	9	9	235	242	35	INDUSTRIAL MACHINERY AND EQUIPMENT
DEVON ENERGY CORP	0.133	0.289	10	25	244	365	13	OIL AND GAS EXTRACTION
MICROSOFT CORP	0.144	0.336	11	55	274	619	73	BUSINESS SERVICES
VERIZON COMMUNICATIONS INC	0.158	0.333	12	51	298	598	48	COMMUNICATION
LILLY (ELI) & CO	0.161	0.266	13	19	302	296	28	CHEMICALS AND ALLIED PRODUCTS
FIRST DATA CORP	0.168	0.311	14	38	320	463	73	BUSINESS SERVICES
BOSTON SCIENTIFIC CORP	0.180	0.363	15	71	361	905	38	INSTRUMENTS AND RELATED PRODUCTS
HONEYWELL INTERNATIONAL INC	0.181	0.238	16	7	364	220	37	TRANSPORTATION EQUIPMENT
AMERICAN INTERNATIONAL GROUP	0.189	0.295	17	30	395	389	63	INSURANCE CARRIERS
COUNTRYWIDE FINANCIAL CORP	0.190	0.382	18	85	396	1220	61	NONDEPOSITORY INSTITUTIONS
ST PAUL TRAVELERS COS INC	0.190	0.216	19	6	400	185	63	INSURANCE CARRIERS
CISCO SYSTEMS INC	0.190	0.356	20	65	401	827	35	INDUSTRIAL MACHINERY AND EQUIPMENT
TYCO INTERNATIONAL LTD	0.192	0.368	21	74	409	985	0	OTHER
ALLSTATE CORP	0.199	0.252	22	11	434	253	63	INSURANCE CARRIERS
SBC COMMUNICATIONS INC	0.200	0.349	23	60	437	739	48	COMMUNICATION
MERRILL LYNCH & CO INC	0.201	0.316	24	42	440	498	62	SECURITY AND COMMODITY BROKERS
OCCIDENTAL PETROLEUM CORP	0.202	0.405	25	90	442	1509	13	OIL AND GAS EXTRACTION

CASH ETR10 (*ETR10*) are defined in Table 1. *CASH ETR10* Rank (*ETR10* Rank) is the firm's ranking of *CASH ETR10 (ETR10)* relative to other firms within a group of the 100 highest market value firms at the end of the 2004 fiscal year. Industry is based on two

Table 5

Descriptive Statistics for Regression Variables

	N	Mean	Std Dev	25th Pctl	Median	75th Pctl
CASH ETR10	1736	0.000	0.198	-0.109	-0.020	0.053
PP&E	1736	0.000	0.212	-0.165	-0.047	0.104
EST_OPT_EXPENSE	1736	0.000	0.041	-0.014	-0.014	-0.008
INTANGIBLES	1736	0.000	0.115	-0.090	-0.045	0.056
HAVEN	1736	0.014	0.117	0.000	0.000	0.000
FI	1736	0.000	0.021	-0.010	-0.010	0.001
FOR_ASSETS	1736	0.000	0.124	-0.058	-0.058	-0.001
LEV	1736	0.000	0.004	-0.002	-0.001	-0.001
ADVERTISING	1736	0.000	0.026	-0.011	-0.011	-0.004
NOL_DUMMY	1736	0.166	0.373	0.000	0.000	0.000
NOL	1736	0.000	0.173	-0.044	-0.044	-0.022
SPECIAL	1736	0.000	0.016	-0.005	0.004	0.007
EQUITY_EARN	1736	0.000	0.003	-0.001	-0.001	-0.001
R&D	1736	0.000	0.042	-0.022	-0.022	0.003
SIZE	1736	0.000	2.162	-1.437	-0.048	1.391

CASH ETR10 is as defined in table 1. *PP&E* is the ration of property, plant and equipment to total assets at the end of 1994 plus the same ration at the end of 2004, divided by two. *EST_OPT_EXPENSE* is calculated from execucomp as the average annual value realized from exercise of options for the top executives grossed up by the fraction of options owned by the covered executives, scaled by average total assets. *INTANGIBLES* is the ratio of intangibles to total assets at the end of 1994 plus the same ratio at the end of 2004 divided by two. *FI* is average foreign pretax income scaled average total assets. *FOR_ASSETS* is average the ratio foreign assets from Compustat geographic segment data divided by total assets at the end of 1994 plus the same ratio at the end of 2004, divided by two. Where *FOR_ASSETS* is missing, it is assumed to equal zero. *LEV* is long term debt/total assets at the end of 1994 plus the same ratio and the end of 2004, divided by two. *ADVERTISING* is average advertising expense divided by average total assets. Where *ADVERTISING* is missing it is assumed to equal zero. *NOL_DUMMY* is equal to one of the firm had a net operating loss at the end of 2004. *NOL* is the dollar amount of the net operating loss at the end of 2004 less the dollar amount of the net operating loss at end of 1994, scaled by average total assets. *SPECIAL* is the average special items reported by the firm, scaled by average total assets. This value is assumed to be zero in firm-years where it is missing. *EQUITY_EARN* is average equity in earnings divided by average total assets. Missing *EQUITY_EARN* is assumed to be zero. *R&D* is average research and development expense scaled by average total assets. *HAVEN* indicates an incorporation code in a tax haven. Average total assets is computed as the assets at the end of 2004 less the total assets at the end of 1995 divided by two. 211 firms do not have data in 1994 necessary to calculate the beginning of year 1995 values, resulting in 1,736 firm with meaningful observations of *CASH ETR10*, different from thte 1,947 firms analyzed in tables 1-4.

Table 6

Regression Analysis

	Prediction	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
INTERCEPT	(0)	0.004	N/A	0.011 **	N/A	0.012 **	N/A	0.013 **	N/A
PP&E	(-)	-0.121 ***	-0.109 ***	-0.121 ***	-0.112 ***	-0.120 ***	-0.112 ***	-0.121 ***	-0.114 ***
EST_OPT_EXPENSE	(-)	-0.698 ***	-0.813 ***	-0.680 ***	-0.795 ***	-0.663 ***	-0.790 ***	-0.671 ***	-0.795 ***
INTANGIBLES	(-)	-0.013	-0.107 **	-0.017	-0.109 **	-0.016	-0.109 **	-0.015	-0.107 **
HAVEN	(-)							-0.084 **	-0.068 *
FI	(-)					-0.272	-0.072	-0.245	-0.055
FOR_ASSETS	(-)	0.087 **	0.084 **	0.251 ***	0.256 ***	0.283 ***	0.263 ***	0.279 ***	0.262 ***
FOR_ASSETS^2	(+)			-0.454 **	-0.464 **	-0.491 **	-0.472 **	-0.471 **	-0.461 **
LEV	(-)	-3.827 ***	-3.582 ***	-3.829 ***	-3.587 ***	-3.832 ***	-3.587 ***	-3.821 ***	-3.581 ***
ADVERTISING	(+)	0.142	-0.083	0.131	-0.100	0.147	-0.094	0.140	-0.094
NOL_DUMMY	(-)	-0.025 **	-0.022 *	-0.027 **	-0.023 **	-0.026 **	-0.023 *	-0.026 **	-0.023 **
NOL	(+)	0.112 ***	0.103 ***	0.111 ***	0.102 ***	0.111 ***	0.102 ***	0.111 ***	0.102 ***
SPECIAL	(-)	-3.330 ***	-3.181 ***	-3.315 ***	-3.176 ***	-3.332 ***	-3.180 ***	-3.311 ***	-3.167 ***
EQUITY_EARN	(-)	-0.439	-1.485	-0.537	-1.580	-0.536	-1.582	-0.526	-1.583
R&D	(-)	0.091	0.209	0.043	0.180	0.068	0.183	0.066	0.179
SIZE	(-)	-0.015 ***	-0.014 ***	-0.016 ***	-0.015 ***	-0.016 ***	-0.015 ***	-0.016 ***	-0.015 ***
SIC 0 OTHER			0.042 **		0.050 **		0.050 **		0.052 **
SIC 13 OIL AND GAS EXTRACTION			-0.093 ***		-0.084 ***		-0.083 ***		-0.081 ***
SIC 26 PAPER AND ALLIED PRODUCTS			0.064 *		0.070 *		0.070 *		0.070 *
SIC 27 PRINTING AND PUBLISHING			0.136 ***		0.145 ***		0.145 ***		0.145 ***
SIC 31 LEATHER AND LEATHER PRODUCTS			0.078		0.083 *		0.082 *		0.082 *
SIC 38 INSTRUMENTS AND RELATED PRODUCTS			-0.039 **		-0.035 **		-0.034 *		-0.034 *
SIC 48 COMMUNICATION			0.113 ***		0.125 ***		0.125 ***		0.127 ***
SIC 50 WHOLESALE TRADE - DURABLE GOODS			0.059 **		0.067 ***		0.067 ***		0.066 ***
SIC 56 APPAREL AND ACCESSORY STORES			0.060 *		0.070 **		0.070 **		0.070 **
SIC 62 SECURITY AND COMMODITY BROKERS			0.117 ***		0.125 ***		0.124 ***		0.124 ***
SIC 63 INSURANCE CARRIERS			-0.076 ***		-0.065 ***		-0.065 ***		-0.062 ***
SIC 65 REAL ESTATE			-0.092 **		-0.084 *		-0.084 *		-0.083 *
SIC 67 HOLDING AND OTHER INVESTMENT OFFICES			-0.152 ***		-0.143 ***		-0.143 ***		-0.143 ***
SIC 73 BUSINESS SERVICES			0.048 ***		0.054 ***		0.054 ***		0.054 ***
INDUSTRY FIXED EFFECTS		NO	YES	NO	YES	NO	YES	NO	YES
N		1,736	1,736	1,736	1,736	1,736	1,736	1,736	1,736
Rsquare		15.9%	22.2%	16.1%	22.4%	16.1%	22.4%	16.4%	22.6%

***,**, and * represent statistical significance at the 1%, 5%, and 10% level, respectively. All variables are defined as in Table 5. *CASH ETR10* is the dependent variable. All variables are de-meaned so as enhance interpretation. Fixed effects are two