Abstract

We examine the impact of tax law ambiguity and tax audit errors on tax compliance in a setting where litigation is allowed. A decrease in audit errors discourages aggressive reporting and leads to fewer audits and trials. A reduction in tax ambiguity, however, has indeterminate effects on aggressive reporting and litigation frequencies. A more effective tax audit benefits taxpayers with relatively strong cases but not those with weak ones. A tax cut encourages aggressive reporting and lowers net revenue. An increase in the penalty, however, leads to less aggressive reporting and higher net revenue without making anyone worse off.

JEL Classifications: H21, K34

Keywords: tax ambiguity, audit error, tax litigation, and tax compliance

1. Introduction

The tax law, in contrast to the criminal law, is characterized by ambiguity and uncertainty (Graetz and Wilde, 1985). A 1988 survey of taxpayers reports that a significant portion of noncompliance can be attributed to tax code complexity and ambiguity (Krause, 2000). Uncertainty about the eligibility of a deduction or a credit may force uninformed taxpayers to underpay or overpay taxes. Alternatively, taxpayers may seek professional advice to resolve uncertainty about their tax liabilities. Kaplow (1998) estimates that taxpayers spend US$75 billion per year on tax advice.

Ambiguity is a state of uncertainty that increases with the unavailability, unreliability, or imprecision of relevant information (Beach and Mitchell, 1978; Magro, 1999). Long and Swingen (1987) define tax ambiguity as the characteristic of the tax law that may lead to more than one defensible position. An example is a rule that requires tax professionals to consider the facts and circumstances surrounding a transaction to decide whether a payment should be taxable (Spilker et al., 1999).

Although both tax complexity and tax ambiguity can create taxpayer uncertainty, we differentiate between the two based on whether competent experts can eliminate the uncertainty after a thorough analysis. Tax professionals may unravel uncertainty caused
by complex tax codes. If related tax rules are ambiguous, however, then experts may reach different conclusions about the tax consequence of a transaction. Krause (2000) notes that the distinction between compliance and noncompliance is not always clear; the Internal Revenue Service (IRS) and taxpayers will genuinely disagree in many instances. In such a case, the tax authority’s assertion that a taxpayer is deficient on a tax liability may not be the final word on the matter.

Post-audit disputes between taxpayers and the IRS need to be resolved in court. A court may not always uphold a tax agency’s position. Over the past two decades, for example, the amount of taxes and penalties assessed by various U.S. courts was about one third of the adjustments originally proposed by the IRS. In Bausch & Lomb Inc. and Consolidated Subsidiaries v. Commissioner of Internal Revenue, 92 T.C. 525 (1989), the U.S. Tax Court held that the IRS abused its discretion under the Internal Revenue Code (I.R.C.) Section 482 in reallocating income from a foreign subsidiary to its domestic parent (Briggs, 1992).

When the court and the IRS interpret ambiguous tax laws differently, taxpayers face two types of uncertainty: one from the ambiguity inherent in the tax rules, and the other from potential disagreement between the IRS and the courts. The former is a necessary condition to make the latter possible. Unlike previous studies that assumed a tax audit as the final stage of a compliance game, this study allows taxpayers to challenge the agency’s audit in court. As a result, we characterize a tax audit as a process by which the tax agency collects and processes information to forecast the probability of the court denying the taxpayer’s controversial deduction. When the tax agency over- or underestimates such a probability, an audit error occurs. We investigate how these two sources of taxpayer uncertainty affect taxpayer behavior in initial reporting and post-audit negotiations with the tax agency.

The number of tax cases tried in court is small relative to total returns filed or examined by the agency. A low frequency of tax litigation, however, understates its potential significance in tax compliance. Although tax litigation does not occur often ex post, it is an option available to every taxpayer ex ante. An explanation for the rare occurrence of tax trials is that litigation costs are so overwhelming that taxpayers may gain nothing even when they prevail in court. I.R.C. Section 7430 alleviates some of the taxpayer’s burden by allowing reimbursement of reasonable litigation costs in certain cases. This study examines how such a change in the litigation environment affects taxpayer aggressiveness and net revenue collection.

We focus on a class of sophisticated taxpayers who have both the resources and motivation to obtain competent tax advice on litigating their cases. With respect to the merit of their cases, we assume that there exist two types of taxpayers: “Low type” taxpayers are those who have strong cases and against whom the tax agency has a low probability of winning at trial. “High type” taxpayers are those who have weak cases and against whom the tax authority has a high probability of prevailing in court.

Prior to an audit, the tax agency does not know whether a taxpayer falls into the low or high type. During an audit, the agency collects relevant information to identify the

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1 In 1991, for example, taxpayers on average needed to pay 32.8% (US$2.2 billion) of the taxes and penalties recommended by the IRS in the cases determined by the U.S. Tax Court, U.S. Claims Court, and U.S. District Courts (Internal Revenue Service, 1991).
taxpayer’s type. However, sometimes the agency over- or underestimates the probability with which it will prevail against the taxpayer in court. Taking this into account, the tax agency proposes a post-audit adjustment. The taxpayer either accepts the adjustment or takes his/her case to court. When challenged, the agency decides whether to proceed or drop the case. If the agency pursues a trial, the court determines final tax liabilities.

Several results are derived from the study. First, a decrease in taxpayer uncertainty due to the ambiguity of tax rules may encourage or discourage aggressive reporting. Depending on parameter values, aggregate audit and litigation frequencies may increase or decrease. Second, a decrease in taxpayer uncertainty due to audit errors discourages aggressive reporting, and leads to fewer audits and trials. A more effective audit (with fewer errors) reduces the burden of the low type taxpayers and increases net revenue. The high type taxpayers who have weak cases, however, do not benefit from such an improvement. Third, a tax cut leads to more aggressive reporting, lower net revenue, and larger social dead-weight losses. A decrease in the penalty rate encourages aggressive reporting and decreases net revenue. The agency audits more returns, and the low type taxpayers’ burden increases. Fourth, a reduction in the tax agency’s litigation costs restrains aggressive reporting and lowers aggregate litigation frequencies. A similar decrease in taxpayers’ litigation costs, in contrast, does not influence reporting/audit behavior but increases aggregate litigation frequencies.

This study may have useful policy implications for tax simplification. Gale (2001) emphasizes that those pleas for simplification need to be buttressed by an understanding of the causes of complexity and the likely outcome of simplification efforts. Our study considers strategic behaviors by both taxpayers and the agency in a realistic setting where taxpayers can challenge the agency’s audit results in court. As explained in Section 6, tax simplification may increase or decrease social dead-weight losses depending on whether it reduces the agency’s audit errors or the ambiguity of tax rules. By analyzing how taxpayers would respond to changes in tax policy, our study contributes to the discussion on social consequences of tax simplification.

The remainder of the paper is organized as follows. Related literature is reviewed in Section 2. Section 3 presents the model, and Section 4 analyzes the equilibrium. Section 5 derives social dead-weight loss measures. Section 6 presents comparative statics results and discusses policy implications. Section 7 concludes the paper. All proofs are available upon request.

2. Literature Review

Early compliance studies examine taxpayers’ reporting decisions using a decision-theory framework, in which the tax agency’s audit probability is assumed to be fixed. Taxpayers either know their tax liabilities with certainty (Allingham and Sandmo, 1972; Yitzhaki, 1974) or are uncertain about them (Alm, 1988; Beck and Jung, 1989a; Scotchmer and Slemrod, 1989). These models, however, ignore the interrelationships between flexible action choices of the IRS and noncompliance, as pointed out by Graetz et al. (1986).
In tax compliance, taxpayers first report to the IRS, and the agency can act strategically by conditioning its audit policy on taxpayer reports. Graetz et al. (1986), Reinganum and Wilde (1986; 1988), and Beck and Jung (1989b) generalize the fixed-audit probability model by adopting a game-theoretic approach that allows reporting and auditing to interact with each other. Sansing (1993) extends this line of research by examining the role of costless but imperfect pre-audit information on reporting and auditing strategies.

The above models assume that the IRS’s audit finalizes tax liabilities and that there is no interaction between the taxpayer and the IRS after an audit. This approach is suitable for a setting where taxpayer uncertainty originates from complex but unambiguous tax rules. In such an environment, an audit, if done without errors, would produce a result that competent professionals can agree upon. Even when the IRS makes errors in (initial) audits, these errors are assumed to be either undetected (Reinganum and Wilde, 1986; Feinstein, 1991) or corrected by the IRS subsequently (Rhoades, 1997).

Taxpayer uncertainty due to ambiguous tax rules, however, may lead to disagreements about tax liabilities even among competent experts. The taxpayer in this setting may challenge results of the IRS audit in court if expected tax savings exceed related costs. Subsequent research introduces the possibility of tax litigation and examines the interaction between tax litigation and tax reporting. Lee (1990) investigates why the IRS may limit the scope of an individual rulings program that can reduce disputes between the IRS and taxpayers. Our study differs from his paper in several aspects. First, we introduce audit errors and examine their impact on strategic reporting, auditing, and subsequent litigation. Second, we examine the role of tax ambiguity in tax compliance. Third, our model leads to a random audit in equilibrium.

Jung (1995) develops a model in which a tax agency, after an audit, can accurately estimate the probability of prevailing in court. Taxpayers in his study, however, cannot rely on experts to discover and evaluate the probability used by the agency. Instead, taxpayers try to infer it from the tax agency’s post-audit settlement offer. Our study models the opposite case of information asymmetry. Focusing on wealthy/sophisticated taxpayers who can access expert knowledge on potential litigation outcomes, we assume that taxpayers, not the tax agency, have the information advantage about the litigation prospect. In addition, our model assumes that the tax agency may make audit errors: the agency may over- or underestimate the probability of winning in court. We examine how these audit errors interact with tax law ambiguity and influence the strategic choices of taxpayers and the tax agency.

3. The Model

Risk-neutral taxpayers have uncertainty about the deductibility of an expense, and hire tax experts to estimate the probability that the deduction will be allowed by a court in the event of a trial. The tax at issue is $T$, where $T > 0$. If the deduction is not allowed,

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2 Lee (1990) also assumes that taxpayers are better informed about the litigation outcome than the agency. Taxpayers’ information advantage could be due to their factual and/or legal knowledge. We assume that an audit usually, but not always, eliminates such advantage.
then the taxpayer’s tax and proportional penalty become $Tq$, where $q > 1$. There exist two types of taxpayers regarding the deductibility of the expenditure: low (high) type taxpayers (do not) have facts strongly in their favor, and the IRS, an expected net revenue maximizer, has a relatively low (high) probability of winning in court against these taxpayers $p_{L(H)}$, where $0 < p_L < p_H < 1$. The proportion of the low (high) type taxpayers in an audit class is denoted by $1 - \theta$ ($\theta$), where $0 < \theta < 1$.

A tax audit costs the taxpayer and the tax agency $c_T$ and $c_A$, respectively, where $c_T, c_A > 0$. The tax agency’s audit is not perfect. The agency misclassifies a low (high) type taxpayer as a high (low) type with a probability $\alpha(\beta)$, where $0 \leq \alpha, \beta < 0.5$. Based on audit results, the tax agency proposes an adjustment/settlement offer $S_L$ or $S_H$, where $0 \leq S_{L,H} \leq Tq$. All taxpayers accept an offer of zero, and the game ends there. If the offer is greater than zero, the taxpayer decides whether to accept it or take the case to court. If the taxpayer challenges the agency’s adjustment, then the agency decides whether to pursue the case in court or drop it. If the agency does not drop the case, then the court makes the final determination on tax liability by choosing $Tq$ with probability $p_L$ or $p_H$ depending on taxpayer type.4 The court does not act strategically.

Litigation is costly. A trial costs the taxpayer $L_T$ regardless of his/her type.5 To exclude trivial equilibria, we assume that tax litigation is viable for some, but not all, taxpayers: the sum of the expected additional tax and penalty, audit costs, and litigation costs for a low (high) type taxpayer is less (greater) than the tax (the tax and penalty) at issue: $p_LTq + C_T + L_T < T < Tq < p_HTq + C_T + L_T$.6 Litigation costs the tax agency $L_A$.7 We assume that the agency’s winning probability against the high (low) type taxpayer is high (low) enough to guarantee that the expected tax and penalty is larger (smaller) than the agency’s litigation costs: $p_LTq < L_A < p_HTq$. The sequence of actions in the game is summarized in Figure 1.

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3 In the United States, all returns are initially processed by a computer to check for technical mistakes. Then each return is assigned to an “audit class” defined by the level and source of income. For each audit class, the IRS applies a discriminant function (DIF) nationally to classify returns into those having “audit potential” and those that do not. For returns with a DIF score that exceeds some minimum value, a DIF inventory file is sent to district offices. These returns are checked by classifiers, who use personal judgment in deciding which returns should be selected for audit (Erekson and Sullivan, 1988).

4 In practice, the rulings of a lower court may be appealed and overturned by a higher court. For simplicity, however, we assume that taxpayers or the agency cannot appeal the court ruling. If we allow an appeals process, we will need to partition the litigation stage into multiple stages. In the new setting, litigation can be more costly than in the current model since litigation costs can be incurred twice or even more. This line of extension may provide additional insights on the interaction between taxpayers and the agency. For example, the agency may update its belief about taxpayer types and adjust its offer accordingly in the appeals process. We leave these possibilities for further research.

5 I.R.C. Section 7430 allows taxpayers to recover reasonable litigation costs when the taxpayer wins the case and the government fails to establish that its position was substantially justified. We assume that each party pays its own litigation costs regardless of litigation outcome. Incorporating Section 7430 will not change the qualitative results of this paper.

6 This assumption helps us simplify low type taxpayers’ behavior and capture aggregate taxpayers’ behavior through high type taxpayers’ strategic choices in reporting and litigation stages.

7 For example, the IRS allocated US$352 million to the appeals and tax litigation activities in 1990, which represented 7% of the agency’s total operating budget and one fourth of its budget for examination activities for the year (Internal Revenue Service, 1991).
Figure 1 Game Tree

where

- $A_L$ = audit result suggesting that the taxpayer audited is a low type,
- $A_H$ = audit result suggesting that the taxpayer audited is a high type,
- $S_L$ = settlement offer made by the tax agency given $A_L$, and
- $S_H$ = settlement offer made by the tax agency given $A_H$.

Payoffs $(X, Y) = (\text{taxpayer's expected payoffs, tax agency's expected net revenue})$. 
4. Equilibrium

The game can be partitioned into two interrelated stages: a reporting-auditing stage and a settlement-litigation stage. To maintain sequential rationality, we analyze the second stage first and then go backward to the first stage.

4.1 Settlement-Litigation Stage

The IRS’s audit classifies taxpayers into two groups: a low type group and a high type group. Due to audit errors, however, the low (high) type group includes not only low (high) type taxpayers but also some high (low) type taxpayers. The tax agency’s audit adjustment for each group depends on its belief about the mix of these two types in each group. The more (fewer) low type taxpayers in a group, the lower (higher) the probability of winning a trial against the group, and the stronger (weaker) the agency’s incentive to settle tax disputes and avoid costly litigation.

The following proposition summarizes equilibrium behavior in the settlement-litigation stage.

**Proposition 1**
The tax agency proposes $T_q$ only if it believes the proportion of low type taxpayers in the group is sufficiently low. Otherwise, the tax agency drops the case after an audit. When asked to pay $T_q$, low type taxpayers always take their cases to court. High type taxpayers choose to do so with a probability less than one.

The agency’s optimal offer in the second stage takes one of the two extreme values: 0 or $T_q$. A zero settlement offer is equivalent to dropping the case after the audit. The tax audit in this case is not warranted *ex post*. If this result is expected *ex ante*, then the agency would not audit the tax return in the first place. When a taxpayer refuses to accept an audit adjustment $T_q$ and takes his/her case to court, the tax agency pursues a trial with a probability less than one.

4.2 Reporting-Auditing Stage

In the reporting-auditing stage, both taxpayers and the tax agency determine their strategies taking into account their impact on the subsequent settlement-litigation stage. While low type taxpayers find it optimal to always report low, high type taxpayers may choose one of the following three strategies: (1) always report low (“low-pooling reporting” strategy); (2) always report high (“separating reporting” strategy); or (3) report low with a probability less than one (“mixed reporting” strategy).

Let $\lambda$ denote the probability that high type taxpayers report low. If high type taxpayers never report low ($\lambda = 0$), all of the low returns are filed by low type taxpayers. In this case, the agency should not audit low returns since it will drop the cases after an audit. However, if the IRS does not audit low returns, reporting high income is not

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8 This is due to our assumption: $p_l T_q + c_r + L_r < T < T_q < p_h T_q + c_r + L_r$. As explained in footnote 6, we capture the strategic behavior of aggregate taxpayers through high type taxpayers’ choices.
optimal for the high type taxpayers. Therefore, the separating reporting strategy does not constitute an equilibrium.

If high type taxpayers always report low ($\lambda = 1$) or with a probability greater than zero but less than one ($0 < \lambda < 1$), the agency does not know for sure, before an audit, which type has reported low. The tax agency needs to weigh the expected audit benefit against audit costs to determine whether to audit low returns. Even after an audit, the IRS is unsure about taxpayers’ true type due to the possibility of audit errors.

The following proposition summarizes equilibrium behavior in the entire game.

**Proposition 2**

*Depending on parameter values, the entire game has one of the following four equilibria:*

1. **Low-pooling reporting and no audit equilibrium (EQ 1)**
   All taxpayers report low, but the tax agency does not audit low reports.

2. **Low-pooling reporting, full audit, and litigation equilibrium (EQ 2)**
   All taxpayers report low, and the tax agency always audits low reports. After an audit, the tax agency drops the case (proposes $T_q$) against (to) those taxpayers classified as a low (high) type. Some taxpayers classified as a high type litigate their cases in court.

3. **Mixed reporting, mixed audit, and litigation equilibrium I (EQ 3)**
   High type taxpayers report low with a probability less than one, and low type taxpayers always report low. The tax agency audits low reports with a probability less than one. After an audit, the tax agency proposes $T_q$ to all taxpayers audited regardless of audit outcome. Some cases are litigated in court.

4. **Mixed reporting, mixed audit, and litigation equilibrium II (EQ 4)**
   High type taxpayers report low with a probability less than one, and low type taxpayers always report low. The tax agency audits low reports with a probability less than one. After an audit, the tax agency drops the case (proposes $T_q$) against (to) those taxpayers classified as a low (high) type. Some taxpayers classified as a high type litigate their cases in court.

The first three cases, EQ 1, EQ 2, and EQ 3, are considered less realistic than EQ 4. In EQ 1, the agency does not audit at all, and therefore there are no audit adjustments to be challenged. Every taxpayer in EQ 2 reports low and is audited by the agency. In EQ 3, the tax agency’s post-audit adjustment does not depend on audit results.

If the tax agency’s audit costs and the underassessment error probability $\beta$ are sufficiently low, we have EQ 4, where both high type taxpayers and the tax agency

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9 This is a case where the tax agency’s litigation cost $L_a$ is larger than the expected net revenue from a trial regardless of audit results. Expecting no benefits from an audit, the agency does not audit any tax returns, which leads to aggressive reporting by all taxpayers.

10 If the proportion of high type taxpayers is not too low and the tax audit is reasonably accurate, then the agency may pursue litigation against a taxpayer classified as a high type. The agency’s audit cost needs to be low enough to warrant a full audit, and underassessment error probability $\beta$ should be high enough to induce aggressive reporting by high type taxpayers.

11 If the proportion of high type taxpayers is high enough, then the agency may audit and pursue litigation even when its own audit cost $c_a$ is fairly large.
adopt mixed strategies. In this equilibrium, the tax agency rejects a taxpayer’s deduction only when its audit suggests that the taxpayer is a high type. EQ 4 is consistent with the observation that both the audit probability and tax litigation frequency are low.

In EQ 4, high type taxpayers accept the tax agency’s audit adjustment in most cases. Thus, they avoid costly litigation even when the expected tax liability from a court decision, \( p_H T_q \), is less than the tax agency’s adjustment, \( T_q \). The tax agency benefits from the rule that its adjustment is presumed to be correct until rejected by a court. Some cases are litigated in court. The low type taxpayers who have a high probability of winning are more willing to litigate than are the high types. This is consistent with the IRS not being successful in defending their assessments in court.

5. Social Dead-Weight Losses

In the current model, taxpayers’ total expenditures can be greater than the tax agency’s net revenue collection. We define the difference between these two as social dead-weight losses following Melumad et al. (1994) and Jung (1995). Social dead-weight losses, denoted by \( W \), are computed as follows:

\[
W = (c_A + c_T) \cdot \text{aggregate audit frequency}^{12} + (L_A + L_T) \cdot \text{aggregate litigation frequency}^{13}.
\]

The more tax returns are audited and litigated, the more social dead-weight losses are incurred. These social costs or their relative size to total net revenue may measure the efficiency of a tax system.

The four possible equilibria in the model have different social dead-weight losses:

**EQ 1:** Low-pooling reporting and no audit equilibrium

\[ W = 0, \]

**EQ 2:** Low-pooling reporting, full audit, and litigation equilibrium

\[
W = T_q \alpha (1-\theta) \left\{ \frac{(L_A - p_L T_q)}{(p_H T_q - L_A)} + \frac{(p_H T_q + L_T)}{(p_H T_q + L_T)} \right\} + c_A + c_T,
\]

**EQ 3:** Mixed reporting, mixed audit, and litigation equilibrium I

\[
W = T (1-\theta) \left[ \frac{c_A (p_H T_q - L_A) + T_q (L_A - p_L T_q) + \alpha T_q (p_H T_q + L_T)}{(T_q - c_A) \cdot (p_H T_q - L_A)} + \frac{T_q (p_H T_q + L_T) + c_T (p_H T_q + L_T)}{(T_q + c_T) \cdot (p_H T_q + L_T)} \right],
\]

**EQ 4:** Mixed reporting, mixed audit, and litigation equilibrium II

\[
W = T (1-\theta) \left[ \frac{c_A (p_H T_q - L_A) + \alpha T_q (L_A - p_L T_q) + \alpha T_q (p_H T_q + L_T)}{(1-\beta) T_q - c_A \cdot (p_H T_q - L_A)} + \frac{\alpha T_q (p_H T_q + L_T) + c_T (p_H T_q + L_T)}{(1-\beta) T_q + c_T \cdot (p_H T_q + L_T)} \right].
\]

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12 Aggregate audit frequency = \( \{(1-\theta) + \theta \lambda \} \phi \).

13 Aggregate litigation frequency = \( \{(1-\theta) \phi \alpha + \theta \lambda \phi (1-\beta) \nu_H \} \nu_H \).
6. Comparative Statics and Policy Implications

Because we consider EQ 4, the mixed reporting, mixed audit, and litigation equilibrium II, the most interesting and realistic case, we focus on and report comparative statics results from EQ 4 in Table 1.

Table 1 Comparative Statics in the Mixed Reporting, Mixed Audit, and Litigation Equilibrium II (EQ 4)

<table>
<thead>
<tr>
<th></th>
<th>$\lambda^*$</th>
<th>$\phi^*$</th>
<th>$\Pi_L$</th>
<th>$\Pi_H$</th>
<th>$\Pi_A$</th>
<th>$W$</th>
<th>AAF</th>
<th>ALF</th>
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<tr>
<td>Overassessment probability $\alpha$</td>
<td>+</td>
<td>0</td>
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<td>0</td>
<td>-</td>
<td>+</td>
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<tr>
<td>Underassessment probability $\beta$</td>
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<td>+</td>
<td>-</td>
<td>0</td>
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<td>+</td>
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<td>Low winning probability $p_L$</td>
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<tr>
<td>High winning probability $p_H$</td>
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<td>+</td>
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<td>Tax at stake $T$</td>
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<tr>
<td>Penalty $q$</td>
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<td>0</td>
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<tr>
<td>Tax agency’s audit costs $c_A$</td>
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<td>+</td>
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<td>0</td>
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<tr>
<td>Taxpayers’ audit costs $c_T$</td>
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<tr>
<td>Tax agency’s litigation costs $L_A$</td>
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<td>0</td>
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<td>Taxpayers’ litigation costs $L_T$</td>
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where $\lambda^*$ = high type taxpayers’ low reporting probability, $\phi^*$ = tax agency’s audit probability given a low report, $\Pi_L$ = expected payoffs of a low type taxpayer at the beginning of the game, $\Pi_H$ = expected payoffs of a high type taxpayer at the beginning of the game, $\Pi_A$ = tax agency’s expected net revenue at the beginning of the game, $W$ = social dead-weight losses (the sum of audit costs and litigation costs), AAF = aggregate audit frequency ($= (1 – \theta \lambda) \phi$), ALF = aggregate litigation frequency ($= (1 – \theta \phi^* (1 – \beta j_H) l_H)$), $j_H$ = high type taxpayers’ rejection probability when offered to pay $Tq$, and $l_H$ = tax agency’s litigation probability when its offer $Tq$ is rejected.

The entries of the above table indicate the impact of an increase in parameter values on the equilibrium outcome as follows: + (Increase), - (Decrease), 0 (No Effect).

Proposition 3
In EQ 4,
1. A decrease in taxpayer uncertainty due to audit errors $\alpha$ or $\beta$ discourages aggressive reporting, and leads to fewer audits and trials. As a result, net revenue collection increases and social dead-weight losses decrease.
2. A reduction in taxpayer uncertainty due to the ambiguity of tax laws (an increase in $p_L$ or a decrease in $p_H$), however, may increase or decrease aggressive reporting, aggregate audit/litigation frequencies, social dead-weight losses, and net revenue collection depending on parameter values.
3. Lowering the tax rate or the proportional penalty rate encourages aggressive reporting and leads to lower net revenue and larger social dead-weight losses. While a lower tax rate reduces both types’ tax burden, a lower penalty rate increases low types’ burden as it increases the agency’s audit probability.
4. A change in taxpayers’ litigation costs affects neither their reporting nor the agency’s audit.
5. An increase in the tax agency’s litigation costs prompts more aggressive reporting and leads to more audits and trials.

The two sources of taxpayer uncertainty have different impacts on the strategic behaviors of taxpayers and the tax agency. When the uncertainty is due to the agency’s audit errors, a decrease in such uncertainty makes taxpayers report less aggressively regardless of the error type. A decrease in $\alpha$ or $\beta$ increases audit benefits, and high type taxpayers who employ a mixed reporting strategy respond to the change by reporting less aggressively. As a result, aggregate audit and litigation frequencies decrease and net revenue increases. However, these changes are not beneficial to every player in the model. High type taxpayers who have weak cases neither gain nor lose from such an improvement, but both low type taxpayers and the tax agency are better off.

In a model without the possibility of litigation, Beck and Jung (1989b) suggest that an increase in tax liability uncertainty will lead to less aggressive reporting when there is a proportional monetary penalty. Incorporating a litigation stage, Jung (1995) predicts that an increase in tax ambiguity would lead to less aggressive reporting, fewer trials, smaller social dead-weight losses, and greater net revenue. As a proxy for tax law ambiguity, he uses a mean-preserving spread of $f(p)$, the distribution of the probability that the agency will prevail in court: as tax law ambiguity increases, the distribution of trial outcomes becomes more diffuse. In his model, a mean-preserving spread of $f(p)$ decreases the ex ante threat of litigation by taxpayers and thus increases the audit benefit, which prompts taxpayers to report less aggressively. These predictions, however, may not hold in other settings with different information structures.

We assume that taxpayers, not the tax agency, have an information advantage on litigation outcome. In our model, $p_L$ and $p_H$ reflect uncertainty due to tax law ambiguity. If we use the difference between $p_L$ and $p_H$ as a measure of tax ambiguity following Jung (1995), a change in ambiguity may induce more or less aggressive reporting in our model. For example, if $p_H$ goes up when $p_L$ remains constant, high type taxpayers report less aggressively. An increase in $p_H$ makes a trial more (less) attractive to the agency (high type taxpayer). The agency offers the maximum adjustment $Tq$ more frequently, and high type taxpayers reject the agency’s offer less frequently. These negative consequences in the litigation stage induce high type taxpayers to report less aggressively. A decrease in $p_L$ with a stable $p_H$ has the opposite impact on expected litigation outcomes and aggressive reporting. High type taxpayers report more aggressively and reject the agency’s settlement offer more frequently.

When these two probabilities change simultaneously, their impact on aggressive reporting and aggregate audit/litigation frequencies depends on parameter values. To facilitate a comparison with Jung (1995), assume $p_H = p$ and $p_L = 1 - p$ as a special case of our model. Then, an increase in $p$ is equivalent to a mean-preserving spread of $f(p)$ in Jung (1995). As $p$ increases, the expected revenue from a trial against a high (low) type taxpayer increases (decreases). The net effect of these two opposing forces depends on the proportion of high and low type taxpayers in a group.
If the agency’s litigation cost is low enough to satisfy $2L_A < Tq$, then greater ambiguity (a higher $p$) results in more aggressive reporting and larger social dead-weight losses. The intuition is as follows. When the agency’s litigation cost is relatively low, it litigates a case even when the proportion of low type taxpayers is relatively high. In this case, the threshold belief about the proportion of low types that makes the agency indifferent between a trial and no trial falls above 0.5. In EQ 4, high type taxpayers reject the agency’s post-audit offer $Tq$ with a probability that brings the agency’s belief to the threshold. Since the agency’s belief at the threshold is higher than 0.5 in this case with $2L_A < Tq$, a marginal increase in $p$ reduces the expected net revenue from a trial, as the loss from a low type taxpayer is given a bigger weight than the gain from a high type taxpayer. A trial becomes less attractive to the agency, which in turn reduces audit benefits. Taking advantage of these impacts, high type taxpayers report more aggressively and reject the agency’s settlement offer more frequently. As a result, both aggregate audit frequency and litigation frequency increase. Greater ambiguity in this case is socially undesirable as it increases dead-weight losses, contradicting the results of Beck and Jung (1989b) and Jung (1995).

If the agency’s litigation costs are high enough to satisfy $2L_A > Tq$, then the threshold is formed below 0.5, and an increase in $p$ makes a trial (and an audit) more attractive to the agency. High type taxpayers respond by reporting less aggressively and rejecting the offer $Tq$ less frequently. This is consistent with the results of Beck and Jung (1989b) and Jung (1995). If the agency’s litigation cost satisfies $2L_A = Tq$, then a change in $p$ does not affect taxpayers’ reporting and litigation behavior.

Our results might provide new insights into tax reform debates, especially on tax simplification. If tax simplification reduces the tax agency’s audit errors, it will lead to less aggressive reporting, higher net revenue, and smaller social costs. A simpler and less ambiguous tax law, however, may increase or decrease aggressive reporting, net revenue collection, and social dead-weight losses. Policymakers will need to analyze the impact of these two factors separately.

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14 The threshold is $(p_H Tq - L_A) / (p_H - p_L) Tq$ in our original model. In the special case, it is simplified to $(p_Tq - L_A) / (2p - 1) Tq$.

15 This result justifies calls for tax simplification as a means to improve compliance. When taxpayers have an information advantage over the tax agency about final tax liabilities, an increase in tax ambiguity exacerbates uncertainty faced by the agency. It is not surprising that strategic choices of taxpayers can lead to lower net revenue and greater social dead-weight losses. Without a litigation phase, Mills et al. (2007) adopt a similar assumption on information advantage and show that changing tax ambiguity may encourage or discourage aggressive reporting behavior depending on parameter values.

16 Although consistent with the two prior studies, this result is valid only under a certain condition in our model. We do not believe that greater tax ambiguity can always reduce both aggressive reporting and social dead-weight losses. Instead, we find that the impact of a change in tax ambiguity on reporting behavior depends on information structure and parameter values.

17 Consider a case of zero ambiguity where all taxpayers face the same uncertainty about tax liabilities, $p_H = p_L = p$. Then, a competent audit would identify the underlying $p$ value, and there would be no information asymmetry after an audit between taxpayers and the agency regarding litigation outcomes. If the agency offers $(p_Tq + L_T)$, all taxpayers will accept it and settle the case. There will be no trials. If the agency’s audit cost is smaller than $(p_Tq + L_T)$, the agency will audit all returns. Whether the society would be better off with zero ambiguity depends on the relative magnitude of the impact of the two factors: no litigation and full audit. The optimal level of ambiguity should minimize the sum of audit costs and litigation costs.
Graetz and Wilde (1985) argue that it is a myth that lowering tax rates will induce greater compliance. They predict that lowering tax rates will encourage aggressive reporting when both taxpayers and the agency act strategically. In our model, a decrease in tax rate $t$ or penalty rate $q$ reduces $Tq$. This reduces a gain from underreporting from the taxpayer’s perspective, but it also lowers the agency’s expected gain from auditing a return. A decrease in $Tq$ makes a trial less attractive to the agency, and the agency offers $Tq$ less frequently after audit. In addition, the agency goes to court with a lower probability when taxpayers reject its offer. High type taxpayers reject the agency’s offer $Tq$ more frequently, resulting in an increase in the aggregate litigation frequency. These changes in the litigation stage motivate high type taxpayers to report more aggressively. This result confirms the conclusions of Graetz and Wilde (1985), Beck and Jung (1989b), and Jung (1995).

The agency’s audit probability, however, may increase or decrease depending on what causes the reduction in $Tq$. If it is due to a lower $T$, then the agency lowers audit probability. It is possible since, as $T$ goes down, the high type taxpayer’s expected burden from reporting high (honestly) and paying $T$ decreases faster than does that from reporting low and going through the audit/litigation phase, $(1 - \beta) Tq + cT$. The net impact of these two opposing forces – more aggressive reporting but a lower audit probability – is to increase both aggregate audit and litigation frequencies. In sum, a lower $T$ increases both types’ expected payoff, decreases net revenue collection, and increases social dead-weight losses. If, however, the reduction in $Tq$ is due to a lower penalty rate, then the agency increases the audit probability to deter high type taxpayers from reporting too aggressively. An increase in the audit probability decreases low type taxpayers’ expected payoff, but does not change the payoff of high type taxpayers.

Taxpayers’ compliance burden, measured by audit costs $cT$ and litigation costs $LT$, has no impact on taxpayer reporting aggressiveness in EQ 4. As $cT$ decreases, going through an audit becomes less costly to taxpayers, reinforcing motivation for aggressive reporting. More aggressive reporting increases the expected benefits of an audit from the agency’s perspective, resulting in more audits. This increase in the audit probability weakens the taxpayer’s aggressive reporting incentive, leaving the taxpayer’s reporting behavior unchanged. Similarly, a decrease in $LT$ makes litigation less burdensome from the taxpayer’s perspective, which induces the agency to take more cases to court (higher $l_H$). This in turn depresses the high type taxpayer’s incentive to reject the agency’s settlement offer. These two offset each other and leave taxpayer litigation behavior unchanged.

A decrease in taxpayers’ litigation costs results in more trials. This increase in litigation frequency, however, does not dominate a decrease in litigation costs, and social dead-weight losses decrease. In contrast, Jung (1995) predicts that a decrease in taxpayers’ litigation costs will unambiguously increase social dead-weight losses, since taxpayers report more aggressively. In his model, taxpayers simply respond to the tax agency’s audit adjustment without any information on the expected outcome of a trial. A decrease in their own litigation costs makes a trial (after aggressive reporting) less costly, and taxpayers report more aggressively. In our study, however, such a change in taxpayers’ litigation cost is absorbed by the agency’s response to taxpayers’ reactions to post-audit settlement offers.
In EQ 4, an increase in the tax agency’s litigation costs $L_A$ encourages aggressive reporting, and leads to more audits and trials. In Jung (1995), however, such an increase has an uncertain impact on the reporting decision and aggregate litigation frequency. The aforementioned differences on information asymmetry between our study and Jung (1995) contribute to this different prediction. Changes in I.R.C. Section 7430 and debates on the burden of proof in tax litigation suggest that it may be worthwhile to test whether taxpayers’ reporting behavior changes in response to a change in the agency’s litigation costs.

7. Conclusions

We developed a tax compliance game in which tax laws are ambiguous and a tax agency may commit audit errors. An audit error occurs in the current setting when the tax agency over- or underestimates the probability of the court denying a questionable deduction. The possibility of audit errors exacerbates taxpayer uncertainty caused by the ambiguity of tax laws. We find that these two sources of taxpayer uncertainty have different implications for tax reporting. Less uncertainty can encourage or discourage aggressive reporting depending on its source and nature.

This study might be extended in several ways. Further research could model a game between a tax agency and multiple taxpayers with similar cases. In such a setting, the tax agency would need to take into account the strategic responses not only of the taxpayers being examined, but also of others who may or may not become aware of the results of an audit (and possible litigation). Alternatively, one could model a multiple-period game in which the tax agency faces a taxpayer over multiple periods, and refines its ability to assess the probability of winning at trial as it obtains more information on the taxpayer. The tax agency may vary its audit intensity by using pre-audit information and adjust its ability to assess the probability of winning at trial. The relation among the tax agency’s pre-audit information and audit/litigation decisions would be an interesting issue for further research. Alternatively, an audit could take place in multiple steps, and the agency might use information obtained from earlier stages to determine the nature and scope of the remaining procedures.

References


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18 Jung (1995) models a case where taxpayers try to infer their own type from the agency’s settlement offer after an audit. As explained in footnote 12 of his paper, he considers only a separating equilibrium in the litigation stage. In contrast, we assume that taxpayers know their own type and that an audit may or may not reveal a taxpayer’s true type. As a result, pooling equilibria could arise in our model.


