

## *Audit Selection and Firm Compliance with a Broad-based Sales Tax*

James Alm, Calvin Blackwell, and Michael McKee

### **Summary**

The retail sales tax is a major revenue instrument of most state and local governments in the United States, and numerous aspects of the sales tax have been studied. However, firm compliance has been largely ignored. We extend this limited literature by examining sales tax compliance using a unique data set for New Mexico. This data set allows us to estimate both the factors that determine the likelihood that a firm will be selected for an audit and, conditional upon audit selection, the firm characteristics that determine the level of firm compliance.

New Mexico's "sales" tax is labeled the Gross Receipts Tax (GRT), and it is the state's largest single source of revenue. The GRT is imposed at a uniform rate, and its coverage is extremely broad because it is imposed on nearly all in-state transactions, including services as well as goods. This broad-based coverage implies that the GRT tax base is rich in business-to-business transactions, compared to the typical retail sales tax that emphasizes business-to-consumer transactions.

As with any tax, there are compliance issues with retail sales taxes. With its broad base, the GRT offers different opportunities for evasion than a pure retail sales tax. For example, all food is taxed under the GRT, so there are fewer opportunities for evasion for grocery stores. The heavier taxation of business-to-business transactions under the GRT generates matching paperwork that may also enhance compliance. With a broader base than the typical sales tax, the GRT tax rate can be lower than that under an equal-yield retail sales tax, and a lower rate may enhance compliance. In contrast, the GRT includes services, and sales taxes on services are often easier to evade than taxes on commodities because service transactions concern intangibles. Overall, there are many unanswered questions about firm compliance with any sales tax, especially one that takes the form of a GRT.

This paper examines the determinants of state audit selection and subsequent firm compliance with a broad-based sales tax like the GRT. With the cooperation of officials in the State of New Mexico, we assembled a data set that contains detailed firm-level information on the firms subject to the GRT, on the firms that were actually selected for audit, and on the results of those audits. We use a two-stage selection model to estimate both the determinants of the State's audit selection rule (if any) and, for those firms selected for an audit, the firm's subsequent reporting result.

Our estimation results from the first-stage audit selection process indicate that returns are systematically selected for audit by the state, based on items reported by the firms on their tax returns. Our second-stage firm reporting results show that firms that exhibit greater variation in deductions, that operate in the service sector, that miss filing deadlines, and that have an out-of-state mailing address have a lower compliance rate. If the State wishes to increase firm compliance with the sales tax, then it should re-orient its audit strategy to target firms with these characteristics.

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**Abstract** - This paper examines the process by which firms are selected for a sales tax audit and the determinants of subsequent firm compliance behavior, focusing upon the Gross Receipts Tax in New Mexico. A two-stage selection model is used to estimate the State's audit selection rule and, conditional upon audit selection, the firm's compliance choice. The first-stage estimation results indicate that auditors select returns based upon a systematic, even if informal, audit rule. The second-stage results show that firms that exhibit greater variation in deductions, provide services, miss filing deadlines, and have an out-of-state mailing address have a lower compliance rate.

## INTRODUCTION

The retail sales tax is a major revenue instrument of most state and local governments in the United States, accounting for roughly one-third of state and local own-source revenues in recent years. Numerous aspects of the sales tax have been studied, including its administration, its incidence, and, especially in recent years, its vulnerability to erosion with the growth of internet commerce.<sup>1</sup> However, with the exception of Murray (1995), firm compliance with the sales tax has been largely ignored. We extend this literature by examining sales tax compliance using a unique data set for New Mexico. This data set allows us to estimate both the factors that determine the likelihood that a firm will be selected for an audit and, conditional upon audit selection, the firm characteristics that determine the level of firm compliance.

New Mexico's "sales" tax is officially labeled the Gross Receipts Tax (GRT), and it is the state's largest single source of revenue. In 2002, tax collections from the GRT were nearly \$2 billion, or over one-third of the state's general fund revenues.<sup>2</sup> The GRT is typically imposed at a uniform rate, and its coverage is extremely broad because it is imposed on nearly all in-state transactions, including services as well as goods.<sup>3</sup> This broad-based coverage implies that the GRT tax base is rich in business-to-business transactions, compared to the typical sales tax that emphasizes business-to-consumer transactions.<sup>4</sup>

The lessons from the New Mexico experience with the GRT seem especially timely, for several reasons. There is recent evidence that the traditional state sales tax based on retail sales generates distortions by reducing the relative prices of non-taxed services (Merriman and

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<sup>1</sup> For a comprehensive discussion of the sales tax in the United States, see Due and Mikesell (1995). Also, in the wake of several Serrano-type cases (*Serrano v Priest*, 5 Cal. 3d 584), many states have studied the possibility of expanding or introducing sales taxes to fund elementary and secondary education.

<sup>2</sup> See [http://www.state.nm.us/tax/pubs/TaxreseStat/RevEstOvr-7\\_02.pdf](http://www.state.nm.us/tax/pubs/TaxreseStat/RevEstOvr-7_02.pdf).

<sup>3</sup> A major exception is the tax on vehicles, which is approximately one-half the general tax rate.

<sup>4</sup> The New Mexico GRT taxes all gross receipts (e.g., a sale of office equipment by a manufacturer to a law firm) including services (e.g., sale of accounting services to a law firm). The latter category is especially heavy in business-to-business transactions, and is completely absent in the case of a retail sales tax.

Skidmore, 2000), and this type of distortion is avoided by the use of a broad-based sales tax like the GRT. With many states currently facing significant budget deficits, there is renewed interest in additional revenue sources, and the New Mexico tax has potential as an alternative form of a state sales tax.<sup>5</sup> As a prominent U.S. example of a broad-based sales tax, the New Mexico experience also may provide an object lesson for the federal government, especially in light of ongoing discussion of a national sales tax and the form of such a national tax.

As with any tax, however, there are potential compliance issues with retail sales taxes (Due and Mikesell, 1995; Murray, 1995). With its broader base, the New Mexico GRT offers different opportunities for evasion than a pure retail sales tax. For example, all food is taxed under the GRT, so there are fewer opportunities for evasion (and fewer complications) for grocery stores. The heavier taxation of business-to-business transactions under the GRT generates matching paperwork that may also enhance compliance. With a broader base than the typical state sales tax, the tax rate under the GRT can be lower than that under an equal-yield retail sales tax, and a lower rate may enhance compliance. In contrast, the GRT includes services, and sales taxes on services are often easier to evade than taxes on commodities because service transactions concern intangibles. Overall, there are many unanswered questions about firm compliance with any sales tax, especially one that takes the form of a GRT.

There is a large literature on individual compliance with the income tax (Andreoni, Erard, and Feinstein, 1998; Alm, 1999) but little work on compliance with other taxes, including firm compliance with the sales tax.<sup>6</sup> A notable exception is the work of Murray (1995), who

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<sup>5</sup> For example, the State of Nevada has recently enacted a GRT (effective 1 July 2005) imposed at 0.25 percent on gross receipts in excess of \$450,000; the wording of the Nevada statute is nearly identical to that of New Mexico. Bills to introduce a GRT have recently been considered in Connecticut, South Dakota, and New Hampshire. In addition, the State of Washington has a sales tax that is labeled a “gross receipts tax” imposed at a low rate, and also levies a retail sales tax. Several states have taxes similar to a GRT but applied mainly to minor or selective categories of expenditures (e.g., utility bills or business services).

<sup>6</sup> See Rice (1992) for empirical evidence on the determinants of corporate tax compliance.

investigates the determinants of audit selection and audit productivity for the Tennessee sales tax. He concludes that sales tax accounts in Tennessee are audited non-randomly and that greater opportunities for underreporting lead to increased tax evasion. Despite these valuable insights, there are no other studies that have examined audit selection and subsequent firm compliance with the sales tax. It seems especially useful to determine whether similar – or different – results on the determinants of audit selection and firm compliance hold for other states, for other sectors of firms covered by the tax, and for a broad-based sales tax like the GRT.

This is our purpose here. With the cooperation of officials in the State of New Mexico, we assembled a data set that contains detailed firm-level information on the firms subject to the GRT, on the firms that were actually selected for audit, and on the results of those audits. We use a two-stage selection model to estimate both the determinants of the State's audit selection rule (if any) and, for those firms selected for an audit, the firm's subsequent reporting result.

Our estimation results from the first-stage audit selection process indicate that returns are systematically selected for audit by the state, based on items reported by the firms on their sales tax returns. Our second-stage firm reporting results show that a firm's compliance decision is related to its opportunities for cheating; that is, firms that exhibit greater variation in deductions, that operate in the service sector, that miss filing deadlines, and that have an out-of-state mailing address have a lower compliance rate. If the State wishes to increase firm compliance with the sales tax, then it should re-orient its audit strategy to target firms with these characteristics (perhaps through reporting requirements). We also find some evidence that firms seem able to discern the audit selection procedures of the State, even though these procedures are informal and unpublicized; that is, compliance is positively correlated with the predicted probability of audit, generated from fitted values from the selection equation. The tax authorities should

therefore recognize that, even absent an explicit audit selection strategy, firms may be able to perceive, even anticipate, the audit selection rules.

In the next section we discuss the main features of the GRT and its administration. We then outline our methodology. We present our estimation results in the following section and our conclusions in the final section.

## **NEW MEXICO'S GROSS RECEIPTS TAX**

The New Mexico statute enacting the GRT specifies that the tax be imposed "...for the privilege of engaging in business in the state".<sup>7</sup> In principle, then, the GRT is an especially broad-based tax, imposed on the receipts from all activities (including services) unless specifically exempted or deducted by the legislation. Exemptions from the tax are relatively few, and include non-retail transactions like wages, bank interest, sales subject to separate taxes (e.g., gasoline or liquor sales), and receipts of 501(c)(3) non-profit organizations. Deductions are also limited, and are given largely for special tax breaks, such as a deduction for research and development services, for "chain of commerce" inputs in the production process, and for items produced in New Mexico and then exported. The chain of commerce deductions are similar to those under a value added tax, and prevent the GRT from becoming a turnover tax; however, the incomplete coverage of deductions allows some tax pyramiding to persist. Firms are also required to pay "compensating taxes" on transactions that involve a purchase from outside the state; these compensating taxes are voluntarily reported.

The New Mexico tax code specifies that the GRT be imposed on the seller. The tax rate levied is the state base rate plus the local jurisdiction (municipal or county) add-on factor. In practice, this means that firms located in more than one jurisdiction may pay taxes on the same

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<sup>7</sup> See Chapter 7 Section 9, Subsection 4 of New Mexico Statutes Annotated, generally quoted as 7-9-4 NMSA 1978.

types of transactions at different rates, depending upon the location of the transaction. Tax rates vary from 5 (the base state rate) to 6.5 percent, depending upon the jurisdiction within the state.

For the most part, individual firms may evade the GRT liabilities by remitting to the State only a portion of the full GRT liability, mainly by underreporting gross receipts or by overstating deductions. Of these two methods, officials believe that underreporting of gross receipts is the most commonly used method, given the relatively small scope for deductions in the broad base of the GRT. Nonfiling of returns is not believed by officials to be a viable avenue for evasion. Any firms found to be noncompliant are subject to fines.

The New Mexico Taxation and Revenue Department (NMTRD) administers the GRT and the audit program. State auditors examine the practices of all firms conducting business in New Mexico. Auditors may also perform “combined audits”, in which a firm selected for possible noncompliance with, say, the GRT, may have aspects of its tax reporting examined, including its gross receipts and compensating taxes as well as tax withholdings and corporate income taxes. This policy of combined audits means that the audit selections may be initiated for taxes other than the GRT. According to officials, nearly all audits are prompted by a desire by the NMTRD to improve the GRT collections.<sup>8</sup>

NMTRD officials also indicate that there are no written guidelines for audit selection or audit procedures. One plausible reason for this policy is to create taxpayer uncertainty.<sup>9</sup> Perhaps more important is the fact that auditors may leave their jobs in the NMTRD and move to private practice, thereby taking this information with them. The absence of formal written guidelines

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<sup>8</sup> District N of the audit division specializes in auditing the New Mexico corporate income tax, and is also responsible for auditing firms located in Albuquerque. Our sample includes firms that were audited by district N auditors; for example, in FY 1994-1995, 28 of 186 firms in our sample for that year were audited by district N. However, interviews with NMTRD officials indicated that the trigger in district N is almost exclusively the potential non-compliance with the GRT and not non-compliance with other taxes. These interviews also indicated that auditors in districts other than N primarily examine compliance with the GRT.

<sup>9</sup> Scotchmer and Slemrod (1989) and Alm, Jackson, and McKee (1992) show that taxpayer uncertainty about audit policies can sometimes lead to higher compliance.

means that in practice firms are audited largely according to individual auditors' preferences. Our interviews with auditors reveal that they employ a wide variety of selection strategies. Some auditors use a completely random approach; others audit firms in a particular industry if some initial audits are productive, and other auditors use information in the tax file system to generate productive leads. In fact, interviews with auditors suggest that this last approach seems the most common. Some of these leads are generated by headquarters and then assigned to individual field auditors, while other leads come from the auditors themselves.

New Mexico's audit coverage tends to be below the average for other states. During the three-year period from 1989 through 1992, the NMTRD audited only 405 out of 90,000 active accounts, for an overall coverage rate of less than one percent and an average of roughly 100 audits per year. This level of coverage placed New Mexico at the bottom when compared at that time to other states (Due and Mikesell, 1995). However, New Mexico's coverage has increased since 1992. Over the period 1992 through 1999, the average number of audits per year was approximately 350. During this period, New Mexico recovered \$16.5 million from audits, or 1.7 percent of total gross receipts and compensating tax revenue. On average, each auditor generated \$239,130 dollars and each audit \$40,740 (post appeals). Both of these numbers are near the average for all states (Due and Mikesell, 1995).

## **THEORETICAL FRAMEWORK, ECONOMETRIC APPROACH, AND DATA**

### *Theoretical Framework*

Tax compliance can be usefully viewed as a "game" in which taxpayers seek to minimize their tax liabilities and revenue authorities establish audit selection rules to maximize their tax collections (Reinganum and Wilde, 1986; Graetz, Reinganum, and Wilde, 1986). Alm, Bahl,

and Murray (1993) apply this framework empirically to the individual income tax, and Murray (1995) follows the same approach for sales tax compliance. Our framework is similar.

The sales tax compliance game has two players: the owner of the firm decides how much of the sales tax revenues collected by the firm to remit to the tax department, and the tax department auditor decides whether to audit a particular firm. In equilibrium, both agents choose a best response strategy.

Consider first the behavior of the tax department and its auditors. Auditors are assumed to select returns to maximize tax and penalty revenues net of audit costs and subject to a tax department budget constraint.<sup>10</sup> This process leads the auditor to assign to each return some index  $A^*$  of expected audit productivity, based upon various observable characteristics of the firm as revealed on its tax return information. The auditor then uses this index (in combination with available resources of the tax department and other directions from the department) to determine which firms to audit. Denoting the firm's observable characteristics by the vector  $X$  and the budget resources of the tax department by  $B$ , the linearized version of this index is given by  $A^* = \Gamma X + \phi B + \varepsilon$ , where  $\Gamma$  is the vector of audit assessment weights on the firm characteristics and  $\phi$  is the coefficient on the tax department's budget. The error term  $\varepsilon$  is assumed to be normally distributed with a mean of zero, and reflects the fact that the tax department is unable to determine audit productivity perfectly but will not sustain a permanent bias.

This audit selection rule can also be expressed as a probability of audit, or

$$p^* = p(A^*), \tag{1}$$

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<sup>10</sup> This assumption is typically made (Graetz, Reinganum, and Wilde, 1986). Other possible goals could include maximization of firm compliance with the sales tax, maximization of audit revenue, the conduct of only "productive audits", and even the maximization of some notion of "social welfare". However, as long as auditors systematically select returns on the basis of firm characteristics and other return items, the empirical specification is not affected.

where  $p^*$  is the probability that a firm will be selected for audit, based upon information provided by the firm on its tax return, auditing resources, and the various assessment weights. Equation (1) reflects the potential endogeneity of the audit selection process; that is, the probability of audit for any firm is not fixed, predetermined, and independent of the firm's actions, but depends in part upon the characteristics that the firm chooses to reveal on its tax return. Of course, the firm does not know either the characteristics that are audit "flags" (e.g., the vector  $X$ ) or the weights that are attached to those flags (e.g., the vector  $I$ ). Note that there may be some institutional constraints on the tax department that influence the audit selection rule, such as a requirement that all sectors be covered in the audit process. Note also that, despite systematic selection of most returns, some audits may be purely random. This practice would serve two purposes: to provide a control dataset to check the efficiency of the endogenous audit selection rule, and to make it more difficult for the firms to divine the audit selection rules. Such additional considerations are discussed in our empirical specification.

As for the firm, we assume that the owner has already chosen the levels of inputs and outputs that maximize gross of tax profits. The firm must then decide what fraction of any GRT revenues that it has collected to pay to the tax department instead of keeping itself. The firm's optimization can be solved for the fraction of GRT sales tax revenue  $c^*$  that the firm chooses to report to the tax department. The optimal size of this fraction will be a function of the sales tax rate  $t$ , the penalty rate  $f$ , the probability of audit  $p$ , and the firm's revenues and costs ( $TR$ ,  $TC$ ), or  $c^*=c(TR,TC,t,f,p)$ , where  $c(\cdot)$  captures the tastes and preferences of the owner. However, it is important to recognize that the situation is more complex for the firm when the state conducts comprehensive audits, as in New Mexico. Recall that the audit may be triggered by a perception that the firm has underreported its GRT, but the auditor may extend the audit to cover the

corporate income tax, withholdings for the individual income tax, and so on. Consequently, a firm's willingness to underreport its GRT will be affected by its vulnerability to other classes of audits. Audits are costly, beyond the penalties levied, and firms will wish to avoid audits. The optimal size of the fraction  $c^*$  is therefore modified to incorporate the comprehensive audit process, or

$$c^* = c(TR, TC, t, f, p, Z), \quad (2)$$

where  $Z$  could include such factors as how many locations (and so how many sets of records) the firm has in the state and whether the firm is a corporation (and so liable for corporate taxes). While the firm has several avenues for evasion, the comprehensive nature of the audit process, whether simultaneous or sequential, may militate against the use of these different avenues, and may actually encourage compliance with the GRT (Rhoades, 1999).

Equations (1) and (2) represent a sequential equilibrium model of the sales tax compliance game. The firm selects the fraction of GRT revenues to report to the tax department and the amount to keep knowing that its characteristics and other information provided on its tax returns may affect the probability of audit but not knowing specifically how this information affects the probability. Auditors in the tax department then choose firms to audit, using the information provided on the return and the relevant assessment weights. The outcome of this game is a tax reporting strategy for the firm and a tax auditing strategy for the auditor, both of which represent a best response strategy for the agent. The next subsection discusses the procedures that we use for estimating this model.

### *Econometric Approach*

Our econometric analysis consists of a two-stage estimation procedure. In the first stage, we estimate the audit selection rule employed by NMTRD auditors, using information conveyed

to the NMTRD by the firms on their tax returns and pooling both audited and non-audited firms. In the second stage, we estimate the proportion of firm compliance but only for those firms selected for audit in the first stage; to correct for any potential bias generated by including only the audited firms, we control for audit selection using the standard Heckman (1979) sample selection procedure.<sup>11</sup>

There are several advantages to this two-stage estimation. The first-stage estimation permits the investigation of how the tax department can use existing data and accepted econometric methods to select more effectively returns for audit. Relatedly, a key policy issue is whether the audit selection of the first stage is able to discover more noncompliant firms in the second stage; that is, does audit selection identify those firms more liable to be tax evaders? If not, then the NMTRD is not efficiently using its resources to encourage sales tax compliance. Further, the first-stage estimation is necessary to generate unbiased estimates of the second-stage firm compliance behavior. If the audit department in fact adopts systematic audit selection rules, then firms in the audited pool will differ from those that are not selected, and appropriate estimation of the firm characteristics affecting firm compliance in the second stage requires correction for this selection bias. Finally, as discussed in more detail later, studying the audit selection process allows us to investigate whether firms can discern (or anticipate) the process and thereby modify their reporting strategy to reduce their probability of audit.

The first-stage linearized audit selection rule is equation (1). Although we cannot observe the index  $A^*$ , we can observe those individual firms who are audited ( $p=1$ ) and those who are not audited ( $p=0$ ), which generates the indicator variable  $A$  for each firm, or

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<sup>11</sup> Murray (1995) employs a three-stage selection procedure in which probit analysis is used to estimate the factors that determine the tax agency's selection of returns for audit in the first stage and the factors that determine the likelihood of firm noncompliance in the second stage; in the third stage linear regressions are then used to estimate the level of noncompliance, using selectivity bias controls from the first two stages. See Alm, Bahl, and Murray (1993) for a similar approach for audit selection and compliance with the Jamaica individual income tax.

$$A = \begin{cases} 1 & \text{iff } A^* > 0 \\ 0 & \text{otherwise} \end{cases}$$

$$= \Gamma X + \phi B + \varepsilon \tag{3}$$

We estimate equation (3) by probit analysis, in which the probability that a firm is audited is estimated as a linear function of firm characteristics  $X$  and NMTRD budget resources  $B$ .<sup>12</sup>

The second-stage compliance equation corresponds to equation (2). Here firm compliance is observed iff  $A^* > 0$ . In this case, the fraction  $c$  of sales tax receipts reported to the NMTRD is estimated as a linear function of firm characteristics, as well as the inverse Mills ratio from the first-stage estimation, or

$$c = \beta Z + \mu, \text{ iff } A^* > 0, \tag{4}$$

where  $Z$  is the vector of firm characteristics (including the inverse Mills ratio),  $\beta$  is the coefficient vector on  $Z$ , and  $\mu$  is the error term. Some variables in  $Z$  may overlap those in  $X$ . Because the compliance rate is bounded between 0 and 1, with some firms at full compliance, we estimate equation (4) by Tobit maximum likelihood estimation.

Identification of the empirical model is established through the nonlinearity of the selection term and also through exclusion restrictions on the independent variables in the selection and compliance equations. The first-stage audit selection criteria equation necessarily excludes any “true” (or post-audit) tax return items generated in the course of the audit (e.g., the true tax liability), and these post-audit items are included in the second-stage compliance equation. The first-stage equation also includes a variable that reflects the different magnitudes of the tax agency’s budget in the years investigated (or variable  $B$  in equation (3)); this variable is excluded in the second-stage equation, and is discussed later.

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<sup>12</sup> This model does not assume that the tax agency always correctly identifies evaders. In fact, the NMTRD audited some firms later found not to have underreported their gross receipts.

It should be noted that there are other possible methods of estimation. An especially intuitive approach is to use the first-stage probit estimation to generate for each audited return a predicted probability of audit, and then to use this predicted probability as an additional explanatory variable in the second-stage compliance equation. This latter approach does not employ the inverse Mills ratio. It is this approach that allows us to examine whether firms are able to discern the audit selection procedure of the NMTRD. We present the results from this alternative method as well.

### *Data*

Our data set consists of two separate samples, the “Audited Firm Sample” and the “Non-audited Firm Sample”. Both samples were constructed from information provided by, and with the cooperation of, the NMTRD Revenue Audit and Compliance Division.

For the Audited Firm Sample, each audited firm has a file opened with the Revenue Audit and Compliance Division when an audit is initiated, and its pertinent tax and other information is placed in this file. We examined audit files for the years 1994, 1995, and 1996 (covering the fiscal years 1994-1995 and 1995-1996). These audit files are not computerized, and, given the costs of collecting the data from paper files, we sampled from the population of these audited returns using a stratified sample with two groups: firms with more than \$100,000 in total violations post audit, and firms below this level. We selected 100 percent of audited firms in the first group, and 50 percent of firms in the second group for inclusion in our sample.<sup>13</sup> Our *initial* Audited Firm Sample consisted of 476 firms. Typical data problems led to some of these firms being dropped. Some final files were simply missing even though an audit had been reported. Also, firms are allowed to protest audit assessments, and protests may take some years

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<sup>13</sup> The smaller firms were selected randomly. We listed all firms with lower than \$100,000 in violations in descending order by the amount of GRT evaded, and then we selected every other firm on the list.

to resolve. Files on active protests were removed because we did not know the final determination of tax liability. At the time of our data collection, we were able to collect information on 411 of the initial 476 firms selected for inclusion in our audited sample. Not all required data could be recovered from these 411 firms as even relatively complete files sometimes had missing data on important variables and so were un-useable. Our *final* Audited Firm Sample consists of 328 audit files.<sup>14</sup>

As for the Non-audited Firm Sample, we elected to construct a choice-based sample of non-audited firms from the files for all firms registered in New Mexico, as a match to the 476 firms in the initial Audited Firm Sample. The GRT is a broad-based tax, and the NMTRD has a limited audit budget. Virtually all SIC codes are subject to the GRT, and our examination of the audited firms indicated that every single three-digit SIC code had at least one audit during the period. Interviews with NMTRD officials also indicated that the NMTRD wished to be represented in all sectors in the New Mexico economy. Thus, based upon the structure of the GRT, the regularities observed in the Audited Firm Sample, and our discussions with NMTRD officials, we constructed a sample of non-audited firms to establish an identical mix of SIC codes in both sets of audited and non-audited firms.

Since the construction of a choice-based sample has implications for our estimation strategy, we discuss our sampling method in some detail here. To construct the match we obtained the New Mexico taxpayer identification number for each audited firm. We then searched the list of taxpayers until the next non-audited firm with an identical SIC code was reached. Because taxpayer identification numbers are assigned sequentially, the closest identification number was also the closest firm in terms of start-of-business date. This procedure

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<sup>14</sup> The breakdown of firms in the *initial* sample is as follows: 98 firms evaded more than \$100,000 in gross receipts taxes, while 378 evaded less than \$100,000. The breakdown for the *final* sample has 58 firms with more than \$100,000 in evaded gross receipts tax and 270 firms with less than \$100,000 in evaded gross receipts.

created a set of firms that were matched by SIC code and, to a substantial extent, by age.<sup>15</sup> Not all data on these firms were available, so that the final sample of non-audited firms consisted of 367 firms. While matching imposes some costs (e.g., we lose the matching criteria as potential testable hypotheses), it ensures that the Non-audited Firm Sample is more representative of the general audit selection strategy of the NMTRD. Indeed, a purely random sample of non-audited firms would have been dominated by retail establishments because this is the largest single sector (numerically) in the New Mexico economy, and so a random sample would not have been representative of the relevant audit pool. Of course, the amount of information for the Non-audited Firm Sample is considerably less than for the Audited Firm Sample.

Variable definitions and descriptive statistics for both samples are reported in Tables 2 and 3. The New Mexico statute allows for a review of files for up to six years from filing. Consequently, the actual dates for the information provided by the each firm, including the year of its audit, extend from 1988 to 1996. We coded a firm as “audited” if it was audited in any of the calendar years 1994, 1995, or 1996. No firm in the Audited Firm Sample was audited more than once during this period.

Our measure of firm compliance (*ComplianceRate*) is the ratio of the gross receipts reported by the firm to the actual (or “true”) assessed gross receipts of the firm, as determined by NMTRD auditors. Noncompliance includes both undeclared gross receipts and excess claimed deductions. As with other types of audit information (such as the Taxpayer Compliance Measurement Program of the Internal Revenue Service), the findings of the NMTRD may or may not be accurate, so that our measure of noncompliance is subject to a variety of potential errors. For example, audits may not detect all unreported gross receipts, and honest errors are

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<sup>15</sup> It might be argued that we do not have a truly matched sample. However, our matching protocol is as close as one can get with the data available for matching. Given that all of the non-audited firms were available for audit, we argue that our matching protocol gives us a Non-audited Firm Sample that is representative of the audit pool.

not identified. Further, as Graetz and Wilde (1985) argue, it is easier for auditors of individual income taxes to uncover illegal deductions than to uncover undeclared income or receipts, and our data are vulnerable to this criticism as well.

Figure 1 shows the average *ComplianceRate* by SIC code, as estimated from our Audited Firm Sample. The average compliance rate across all firms is 43 percent, but compliance behavior varies widely across SIC codes. Compliance rates range from a high of over 80 percent in auto repair to a low of approximately 10 percent in health and legal services. Sectors with a significantly higher than average *ComplianceRate* include general construction, contractors, personal services, business services, auto repair, miscellaneous repair, and miscellaneous services; sectors with a lower than average compliance rate are mainly in highway and street construction, food processing, and health and legal services. The compliance rate for some types of services (e.g., personal services and business services) is higher than average, a finding that contradicts prior conjectures and some econometric evidence.

While officials of the NMTRD say that they do not utilize formal statistical analysis in the audit selection procedures and also do not publish formal guidelines for audit selection, it seems likely that observable firm characteristics affect audit selection, whether through an oral tradition among auditors, informal guidelines occasionally issued to field auditors, or specific leads communicated by the NMTRD to its auditors. Indeed, the descriptive statistics in Table 3 illustrate some immediate and obvious differences between audited and non-audited firms. One difference is the size and variability of the firm's reported revenues and deductions, as measured by the normalized value for each firm's reported gross receipts (*NormalizedGrossReceipts*) and deductions (*NormalizedDeductions*), where each variable equals the range of the firm's variable over the period 1993 to 1995 divided by the average of the firm's variable over these years.

Both *NormalizedGrossReceipts* and *NormalizedDeductions* are much larger for audited firms than for non-audited firms. The sizes of the average gross receipts of the firm (*AverageGrossReceipts*) and of the average deductions of the firm (*AverageDeductions*) are also much larger for audited firms than for non-audited firms.

The first-stage audit selection equation estimates whether there are factors available to NMTRD auditors that affect the likelihood that a firm will be selected for audit, and so combines the Audited and the Non-audited Firm Samples. The dependent variable is the observed variable *A*, equal to 1 if the firm is selected for audit by the NMTRD and 0 otherwise. Independent variables include those firm characteristics likely to affect the auditor's index of audit productivity, as well as the audit department budget measure *AuditRegime*.

*AuditRegime* captures variable *B* in equation (3), and is defined as a dummy variable equal to 1 if the firm is sampled in fiscal year 1995-1996 in either the Audited or the Non-audited Firm Sample and 0 if sampled in 1994-1995. This variable applies to all firms doing business in the respective fiscal years because it reflects the chance of being audited based on the resources available to the audit branch.<sup>16</sup> The NMTRD audited 334 firms in 1994-1995 and 500 firms in 1995-1996. This difference represents an increase of more than 40 percent in the intensity of audit effort. As a reflection of the greater intensity of audit effort, the NMTRD assessed \$23.1 million in unpaid GRT in 1994-1995 versus \$34.5 million in 1995-1996. The inclusion of *AuditRegime* in the first stage and its exclusion in the second stage helps to identify the equations.<sup>17</sup>

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<sup>16</sup> Given the way in which we constructed the datasets, no firms in the Non-audited Firm Sample were in fact audited during the period under study.

<sup>17</sup> We argue that the additional resources allocated to audits were primarily directed to increasing the audit rate and not the audit effort per case. Indeed, the average post-audit assessment of unpaid GRT was virtually unchanged over the two periods at about \$69,000. Consequently, we believe that *AuditRegime* serves as a representation of resource availability that affects the audit rate (the first stage) but not the compliance rate (the second stage), so that *AuditRegime* should be included only in the first-stage audit selection equation.

There are several observable factors available to the auditors that seem likely to affect whether a firm is selected for audit. Larger firms may be more likely to be selected for audit because they will, *ceteris paribus*, have higher tax liabilities and so be more productive targets. Larger firms also have more resources available to support evasion (e.g., accountants and legal advice). Our measure of firm size is the average reported deductions (*AverageDeductions*). The scope of deductions is largely determined by the line of business (SIC), but the level of deductions seems more likely to be determined by the size of the firm. Thus, for a given SIC, *AverageDeductions* may be used as a measure of size. In addition, firms that take substantial deductions have more opportunity for evasion through overstating deductions.

Auditors may use the variability in a firm's reported deductions as a clue to the compliance behavior of the firm. If a firm is not consistent in its evasion behavior over time (e.g., if the firm had complied in previous years, but not in the current year), then its reported deductions will tend to vary more than compliant firms. Likewise, high variability in reported deductions will also act as a potential flag for evasion. The normalized range of declared deductions *NormalizedDeductions* is used to capture this variability.

It is likely that New Mexico resident firms have a better understanding of their tax obligations, and so the NMTRD may audit out-of-state firms with higher frequency. We include *NMAddress* as an explanatory variable, equal to 1 if the firm's mailing address is in New Mexico and 0 otherwise. We also include a dummy variable for whether or not the firm is incorporated (*Corporation*). Rice (1992) speculates that corporations comply more than other types of firms due to disclosure laws; however, his empirical estimates suggest that corporations actually underreport corporate income taxes to a significant degree. Finally, firms with a previous history of suspect behavior are likely targets for an audit, and we include a variable (*MonthsNonfiling*)

for the number of months for which the firm failed to file gross receipts with the NMTRD.

Except for very small enterprises, the default filing period is monthly. We cannot use any sector dummy variables (or the age of the firm) in estimating the audit equation because we utilized a choice-based sampling approach with SIC (and age) as our sampling criteria.

For the second-stage compliance rate equation, we include some of these same variables as determinants of the compliance rate of the firm, with similar justifications. The dependent variable is *ComplianceRate*, defined earlier.<sup>18</sup> We use the compliance rate rather than the absolute level of compliance because the range of firm sizes in the data set is extremely large (see Table 3), and the normalized variable reduces problems associated with heteroskedastic error terms. Since *ComplianceRate* is constructed using the “true” tax liabilities as determined by NMTRD auditors, the second-stage equation includes measures that could not be determined prior to audit.

One explanatory variable is the normalized range of deductions (*NormalizedDeductions*) because firms with greater variability in deductions may be overstating deductions in some periods. *NMAddress* is included, as is *MonthsNonfiling*. We also include a dummy variable equal to 1 if the firm’s primary business is in service and 0 otherwise (*Service*) to reflect the possibility that taxes on services are easier to evade than taxes on tangible products. Finally, we include the inverse Mills ratio from the first-stage audit selection equation (*InverseMillsRatio*) to

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<sup>18</sup> One issue in the compliance equation is the treatment of over-compliant firms. Studies of individual income tax compliance behavior report instances of over-compliance (e.g., Mackie-Mason, 1992; Alm, Bahl and Murray, 1993). Such behavior may be strategic, as an individual chooses to over-report on some categories in case an audit occurs, or it may simply reflect confusion with the tax code. This behavior is fundamentally different from evasion, and in general it seems advisable to eliminate this behavior from the analysis, especially if there are few recorded instances. We have chosen to do so. Although not explicit policy, auditors are instructed to abandon an audit if it becomes apparent that the firm has over-complied. When firms that over-complied are removed, the Audited Firm Sample falls from 328 to 320, so that over-reporting is observed roughly two percent of the time.

control for sample selection. Because the dependent variable is censored to lie between 0 and 1, we estimate the second-stage equation using Tobit maximum likelihood estimation methods.<sup>19</sup>

We estimated a wide range of alternative specifications of equations (3) and (4) to test for robustness. For example, we included in some specifications of the second stage compliance rate equation the normalized range of gross receipts, the average level of deductions, the number of business locations in New Mexico (*Locations*), the average level of withholding tax (*AverageWithholdingTax*), the average level of compensating tax (*AverageCompensatingTax*), and a dummy variable equal to 1 if the firm protested the audit finding and 0 otherwise (*Protest*). These variables were never statistically significant, and results for the other variables were not affected. We also conducted some sensitivity analysis by estimating the second-stage only for firms with compliance rates of less than ninety percent and also less than ninety-five percent, and our results were unaffected. Finally, we estimated several variants of the first-stage audit selection equation, with unchanged results. We do not report these results here.<sup>20</sup>

Recall that an alternative approach is to use the first-stage probit estimation to generate for each audited return a predicted probability of audit, and then to use this predicted probability as an additional explanatory variable in the second-stage compliance equation. This alternative specification is discussed later.

## **ESTIMATION RESULTS**

We report in Tables 4 and 5 the results for our preferred audit selection and compliance rate equations. The first-stage audit selection results are reported (with t-statistics reported for the coefficients in parentheses) in Table 4. The selection equation has fairly high predictive

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<sup>19</sup> 45 percent of our audited firms report either zero or full compliance, so that a censored model is required.

<sup>20</sup> All specifications are available upon request.

power, approximately 75 percent overall, and the overall goodness of fit (as represented by the Chi-square statistic) is quite strong. These results clearly indicate that returns are systematically selected for audit. The NMTRD targets larger firms, as shown by the positive coefficient on *AverageDeductions* (although significant at only the 0.10 level). Firms with greater variation in their reported deductions are also more likely to be audited, given the positive and significant coefficient on *NormalizedDeductions*. Corporate status firms are more likely to be selected (the coefficient on *Corporation* is positive and significant at the 0.01 level). On the other hand, firms with mailing addresses inside New Mexico are less likely to be audited; the coefficient on *NMAddress* is negative and significant at the 0.05 level. Surprisingly, the likelihood of being audited is negatively affected by the number of periods in which the taxpayer failed to report (*MonthsNonfiling*). The information on missed filing periods is available to auditors in real time. It would seem likely that a firm missing several filing periods over, say, a year would be a prime candidate for an audit, but this does not appear to be the case. There is also a greater likelihood of audit in fiscal year 1995-1996 (*AuditRegime*), although this variable is not statistically significant. Overall, there appear to be several factors that the NMTRD relies upon when selecting firms for audit.

These results are not strictly comparable to those of Murray (1995), given his different data, variable definitions, methodology, and specification. There are some broad similarities. For example, he found that the likelihood of audit was greater for firms with more variation in their gross sales, for corporations, for out-of-state firms, and for firms who submit returns on time. However, Murray (1995) also found that firms with larger gross sales actually had a lower probability of audit, a result counter to ours. Overall, his results are consistent with the use by

Tennessee auditors of a systematic audit selection rule, although one that differs to some extent from the New Mexico rule.

The estimation results for the second-stage compliance rate equation are reported in Table 5. The overall goodness-of-fit statistic is high, and the error measure (*Sigma*) is significant at the one percent level.

Deductions offer opportunities for evasion, and firms with more variable deductions are less compliant, as suggested by the negative and significant coefficient on *NormalizedDeductions*. Greater variability may offer firms more evasion opportunities or it may simply introduce reporting errors. In either case, selecting audits on the basis of variability seems justified since such firms tend to be less compliant. Compliance is higher for firms located within the state (*NMAddress*), suggesting that information regarding the GRT and/or reputation may matter. It may also reflect the effect of the audit department's comprehensive audit policy, which provides an incentive for in-state firms to comply so as to avoid audits on other tax liabilities (such as the corporate tax), or it may reflect the difficulty of maintaining accurate records for out-of-state companies.

As expected, compliance is lower for firms that miss filing periods (*MonthsNonfiling*), a result that is significant at the 0.01 level. Recall that this variable has a negative coefficient in the selection equation. The information on nonfiling would appear to be a good metric upon which to select firms for audit. Targeting firms that miss filing should be straightforward, and, given their lower compliance, it should yield significant amounts of unpaid taxes. It is puzzling that the audit department apparently does not select on this criterion. It may be that the low frequency of audits combined with the objective of auditing in all SIC categories simply overpowers this factor.

The estimated coefficient on *Corporation* was not significant in any of the various specifications, and so *Corporation* is not included in Table 5. There is some evidence that corporations have a lower compliance rate than non-corporations. A possible countervailing effect stems from the comprehensive audit program of the NMTRD. Corporations may be audited for corporate tax reporting, and the audit department is able to extend the audit beyond the corporate tax to include other taxes such as GRT; that is, a comprehensive audit process makes it less attractive for entities with multiple tax levies to evade on a single item. This reasoning implies that the coefficient on *Corporation* should be positive. Since the estimated coefficient on *Corporate* was sometimes positive and sometimes negative but never statistically significant, our results are at least suggestive of the usefulness of comprehensive multi-stage audits (Rhoades, 1999).

The coefficient on the inverse Mills ratio is negative and significant, indicating that the unobservables associated with being selected for audit are negatively correlated with the unobservables associated with the rate of compliance.

As with the first-stage estimation, the results here are not strictly comparable to those of Murray (1995).<sup>21</sup> Still, it is worth noting that he found that firms were more compliant when they exhibited greater variation in gross sales and were out-of-state firms, in contrast to our results. Murray (1995) also found that firms who filed late were less compliant and that the selection term from the first-stage estimation was not significant in the second-stage estimation. These latter results are similar to our results after we adjust for different definitions of the dependent variable.

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<sup>21</sup> Our dependent variable is the computed compliance rate. Murray (1995) employs a variable that measures the yield from audit effort. While of interest to the question of audit efficiency, this variable seems less relevant for the policy question of how to increase compliance. Further, the productivity of an audit is the result of an interaction that extends beyond the initial audit assessment.

### *An Alternative Specification*

An alternative specification is to use the first-stage probit estimation to generate for each audited return a predicted probability of audit (*PredictedAuditRate*), and then to use this predicted probability in the second-stage compliance equation. We expect *PredictedAuditRate* to have a positive sign. We also expect it to have a smaller marginal effect than the Mills ratio variable if the selection model employed by the audit department is not perfectly perceived by the firms. We cannot include both *PredictedAuditRate* and *InverseMillsRatio* in the same equation since both variables are generated from the audit selection equation and so both capture the same audit selection effect.

The results reported in Table 6 confirm our predictions. The sign is positive and the marginal effect of *PredictedAuditRate* is smaller than that of *InverseMillsRatio*. The impacts of the other variables are unaffected in sign or significance, although their magnitudes are marginally altered. Note that, if firms are aware (even if imperfectly) that some return items are likely to trigger an audit, then the fitted values from the audit equation will be correlated with the inverse Mills ratio. In fact, the correlation coefficient between *InverseMillsRatio* and *PredictedAuditRate* is negative, or -0.81. It would therefore appear that there are at least some aspects of the audit selection process that firms are able to discern and anticipate.

It is also interesting to speculate on whether the audit department should consider periodic revisions to its audit strategy if the firms are able to see through the veil surrounding the audit process. The fact that compliance rates are as low as they appear to be despite this anticipation suggests very strongly that the audit rate needs to be increased; that is, it would appear that, even though firms are able to understand some aspects of the audit rules, the expected value of the evasion gamble is such that evasion is still an attractive strategy for firms.

## CONCLUSIONS AND POLICY IMPLICATIONS

Today, many states face a shrinking sales tax base. Increasing volumes of largely untaxed internet transactions are claiming sales from traditional “brick-and-mortar” businesses, and expanding amounts of untaxed services are eroding revenues from sales taxes. States see a need to broaden their sales tax bases to include services that are less available to erosion via the internet and to ensure revenue stability by taxing less mobile transactions, especially services. Further, as many jurisdictions approach sales tax rates of 10 percent or more, there is some justification for broader coverage to include services, a move that would allow the rate to be lowered and that would reduce the distortions noted by Merriman and Skidmore (2000). There is also consideration of a national sales tax that would replace the existing “system” of state (and local) sales taxes, and the appropriate design of any national sales tax remains controversial.

In the face of these challenges, it is useful to consider alternative approaches to sales taxes, and one such alternative is the New Mexico broad-based GRT. However, if states were to broaden the sales tax base, it is important to understand the implications of such a change for firm compliance with the tax.

Our main results suggest that, conditional upon being audited, firm reporting behavior follows closely firm opportunities for cheating. Firms are less likely to report fully their GRT collections when they have greater variability in their deductions, are in the service sectors, miss filing periods, and have a home address that is not in the state; firms are also less likely to comply when the (expected) audit rate declines. These results are in some ways similar to those reported by Murray (1995) for the narrower-based sales tax in Tennessee, and they suggest (if not prove) that the use of the GRT neither enhances nor limits cheating. Put differently, there are

good reasons for adopting a broad-based sales tax, and such adoption should not be deterred by undue concern about the consequences for compliance.

Our results also provide strong evidence that New Mexico auditors employ a systematic, even if informal, audit selection process. Firms are more likely to be selected for audit when they have greater levels of tax deductions, when they exhibit greater variation in tax deductions, when they have corporate status, and when they have headquarters that are out-of-state. An obvious implication of these results is that the audit department can use them to improve its audit selection strategy, much as the Internal Revenue Service does via its use of systematic audit rules under the income tax. In the case of the GRT, the audit selection strategy can target firms with the characteristics identified in the compliance rate equation but not significantly related to audit selection. One such example is provided by the missed filing periods variable (*MonthsNonfiling*); this variable is highly significant in the compliance rate equation, but it seems to be ignored in the audit selection phase. Also, since corporate status is not associated with a lower compliance rate, the comprehensive audit strategy utilized by the New Mexico audit department seems to be productive here. The practice of comprehensive audits may discourage non-compliance since any detected evasion will elicit a series of audits over all tax sources: audits are costly to the firm even when no evasion is detected, so avoiding the audit itself is a desirable outcome.

Overall, then, if states follow systematic audit selection strategies and are aware of potential sources of noncompliance, then a move to a broad-based sales tax should not impose intractable compliance problems. Such a move could also address some of the potential inefficiencies occasioned by a narrow tax base, and it has the potential to increase revenues.

**Table 1. Examples of SIC Codes Audited**

<b>SIC Code</b>	<b>Industry</b>	<b>Number in Audited Firm Sample<sup>a</sup></b>
1500	General Construction	60
1600	Highway and Street Construction	5
1700	Contractors	24
2000	Food Processing	4
3000	All Manufacturing	13
5000	Retail and Wholesale Trade	26
5800	Eating and Drinking Places	67
6000	Finance, Insurance, and Real Estate	12
7200	Personal Services	14
7300	Business Services	67
7500	Auto Repair	8
7600	Misc. Repair	9
8000 & 8100	Health and Legal Services	16
8200	Education Services	5
8900	Misc. Services	63

<sup>a</sup> Note that the total does not match the total number of firms in the original Audited Firm Sample because some SIC codes were audited only infrequently and are not included here.

**Table 2. Description of Variables**

<b>Variable Name</b>	<b>Description</b>
<i>ComplianceRate</i>	Compliance rate of audited firms, equal to actual gross receipts reported for the years 1993 to 1995 divided by the “true” (or post-audit) gross receipts for the years 1993 to 1995
<i>AuditRegime</i>	Dummy variable equal to 1 if sampled (audited or non-audited) in 1995-1996 and 0 if sampled in 1994-1995
<i>NormalizedGrossReceipts</i>	Normalized range of declared gross receipts, equal to the range of gross receipts from 1993 to 1995 divided by the average of gross receipts from 1993 to 1995
<i>NormalizedDeductions</i>	Normalized range of declared deductions, equal to the range of deductions from 1993 to 1995 divided by the average of deductions from 1993 to 1995
<i>AverageGrossReceipts</i>	Average reported gross receipts over the years 1993 to 1995 (in dollars)
<i>AverageDeductions</i>	Average reported deductions over the years 1993 to 1995 (in dollars)
<i>AverageCompensatingTax</i>	Average reported compensating tax over the years 1993 to 1995 (in thousands of dollars)
<i>AverageWithholdingTax</i>	Average withholding tax paid for the years 1993 to 1995 (in thousands of dollars)
<i>Service</i>	Dummy variable indicating whether the firm’s primary business is in service industry, equal to 1 if in the service industry and 0 otherwise
<i>Corporation</i>	Dummy variable indicating whether the firm is incorporated, equal to 1 if the firm is a corporation and 0 otherwise
<i>NMAddress</i>	Dummy variable indicating whether the firm has its mailing address in state, equal to 1 if the mailing address is in New Mexico and 0 otherwise
<i>MonthsNonfiling</i>	Number of months for which the firm failed to file a gross receipts return with the NMTRD
<i>Age</i>	Age of the firm (in years)
<i>Locations</i>	Number of business locations in New Mexico
<i>Protest</i>	Dummy variable equal to 1 if the firm is protesting the audit finding and 0 otherwise
<i>TrueGrossReceipts</i>	“True” (or post-audit) amount of gross receipts that should have been reported for final three years of audit period, as determined by audits of the NMTRD (in dollars)
<i>ReportedGrossReceipts</i>	Amount of gross receipts reported by the firm for the final three years of the audit period (in dollars)
<i>InverseMillsRatio</i>	Inverse Mills Ratio from the audit selection equation
<i>PredictedAuditRate</i>	Fitted values from the audit selection equation

**Table 3. Descriptive Statistics for Audited Firm and Non-audited Firm Samples**

<b>Variable</b>	<b>Overall</b>		<b>Audited Firms</b>		<b>Non-audited Firms</b>	
	<b>Mean</b>	<b>Standard Deviation</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Mean</b>	<b>Standard Deviation</b>
<i>ComplianceRate</i>	NA	NA	0.483	0.438	NA	NA
<i>AuditRegime</i>	0.576	0.495	0.592	0.492	0.561	0.497
<i>NormalizedGrossReceipts</i>	1.093	1.155	1.397	1.181	0.854	1.076
<i>NormalizedDeductions</i>	0.968	1.226	1.526	1.262	0.529	1.000
<i>AverageGrossReceipts</i>	1.3x10 <sup>6</sup>	5.5 x10 <sup>6</sup>	2.3x10 <sup>6</sup>	6.7 x10 <sup>6</sup>	5.6 x10 <sup>5</sup>	4.1 x10 <sup>6</sup>
<i>AverageDeductions</i>	7.4 x10 <sup>5</sup>	4.2 x10 <sup>6</sup>	1.3 x10 <sup>6</sup>	5.5 x10 <sup>6</sup>	2.6 x10 <sup>5</sup>	2.9 x10 <sup>6</sup>
<i>AverageCompensatingTax</i>	2.051	18.530	3.042	24.030	1.269	12.580
<i>AverageWithholdingTax</i>	3.848	18.140	6.780	24.220	1.536	10.710
<i>Service</i>	0.690	0.463	0.704	0.457	0.678	0.468
<i>Corporation</i>	0.402	0.491	0.601	0.491	0.245	0.431
<i>NMAddress</i>	0.651	0.477	0.532	0.499	0.761	0.427
<i>MonthsNonfiling</i>	7.257	23.030	2.488	8.519	11.020	29.330
<i>Age</i>	15.270	12.470	14.380	10.280	15.970	13.920
<i>Locations</i>	1.886	5.991	2.440	6.978	1.454	5.058
<i>Protest</i>	NA	NA	0.131	0.101	NA	NA
<i>TrueGrossReceipts</i>	NA	NA	9.7 x10 <sup>5</sup>	3.4 x10 <sup>6</sup>	NA	NA
<i>ReportedGrossReceipts</i>	NA	NA	2.5 x10 <sup>6</sup>	7.1 x10 <sup>6</sup>	NA	NA
Number of observations	695	NA	328	NA	367	NA

**Table 4. First-stage Audit Selection Equation<sup>a</sup>**

<b>Independent Variable</b>	<b>Coefficient (t-statistic)</b>
Constant	-0.664 (4.522)
<i>AuditRegime</i>	0.026 (0.239)
<i>NormalizedDeductions</i>	0.448 (9.749)
<i>AverageDeductions</i>	0.012 (1.646)
<i>Corporation</i>	0.765 (6.191)
<i>MonthsNonfiling</i>	-0.008 (3.045)
<i>NMAddress</i>	-0.281 (2.235)
Number of Observations	695
Log-likelihood	-357.469
Restricted Log-likelihood	-480.643
Chi-squared	246.347

<sup>a</sup> The dependent variable equals 1 if the firm is selected for audit and 0 otherwise.

<b>Actual Outcome</b>	<b>Predicted Outcome</b>		
	Not Selected	Selected	Total
Not Selected	274	93	367
Selected	80	248	328
Total	354	341	695
Percentage Correct	77%	73%	75%

**Table 5. Second-stage *ComplianceRate* Equation <sup>a</sup>**

<b>Independent Variable</b>	<b>Coefficient (Asymptotic t-statistic) [Marginal Effect]</b>
Constant	0.773 (5.73) [0.44]
<i>NormalizedDeductions</i>	-0.203 (4.70) [-0.114]
<i>NMAddress</i>	0.783 (8.39) [0.432]
<i>MonthsNonfiling</i>	-0.011 (2.17) [-0.008]
<i>Service</i>	-0.244 (2.84) [-0.137]
<i>InverseMillsRatio</i>	-0.474 (3.284) [-0.267]
Observations	320
<i>Sigma</i>	0.632 (16.202)
Log-likelihood	-281.009

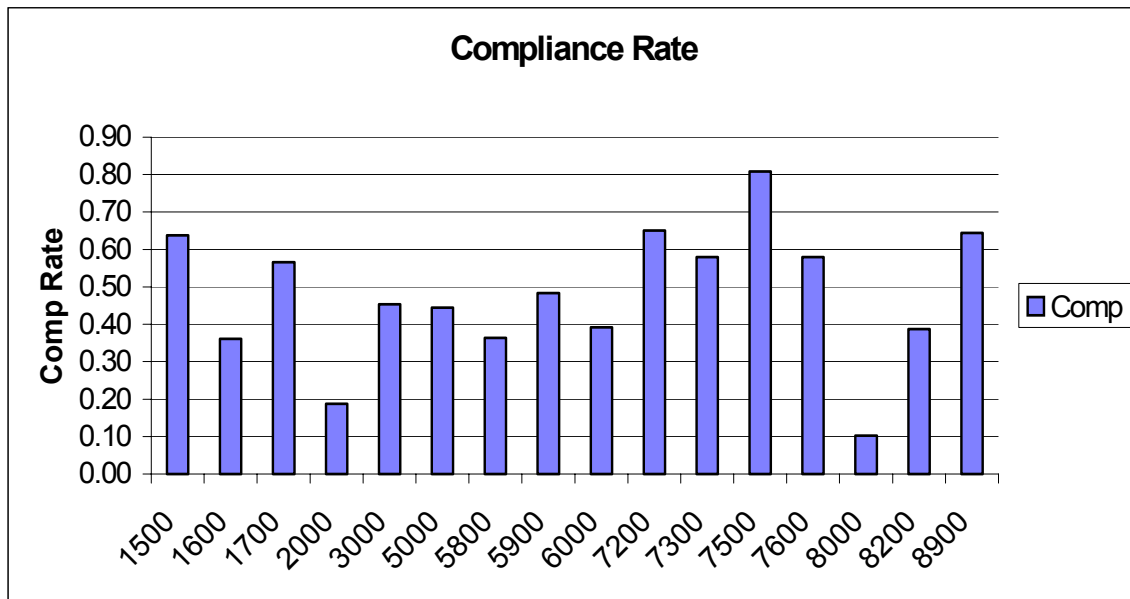
<sup>a</sup> The dependent variable is *ComplianceRate*. Asymptotic t-statistics are in parentheses, and marginal effects are in brackets.

**Table 6. Alternative Specification of Second-stage *ComplianceRate* Equation <sup>a</sup>**

<b>Independent Variable</b>	<b>Coefficient (Asymptotic t-statistic) [Marginal Effect]</b>
Constant	0.341 (2.77) [0.189]
<i>NormalizedDeductions</i>	-0.131 (6.32) [-0.073]
<i>NMAddress</i>	0.693 (7.726) [0.384]
<i>MonthsNonfiling</i>	-0.017 (3.21) [-0.008]
<i>Service</i>	-0.282 (3.25) [-0.156]
<i>PredictedAuditRate</i>	0.148 (1.83) [0.082]
Observations	320
<i>Sigma</i>	0.645 (16.176)
Log-likelihood	-285.525

<sup>a</sup> The dependent variable is *ComplianceRate*. Asymptotic t-statistics are in parentheses, and marginal effects are in brackets.

**Figure 1. Compliance Rates by SIC Code**



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