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INCREASING TAX COMPLIANCE IN WASHINGTON STATE: A FIELD EXPERIMENT

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This paper reports the results of a field experiment conducted in Washington State to improve compliance with the use tax and the Business and Occupation (B&O) tax. As part of the program, the Department of Revenue mailed letters that enhanced perceived detection risk and/or raised penalty awareness. Results indicated that the enforcement strategy produced a same-period improvement in use tax compliance. Subsequent year effects were not examined. Compliance with the B&O tax was unaffected.

Keywords: tax compliance, use tax, field experiment

JEL Codes: H25, H26

I. INTRODUCTION

Each of the 50 United States has a revenue department charged with the collection of legislated state taxes. While collecting taxes is critical to meeting states' budgetary needs, few legislatures provide adequate support toward achieving this mission. Consequently, departments of revenue continuously search for the most efficient means to spend limited compliance dollars in order to maximize collections. In such a search, the Washington Department of Revenue (DOR) invited the authors to conduct a field experiment examining use tax and Business and Occupation (B&O) tax filings of approximately 1,000 firms within the construction industry.

Putting theory into practice, the Washington State DOR agreed to test the actual effectiveness of two complementary enforcement strategies suggested by compliance theory: increasing sanction awareness (penalty), and threats of enhanced detection risk (detection). Our results indicate that different combinations of threat of detection

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and increased sanction awareness strongly influence reporting behavior with respect to the use tax. Also, the reporting behavior of taxpayers is strongly influenced by their revenue trend (i.e., whether or not their revenues increased or decreased from the prior period). We found that an economical mail-based program aimed at increasing awareness of sanctions and detection enhancement produced a same-period improvement in use tax compliance. Our research design did not address whether the improvement was sustained in following periods, or whether taxpayers reverted to or increased noncompliance behavior in subsequent periods to "make up" for their increased compliance in the test period.

This study advances tax research by applying compliance theory to firms (rather than individuals) and their actual payment of business taxes. Also, this research deals with state and local taxes that are less frequently addressed in the compliance literature. The field experiment involves real businesses that were not aware that they were participating in an experiment. Consequently, the experiment preserves realism, measures actual taxpayer behavior, and avoids demand effects.

The paper proceeds in the following manner. The first section provides a brief background of Washington State's tax structure and environment. The next section provides a brief overview of the field experiment and the related literature that guided the development of the field experiment. A detailed experimental design is described in the subsequent section. Data analysis and a discussion of the results follow. Lastly, limitations and the conclusions from the experiment are presented.

II. WASHINGTON STATE TAX STRUCTURE

Washington State does not impose a net income tax on individuals or businesses. Instead, Washington imposes an excise tax on gross revenues, called the Business and Occupation (B&O) tax. Additionally, Washington imposes sales/use taxes, excise taxes, and property taxes. The agency responsible for collecting Washington's taxes (other than property taxes) is the Washington State DOR.

A. Use Tax

Residents of, and businesses operating in, states with high sales taxes have an incentive to make purchases out-of-state or on the Internet. This is especially true for Washington residents, as it has one of the highest state sales tax rates in the U.S.[1] In addition, Washington taxpayers have easy access (for the purposes of purchasing goods) to the neighboring states of Idaho (with a lower sales tax rate) and Oregon (with no sales tax) or on the Internet where Washington state sales tax is frequently not collected. Due to the proximity of two large population centers, Vancouver and Spokane, to the Oregon and Idaho borders (respectively), many Washington residents and businesses can take

[1] California is the only state with a higher state sales tax rate than Washington, and Minnesota has the same rate.

advantage of sales tax rate differentials. While Seattle is not contiguous to a state border, Seattle-based Washington businesses are known to travel to Oregon, despite the distance, to purchase costly items.

The function of a use tax is to neutralize the benefits of purchasing items in out-of-state jurisdictions with low or zero sales tax rates, thus protecting in-state businesses from low price competition based on taxing jurisdiction. Residents and businesses are subject to the Washington use tax when purchasing items to be used in Washington for which the full Washington sales tax was not paid. The amount of use tax due is the positive difference between the sales tax that would be paid if purchased in Washington and the amount actually paid by the purchaser. Any asset that must be registered with the state, such as a vehicle or boat, requires proof of sales taxes paid before it can be licensed. This licensing requirement is the primary collection device for exacting use tax from individuals. The Washington DOR does not aggressively pursue other enforcement methods with regard to individuals' use tax compliance. On the other hand, the DOR vigorously pursues use tax collections from businesses. Washington State levies a retail sales tax on all items purchased at retail. This includes purchases of inputs by businesses. Originally, the tax applied only to tangible personal property. Over the years the tax base has been extended to several services, such as construction labor, repair, lodging, telephone, leasing of equipment and some participatory recreational activities (Washington State Tax Structure Study Committee, 2002). If these items are purchased out of state, the business is responsible for computing and paying the use tax. Of approximately $472 million of use taxes collected in the 2006 fiscal year by Washington, most was paid by filing the Combined Excise Tax Return.[2] The use tax costs about $3 per $100 to collect, which is much higher than the other main Washington taxes (Washington State Tax Structure Study Committee, 2002).

B. Business and Occupation (B&O) Tax:

Washington imposes the B&O tax on all types of entities operating within its boundaries. Unlike an income tax, the B&O tax is considered an excise tax whose base is an entity's gross (not net) receipts from sales and services or the value of products extracted

[2] Generally, computing the Washington use tax due is a relatively straightforward process for businesses. However, there are items that are exempted from the use tax, which can complicate tax compliance and accordingly create a need for taxpayer education. For example, "speculative builders" owe use tax on all building materials and all charges from other contractors whereas "custom builders" do not owe use tax on materials. Many construction businesses engage in both speculative and custom building concurrently. Equipment and machinery that are used directly in manufacturing can also qualify for an exemption. Certain maintenance and repairs on selected machinery and equipment are not subject to use tax while others are. These exclusions cause taxpayer confusion and hinder use tax compliance and collection. Under the B&O tax, the total value of a good is taxed when it is sold from one enterprise to another in a production chain. Because the gross value of the product at each stage includes taxes paid on intermediate products, the tax accumulates (pyramids) as it moves through the production chain. For a detailed evaluations of gross receipts taxes, see Pogue (2007) and Testa and Mattoon (2007).

or manufactured within Washington. A few deductions, of a limited nature, are allowed. The B&O tax does not apply to outbound sales (sales to buyers located outside of Washington); rather it concentrates on sales originating and completed within the state. Thus, there is essentially no need to apportion income for most multi-state operations (Department of Revenue, 2005).[3] The flat rate at which the gross proceeds are taxed is dependent on the industry as opposed to the type of entity being taxed. Consequently, sole proprietors, partnerships, and corporations within the same industry are subject to the same B&O tax rate. Construction receipts may be considered as arising from retail sales (0.471 percent rate) or from wholesaling (0.484 percent rate). Thus, companies falling within the broad definition of construction may be subject to both of these rates when they provide general and subcontractor services.

An advantage of the B&O tax over an income tax is that the base is gross *receipts* (with limited deductions). Hence, there are fewer opportunities to manipulate the tax base, causing the B&O tax to be a fairly stable income source for Washington. The gross receipts base has the added benefit of making the tax easy to understand and easy for taxpayers to compute. Further, auditing B&O tax compliance is more straightforward; the DOR estimates the cost for collecting B&O taxes at 75 cents for each $100 collected (Washington State Tax Structure Study Committee, 2002). On the downside, the B&O tax is imposed on unprofitable as well as profitable businesses. Being based on gross receipts, a business with high expenses receives no tax relief. Consequently, the B&O tax rates vary by industry to take into consideration the differing profit margins across industries.

III. FIELD EXPERIMENT OVERVIEW

A. Use and B&O Taxes

The field experiment focuses primarily on use taxes reported from businesses in the construction industry. In addition, the study also addresses noncompliance with the B&O tax. The use tax was chosen for the study because it has the highest noncompliance rate in percentage terms among the four major Washington taxes.[4] Because of its high noncompliance rate, the effect (if any) of experimental manipulations is most likely to manifest for the use tax. The B&O tax was also examined because it is reported on the same Combined Excise Tax Return. Furthermore, the noncompliance rates of the use tax and the B&O tax vary significantly. The use tax noncompliance rate is estimated at 18.1 percent while the B&O tax noncompliance rate is estimated at 2.2 percent (Department of Revenue, 2006). By examining the B&O tax in addition to the use tax, the effectiveness of experimental manipulations in different circumstances can be gauged since the experiment addresses two taxes with markedly different levels of compliance. Finally, by examining two taxes, the experiment has more potential to generate a significant revenue increase for the DOR.

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[3] Services may require an apportionment if the services are provided in more than one state. Service is not the industry used in this experiment.

[4] The sales tax has a higher noncompliance revenue loss in dollars (estimated to be $55 million for 2006) but its noncompliance rate is only 1 percent.

B. Construction Industry

The Washington DOR identified construction as a target industry for this study for two reasons. First, when examining Washington noncompliance by industry, construction has one of the worst records. Its overall noncompliance is estimated to account for nearly 14.5 percent of the state's total noncompliance.[5] For the use tax alone, construction accounts for about 10 percent of total noncompliance (Department of Revenue, Washington State, 2006). Second, the amount of use tax owed by construction businesses can be substantial. Construction businesses owe use tax on tools and equipment acquired from out-of-state vendors. Given that these items can cost thousands of dollars, the amount of use tax due from these businesses is non-trivial, especially when the items are acquired in Oregon where no sales tax is paid. For 2005, noncompliance with the use tax by construction firms alone is estimated at almost $5.7 million and $1.9 million for the B&O tax (Department of Revenue, Washington State, 2006).

Our task was to create an inexpensive mail-based program that would increase compliance. We identified two factors as having the potential to increase compliance: the perception of the likelihood of detection, and awareness of legislated penalties. Since the ultimate purpose was to reduce compliance costs, any method (such as audits or other enforcement measures) that involved non-trivial administrative costs were not considered. The choice of these two factors was based on the extant tax compliance literature. A brief review of this literature follows.

C. Review of the Tax Compliance Literature

In order for a self-reporting tax system to function, taxpayers must comply with the tax laws by remitting all taxes legally due. The extant literature on individual tax compliance suggests that visibility, sanctions, perceptions of risk, and taxpayer frame are related to noncompliance (Joulfaian and Rider, 1998; Porcano, 1988).

1. Visibility (Opportunity)

It is generally accepted that there is a significant relationship between visibility and tax compliance (Bloomquist, 2003). Numerous economic and empirical studies support this conclusion (Clotfelter, 1983; Witte and Woodbury, 1985; Dubin and Wilde, 1988; Klepper and Nagin 1989; Robben et al., 1990; Christian and Gupta, 1993; Antonides and Robben, 1995, Carnes and Englebrecht, 1995). Analyzing IRS data, Kagan (1989) concludes that income visibility is likely the most important factor in determining taxpayer compliance. For example, third party reporting significantly increases visibility and thus compliance (Maroney and Rupert, 2002). The field study of Slemrod, Blumenthal,

[5] Three other industries have higher noncompliance rates in Washington. All of these industries were subject to programs to increase their compliance in relatively close proximity to this study and therefore were not selected for this study. A preliminary analysis of results in a related study of the retail industry indicates that B&O tax reporting is significantly influenced by detection and penalty manipulation.

and Christian (2001) demonstrates that threats of detection *against individuals* influence tax evading taxpayers. Furthermore, taxpayers who evade are, on average, taxpayers who have a "high opportunity" (to evade) due to self-reported income. Thus, taxpayers' likelihood of misreporting income is related to its visibility.

2. Visibility of Washington Taxes

The visibility of the Washington B&O and use taxes are very different. In general, the B&O tax is considered to have a higher visibility, which accounts for its estimated compliance rate of almost 98 percent (Department of Revenue, Washington State, 2006). Since the B&O tax base is gross receipts, this amount is reported on a taxpayer's Federal income tax return and/or financial statements. Amounts disclosed in these reports are accessible by the DOR. Thus, if a firm misrepresents its gross revenues, the misrepresentation must be made in multiple places, and thus the misrepresentation is subject to detection by several authorities. Notwithstanding this multiple reporting, gross revenues are not provided by a third party to taxing agencies; the primary report is a self-report.

The compliance rate for the use tax is less than 82 percent (Department of Revenue, Washington State, 2006). This low rate may be due in part because the taxable base for use taxes has no Federal or financial counterpart. While there are Federal income forms that list acquisitions of assets, supplies, and other consumables acquired in the current year, not all of these purchases will be subject to use tax because some (or all) may have been purchased within Washington's borders.

3. Perception of the Likelihood of Detection

Visibility is important but it is insufficient to assure tax compliant behavior without a verification mechanism employed by the tax authorities. Consequently, a taxpayer's *perception* of a significant risk of detection is essential for compliant behavior. Absent detection risk, taxpayers may willingly engage in noncompliant behavior. Accordingly, income visibility and the possibility of getting caught underreporting are two vital components of tax compliance. Roth, Scholz and Witte (1989) find that taxpayers consider visibility to be directly related to actual detection rate probabilities. Martinez-Vasquez and Rider (2005) find that increased enforcement has a positive effect on compliance.[6] Other researchers also find that detection risk influences compliance (Kinsey, 1990; Alm, 1991; Carnes and Englebrecht, 1995; Pforisch, Gill and Sanders, 2007).

[6] Martinez-Vasquez and Rider (2005) develop a theoretical model with two modes of tax evasion (reducing income and increasing deductions). According to their theoretical model, increased enforcement has an ambiguous effect on compliance in the mode that is targeted for enforcement and in the untargeted mode. However, empirically, based on data from Internal Revenue Service 1985's Taxpayer's Compliance Measurement Program, they found increasing enforcement (detection probability) increased compliance in the targeted mode and decreased compliance in the other mode. The net revenue effect of increased enforcement effort was positive.

Alm, McClelland and Schulze (1992) conclude that most individuals appear to substantially overweight the probability of an audit, resulting in greater than predicted compliance. Fischer, Wartick and Mark (1992) suggest that a taxpayer's compliance behavior is influenced by the *perceived* detection risk rather than the *actual* detection rate. Kleppler and Nagin (1989) confirm the salience of perceived detection risk in their compliance regression models.

An individual's perception of detection risk is based on personal experiences, knowledge of the tax laws, professional tax advice, and other demographic characteristics (Roth, Scholz and Witte, 1989). Taxpayers that perceive a low level of detection risk may increase their compliance if their perception of risk increases, even if that increase is rather small (Kagen, 1989; Carnes and Englebrecht, 1995; Pforisch, 2006). For example, Slemrod, Blumenthal and Christian (2001) sent letters informing individual taxpayers that their returns would be "closely examined." These letters resulted in an increase in the amount of state income taxes paid by some of the targeted taxpayers when compared to the control group. We, therefore, believe that changing the perceived level of detection may be an important and an efficient way of increasing compliance.

4. Penalty Awareness

Detection of noncompliance is a necessary threat in compliance models; however, it is only relevant when it elicits sanctions (Slemrod, 2004). Starting with the seminal papers of Allingham and Sandmo (1972) and Yitzhaki (1974), much research has been devoted to examining the effects of penalties on income tax compliance (Jackson and Milliron, 1986; Roth, Scholz and Witte, 1989; Webley et al., 1991). Results on the effectiveness of penalties have been mixed. For example, Alm (1991) indicates that increases in penalties influence compliance, whereas Roth, Scholz and Witte's (1989) review of penalty research finds that penalty severity does not significantly influence compliance. The Webley et al. (1991) conclusions were similar to Roth, Scholz and Witte (1989). Slemrod (2004) suggests that severe penalties may reduce the effectiveness of penalties as a deterrent, because severe penalties cause some taxpayers to frame the compliance decision as primarily one of balancing economic risks and rewards and subordinates the framing of the compliance decision as one of good citizenship and ethical responsibility. Carnes and Englebrecht (1995) confirm the effectiveness of penalties in an experiment using the actual civil penalties available to the IRS.

At the inception of our study, the Washington DOR was in the process of changing its policy by requiring stricter enforcement of mandatory penalties for noncompliance. The DOR believed that in general businesses were not aware of legislated mandatory and discretionary penalties since they were infrequently applied in the past. We hypothesize that raising taxpayer awareness of the penalties associated with evasion will spur greater compliance.

IV. EXPERIMENTAL DESIGN AND DATA

A. Experimental Manipulations

The DOR from time to time sends educational information to the taxpayers of Washington State. For this experiment, the two factors identified earlier (likelihood of detection and potential penalties) were manipulated in letters from the DOR to the taxpayer. The educational letters, sent to the construction firm sample, delineated the major types of purchases that would require payment of use taxes. The letters also provided separate details for speculative builders (retail) and custom builders (wholesale), as these two groups have different sales/use tax requirements. The firms were asked to review their prior purchases to determine if any additional use tax was due. After the review, if a firm owed additional use tax, it was instructed to include this amount in its next Combined Excise Tax Return (see Appendix for copies of the letters).

1. Detection Manipulation

The purpose of the detection manipulation was to heighten the level of perceived scrutiny and visibility of only the use tax. The detection enhancing paragraph in the educational letter explained that the DOR was trying to improve compliance with tax laws by examining tax returns to assess use tax underpayments. The detection manipulation also informed firms that the DOR required them to provide a detailed report of assets purchased and that these reports should be consistent with their Federal Depreciation Schedule, Form 4562. The no-detection manipulation omitted any mention of the DOR trying to improve compliance or requirements for additional reports (see Appendix for copies of the letter manipulations).

2. Penalty Manipulation

Prior to this study, the DOR had been lenient in its application of penalties for underpayments of use and B&O taxes. However, Washington legislators had requested the DOR be more diligent in applying at least the minimum automatic penalties for late payments. Due to the prior leniency, the DOR felt that most taxpayers were unaware of existing penalties for noncompliance. Therefore, the penalty manipulation letter included paragraphs explaining the penalties and interest the DOR may assess if a business underpaid taxes. Specifically, the letter noted that interest plus a 5 percent billing penalty were to be automatically assessed upon unpaid back taxes. Penalties were also specified for late filing (from 5–25 percent), negligence (10 percent) and evasion (50 percent plus potential criminal prosecution). The no-penalty manipulation did not include the penalty awareness language in its letter (copies of the letter manipulations are available upon request).

B. Field Research

The DOR sent educational letters containing the experimental manipulations to a random sample of construction firms that had filed at least one Combined Excise Tax Return during the prior year. The sample was selected in the following manner:

1. The authors along with the Washington DOR selected the full sample.
2. The treatment communications were sent out by the DOR.
3. The only requirement for a taxpayer to be included in the sampling frame was that they should have filed a Combined Excise tax return in 2002.
4. Random number tables were used to select the sample and assign it to one of the four treatment groups.
5. Every taxpayer had an equal probability of being included in the sample and receiving any one of the four treatments.
6. The DOR made all data available to the authors after the 2003 returns were filed and entered in their system.

The experiment was a fully crossed 2 X 2 experimental design. Thus, the subjects could either receive information about the current tax penalties applicable in Washington State or this information was omitted from their letter. Likewise, for the detection manipulation, the subjects were either required to provide details from their Federal Tax Return on acquisitions (a form was required to be filed with the DOR) or they did not receive such a request.

In this field study, the subjects did not know that they were participating in an experiment. The subjects' decisions actually influenced the amount of use and B&O taxes that they paid for the period examined. As stated earlier, the Washington DOR selected the experimental sample from construction firms that had previously filed an excise tax return. However, just because a firm filed a return in the prior year does not mean that it will be subject to use tax in the period under investigation in this study. Accordingly, out of the 1000 firms selected by the DOR, only 257 matched pairs of positive use tax and 908 matched pairs of positive B&O tax in the two years.

The letters were sent so as to arrive in October, which is after the close of the third quarter tax payment (September 30th). With this timing, the letters could not affect the location where acquisitions were made but the letters were early enough to impact reporting for the period. The deadline for filing the third quarter Combined Excise Tax Return is October 31.

Note that while the detection manipulation specifically targets only the use tax, there may be spillover effects of this manipulation on to the B&O tax as well, since both taxes are reported on the same excise tax form. The penalty information is applied equally to all Washington State taxes.

V. RESULTS AND ANALYSES

A. Dependent Variable

As described in more detail below, the statistical analysis used for this study includes Analysis of Covariance (ANCOVA) and Analysis of Variance (ANOVA). The natural logarithm of use and B&O tax bases for the third quarter of 2003 are the dependent variables for this experiment. We use the tax base rather than the actual tax paid because the construction industry is subject to two different B&O tax rates. Therefore, changes in taxes paid could be a result of differences in the mix of retail and wholesale sales and may confound the results. For the use tax, local variations in sales tax rates make comparability difficult especially for firms performing construction in a variety of locations.

B. Covariate and Factors

To control for common trends, the respective reported tax bases (natural logarithms) from related prior year third quarter tax filings are included in our statistical (ANCOVA) models as control covariates. Detection and Penalty are the two manipulated factors (two levels each). In addition, we include revenue trend as a factor (i.e., whether the firm's gross revenues are increasing or decreasing in the current year when compared to the prior year's revenue).[7] Descriptive statistics are given in Tables 1A and 1B for the use tax and B&O tax, respectively.

C. Logarithmic Transformation and ANCOVA

The tax bases of the current and prior years have highly skewed distributions that are unsuitable for ANCOVA. This is a frequent problem with tax data. Accordingly, we use the natural logarithm of the tax bases to account for this feature of our data. Such transformations are common in prior research (Martinez-Vazquez and Rider, 2005; Joulfaian and Rider, 2004; Sobel and Holcombe, 1996). While these transformations are beneficial, the condition-specific means are only useful for comparisons among

[7] We believe that changes in firm revenues may also impact reporting behavior. That is, taxpayers who have decreasing revenues may behave differently than taxpayers who have increasing revenues. For instance, Andreoni (1992) suggests that the IRS may inadvertently take the role of a high risk lender for taxpayers facing binding borrowing and liquidity constraints, such as when current revenue is decreasing; see Fishlow and Friedman (1994) for similar conclusion. Rice (1992) finds that managers of corporations whose profit performance falls short of targets may resort to noncompliance as a means of shaving costs. The economic model of Fishlow and Friedman (1994) also demonstrates that negative shocks to current income will increase evasion. There were 115 firms that had declining gross revenue and 142 that had increasing gross revenue.

experimental conditions. The condition-specific means cannot be interpreted as dollar amount differences among the experimental cells. Also note that in the tables we report Type III sum of squares. Type III sums of squares are appropriate since they are obtained by fitting each effect after all the other terms in the model, i.e., the sums of squares do not depend upon the order in which the treatment or factors are specified. They correspond to the variation attributable to a factor after correcting for the effects of all other factors. In addition, besides Table 1, all the test of means involve estimated marginal means, and in the case of ANCOVA, the covariate appearing in the model is evaluated at its mean value.

Descriptive statistics and unconditional means of the dependent variable are provided in Tables 1A and 1B.

Table 1A

Experimental Design: Use Tax, Manipulated Variables are Detection and Penalties
(Means of the Dependent Variable, Log Use Tax Base, Third Quarter, 2003)

Overall Mean = 8.87 N=257	
No Detection	Detection
Mean=8.91	Mean=8.81
N=119	N=138
The means shown above are not significantly different (t=0.31, p=0.75)	
No Penalty	Penalty
Mean=9.02	Mean=8.70
N=127	N=130
The means shown above are not significantly different (t=1.07, p=0.29)	
No Detection	Detection
No Penalty	No Penalty
Mean=8.87	Mean=9.18
N=55	N=72
No Detection	Detection
Penalty	Penalty
Mean=8.95	Mean=8.45
N=64	N=66

Notes: ANOVA and test of means indicated that the dependent variable was not significantly different across the four treatment cells (F=1.10, p=0.35). Detection refers to whether the taxpayers received a letter requesting them to submit additional Federal Tax information. Penalty refers to whether the taxpayers received educational letters delineating the penalties associated with noncompliance with Washington State tax laws.

Table 1B

Experimental Design: B&O Tax, Manipulated Variables are Detection and Penalties
(Means of the Dependent Variable, Log B&O Tax Base. Third Quarter, 2003)

Overall Mean = 12.59 N=908	
No Detection	Detection
Mean=12.64	Mean=12.56
N=447	N=461
The means shown above are not significantly different (t=0.77, p=0.44)	
No Penalty	Penalty
Mean=12.62	Mean=12.57
N=455	N=453
The means shown above are not significantly different (t=0.49, p=0.62)	
No Detection No Penalty	Detection No Penalty
Mean=12.55	Mean=12.69
N=229	N=226
No Detection Penalty	Detection Penalty
Mean=12.72	Mean=12.42
N=218	N=235

Notes: ANOVA and test of means indicated that the dependent variable was not significantly different across the four treatment cells (F=1.69, p=0.17). Detection refers to whether the taxpayers received a letter requesting them to submit additional Federal Tax information. Penalty refers to whether the taxpayers received educational letters delineating the penalties associated with noncompliance with Washington State tax laws.

D. Results for Use Taxes

The results of the ANCOVA analyses for the penalty and detection treatments are presented in Table 2, Panel A. The total use tax base reported for the target quarter (the third quarter of 2003) was the dependent variable in this experiment. As expected, the reported use tax base for the same period in the preceding year was a highly significant covariate. We use this covariate to control for size and the expected level of the use tax base.

1. Testing the ANCOVA Assumptions

Among other assumptions, two important assumptions underlie the use of ANCOVA as an appropriate statistical technique: (1) homogeneity of within-group regressions, and (2) homogeneity of variance of conditional Y scores (Huietema, 1980). Homogeneity of within-group regressions assumes that the regression slopes associated with the different

Table 2

Analysis of Covariance: Use Tax

(Dependent Variable: Log Use Tax Base, Third Quarter, 2003)

Panel A: ANCOVA

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	821.3	8	102.7	37.29	0.000
Intercept	203.6	1	203.6	73.96	0.000
Covariate use tax, third quarter, 2002	766.3	1	766.3	278.3	0.000
Revenue Trend	0.180	1	0.180	0.065	0.798
Penalty	0.002	1	0.002	0.001	0.981
Detection	6.047	1	6.047	2.196	0.140
Revenue Trend*Penalty	0.137	1	0.137	0.050	0.824
Revenue Trend*Detection	0.199	1	0.199	0.072	0.789
Penalty*Detection	18.45	1	18.45	6.701	0.010
Trend*Penalty*Detection	12.97	1	12.97	4.712	0.031
Error	682.8	248	2.753		
Total	21,720	257			
Corrected total	1,504	256			

Note: R-Squared = 0.546 (Adjusted R-Squared = 0.531)

Panel B: Estimated Marginal Means

Penalty*Detection			
Penalty	Detection	Mean	Std. Error
No Penalty	No Detection	8.422[a]	0.227
	Detection	9.277[b]	0.198
Penalty	No Detection	8.970[c]	0.210
	Detection	8.740	0.205

Notes: The covariate appearing in this model is evaluated at its mean value. Superscripts [a] and [b] reflect significant differences at p=0.004 (t=2.84), and superscripts [a] and [c] reflect significant differences at p=0.07 (t=1.77).

treatments are the same. That is, the individual scores of the various treatments do not vary depending upon the level of the covariate. If this assumption is violated, there is uncertainty with respect to a retained null hypothesis because it is not clear whether the overall mean effects are masking treatment differences associated with specific levels

Table 2 (Continued)

Analysis of Covariance: Use Tax
(Dependent Variable: Log Use Tax Base, Third Quarter, 2003;
Decreasing-Revenue Firms)

Panel C: ANCOVA

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	368.7	4	92.16	35.61	0.000
Intercept	65.22	1	65.22	25.20	0.000
Covariate use tax, third quarter, 2002	325.5	1	325.5	125.8	0.000
Penalty	0.048	1	0.048	0.019	0.892
Detection	2.124	1	2.124	0.821	0.367
Penalty*Detection	27.53	1	27.53	10.64	0.001
Error	284.7	110	2.588		
Total	9,499	115			
Corrected total	653.3	114			

Note: R-Squared = 0.564 (Adjusted R-Squared = 0.548)

Panel D: Estimated Marginal Means, Penalty*Detection

Penalty	Detection	Mean	Std. Error
No penalty	No detection	8.140[a]	0.329
	Detection	9.404[b]	0.289
Penalty	No detection	9.087[c]	0.311
	Detection	8.375	0.281

Notes: The covariate appearing in this model is evaluated at its mean value. Superscripts [a] and [b] are reflect significant differences at p=0.004 (t=2.88), and superscripts [a] and [c] reflect significant differences at p=0.038 (t=2.09).

of the covariate. Homogeneity of variance of conditional Y scores assumes that (1) the variance of the conditional Y scores is the same for each treatment group, and (2) the variance of the conditional Y score does not depend upon the value of the covariate. Violation of this assumption is a concern especially when the design is unbalanced and may lead to a substantial bias in the distribution of the ANCOVA *F* statistic (Huitema, 1980).

To test the homogeneity of a within group regression assumption, we perform the following three tests: (1) plots of Y and X for each treatment, (2) ANCOVA that includes

Table 2 (Continued)

Analysis of Covariance: Use Tax
(Dependent Variable: Log Use Tax Base, Third Quarter, 2003;
Revenue-Increasing Firms)

Panel E: ANCOVA

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	451.9	4	113.0	39.00	0.000
Intercept	139.1	1	139.1	48.00	0.000
Covariate use tax, third quarter, 2002	442.1	1	442.1	152.6	0.000
Penalty	0.042	1	0.042	0.014	0.905
Detection	4.391	1	4.391	1.516	0.220
Penalty*Detection	0.202	1	0.202	0.070	0.792
Error	396.9	137	2.897		
Total	12,220	142			
Corrected total	848.8	141			

Note: R-Squared = 0.532 (Adjusted R-Squared = 0.519)

interaction terms (interaction between the treatment and covariate), and (3) F test based on Huitema (1980). Each one of these tests indicates that the homogeneity of regression slopes assumption is not violated.

To test the homogeneity of variance of conditional Y scores, we employ the ratio of the largest conditional variance to the smallest conditional variance as a test statistic (Huitema, 1980). For each factor this conditional variance ratio is approximately equal to 1, indicating that the homogeneity of variance of conditional Y scores assumption is not violated. In addition, we also perform the Levene's test of homogeneity of variances (in SPSS). This test also indicates that this assumption is not violated.

2. Analyses of Results

Table 2 (Panel A) indicates a significant effect for the Penalty*Detection variable ($F = 6.70$, $p = 0.01$). Furthermore, Panel B shows that the reported use tax base is lowest for taxpayers that receive no experimental manipulation. That is, receipt of the penalty letter or detection letter is associated with increased use tax base reporting. In the absence of either manipulation, the logarithm of the reported use tax base is 8.42. When the taxpayers are asked to provide federal tax information (detection/no penalty

scenario), the reported use tax base variable increases to 9.28 (significant at t = 2.84, p = 0.004). Likewise, when penalty information is communicated to the taxpayers (penalty/no detection scenario), the reported use tax base increases to 8.97 (significant at t = 1.77, p = 0.07). Note that the reported means are estimated marginal means and the covariate appearing in the model is evaluated at its mean value.

The higher level three way interaction of revenue state, penalty and detection is also significant (F = 4.71, p = 0.03) suggesting that the effects of penalty and detection manipulation are contingent upon the revenue trend variable. Table 2, Panels C-D and E show separate analyses for revenue-increasing and revenue-decreasing firms, respectively.

Table 2, Panel D shows that in the absence of any manipulations, revenue-decreasing firms report 8.14 as the average use tax base. When taxpayers are requested to provide Federal tax information (no penalty/detection scenario), the reported use tax base increases to 9.40 (significant at t = 2.88, p = 0.004). Likewise, when penalty information is communicated to taxpayers (penalty/no detection scenario), the reported use tax base increases to 9.09 (significant at t = 2.09, p = 0.038).

Table 2, Panel E presents the ANCOVA model for revenue-increasing taxpayers. Note that none of the manipulations (detection, penalty and combination) is significant. Based on the results presented in Table 2, Panels A–E, we conclude that (1) the manipulations have a significant impact on compliance, especially for revenue-decreasing taxpayers, or (2) the drop in reported revenue is due to evaders tending to underreport more (a positive correlation between the decrease in reported revenue and evasion propensity). Regardless, the finding is important from a tax administration point of view since lower revenue is an important profile marker for "tax cheats."

3. Sensitivity Tests

We conduct three sensitivity tests to ensure that our results are robust. First, we eliminate all firms whose incomes change by less than 1 percent from the earlier period. The results, presented in Table 3, are unchanged.

Second, we perform a difference-in-differences analysis to control for common trends. Difference-in-differences analysis is considered to be an appropriate test when there is panel data—before and after responses for the treatment and control samples (Wooldridge, 2001; Buckley and Shang, 2003). In this case, the dependent variable for the difference-in-differences analysis is the natural logarithm of the use tax base for the third quarter of 2003 (the dependent variable in the earlier ANCOVA) minus the natural logarithm of the use tax base for the third quarter of 2002 (the covariate in the earlier ANCOVA), ensuring that any common trend effects unrelated to the factors are differenced out. We then conduct an Analysis of Variance (ANOVA) with the above-mentioned dependent variable and the two factors, detection and penalty. The analysis is performed separately for revenue-decreasing and revenue-increasing taxpayers. The results are shown in Table 4, Panels A and B, respectively.

For revenue-decreasing firms, the presence of the detection variable significantly increases the reported tax base. The presence of the penalty variable also significantly increases the reported tax base in the absence of an increased detection mechanism. For

Table 3

Analysis of Covariance: Use Tax, Excluding Firms with Revenue Difference Less than 1% (Dependent Variable: Log Use Tax Base, Third Quarter, 2003)

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	785.4	8	98.17	34.65	0.000
Covariate log use tax, third quarter, 2002	733.1	1	733.1	258.7	0.000
Revenue Trend	0.177	1	0.177	0.06	0.803
Penalty	0.011	1	0.011	0.00	0.951
Detection	7.446	1	7.446	2.63	0.106
Revenue Trend*Penalty	0.450	1	0.450	0.16	0.691
Revenue Trend*Detection	0.183	1	0.183	0.06	0.800
Penalty*Detection	17.53	1	17.53	6.19	0.014
Trend*Penalty*Detection	11.00	1	11.00	3.88	0.050
Error	668.7	236	2.833		
Corrected total	1,454	244			

revenue-increasing firms, the ANOVA model is not significant, suggesting that none of the manipulations or their combinations significantly affected the reported tax base. This conclusion mirrors the conclusions obtained from the earlier ANCOVA model and the ANCOVA model, after eliminating firms with less than 1 percent difference in revenue (compared to the prior period). While the difference-in-differences approach overcomes the problem of controlling for common trends, partiality unbiasedness of the difference-in-differences estimator requires that the treatment changes not be related to other factors that affect the use tax base and are hidden in the error term (Wooldridge 2001, 130). The *"pooled cross sections over time"* approach (described below) overcomes this weakness.

As the third sensitivity test, we employ a *"pooled cross sections over time"* method and estimate our model using ordinary least squares (OLS) regression with robust standard errors to account for potential heteroskedasticity and serial correlation of the error term. Based on Wooldridge (2001, p. 129–130), the OLS model we estimate is as follows:

$$(1)\quad \textit{Log use tax base} = \delta_0\, \textit{YearDum} + \beta_1\, \textit{DetDum} + \beta_2\, \textit{PenDum} + \beta_3\, \textit{DetPenDum} + \delta_1\, \textit{YearDum*DetDum} + \delta_2\, \textit{YearDum*PenDum} + \delta_3\, \textit{YearDum*DetPenDum},$$

where *YearDum, DetDum, PenDum* and *DetPenDum* are all dummy variables with the following values: *YearDum* = 0 for the year 2002 (the prior period) and *YearDum*

Table 4

Analysis of Variance: Use Tax
(Dependent Variable: Difference in Log Use Tax Bases,
Third Quarter, 2003 and Third Quarter, 2002)

Panel A Revenue-Decreasing Firms

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	27.99	3	9.330	3.07	0.031
Penalty	0.038	1	0.038	0.20	0.911
Detection	5.408	1	5.408	1.78	0.185
Penalty*Detection	22.96	1	22.96	7.56	0.007
Error	337.1	111	3.037		
Corrected total	365.1	114			

Test of Estimated Marginal Means: Penalty*Detection

Penalty	Detection	Mean	Std. Error
No Penalty	No Detection	–0.268[a]	0.356
	Detection	1.069[b]	0.313
Penalty	No Detection	0.595[c]	0.335
	Detection	0.132	0.303

Notes: The covariate appearing in this model is evaluated at its mean value. Superscripts [a] and [b] reflect significant differences at p=0.005 (t=–2.82), and superscripts [a] and [c] reflect significant differences at p=0.08 (t=1.77).

Panel B Revenue-Increasing Firms

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	15.10	3	5.034	1.34	0.263
Penalty	3.267	1	3.267	0.87	0.352
Detection	11.02	1	11.02	2.94	0.089
Penalty*Detection	1.970	1	1.970	0.53	0.470
Error	517.3	138	3.748		
Corrected total	532.4	141			

= 1 for the year 2003 (the test period); *DetDum* = 1 if the taxpayer receives *only* the detection treatment, otherwise *DetDum* = 0; *PenDum* = 1 if the taxpayer receives *only* the penalty treatment, otherwise *PenDum* = 0; *DetPenDum* =1 if the taxpayer receives the detection *and* the penalty treatments, otherwise *DetPenDum* = 0. The *YearDum*

variable accounts for aggregate factors that affect the use tax base over time the same way for the control and the treatment groups. The *DetDum, PenDum,* and *DetPenDum* variables capture possible differences between the treatment and control groups before the treatment is administered. Thus, the coefficients of interest are δ_1, δ_2, and δ_3 because they capture the effect of the treatments in the test period. Additionally, we use the *ACOV* option in SAS *PROC REG* to estimate our OLS model using heteroskedastic consistent standard errors.

Since this approach does not require us to maintain panel data or matched pairs of observations, our sample size increased from 514 observations (257 matched pairs) to 738 observations.[8] Results show that δ_1, δ_2, and δ_3 are all significant at conven-

Table 5

Pooled Cross Sections Over Time Ordinary Least Squares Regression: Use Tax (Dependent Variable: Log Use Tax Bases, Third Quarter, 2003 and Third Quarter, 2002; N=738)

		Robust SE Estimates		
Variable	Parameter Estimate	Standard Error	t-value	Pr >|t|
Intercept	8.998	0.284	31.68	<0.001
YearDum	–0.740	0.381	–1.94	0.05
DetDum	–0.623	0.386	–1.61	0.11
PenDum	–0.717	0.401	–1.79	0.07
DetPenDum	–1.142	0.379	–3.01	0.01
YearDum*DetDum	1.109	0.521	2.13	0.03
YearDum*PenDum	0.985	0.531	1.86	0.06
YearDum*DetPenDum	1.112	0.505	2.20	0.03

Notes: YearDum equals zero if the observation is from the year 2002 and equals one if it is from 2003. DetDum equals one if the subject receives only the detection manipulation; otherwise it is zero. PenDum equals one if the subject receives only the penalty manipulation; otherwise it is zero. DetPenDum equals one if the subject receives the detection and the penalty manipulations; otherwise it is zero.

[8] We had 87 taxpayers reporting zero use tax base in the third quarter of 2003 and a positive use tax base in the third quarter of 2002. Because the 87 observations of 2003 were eliminated (due to logarithmic transformation), the corresponding positive observations of 2002 were also eliminated due to the matched pairs design of ANCOVA and difference-in-differences method. In the pooled cross sections over time method, we were able to include the positive observations from 2002. Likewise, 137 taxpayers reported zero use tax base in the third quarter of 2002 and a positive use tax base in third quarter of 2003. The 137 positive observations from 2003 were included in the OLS model. Thus, the OLS method had 738 observations instead of 514 observations (257 matched pairs) used by the ANCOVA and the difference-in-differences method.

tional levels.[9] Detection and penalty, individually and jointly impact compliance behavior.

E. Results for the B&O Tax

As mentioned earlier, the detection manipulation is targeted only at the use tax. However, reported B&O tax may also change if there are any spillover effects. Additionally, the penalty manipulation applies to all Washington taxes, including the B&O tax. We begin the statistical analysis of the B&O tax with analysis of covariance. The dependent variable is the natural logarithm of B&O tax for the target quarter. The covariate is the natural logarithm of B&O tax for the same quarter of the prior year, and the factors are detection, penalty and revenue trend.

1. Testing the ANCOVA assumptions

As in the case of use tax, we test for (1) homogeneity of within-group regression, and (2) homogeneity of variances of conditional Y scores. Both these assumptions are violated. There is a significant interaction effect of the covariate with revenue trend ($F = 5.012$, $p = 0.024$) indicating that the X and Y regression slopes are different for revenue-decreasing and revenue-increasing firms. Also, Levene's test indicates that the homogeneity of variances of conditional Y scores is marginally violated ($F = 1.69$, $p = 0.1$). Since ANCOVA is not appropriate in this context, we conduct a difference-in-differences analysis.[10] The dependent variable for the ANOVA is the difference between the logarithm of B&O tax for the third quarter of 2003 and the logarithm of B&O tax for the third quarter of 2002. This accounts for common trends between the original dependent variable and the original covariate. The analysis is performed individually for revenue-decreasing and revenue-increasing taxpayers.[11]

2. Analyses of Results

Results for the difference-in-differences regression are presented in Tables 6 and 7 for revenue-decreasing and revenue-increasing taxpayers, respectively. Table 6 indicates marginally significant treatment effects ($F = 2.093$, $p = 0.10$). The ANOVA also indicates a marginally significant detection effect ($F = 3.00$, $p = 0.08$) and a marginally significant detection*penalty effect ($F = 3.42$, $p = 0.06$). This suggests a modest

[9] Like the earlier results, the factors of interest were significant in the revenue-decreasing subsample but not in the revenue-increasing subsample.

[10] Separate ANCOVAs on the revenue-increasing and revenue-decreasing firms also violated the assumption of homogeneity of within-group regressions and hence was not considered an appropriate technique.

[11] To be consistent with the analysis on use taxes, we performed the analysis on individual groups. Furthermore, the homogeneity of variance assumption (Levene's test) was violated for the full sample but not for the individual groups.

Table 6

Analysis of Variance: B&O Tax
(Dependent Variable: Difference in Log B&O Tax Bases, Third Quarter, 2003 and Third Quarter, 2002; Revenue-Decreasing Firms)

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	6.149	3	2.050	2.093	0.101
Penalty	0.046	1	0.046	0.047	0.828
Detection	2.939	1	2.939	3.000	0.084
Penalty*Detection	3.346	1	3.346	3.416	0.065
Error	399.6	408	0.979		
Corrected total	405.7	411			

Test of Estimated Marginal Means: Detection, Revenue-Decreasing Firms

			95% Confidence Interval	
Detection	Mean	Std. Error	Lower Bound	Upper Bound
No detection	–0.354	0.070	–0.491	–0.0216
Detection	–0.185	0.068	–0.319	–0.0051

Test of Estimated Marginal Means:
Penalty*Detection, Revenue-Decreasing Firms

				95% Confidence Interval	
Penalty	Detection	Mean	Std. Error	Lower Bound	Upper Bound
No penalty	No detection	–0.454	0.099	–0.650	–0.259
	Detection	–0.105	0.098	–0.299	0.089
Penalty	No Detection	–0.253	0.098	–0.446	–0.060
	Detection	–0.264	0.094	–0.450	–0.079

Note: The covariate appearing in the above models is evaluated at its mean value.

association between reported B&O taxes paid by revenue-decreasing taxpayers and treatment manipulations. Table 6 presents test of means as well. The first test of means table shows that firms that receive detection information tend to have a lower difference between current reported tax and prior reported tax than firms that did not receive detection information. The second test of means table shows that the detection effect is salient in the absence of penalty information, while penalty information makes a modest difference in the absence of detection information. Current reported B&O tax as compared to prior B&O tax is lowest for firms that did not receive either manipulation.

In contrast, Table 7 indicates that for revenue-increasing taxpayers, the ANOVA model is not significant (F = 0.209, p = 0.80). Consequently, the difference in reported B&O tax between the two years is not impacted by either manipulation or any combination thereof.

Table 7

Analysis of Variance – B&O Tax
(Dependent Variable: Difference in Log B&O Tax Bases, Third Quarter, 2003 and Third Quarter, 2002; Revenue-Increasing Firms)

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Significance
Corrected model	0.291	3	0.097	0.209	0.890
Penalty	0.169	1	0.169	0.363	0.547
Detection	0.008	1	0.008	0.017	0.898
Penalty*Detection	0.112	1	0.112	0.241	0.623
Error	228.4	492	0.464		
Corrected total	228.6	495			

Table 8

Pooled Cross Sections Over Time Ordinary Least Squares Regression: B&O Tax
(Dependent Variable: Log B&O Tax Bases, Third Quarter, 2003 and Third Quarter, 2002; N=1867)

		Robust SE Estimates		
Variable	Parameter Estimate	Standard Error	t-value	Pr >|t|
Intercept	12.71	0.104	122.6	<0.001
YearDum	–0.139	0.150	–0.93	0.35
DetDum	–0.036	0.148	–0.24	0.81
PenDum	0.084	0.144	0.58	0.56
DetPenDum	–0.057	0.142	–0.40	0.69
YearDum*DetDum	0.101	0.212	0.47	0.64
YearDum*PenDum	0.159	0.204	0.78	0.44
YearDum*DetPenDum	–0.120	0.215	–0.56	0.58

Notes: YearDum equals zero if the observation is from the year 2002 and equals one if it is from 2003. DetDum equals one if the subject receives only the detection manipulation; otherwise it is zero. PenDum equals one if the subject receives only the penalty manipulation; otherwise it is zero. DetPenDum equals one if the subject receives the detection and the penalty manipulations; otherwise it is zero.

The results of the two ANOVAs taken together are consistent with the results obtained for the use tax.[12] While B&O taxes were not specifically targeted by the detection manipulation, there is a modest spillover effect. Penalty information is, as in the case of use tax, marginally significant in the absence of detection manipulation.

As in the case of the use tax, we also perform a "pooled cross sections over time" ordinary least squares regression using robust standard errors. The sample size increased from 1816 observations (908 matched pairs) to 1867 observations. We use the same model that was employed for the use tax analyses, but the dependent variable is the natural logarithm of the B&O tax base. The coefficients of interest δ_1, δ_2, and δ_3 (indicating the effects of detection only, penalty only, and both) are not significant. That is, none of the treatments influence compliance with the B&O tax in a significant manner. The results are the same for the full sample (shown in Table 8) and the two revenue-based subsamples (not shown).

VI. CONCLUSION

State revenue departments do not have the resources to aggressively enforce compliance with tax laws. Consequently, some, like the Department of Revenue in Washington State, explore creative and inexpensive avenues to maximize compliance. In this experiment, the Washington State Department of Revenue asked the authors to conduct a field experiment that examined the influences of detection and sanctions on tax compliance in the construction industry. The taxes selected for the experiment are the use tax, which has the lowest compliance rate in Washington probably due to low visibility, and the Business & Occupation (B&O) tax. The latter is selected because it also has a high amount of unpaid taxes and is reported on the same tax form as the use tax. The construction industry was selected as the subject for this study because of the possibility of producing substantial collection increases for the DOR due to the nature of its asset acquisitions and its prior noncompliance issues.

The results of the experiment indicate that sending educational communications regarding penalties for noncompliance to firms or enhancing the taxpayer's awareness of the risk of detection is associated with a significant increase in reported use tax base at least for the period in which the communications are first sent out. The detection and penalty effects are salient for taxpayers with decreasing revenues, but not for taxpayers with increasing revenues. This suggests that an effective enforcement mechanism may be designed based on comparing reported tax base with prior period tax base. When audit resources are scarce, concentrating on taxpayers with declining revenues or profitability may provide the best return on audit dollars spent. The significant result for use tax is encouraging for the revenue departments that constantly struggle to stretch their enforcement budget.

[12] An important caveat to note here is that revenue trend is not an exogenously manipulated factor like detection and penalty. Consequently, the different results obtained for the two subsamples may simply be an artifact of splitting the sample based on reported revenue.

In this field study, the communication of sanctions and increased visibility of taxes significantly influenced business taxpayer compliance. However, more research is clearly appropriate. We examined the effect of the communications only for one period. Consequently, we cannot comment on whether they will impact reporting behavior in subsequent periods. Related to the above, we also cannot comment on whether a similar exercise in the next period will elicit a similar response. The taxes involved in this study are substantially different than those examined in other field experiments (generally income taxes) and the taxpayers analyzed are firms rather than individuals. It is entirely possible that firms' behavior is distinctive from that of individuals and, as Davis, Hecht, and Perkins (2003) suggest, compliance can vary across time, geographic regions, and cultures. The attitudes of Washington construction business owners may not generalize to other industries, states or tax bases. We encourage future researchers to consider alternative taxes in other states exhibiting different non-compliance and evasion opportunity profiles, and other industries also warrant consideration.

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