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Evidence from a natural field experiment

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Abstract

It is challenging to distinguish the role of information in tax compliance from other factors affecting it. This paper utilizes a novel natural field experiment design to study the issue. In the experiment firms reporting their VAT were sent a letter asking them questions about their attitude towards the tax authority. The introductions to the questions provided candid information about VAT rules for a randomized treatment group, while a randomized control group was only asked questions without additional information. We observe the effects of the treatments directly from firm-level tax records. Providing information did reduce the noncompliance in tax reporting, which indicates that there were unintentional errors. The experimental design also allows us to study whether the difficulty and novelty of the tax code plays any role in tax compliance. The results indicate that tax reporting changes when new and easy information is provided.

Key words: tax compliance, information, field experiment

JEL classification numbers: C93, H25, H26

Tiivistelmä

Informaation roolia on vaikea erotella muista verosääntöjen noudattamiseen vaikuttavista asioista. Tässä tutkimuksessa esitellään ainutlaatuista luonnollista kenttäkoetta, jonka avulla informaation rooli selviää. Kenttäkokeessa ALV-velvollisia yrityksiä lähestyttiin kirjeellä, jonka sisältämässä kyselyssä tiedusteltiin vastaajan asenteita verottajaa kohtaan. Kysymysten johdannot tarjosivat hienovaraisesti ALV-sääntöihin liittyvää tietoa satunnaisesti valitulle koeryhmälle. Kontrolliryhmälle vastaavaa tietoa ei jaettu. Informaation vaikutukset voidaan nähdä suoraan yksityiskohtaisista yritystason verotiedoista. Tulosten perusteella virheet veroilmoittamisessa todella vähenivät, kun verosäännöistä jaettiin informaatiota. Koeasetelma mahdollistaa myös vastaamisen siihen vaikuttaako tieto eri tavalla, jos kyseessä on uusi tai vaikea

verosääntö. Saimme merkitseviä tuloksia vain uudesta ja helposta verosäännöstä tarjotusta informaatiosta.

Asiasanat: verosääntöjen noudattaminen, informaatio, luonnollinen kenttäkoe

JEL-luokittelu: C93, H25, H26

1 Introduction

Lack of knowledge about tax rules may explain a substantial part of total tax non-compliance. As much as 30% of all wrong reporting in income taxes may be due to honest mistakes (Christian 1994 and Erard 1997). Despite its importance, the literature on explaining the role of information in tax compliance is scant (Slemrod and Yitzhaki 2002). In particular, the role of information in tax non-compliance by firms is unexplored. From observational data it is impossible to distinguish the effect of information from other factors affecting tax compliance. Simply providing information about tax rules to taxpayers also induces other possible changes like an increase in the perceived probability of being detected.

Some tax codes are easier to comprehend than others. Thus it is interesting to study to what extent the degree of misreporting is related to the complexity of tax codes. Providing relatively simple information about tax codes that may be difficult to understand, like marginal tax rates, might not lead to large behavioral responses (see Chetty and Saez, 2013). This study contributes by analyzing the effect of separately providing information about simple, new and complicated tax codes on the tax reporting behavior of firms. Randomized groups of firms received the different types of information in letters as part of a written survey.

We carried out a natural field experiment together with the Finnish Tax Administration. The idea of the experiment is to separate the role of information from other factors affecting the tax compliance of firms. The experiment consisted of sending letters to randomized control and treatment groups. The letters included a questionnaire on attitudes towards the tax authority. The questions candidly provided information about certain key aspects of Finnish VAT legislation to the treatment group but only enquired about the attitudes of the control group. Otherwise these two groups were treated in exactly the same way. Furthermore, we enhanced the likelihood of respondents reading the questions, since soon after receiving the letter, a polling firm conducted a telephone survey asking the questions provided earlier in the letter. We monitor the effects of the treatment on firms' VAT reporting behavior from

very detailed monthly level tax records.

The experiment was designed to distinguish the effect of providing information about the tax code from other factors affecting compliance because both the treatment and control groups were contacted by the Finnish Tax Administration. Without this careful set-up, firms in different groups could perceive a different increase in their subjective probability of getting caught. If only the treatment group were contacted, they might expect that the tax administration would pay special attention to their next tax report. In the setting of this study, even if the letter had such an effect, it would have been the same for both treatment and control groups. In this setting the only difference between the groups is the provision of information.

We provided information to firms facing different types of tax rules in their normal activities. One group was provided with information about a relatively simple and new tax rule: the VAT rate for certain services changed one month before sending the letter. Another group was provided with information about a relatively complicated VAT rule. By looking into possible differences in the results across these groups, we can study whether the degree of complexity in information and the complexity of tax rules affect tax reporting behavior differently.

The results show that providing information on VAT rules can affect firms' tax reporting behavior. In the groups for which the VAT rate changed, a substantial number of firms continued reporting at the old VAT rate, although this VAT rate did not exist for these services any more. Reporting wrongly is costly for the tax authority, since the mistakes need to be corrected manually afterwards, and also costly for firms, since they need to go back to their reports and possibly pay more taxes with interest. We estimate a treatment effect of 5 percentage points (60%) less wrong reporting for the treatment group as a result of receiving information about the change in the tax code. This is a substantial reduction in mistakes. Moreover, this large effect resulted from relatively gentle provision of information as part of a written survey question.

Providing similar information about a more complicated tax code or a tax code that has been in place for longer does not produce differing behavior

between treatment and control groups. The results on this are not very consistent, but we infer from this that the complexity of tax codes limits taxpayers' ability to react to information. This is natural, because even if the information about something is clear, it does not affect the receiver if he or she does not understand the subject the information is about. Moreover, a tax code that has been in place for prolonged period may be already familiar to taxpayers and thus providing information about it does not change their behavior.

Our study is related to Chetty and Saez (2013), who conducted a randomized natural experiment to study the effects of highly detailed and illustrative information about the earned income tax credit (EITC) schedule on earnings decisions. Although taxpayers respond to the salient tax incentives of whether or not to enrol in the EITC, they do not seem to respond to more difficult marginal tax rate decisions, despite the clear information given on these.

We contribute to tax salience literature, which is about the visibility of tax incentives. In this way the salience of the tax code is closely related to the extent of information given out on the tax code. More information makes the tax code more visible. Chetty *et al.* (2009) analyzed the effect of tax-inclusive versus tax-exclusive price tags on the demand for goods in a grocery store. Seeing the tax reduced demand by 8 per cent, suggesting that tax salience matters. Finkelstein (2009) compares electronic and non-electronic toll collections in the U.S. to study whether salience affects drivers' awareness of tolls. She finds that drivers are less aware of electronic tolls. Abeler and Jäger (2013) conducted a laboratory experiment, which provided treatments featuring simple and complex tax systems. They show that subjects in the complex treatment underreact more to taxes relative to simple treatment. We contribute to the tax salience literature by showing that providing information about changes in the tax code, which makes these changes more salient, affects the behavior of taxpayers.

We also contribute more generally to the literature about the role of information in explaining economic behavior (Dranove *et al.* 2003, Duflo and Saez 2003, Jin and Leslie 2003, Hastings and Weinstein 2008, Jensen

2010, Jones 2010 and Rockoff *et al.* 2012). We do this by proposing a novel design where both treatment and control groups are contacted, but only the treatment group receives the information. For example, Card *et al.* (2012) found that providing information on peer salaries affects employees earning below the median. They report lower pay and job satisfaction and are more likely to search for a new job. It could be an interesting addition to know to what extent workers would react to a mere contact as opposed to receiving information about others' salaries.

The paper proceeds by describing the relevant institutions in section 2. Section 3 presents the experimental design in detail. Section 4 describes the data and section 5 the results. Section 6 concludes the study.

2 The Finnish VAT System and the Filing Practices for Firms

The experiment was conducted in Finland, which is a member of the European Union (EU). The consumption tax system in the EU is value-added tax (VAT).¹ According to EU directives, member states may apply at most four separate VAT rates: a general rate of at least 15%, at most two reduced rates and a zero rate. The directives name the commodities allowed to be taxed at one of the reduced rates. Consumer prices within the EU are tax-inclusive. Price tags already include VAT.

Each firm must report their value-added taxes using periodic tax returns.² In addition to value-added taxes, employers' contributions are also reported using this form. In each period (month or quarter) a firm reports the sum of VAT separately by different VAT bases to the tax authority. The form also includes specific slots for certain specific taxes like reversed VAT for the construction industry. Firms also report their wage sums and other taxes on

¹The other commonly used consumption tax is retail sales tax (RST). For a discussion about the relative merits of RST and VAT, see Zodrow (1999).

²Reporting takes place monthly, quarterly or yearly depending on the turnover of the firm. If it exceeds 50,000€ per year, the reporting must be done monthly. Otherwise it is done quarterly unless the turnover per year is less than or equal to 25,000€.

the same form. Figure 18 in the appendix presents the periodic tax returns form. The information on the form is recorded in the firm's own tax account, which the tax authority may check for inconsistencies.

VAT must be reported before a strict deadline. The deadline is one and a half months after the end of the period which the report covers. There are two ways to report VAT: electronically or by a regular mail. If the firm uses the more popular electronic system, it must report by the 12th day of the second month from the end of the period. For example, the VAT related to November 2011 must be reported by January 12 the following year. For firms that report using regular mail, the corresponding day is the 7th.

The firms report information in their periodic tax returns to the tax authority. This holds even if a firm uses external accounting services. Then the external firm keeps the firm's accounts, but does not report VAT to the tax authority. Moreover, firms are responsible for collecting VAT from their customers on each transaction they make. For example, when a barber shop sells a service (at a VAT-inclusive price) it first records this transaction in its cash register and only afterwards reports its transaction to its accounting firm.

The law on VAT may be complicated. The Finnish VAT law is 159 pages long and includes many special cases about which VAT base should be applied for a particular good or service. The tax administration provides instructions for periodic tax returns. These are 16 pages long and in many cases also refer to the internet for more detailed instructions.

Next we describe the relevant features for this study of the tax code for some labor-intensive services (barbers, masseurs and beauty salons), the construction industry and the restaurant industry that we focus on.

Reduced VAT rate for labor-intensive services

There was a VAT reform for labor-intensive services at the beginning of 2007. The reduced VAT rate of 9% applied to them until December 2011. From the beginning of January 2012 the reduced rate was abolished and the general rate of 23% applied instead.

As one outcome we examine whether firms reported at the wrong VAT rate. The tax authority observes the reported VAT by the rate. Therefore, where the rate does not apply for a particular firm, it is straightforward to detect false reporting. Furthermore, since the firms themselves report their VAT by rate they must understand that reporting at the wrong rate is easily detected.

Reversed VAT and regular VAT obligations in the construction industry

Normally the provider of a product is responsible for collecting the VAT and consequently reports it to the tax authority. However, with reversed VAT it is the buyer firm that is responsible for collecting and reporting the VAT. Reversed VAT responsibility applies to construction services in Finland. This practice took effect from April 2011.

The conditions where reversed VAT responsibility is applied are far from self-evident. What complicates the law is the fact that within the construction industry it applies only to some services. This depends both on the nature of the buyer and the service being sold. If the service does not fulfill the criteria, the regular VAT procedure is applied instead. For instance, in order for reversed VAT to be applied in the construction industry, the buyer firm must practice construction work more often than occasionally.

Reduced VAT and regular VAT rates in the restaurant industry

From July 2010 the reduced VAT rate of 13% has been applied to restaurant services (food). For other sales in restaurants, like sales of beer, newspapers or magazine, VAT is paid at the general rate of 23%. The two different rates could potentially lead to mistakes. The system is relatively well established, takeaway food from restaurants having been taxed at a reduced rate for a long time in Finland. Food sold inside restaurants was switched to the reduced rate from the main rate. Still, the VAT rules for restaurants are relatively old and easy for firms to comprehend.

3 Experimental Design

We carried out a natural field experiment in order to study the role of information in tax compliance. We first chose industries (labor-intensive services, the construction industry and the restaurant industry) for which we provided information about the VAT rules. We randomly selected firms from tax records into the treatment and control groups.

The Finnish Tax Administration contacted both groups by letter, which included a written survey questionnaire about attitudes towards the tax authority. The letter candidly provided information about VAT rules among the questions to the treatment group. For the control group there was no such information, only the questions. The firms did not know that they were participating in an information experiment. They thought they were merely answering questions about attitudes towards the Finnish Tax Administration.

Our design, where we contact both the treatment and the control groups, allows us to separate the effect of the information from that of the contact only. In order to enhance the likelihood of a respondent reading the questions, a polling firm collected the answers to the survey by phone right after the firms received the letters.

Timing

We compare firms in the treatment and control group before and after the experiment. The timeline of the experiment is depicted in Figure 1.

The experiment took place in the beginning of 2012. The tax administration contacted 2000 firms with the survey questionnaire, which entrepreneurs received in the second half of January 2012 (see Figure 1). At that time the latest reporting dates for November 2011 taxes had already gone and therefore it is not possible for our treatments to have affected reporting for November 2011.

The first time our treatments might show up is in the reports for December 2011. We can see whether receiving a letter has any effect on post-letter reporting by comparing the outcomes in the treatment and control groups.

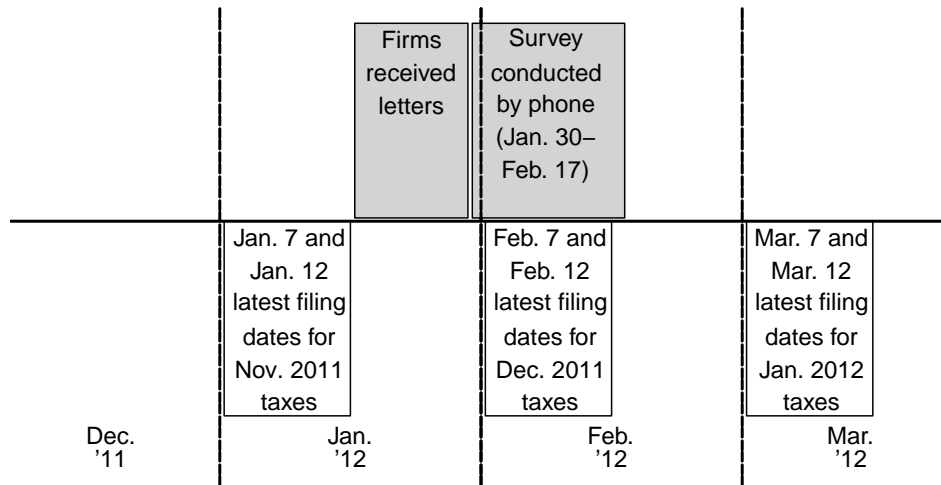


Figure 1: Timeline of the experiment

For labor-intensive services in particular we expect firms to react in their reports for January 2012, since the information was about the VAT reform that took place then. The data allows us to monitor when potential effects show up, since the tax records show by date when the firms report their taxes.

Structure of the survey

We put different survey questions to the treated firms in the three sectors: labor-intensive services, construction sector and restaurants. The corresponding control groups received similar questions.³ Each of these surveys included a cover letter and three different sets of questions: the first set related to attitudes towards the tax authority (see Table 7), the second set provided information to the treatment group, but not to the control group and the third set asked about background information (see Table 8). The treatment and control group questions were the same, except for the second set of questions.

The cover letter provided general information to the respondents, like the purpose of the survey and the estimated time needed to answer the questions. It also emphasized that the survey should be completed by the

³For each industry the treatment and the control group were of the same size.

person responsible for taxation issues in the firm. By stating this explicitly in the cover letter we try to make it less likely that the survey would be redirected to an accounting firm, because otherwise the entrepreneurs (who are responsible for their taxation) might not have got the information.

The control group questions neither provided information on periodic tax returns nor did they direct respondents in the control group to find out about the tax rules by themselves. The second set of questions asked the control group, e.g. the following: What service provider do you use for electronic reporting? Have you had difficulties in logging on to the electronic tax reporting system? Where have you searched for information about periodic tax reporting?

For the treatment group the second set of questions differed as between industries (labor-intensive services, construction sector and restaurants). These questions provided information about periodic tax returns of likely relevance to the respondents. We describe the information in detail below. An important feature in our design is that we can relate each specific piece of information within a question to a corresponding slot in the periodic tax return form. This allows us to deduce which piece of information has caused the observed changes in tax reporting.

Our results are based on the estimation of the following equation:

$$Y_{ft} = \alpha TR_{ft} + \beta AFTER_{ft} + \gamma TR_{ft} * AFTER_{ft} + \mu_t + \nu_f + \varepsilon_{ft} \quad (1)$$

Y_{ft} is the value of the dependent variable for firm f in period t . $AFTER$ and TR are indicators of whether the observation is after the treatment and whether the firm is assigned to the treatment group. The most interesting parameter is γ , which stands for the difference-in-differences coefficient. μ_t and ν_f capture the month and firm fixed effects and ε is an error term, which captures all the other things not included in the equation, also those we cannot observe.

With observational data, correlation between the error term and the treatment status would bias the treatment effect estimates. In our design this does not matter, because for the identification of our natural field experiment we only need the treatment status to be randomly assigned. Even if there were

some differences between the treatment and control groups, our randomized (information) treatment allows us to identify the treatment effect, γ . Our treatment operates as a shock for the firm and by estimating the above equation we can determine the effect of it.

In order to identify the effect of information provision, we contacted both the treatment and the control groups. Because we provided no information to the control group, any reaction by this group would have been due to the contact alone. The reaction in the treatment group is a combination of information provision and the contact. Therefore the difference between the changes in the treatment and the control group provides us with an estimate for the reaction to the information provision, $\hat{\gamma}$.

Our results would be confounded if approaching the control group had induced them to check their tax code more closely. We think that this is unlikely, since the control group questions were more about attitudes towards the tax administration and the electronic reporting system than hinting at the tax code. We perform robustness checks after the main results to check whether approaching the control group by letters somehow changed their behavior.

Reduced VAT rate for labor-intensive services

We provided information about the VAT reform to firms engaged in labor-intensive services. Table 9 shows a snapshot of the survey question containing the information. In this question we drew attention to the main fact (the VAT reform) by stating that: “The VAT test period for labor-intensive services ended on December 31, 2011.” The question then continues with more specific information about the VAT reform.⁴ After the introductory part of the question comes the actual question: “Will the number of tax rates in your firm change from the present number?” The purpose of this question was to prompt the entrepreneur to think about her own tax reporting.

⁴It explains that, although some services like haircutting or beard-trimming used to be taxed at the 9% rate and some services like trimming eyelashes or eyebrows at the general rate of 23%, from the beginning of 2012 these will all be taxed at the general rate and that the reduced rate no longer applies.

If all firms engaged in labor-intensive services both knew the new tax rules and obeyed them, we would observe no reporting at the old 9% rate after the change. Instead they should have reported only at the 23% VAT rate. If some firms were unaware of the change, this would be evident in their tax reports.

Reversed VAT in construction industry

For firms in the construction industry our information treatment consists of four questions each dealing with the reversed VAT obligation. Their structure is very similar to that for labor-intensive services described above. Each question first briefly provides information on the reversed VAT obligation, then this information is given in more detail and finally the questions prompt the firms to think about their own tax reporting.

There are separate sections in the periodic tax return form for cases where reversed VAT applies (318, 319 and 320) and for those where it does not (301). In order to relate to the right sections in the periodic tax return form, our questions not only provide information about what activities are taxed at each rate, they also explain the exact sections where they are reported. For example, one of the questions says that: "... If the buyer does not satisfy the above criteria [for the reversed VAT obligation], the seller shall report the VAT in section 301. Otherwise the seller reports only the tax-exempt price in section 319". If our treatments change the tax reporting behavior of firms in the construction industry, the reaction should especially be seen as a shift between reporting in sections 301 and 319.

Reduced VAT and regular VAT in the restaurant industry

For firms in the restaurant industry the two most relevant tax rates are the general rate and the reduced rate of 13%. Two of the information treatments provide information about the distinction between what sales are to be taxed at each of these two tax rates.

VAT must be reported in different sections for each rate: VAT at the 23% rate is reported in section 301 and VAT at the 13% rate in section 302. If

firms in the restaurant industry react to this information, this reaction ought to be due to a change in reporting in sections 301 and 302.

4 Data Description

The data we use are tax register data from the Finnish Tax Administration. They contain a panel of monthly level tax records from every firm whose tax liability is registered in Finland. The tax register data contain information about everything the firms report to the tax authority. The survey data consist of the responses to the survey questions collected via phone interviews and the data on tax returns for all the firms which received the letters. Table 1 provides some key details of the data.

Table 1: About the data

	Firms	Resp. rate	Obs.	Producer price turnover
Labor-intensive services	600	39%	16422	3628€
Construction industry	800	37%	19070	5410€
Restaurant industry	600	26%	17112	7314€

The first column in Table 1 shows the number of firms randomized into each letter group. Half of these firms in each industry are randomly selected to the treatment group and the other half to the control group. The second column gives the response rates to the phone interview. It shows that firms in labor-intensive services and the construction industry answered the questions more often than those in the restaurant industry. In total 684 firms out of 2000 responded to the survey, making the response rate 34.2%.

Our dataset includes all the information on the firm-level tax returns, such as the entire VAT records (at different rates, reversed VAT etc.), employers' contributions, industry classification and the reporting dates. The tax return data are from January 2010 to July 2012, resulting in between 15,000 and 20,000 observations for each industry (column 3 in Table 1). The last column in Table 1 shows the average monthly producer price turnover for each industry. The restaurant industry is the largest in turnover size and labor-intensive services the smallest.

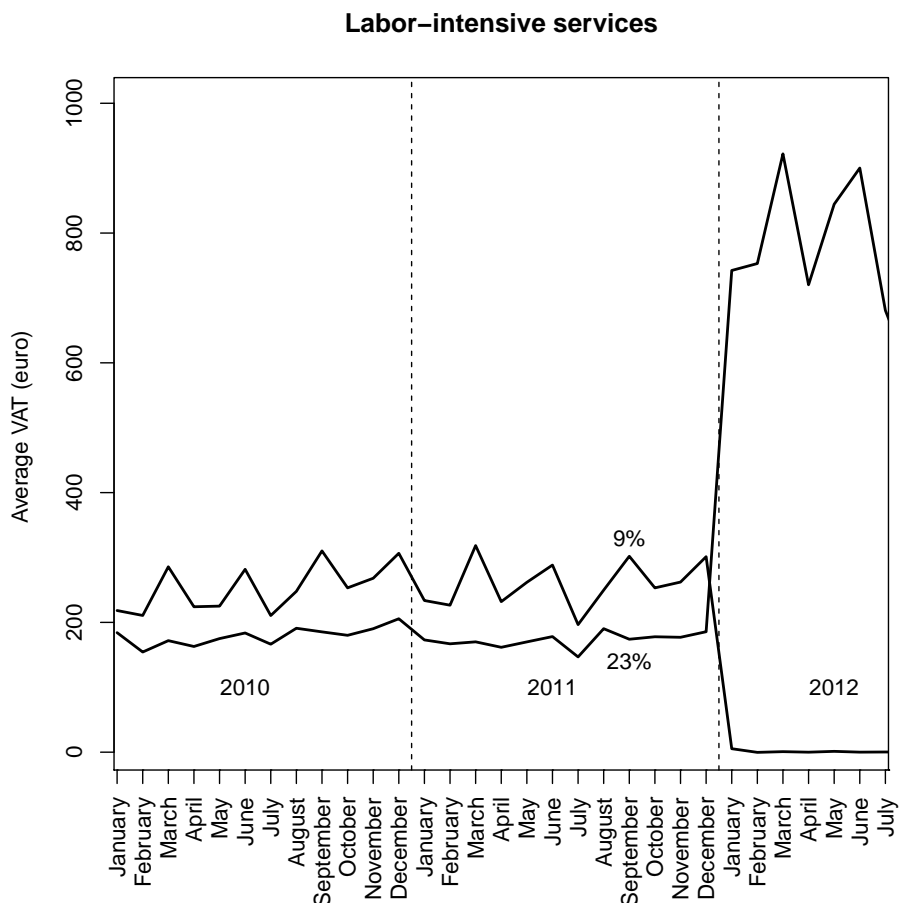


Figure 2: Average VAT at the 9% and 23% VAT rates

Figures 2 - 4 describe the evolution of the most relevant VAT-related numbers for each of the three industries. Figure 2 shows the evolution of average monthly VAT in labor-intensive services at the 9% and 23% tax rates. The figure shows that in the beginning of 2012 average tax reports at the 9% rate decreased to close to zero. At the same time average VAT reports at the 23% rate increased substantially. This pattern clearly shows the effect of the reform - the abolition of the 9% rate for these services.

Figure 3 shows average producer price turnover in regular and reversed VAT transactions for firms in the construction industry. The figure shows that because reversed VAT was introduced in April 2011, reporting in section

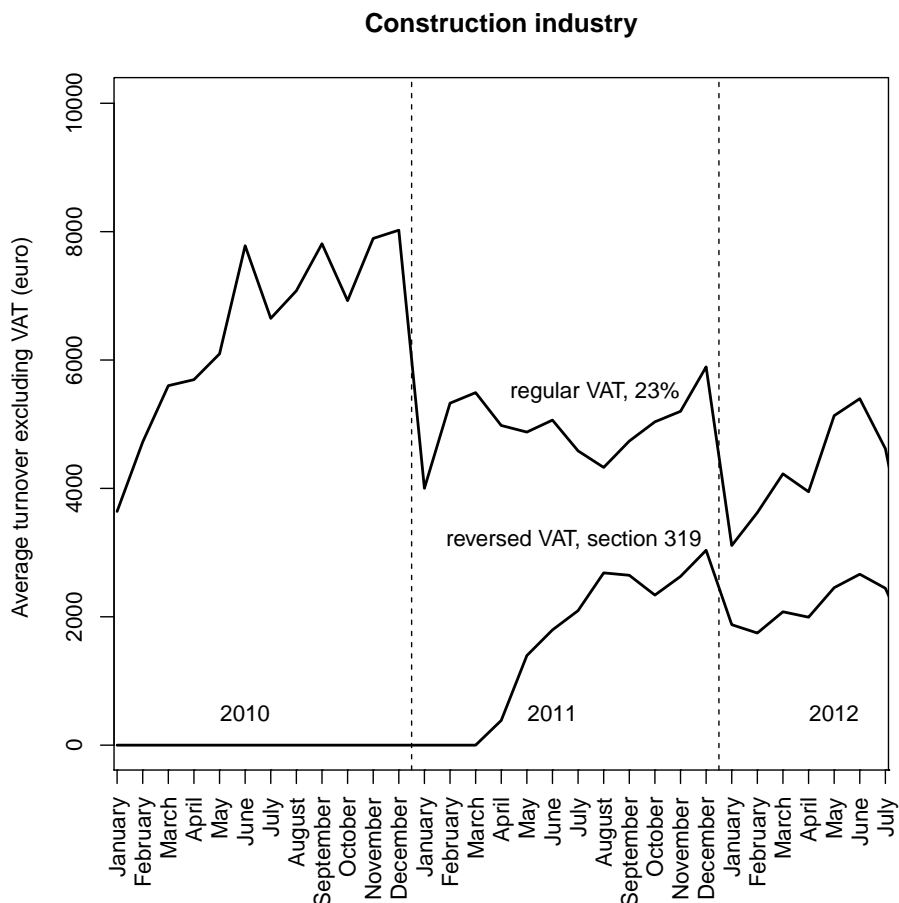


Figure 3: Average turnover with regular and reversed VAT

319 was zero before that. After its introduction some of the reporting at regular VAT clearly shifted to reporting at reversed VAT.

Figure 4 plots the average tax reports at the two most relevant VAT rates in the restaurant industry, the 13% reduced rate and the 23% general rate. The reduced rate for restaurant meals was introduced in July 2010. As a response to this, the figure shows a sharp increase in VAT reports at the 13% rate and a reduction in VAT reports at the 23% rate in July 2010. However, at the time of our experiment, in the beginning of 2012, there is no visible deviation from the general time trends.

Restaurant industry

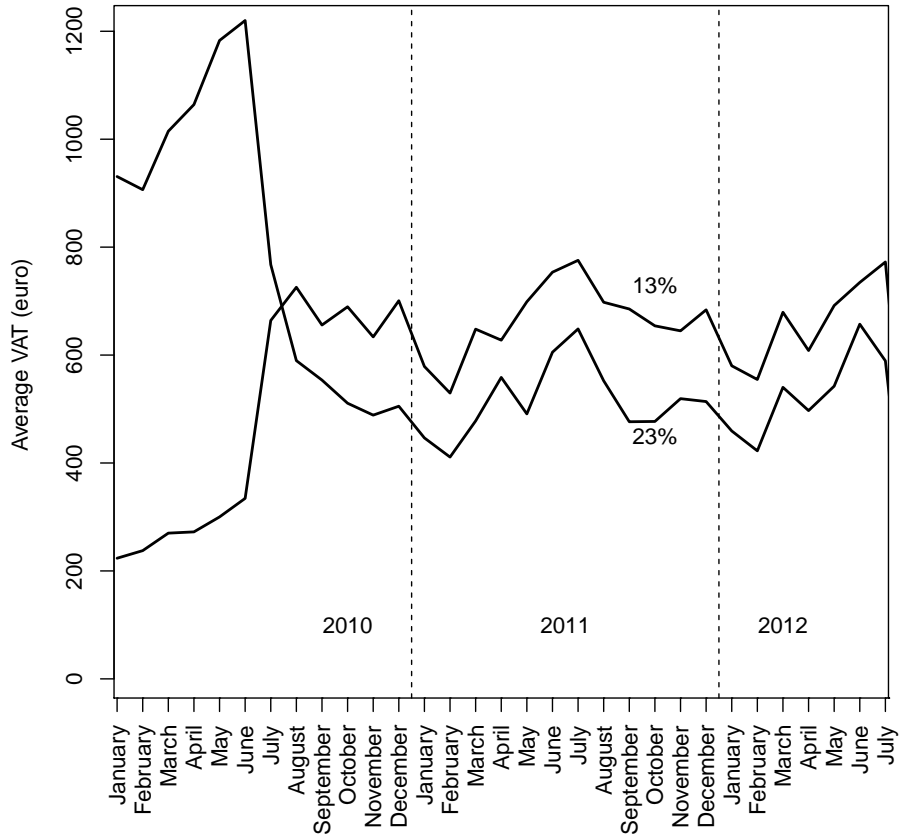


Figure 4: Average VAT at the 13% and 23% rates

5 Results

5.1 Labor-intensive services

This section presents the results for labor-intensive services. The information in the treatment was about the VAT reform, where the VAT rate for these services increased from 9% to 23%. This change in the tax code took effect on January 2012. After that these firms should not have reported at the reduced VAT rate. Instead they should have charged VAT on their services at the standard 23% rate and reported to the tax authority at that rate.

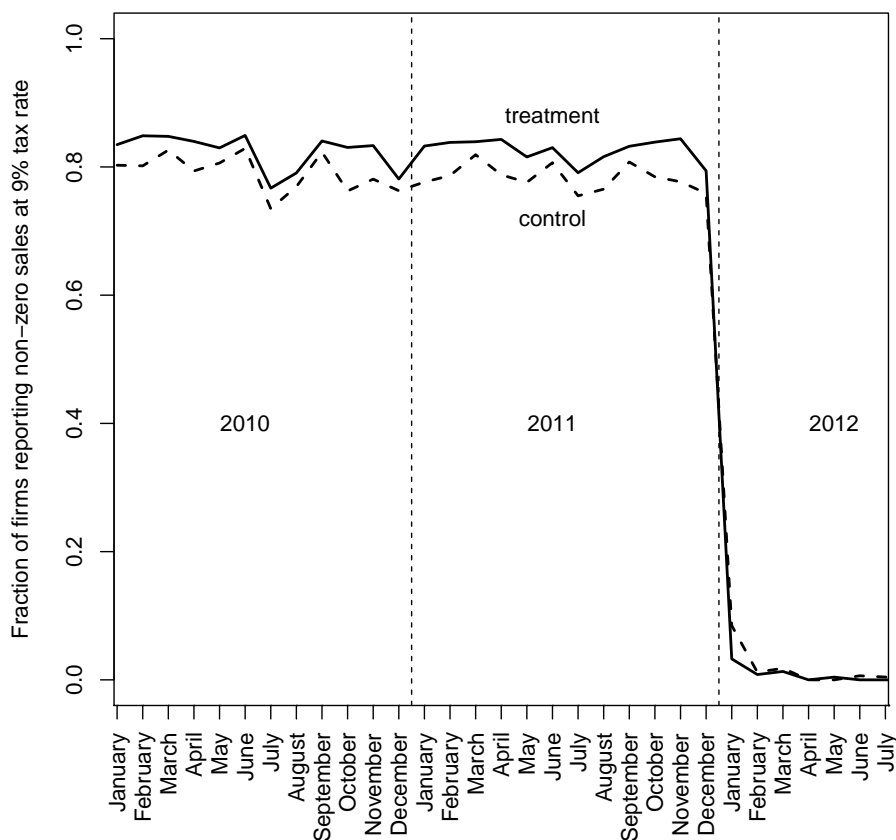


Figure 5: Fraction of firms in labor-intensive services reporting at the 9% reduced rate

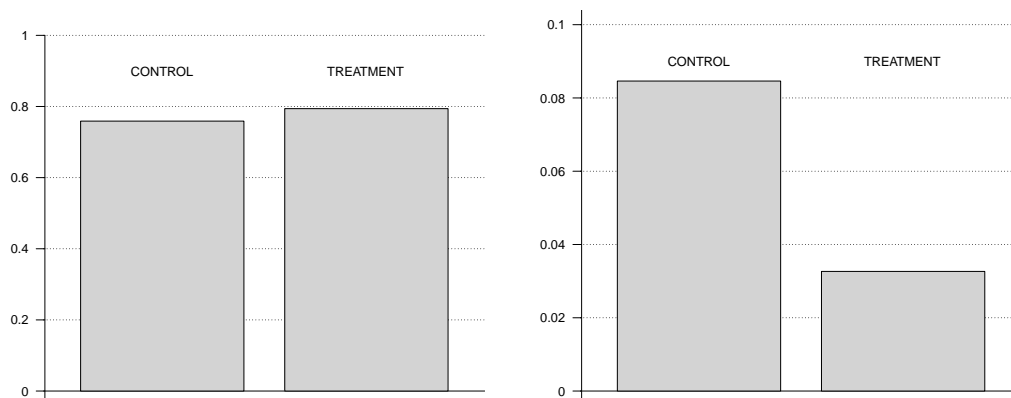


Figure 6: Fractions of firms reporting with 9% reduced rate in December 2011 (left graph) and January 2012 (right graph)

We first study the effect of providing information about the reform on the fraction of firms making the mistake of reporting at the reduced rate after it no longer existed. Figure 5 shows the fraction of firms reporting non-zero sales at the 9% tax rate. Before the change in the tax rule most firms reported at the reduced rate. Moreover, firms in the two groups had a similar fraction of reports, although a slightly larger fraction of firms reported at the 9% rate in the treatment group (79.4% in December 2011) than in the control group (75.9% in December 2011).⁵ The time trends are similar between the groups. Thus the difference between groups does not jeopardize identification, since we use the DID estimator. This takes into account the pre-treatment difference between the groups.

In the beginning of 2012 the fraction of firms reporting at the 9% VAT rate drops significantly in response to the reform. However, a non-trivial fraction of firms still reported at the 9% rate in January, although that rate was no longer available for these firms. Figure 6 shows that for the control group the fraction making the mistake is 8.5% (right graph). For

⁵The difference between groups is not statistically significant (p-value 0.27) when comparing observations in December 2011, whereas for all the observations for 2010 and 2011 the difference is statistically significant (p-value 1.5e-7).

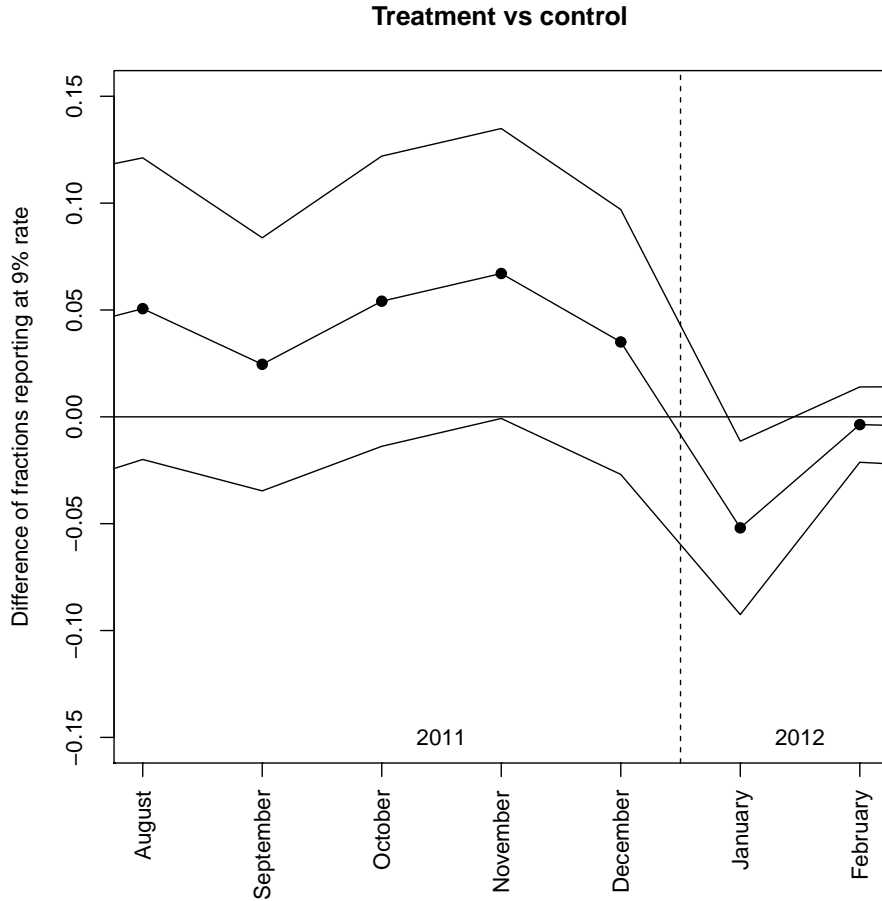


Figure 7: Difference between treatment and control group fractions of firms reporting at the 9% rate

the treatment group, the fraction making the mistake is only 3.3%. This descriptive difference suggests a treatment effect of 5 percentage points due to receiving the information. Furthermore, the order between the treatment and control groups is reversed from the end of 2011 (see Figure 6). This implies that the true treatment effect could be even larger than 5 percentage points. Figure 7 shows the differences between the treatment and control groups from August 2011 to January 2012. The difference in January 2012 is negative, whereas in February 2012 it is essentially zero and statistically insignificant. The latter fact arises because the errors in both groups go to

close to zero. This is because the tax authority regularly checks suspicious reports and would have had time to correct them by February.

To measure the exact size of the treatment effects shown in Figure 5, we run regressions measuring the size of the difference between the treatment and control groups. Table 2 shows the difference and difference-in-differences (DID) estimates for the effect of information on false reports in January 2012. Column “1/2012” shows the difference between the treatment and control groups in January 2012. The treatment group had 5 percentage points less false reports, and this difference is statistically significant.

We perform DID estimation to control for potential differences in the treatment and control groups prior to the experiment. The corresponding columns in the table give the DID estimates with four different time spans. We further show results varying the control vector, either including month or firm fixed effects. The DID estimates are in the third row. The first DID estimates (“12/2011-1/2012”) use the observations for December 2011 and January 2012 and the corresponding columns use wider time spans. These different DID estimates indicate that the treatment effect is negative, the coefficients ranging between -5% and -10%. All these point estimates are statistically significant.

The treatment effect of providing information on making a mistake in tax reporting is large. The treatment effect estimates imply a more than 50% reduction in the rate of making a mistake. Given that the information was provided in a letter accompanying the questions, this strong effect is intriguing. This kind of method for information provision is not particularly strong. It does not highlight the information being provided. Therefore this result suggests that the tax authorities may have wanted to better inform taxpayers about the changes in the tax code. It is a relatively low cost operation to send targeted letters. The effect found here suggests there are benefits acting this way.⁶

The effect of providing information to firms in this setting was only temporary. The number of firms making a mistake goes to zero after January. This is because the tax authority made a desk audit of those firms that made

⁶The total number of firms in our sample making the mistake is less than 50.

Table 2: Difference and Difference-in-Differences Estimates

Independent variables	Dependent variable: non-zero reporting at 9% tax rate (1 = yes, 0 = no)									
	1/2012	12/2011-1/2012		11/2011-2/2012		1/2010-2/2012	1/2010-7/2012			
Firm has been provided with information (1 = yes, 0 = no)	-0.05* (0.02)	0.04 (0.03)	0.05 (0.38)	0.05** (0.02)	0.05** (0.02)	0.04 (0.22)	-0.10 (0.09)	-0.08 (0.08)		
After the tax rate change (i.e. in 2012)		-0.67***	-0.67***	-0.72***	-0.76***	-0.77***	-0.79***	-0.81***		
(1 = yes, 0 = no)		(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)		
Information and 2012 (DID estimate)		-0.09*	-0.10*	-0.08**	-0.08**	-0.08**	-0.06**	-0.05***		
(1 = yes, 0 = no)		(0.04)	(0.04)	(0.03)	(0.03)	(0.03)	(0.02)	(0.01)		
Month fixed effects	no	no	no	no	yes	yes	yes	yes		
Firm fixed effects	no	no	yes	no	no	yes	yes	yes		
Number of observations	505	1200	1200	2204	2204	2204	13741	16461		

Notes. ***, ** and * denote significance levels 0.1%, 1% and 5% respectively.

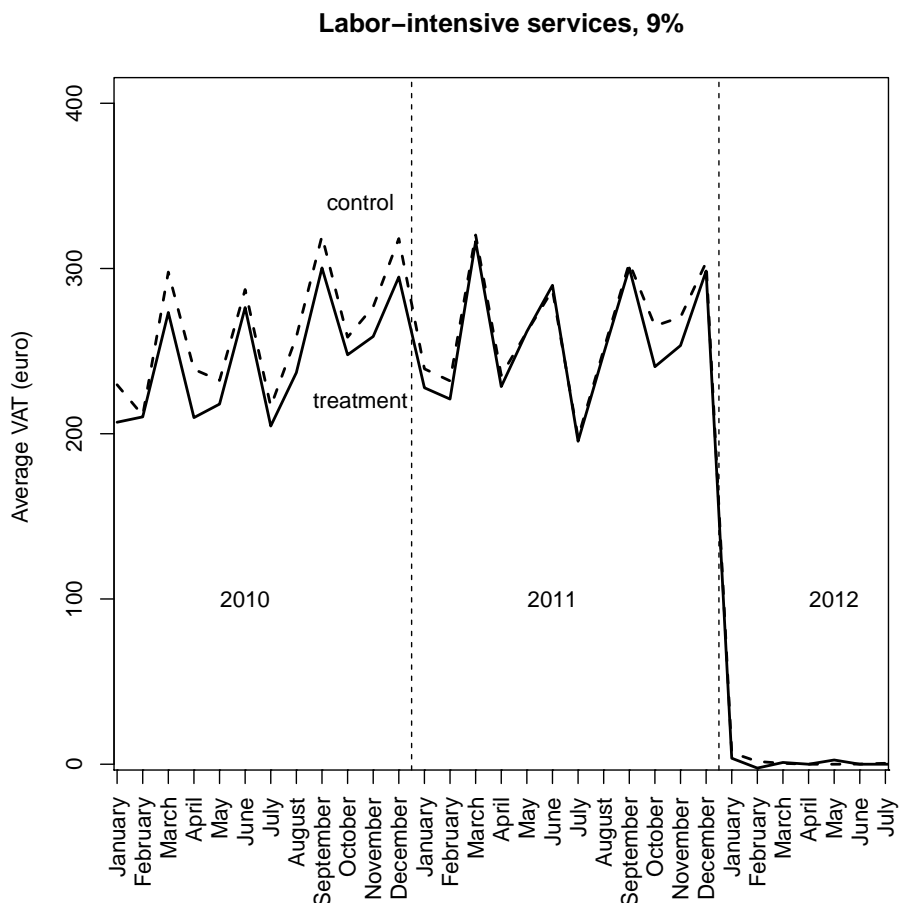


Figure 8: Average VAT at the 9% rate for treatment (solid line) and control (dashed line) groups

a suspicious entry in their tax account. However, it is entirely possible that in another setting firms would have continued making the mistake for longer. In any case, it was costly for the tax authority to have to carry out desk audits of firms making the mistake. It would have been less costly for the tax authority to inform all firms affected by the reform about the reform before it took place.

We next study the extent to which the treatment affected the average VAT firms reported at different VAT rates. Figure 8 shows the average VAT reports at the 9% rate for both the treatment group (solid line) and the

control group (dashed line). Before the reform the groups have very similar trends. Table 3 shows that for some time periods the difference between the groups is statistically significant, but not always. In the beginning of 2012, average VAT at the 9% rate drops, corresponding to the discontinuation of the 9% VAT rate, and is close to zero from there on for both groups. Table 3 shows that there is no statistically significant difference between the treatment and control groups in 2012. We find no effect from the treatment on average VAT at the 9% rate. This indicates that although there were false reports at this rate in January 2012, the magnitude of these effects was not very large.

Figure 9 shows average VAT at the general 23% rate for the treatment and control groups. VAT in the treatment group displays a similar trend to that of the control group, both before and after the change. In some periods the difference between the groups is statistically significant (see Table 4). Due to the change in the tax rules average VAT at the 23% rate increases sharply in both groups, but according to Table 4 this change does not differ between the groups.⁷

Table 3: Difference and Difference-in-Differences Estimates

Dependent variable: VAT at 9% reduced rate				
Independent variables	2010	2011	2012	2010 - 2012
Firm is in treatment group (1 = yes, 0 = no)	-17.5*** (6.6)	-6.7 (6.3)	-0.7 (1.8)	-11.9** (4.0)
Year 2012 (1 = yes, 0 = no)				-223.6*** (15.8)
Treatment group and year 2012 (DID estimate) (1 = yes, 0 = no)				11.3 (8.5)
Month fixed effects	yes	yes	yes	yes
Number of observations	6177	6565	3680	16422

Notes. ***, ** and * denote significance levels 0.1%, 1% and 5% respectively. Including firm fixed effects does not change the qualitative result of DID estimation.

⁷Especially in January 2012 average VAT seems to be somewhat higher in the control group than in the treatment group, but this difference is not statistically significant. The difference estimate when comparing the averages in January 2012 is -51.4€ with a p-value of 0.6. The difference-in-differences (DID) estimate when comparing the treatment and control groups in December 2011 and January 2012 is -80.7€ with a p-value of 0.4.

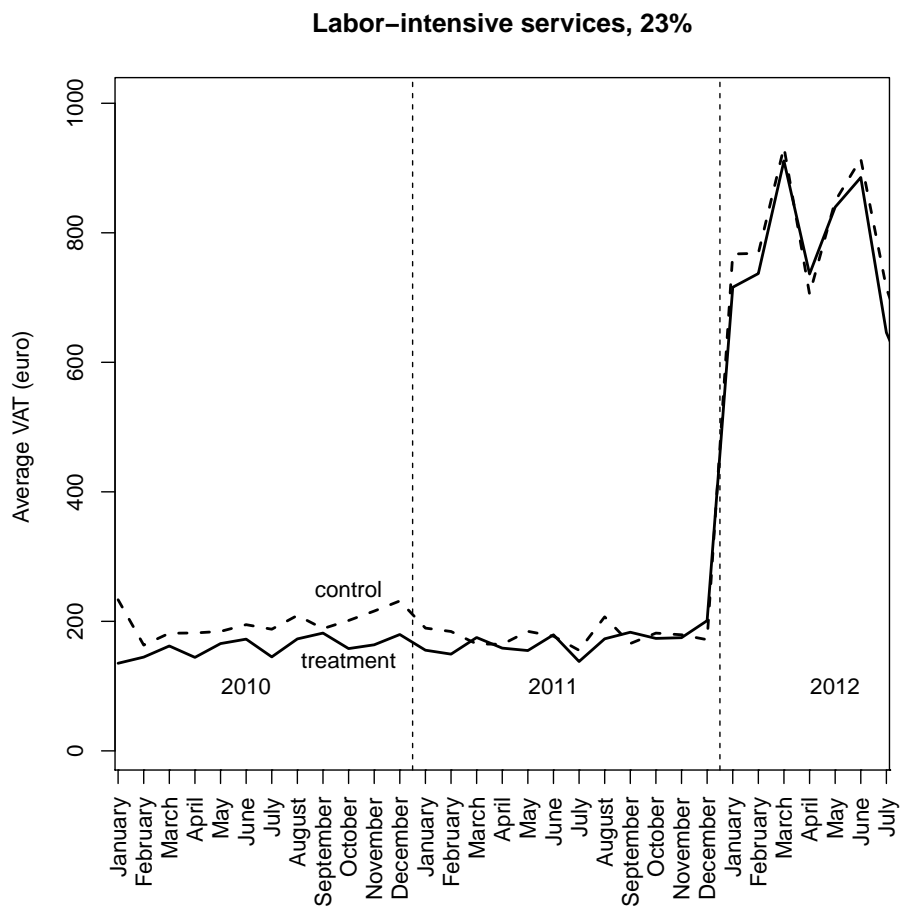


Figure 9: Average VAT at 23% rate for the treatment (solid line) and control (dashed line) groups

Table 4: Difference and Difference-in-Differences Estimates

Dependent variable: VAT at 23% reduced rate				
Independent variables	2010	2011	2012	2010 - 2012
Firm is in treatment group	-36.3**	-6.7	-25.2	60.9***
(1 = yes, 0 = no)	(11.4)	(10.6)	(25.3)	(9.2)
Year 2012				504.1***
(1 = yes, 0 = no)				(36.0)
Treatment group and year 2012 (DID estimate)				-21.7
(1 = yes, 0 = no)				(19.3)
Month fixed effects	yes	yes	yes	yes
Number of observations	6177	6565	3680	16422

Notes. ***, ** and * denote significance levels 0.1%, 1% and 5% respectively. Including firm fixed effects does not change the qualitative result of the DID estimation.

5.2 Construction industry

This section studies the effects of the information treatment on the reporting behavior related to the reversed VAT obligation in the construction industry. Figure 10 plots the average turnover with reversed VAT responsibility for both the treatment and control groups. The figure shows the effect of initiating the reversed reporting system in April 2011 as a rapid increase in reporting within the reversed system. The data for reversed VAT reporting is quite messy and there are substantial changes in the series over time. There appears to be a difference between the groups at the time of the experiment in January and February 2012. However, Table 5, reporting the estimation results, shows that this difference is not statistically significant and is therefore likely to be just noise. After that there are no clear differences.

It is worth noting that due to the magnitude of standard errors⁸, the average effects should be half of the original reporting in order for us to detect any treatment effect. An increase in reporting by 50% would be a radical change and that is something our relatively gentle treatment is not capable of providing. We find no evidence of a strong effect but cannot rule

⁸There is lot of variation in the underlying distributions. For example, in January 2012 there are 590 observations, 436 (74%) of which are zeros and the two largest observations are about 130000€ and 42000€.

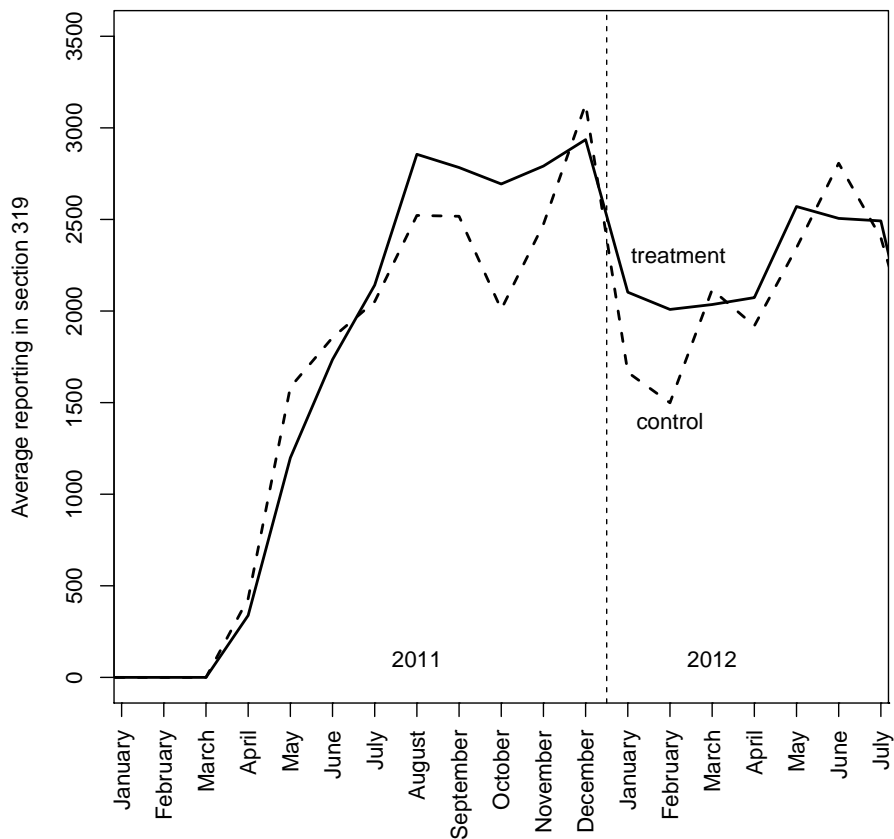


Figure 10: Average turnover with reversed VAT responsibility

out small effects either.

We tried to make the standard errors smaller by including costs, deductions and wages of a firm as control variables. The standard errors of difference and DID estimates did not change much and the reduction was at most only about five percent in tables 5 and 6. In some cases standard errors even increased. None of the difference and DID estimates becomes statistically significant due to inclusion of the control variables.

In Figure 11 we plot the average VAT tax reporting at the regular VAT rate for the treatment (solid line) and the control group (dashed line). The potential treatment effect should show up in early 2012. The average for the

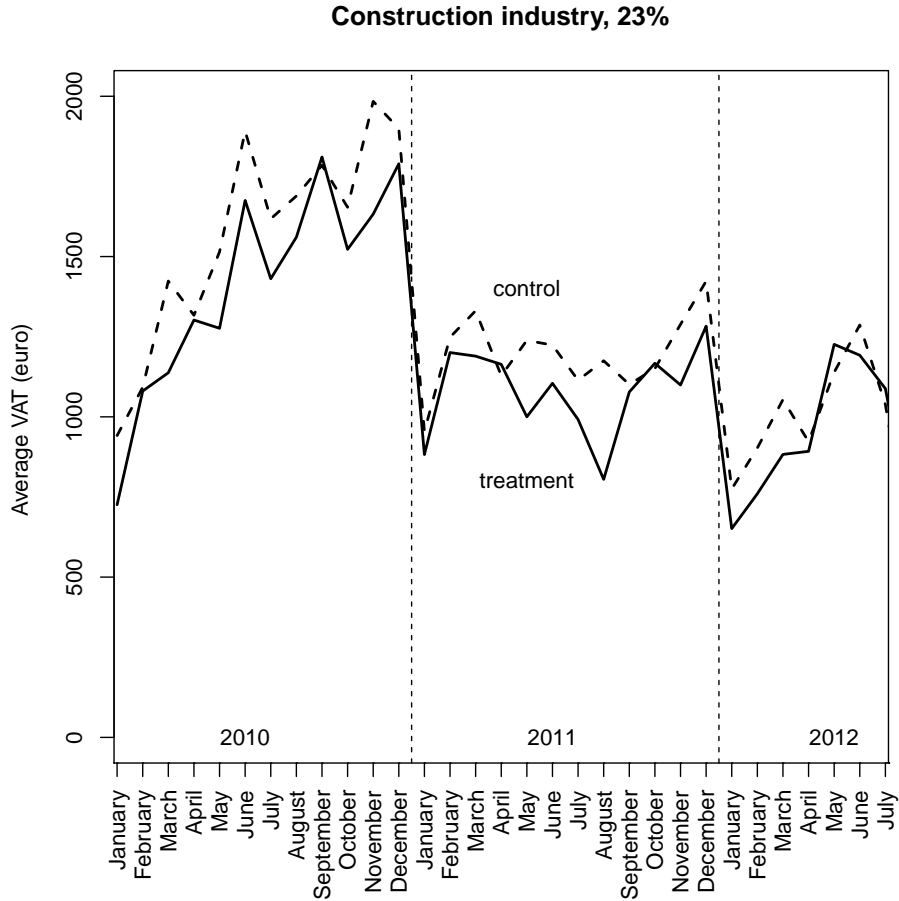


Figure 11: Average VAT at regular VAT rate

treatment group is smaller than that for the control group, but the difference is not statistically significant (see Table 6). In addition, the treatment group has lower reports already prior to the experiment. Therefore, the DID estimates in Table 6 are essentially zero. The power calculation indicates that in order for us to detect an effect, there should have been a change of about a third in the treatment group.

Let us next study something that might be less volatile than average VAT, namely the fractions of firms reporting under different sections (319 and 301). Figure 12 shows the fraction of firms with non-zero reporting in section 319. After April 2011 the evolution of the fractions was similar in both groups. In

the beginning of 2012, at the time when our treatment should show up, the fractions hardly differ at all. The regression results also confirm that there is no sign of our treatment in reporting with the reversed VAT obligation.⁹

Figure 13 shows the fraction of firms with non-zero reporting at the regular VAT rate (section 301). Although the fraction is lower for the treatment group than for the control group in January and February 2012, the difference is not statistically significant. Nor are the DID estimates in the regressions corresponding to those in tables 5 and 6. Thus there is no evidence of the treatment effect here.

There are multiple possible explanations for the messy results. First, this particular tax code might be too difficult for firms to understand. The tax code is indeed very complex and full of exceptions. Second, it is possible that the firms already knew the information provided, because the reversed VAT obligation had already been in place for more than half a year when our experiment took place. Third, the way we provided the information in the letters might not have been strong enough to allow the respondent to absorb the information. Fourth, it is possible that the firms were simply reluctant to change their behavior despite the new information.

Our results would have been confounded if the experiment had induced the firms in the control group to find out about the tax rules by themselves. To control for this possibility we compare the reporting of control group firms with those firms to which we did not send a letter. The comparisons between the control group firms and those which were not contacted show no differences. Therefore the contact did not affect tax reporting behavior in the control group.

Even if our treatments had succeeded in terms of information provision, the zero average effects might still have shown up as a result of two simultaneous effects: some firms may have shifted reporting from the reversed VAT to regular VAT or *vice versa*. We studied the distributions of the reports, but did not find any sign of changes in the shape of the distributions indicating such behavior. Therefore, our result for the construction industry cannot be

⁹The difference and DID estimates corresponding to those in tables 5 and 6 do not differ statistically significantly from zero.

Table 6: Difference and Difference-in-Differences Estimates
 Dependent variable: reporting at the regular VAT rate (section 301)

Independent variables	1/2012	1/2012 - 2/2012	11/2011 vs 1/2012	10/2011-2/2012	10/2011-2/2012
Firm has been provided with information (1 = yes, 0 = no)	-124 (126)	-133 (97)	-189 (178)	-84 (136)	902 (1386)
After the tax rate change (i.e. in 2012)			-513 (177)	-379 (136)	-351 (158)
Information and 2012 (DID estimate)			68 (255)	-49 (195)	-54 (185)
(1 = yes, 0 = no)			no	no	yes
Month fixed effects	no	no	no	no	yes
Firm fixed effects	no	no	no	no	yes
Number of observations	590	1180	1209	2442	2442

Notes. ***, ** and * denote significance levels 0.1%, 1% and 5% respectively. The observations for December 2011 were not used in this table, although including them in the control group does not take any of the results even close to statistical significance.

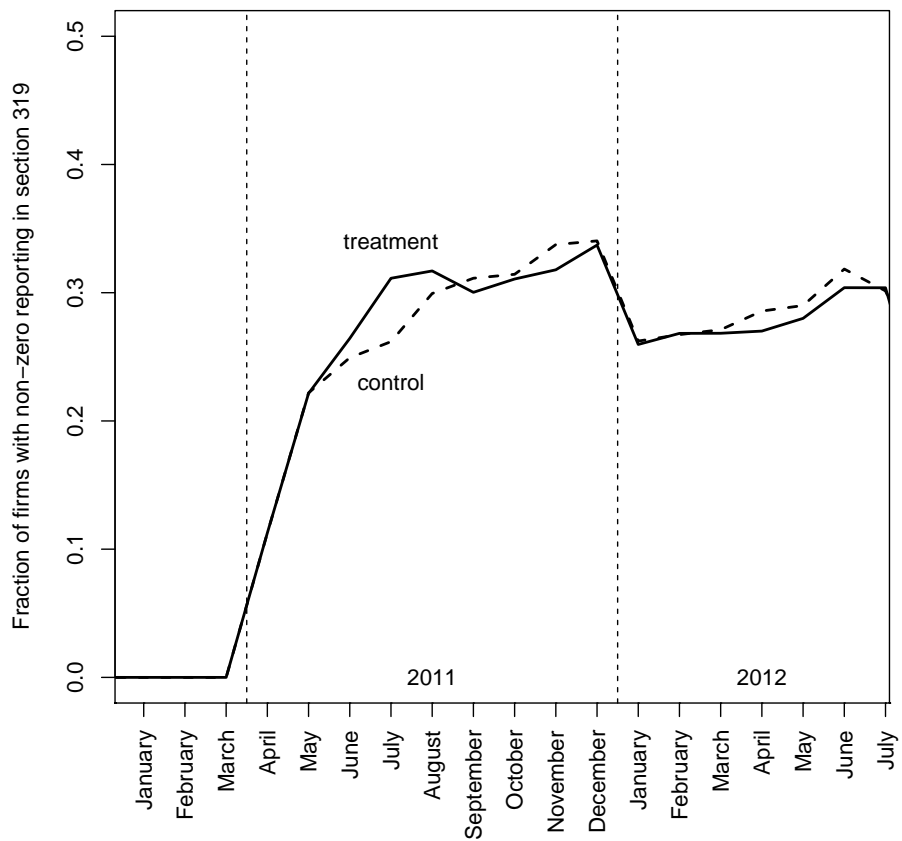


Figure 12: Fraction of firms in the construction industry reporting in section 319

explained by these two opposite reactions canceling each other out.

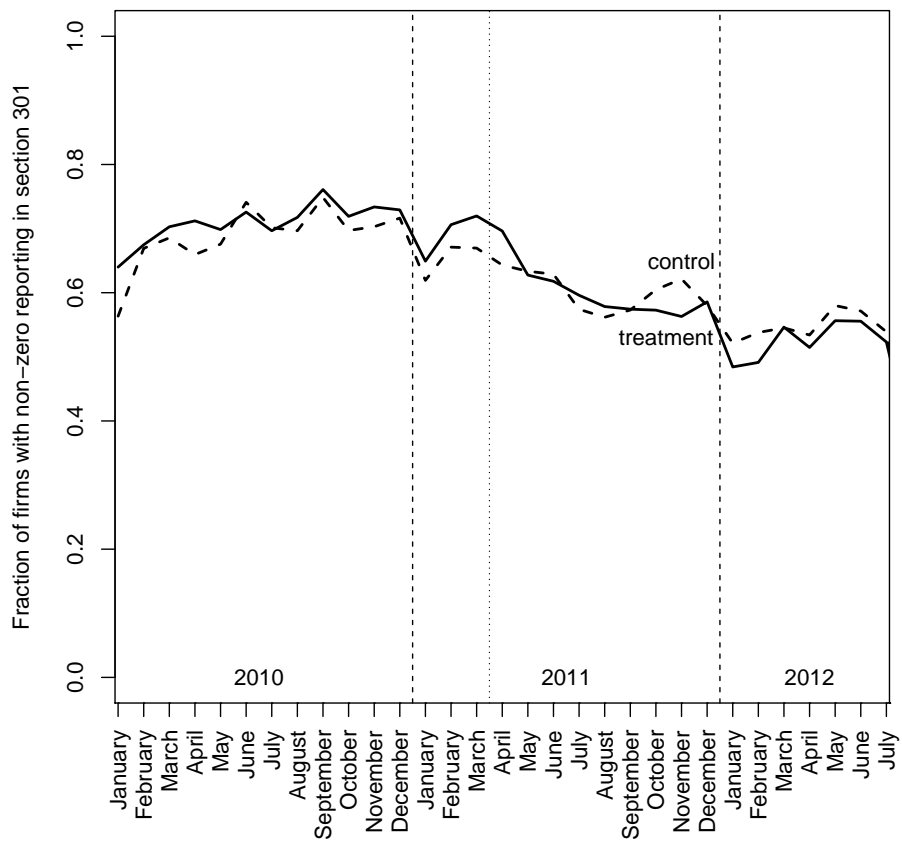


Figure 13: Fraction of firms in the construction industry reporting in section 301

5.3 Restaurant industry

This section concentrates on tax reporting in the restaurant industry. The information treatment is about clarifying which services are subject to which VAT base. The reduced rate has been employed since July 2010.



Figure 14: Average VAT at the reduced rate

Figure 14 shows VAT reports at the 13% and figure 15 at the 23% VAT rate for the restaurant industry in the treatment and control groups from July 2010 to July 2012. A potential treatment effect is that the firms switched from reporting at the general rate to reporting at the reduced rate. The effect should show up in the beginning of 2012. The figures indicate no treatment



Figure 15: Average VAT at the general rate

effect on average VAT reports. The regression results also show no sign of the treatment effect. None of the difference and DID estimates corresponding to those in tables 5 and 6 are statistically significant.

Figure 16 (17) shows the fraction of firms with non-zero reporting at the reduced (general) rate. No statistically significant change takes place in the beginning of 2012 in the treatment group compared to the control group.¹⁰

As a result of our information treatments some firms might have changed

¹⁰Again, none of the difference and DID estimates is statistically significant in the regressions corresponding to tables 5 and 6. Including costs, deductions and wages as control variables for the regressions does not reduce the standard errors of difference and DID estimates much, at most by about ten percent. The reduction does not make any of these estimates statistically significant.

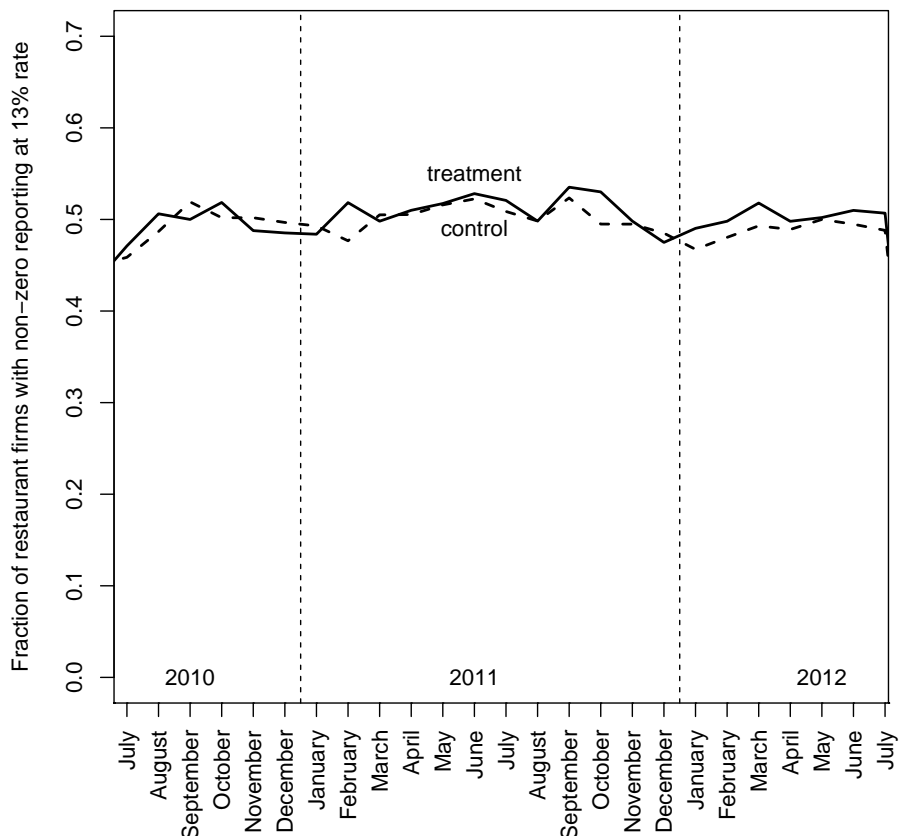


Figure 16: Fraction of firms in the restaurant industry reporting in section 302

from 13% to 23% and others from 23% to 13%. We studied the evolution of the distributions of reports at 13% and 23% to see whether this is the case or not. We do not find any evidence of these two possible simultaneous effects, which might have cancelled each other out.

In summary, we could not find any treatment effect for the restaurant industry. Because the reduced rate had been in place about 18 months before our experiment, it is likely that restaurants have already become acquainted with the relevant tax rules. It is, however, also possible that it is due to our treatment providing the information inadequately or that the tax code itself is too difficult to understand.

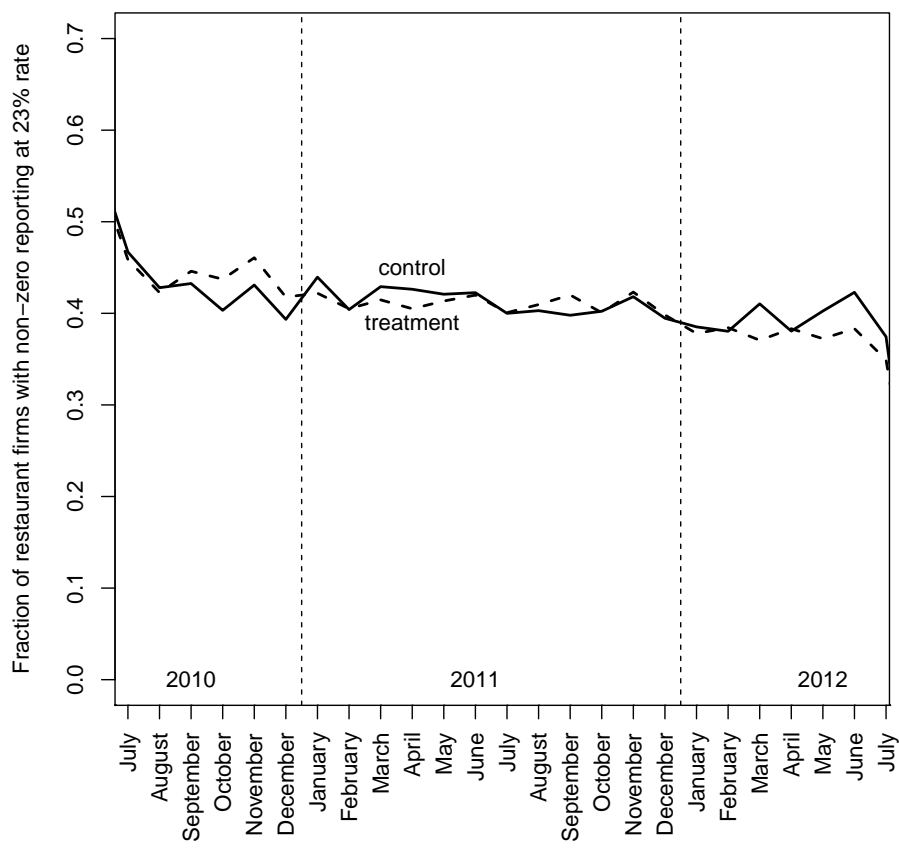


Figure 17: Fraction of firms in the restaurant industry reporting in section 301

6 Conclusions

We conducted a randomized field experiment to study the role of information in firms' tax compliance. The information treatment in the experiment was to candidly provide information about VAT rules to reporting firms. A letter to the firms contained a survey on attitudes towards the Finnish Tax Administration. For a randomly chosen treatment group the letter provided information about the tax code among the questions in the letter. For a randomly chosen control group the letter provided similar questions without this information. In this way the experiment tested the effectiveness of providing information. Both groups were otherwise treated in the same way.

We estimated the treatment effect of informing labor-intensive firms about a VAT reform. The reform removed a reduced VAT rate for certain services. A non-trivial fraction of firms made the mistake of continuing to report at the reduced rate, even after it ceased to exist. Our information treatment induced the firms to make the mistake more than 5 percentage points less often. This more than halved the mistakes compared to the control group. This is a very large behavioral response from relatively gentle information provision.

We looked at other cases where the tax codes either have not changed for a while or are more complex. We provided information about the tax codes that are relevant for the firms which received the information. We did not find any clear effects from these other types of information. The reason for the statistically insignificant results is the very noisy data. There is a lot of heterogeneity in the VAT reports for firms and great variance over time. The treatment effect should be very large for us to observe it.

Despite the noise in the data, our results suggest that firms facing changes in their tax regime are prone to make mistakes in their reporting. Incorrect reports are truly mistakes and not intentional tax noncompliance. Moreover, it seems that a large share of these mistakes would not have occurred if the firms had been better informed about the change in the VAT law. Since it is a relatively low-cost policy to send information letters, the tax authorities may want to consider adopting this policy. Our results support the idea

that right time to inform taxpayers about rules is when there are changes in them. In other periods it seems difficult to obtain clear benefits from targeted information treatments.

Our results are in line with earlier studies which show that the provision of easy information is observed to be effective (Chetty *et al.* 2009 and Card *et al.* 2012). Studies providing more difficult information, especially on the EITC schedule,¹¹ have not found equally strong reactions to information provision (Jones 2010 and Chetty and Saez 2013). Abeler and Jäger (2013) show that in a laboratory subjects underreact to new taxes in a complex environment.

We provide a novel experimental design, where both treatment and control groups are contacted. This allows us to separate the effect of information from that of the contact. The (information) treatment is mediated using a survey. Our design might also be useful in other contexts, where it is important both to separate the treatment effect from that of the contact and for the subjects to be treated without letting them know they are participating in an experiment.

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¹¹McCubbin (2000) cites evidence which suggests that about 50% of EITC-related mistakes might be unintentional. This might be due to the complexity of the EITC-related rules.

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Appendix

The appendix provides additional details related to the survey. It first shows in Figure 18 the form for the Periodic Tax Returns. Tables 7 and 8 show the first and the third set of questions - those about the attitudes towards the tax authority and about background of a firm. An example of the second set of questions is given in Table 9.

Send completed form to:
FINNISH TAX ADMINISTRATION
 PO Box. 5000
 00053 VERO

PERIODIC TAX RETURN **K**
 If making corrections to an earlier filing, please only submit difference amounts instead of full amounts. Do not send any enclosures with the Periodic tax return form.

Taxpayer's name		010 Business ID or personal identity number	
-----------------	--	---	--

VALUE ADDED TAX		EMPLOYERS' CONTRIBUTIONS	
050 Reporting frequency	052 Period in question	050 Reporting frequency	052 Period in question
Month <input type="checkbox"/> Quarterly <input type="checkbox"/> Yearly <input type="checkbox"/>	053 Year	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/>	053 Year
Tax on domestic sales by tax rate		euro	
301 23 % tax	cents	euro	
302 13 % tax	cents	euro	
303 9 % tax	cents	euro	
305 Tax on goods purchased from other EU Member States		euro	
306 Tax on services purchased from other EU Member States		euro	
316 Tax on construction services purchased (reverse charge)		euro	
307 Tax deductible for period in question		euro	
317 Amount of VAT relief		euro	
308 Tax payable / Negative tax that qualifies for refund ()		euro	
309 Sales taxable at zero VAT rate		euro	
311 Sales of goods to other EU Member States		euro	
312 Sales of services to other EU Member States		euro	
313 Purchases of goods from other EU Member States		euro	
314 Purchases of services from other EU Member States		euro	
319 Sales of construction services (reverse charge)		euro	
320 Purchases of construction services (reverse charge)		euro	
No VAT activity		euro	
054 Period - start	055 Year	056 Period - end	057 Year

K

Date	Signature and printed name	042 Telephone
------	----------------------------	---------------



VEROH-4001e1, 1.2012

K

Send completed form to:
FINNISH TAX ADMINISTRATION
 PO Box. 5000
 00053 VERO

PERIODIC TAX RETURN (page 2)
 If making corrections to an earlier filing, please only submit difference amounts instead of full amounts. Do not send any enclosures with the Periodic tax return form.

Taxpayer's name		010 Business ID or personal identity number	
-----------------	--	---	--

TAX RETURN FOR OTHER UN-PROMPTED TAXES

Please enter type of tax (code numbers from list below), reporting frequency, taxable period in question, year, and amount of tax payable.

- 10 Lottery tax
- 16 Tax on insurance premiums
- 24 Amount withheld from purchase price for timber
- 25 Amount withheld from payment to limited company, cooperative or other corporation
- 68 Amount withheld from interest paid out
- 92 Amount withheld from dividend paid out
- 39 Tax at source withheld from dividend (paid out to nonresidents)
- 69 Tax at source withheld from interest and royalties (paid out to nonresidents)
- 84 Tax at source withheld from interest income (of residents)

060 Tax type code	060 Reporting frequency	062 Period in question	063 Year	061 Amount of tax payable
	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/>			euro
	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/>			cents
	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/>			
	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/>			
	Monthly <input type="checkbox"/> Quarterly <input type="checkbox"/>			

M

For taxpayers of tax on insurance premiums (vakuutusmaksuvero):

No-activity period of business subject to insurance-premium tax	
054 Period - start	055 Year

Date	Signature and printed name	042 Telephone
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VEROH-4001e2, 1.2012

M

Figure 18: Periodic Tax Returns

Table 7: Questions related to attitudes towards the tax authority (A1-A6)

For the following questions, please circle the opinion, which is closest to your own.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
1	2	3	4	5

- A1. Dealing with the tax authorities is easy.
 - A2. I have searched for tax-related instructions during the last month.
 - A3. Clearer instructions would induce more accurate reporting of periodic tax re-
turns.
 - A4. Examples related to tax reporting have helped me in reporting my taxes.
 - A5. The use of electronic tax reporting has helped me in reporting my taxes.
 - A6. In the periodic tax return I find the following particularly difficult:
-

Note: Translated from Finnish by the authors.

Table 8: Background questions (B1-B6)

B1. Do you yourself take care of tax reporting?	yes 1	no, some other person in our firm takes care of it 2	no, an accounting company takes care of it 3	it is taken care of in some different way 4
B2. Are you an entrepreneur?	yes 1	no 2		
B3. Have you been an entrepreneur before?	yes 1	no 2		
B4. For how long have you been an entrepreneur?		_____ years		
B5. For how long have you been working in your current firm?		_____ years		
B6. Sex		male 1	female 2	

Note: Translated from Finnish by the authors.

Table 9: Question A8 for labor-intensive services

A8. The VAT test period for labor-intensive services ended on December 31, 2011.

Until December 31, 2011 the value added tax on labor-intensive services was 9% and after that 23%. This change will not affect deductions made from purchases. [...] The following question is designed to estimate the number of firms affected by the VAT rate change.

43

Will the number of the tax rates in your firm change from the present number?

yes	no	don't know
1	2	3

Note: Translated from Finnish by the authors.



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