Extrinsic and Intrinsic Motivations for Tax Compliance: Evidence from a Field Experiment in Germany

Nadja Dwenger, Henrik Kleven, Imran Rasul, Johannes Rincke*

October 2014

Abstract

We study extrinsic and intrinsic motivations for tax compliance in the context of a local church tax in Germany. The tax system encourages overpayments (donations), and it has historically relied on zero deterrence so that any compliance is intrinsically motivated. We exploit administrative data to identify intrinsically motivated types (compliers/donors under zero deterrence) and extrinsically motivated types (evaders under zero deterrence). In this zero deterrence baseline, we implement a field experiment that introduces incentives for compliance through either deterrence or rewards/recognition. Using these treatments combined with our ability to measure baseline motivation types, we provide evidence on the relative importance of, and interaction between, extrinsic and intrinsic compliance motives. We find that intrinsically motivated compliance is substantial, that a significant fraction of it may be driven by duty-to-comply preferences, and that there is no crowd-out between extrinsic and intrinsic motives. To interpret our findings, we develop a tax compliance theory that unifies the standard deterrence model with a warm-glow model of public goods donations.

JEL Codes: C93, D03, H26.

*Dwenger: MPI for Tax Law and Public Finance (nadja.dwenger@tax.mpg.de); Kleven: LSE (h.j.kleven@lse.ac.uk); Rasul: UCL (i.rasul@ucl.ac.uk); Rincke: Erlangen-Nuremberg (johannes.rincke@fau.de).

We thank Alan Auerbach, Loukas Balafoutas, Oriana Bandiera, Raj Chetty, Michael Devereux, Denvil Duncan, Larry Katz, Judd Kessler, R.Vijay Krishna, Steve Levitt, Brian McManus, Paul Niehaus, Kathleen Nosal, Ricardo Perez-Truglia, Michael K.Price, Emmanuel Saez, Jonathan Shaw, Monica Singhal, Joel Slemrod, Sarah Smith, Christian Traxler, Shlomo Yitzhaki and numerous seminar participants for useful comments. We are grateful for financial support from the Schoeller Foundation. All errors are our own.
1 Introduction

Is tax compliance driven only by extrinsic motivations related to deterrence and tax policy, or is there also a role for intrinsic motivations such as morals, norms and duty? The economic theory of tax compliance building on Becker (1968) and Allingham and Sandmo (1972) focuses only on the former and predicts low compliance under low audit probabilities or penalties. This prediction stands in sharp contrast to the empirical observation that tax compliance is high in modern tax systems despite very low audit probabilities and modest penalties. The literature has proposed three ways of resolving this so-called compliance puzzle (e.g. Sandmo 2005, Slemrod 2007).

First, modern tax systems make widespread use of third-party information from firms and the financial sector, which creates a divergence between observed audit rates and actual detection probabilities conditional on evading (Kleven et al. 2009, Kleven et al. 2011). Hence, the notion that deterrence is weak is to some extent an illusion. Second, theory assumes that taxpayers have perfect knowledge of deterrence parameters, but in practice there may be misperception. Survey evidence suggests individuals tend to overestimate audit probabilities and penalties associated with tax evasion (Scholz and Pinney 1995, Chetty 2009). Third, individuals may comply due to a wide range of non-pecuniary motivations including moral sentiments, guilt, reciprocity, and social norms (Andreoni et al. 1998, Luttmer and Singhal 2014). We label all such motivations under the umbrella term intrinsic motivations. The importance of such intrinsic motivations for compliance is the hardest to measure and study empirically, and therefore the least well understood.

We consider a context and natural field experiment that are ideally suited to provide novel and substantive insights on the second and third explanations for the compliance puzzle. In our setting third-party information reporting is not implemented, and our field experiment is designed to reveal extrinsic and intrinsic motivations to comply through the provision of two forms of incentive: (i) the injection of positive deterrence; (ii) the provision of compliance rewards/ recognition.

Our empirical setting is the local church tax in a metropolitan region of Bavaria, Germany. This is a legally binding tax that is levied on church members, namely those baptized into the church. Three features of this setting allow us to provide novel insights into motives for tax compliance. First, the setting combines taxation with charitable giving: the church tax is compulsory and non-compliance represents a violation of tax law, but the church highlights the good cause and encourages overpayments that are defined as donations. Hence, tax evaders and donors can coexist in this system. Second, the true tax base relevant for the church is defined as reported taxable income to the government, which we can perfectly observe for each individual by linking church tax records to administrative income tax records. This allows us to compare actual church taxes paid with true taxes owed for each individual, and thus precisely distinguish between evaders,
compliers, and donors. This overcomes a key limitation of previous tax evasion studies, namely that the outcome of interest is not observed (Slemrod and Weber 2012). Third, even though the church has the legal right to cross-check filed taxes against income tax returns (which would detect evasion with certainty), they have not previously exercised this right. In other words, prior to our field experiment there is zero deterrence in the system. Together with the previous point, this implies that we can observe compliance in a baseline with zero deterrence, providing a direct measure of intrinsically motivated tax compliance.\footnote{This measure could also be affected by misperception about deterrence. We parse out any potential misperception using a treatment specifically designed to do so.}

To motivate the design of our field experiment and interpret our findings, we develop a conceptual framework that unifies the standard compliance model (Allingham and Sandmo 1972) with the warm-glow model of public goods contributions (Andreoni 1989, 1990). The framework incorporates heterogeneity in intrinsic motivation to allow for the coexistence of evaders, compliers and donors as in our empirical setting. We use this to characterize the heterogeneous impacts of compliance incentives on evader and donor types. Our empirical analysis therefore distinguishes throughout between the treatment responses of extrinsically motivated individuals (those who evade in the zero deterrence baseline) and the responses of intrinsically motivated individuals (those who comply or donate in the zero deterrence baseline). Our empirical measure of these motivational types is particularly compelling, because our linked panel data from administrative tax records and church records allows us to identify each individual’s type using their observed pre-treatment compliance behavior.

Our natural field experiment is implemented with the Protestant church. We vary the compliance incentives that individuals face by manipulating the official tax notification sent to collect the local church tax: 40,000 individuals participated in the experiment and were randomly assigned to a control group or to one of 12 treatments. These treatments varied along three key dimensions. The first set of treatments simplify the payment of the tax, and correct any misperceptions individuals may have on audit probabilities. The second set of treatments vary the deterrence parameters individuals face. We do this through the announcement of strictly positive audit probabilities, including both fixed probabilities on all taxpayers and notched probabilities that depend on the tax payment. The third set of treatments offer compliance rewards in the form of social recognition (as is common in charitable giving), entry into monetary prize draws, or a combination of the two. The conceptual framework clarifies how the different types of incentives may reveal the existence of extrinsic and intrinsic motivations: deterrence incentives directly leverage against taxpayers being extrinsically motivated, and might also induce responses among the intrinsically motivated if there are cross-effects between the two types of motivation; compliance rewards have
an expected value close to zero (given all compliers are offered the chance to receive the reward), yet individuals can still respond to the offer of rewards if they shift perceptions about the tax institution. Through this channel such compliance rewards shed light on intrinsic motivations to comply with an otherwise legally binding tax obligation.

Our main empirical findings are as follows. First, a significant fraction of individuals comply in the zero deterrence baseline where compliance should be zero absent intrinsic motivations. Around 20% of individuals pay at least the true taxes owed, implying that intrinsic motivation is substantial. On the other hand, the remaining 80% of individuals evade taxes and most of them fully evade, and so the vast majority behave as extrinsically motivated taxpayers consistent with the Becker-Allingham-Sandmo framework. Previous studies have not been able to directly test the economic model of tax evasion in this manner both because effective deterrence is typically difficult to measure (making the compliance prediction unclear) and because actual compliance is typically not well observed.

Second, there is sharp bunching at exact compliance in the zero deterrence baseline. As there is no extrinsic incentive to locate at exact compliance under zero deterrence, such excess bunching requires either a discontinuity in intrinsic motivation at the point of exact compliance, naturally labelled as a ‘duty to comply’, or the presence of attention or focal point effects of exact compliance. While it is in general difficult to distinguish between these explanations, we exploit our simplification treatment (which makes the point of exact compliance more salient) to shed light on this. We find that the simplification treatment does not increase bunching at exact compliance, suggesting that bunching may be driven by duty-to-comply preferences. While duty motives have been much discussed in the literature (Scholz and Pinney 1995, Andreoni et al. 1998), we are among the first to provide non-parametric evidence of such effects.

Third, announcing a zero audit probability (the status quo) has only a small impact on compliance, implying that there is very little misperception on average. In fact, less than 5% of baseline compliance can be attributed to misperception of the audit probability, and hence this is not an important confounder in the measurement of baseline intrinsic motivation.

Fourth, tax simplification and deterrence have strong effects on compliance for baseline evaders, but small and mostly insignificant effects for baseline donors. As the enforcement constraint is not binding for baseline donors, introducing deterrence does not directly alter their extrinsic incentives to comply, and hence they should only respond to this treatment if there is crowd-out or crowd-in between extrinsic and intrinsic motivations. Our findings are therefore consistent with the absence of cross-effects between the two types of motivation.

Finally, the provision of compliance rewards has fundamentally different impacts on baseline
donors (who increase their donations) and baseline evaders (who increase their evasion). That
is, whether recognition for compliance raises or reduces tax payments hinges on what motivates
taxpayers in the first place, with positive effects on the intrinsically motivated and negative effects
on the extrinsically motivated. These qualitative patterns arise irrespective of the exact form of
the compliance reward, be it in terms of social recognition, entry into monetary prize draws, or
their combination. This suggests that the behavioral effects are driven by what such compliance
rewards signal about the tax institution rather than by the social/private nature of the reward. A
natural interpretation is that rewarding taxpayers for contributing to the public good (rather than
punishing them for not paying their taxes) signals the voluntary aspect of a poorly enforced tax
system (and so positively affects the warm glow of donor types) and at the same time downplays
the mandatory aspect of a legally binding tax system (and so may affect evader types negatively).

This paper contributes to the vast literature on tax compliance (surveyed by Andreoni et al. 1998, Slemrod and Yitzhaki 2002, Slemrod and Weber 2012), and it advances an emerging
literature using field experiments to study compliance behavior (Blumenthal et al. 2001, Slemrod et
2014). Despite the large amount of work on compliance, there is very little field evidence on the
relative importance of, and interaction between, extrinsic and intrinsic motivations to comply with
taxes (see Luttmer and Singhal 2014 for a discussion). We make headway on this question by taking
advantage of novel aspects of our data and setting, including the fact that the tax system studied
has relied on zero deterrence so that observed baseline compliance must be intrinsically motivated.
It is much harder to uncover intrinsically motivated compliance when studying standard personal
income taxes in which compliance depends in complicated and unobserved ways on a multitude of
extrinsic factors such as third-party information reporting, withholding, audit selection strategies,
etc., and where misperception about deterrence is likely to be important. On the other hand, the
novel aspects of our setting raise potential issues of external validity that we discuss in the paper.

The paper is organized as follows. Section 2 describes the key features of our setting, section 3
develops our conceptual framework, section 4 describes the experimental design and data, section
5 presents our empirical results, and section 6 concludes. The appendix presents additional data
description and empirical analysis.

2 Institutional Background

The payment of church taxes is a legal obligation for all members of the Catholic and Protestant
churches in Germany. Church taxes are well established, having evolved during the 19th century
and been codified in the Weimar Constitution of 1919. The institution is also widespread: a similar system of church taxes exists in Austria, Denmark, Finland, Iceland and Sweden.

In Germany two tiers of church taxes exist: at the federal state and the church district levels. The state church tax is collected by state tax authorities, corresponds to around 9% of income tax liabilities, and raises billions of euros annually for both the Protestant and Catholic churches. The local church tax is collected by decentralized church authorities and is much smaller in size. The focus of our study is the local church tax collected by the Protestant church in a major metropolitan area in Bavaria, covering 68 parishes that collectively comprise a Church District.\(^2\)

By default, individuals baptized as Protestants (typically at birth) are church members and therefore liable to pay the local church tax once they turn 18. The vast majority of baptized individuals do not attend church as an adult: between 8% and 8.8% of eligible church members regularly attend church services in our sample parishes. Hence our study is not based on an especially religious sample; rather it accurately reflects the population of taxpayers as a whole. We later provide evidence on the similarity of observables between our sample and either non-church members or all tax filers in the metropolitan area we study.\(^3\)

The major revenue source for parishes is a redistribution of the state church tax. The local church tax contributes only around 9% of total revenues per member. However, this is an under-exploited revenue source because the baseline scenario for the local church tax is one of weak enforcement and limited compliance. As we document below, baseline compliance with the church tax is only around 20%. Assuming full compliance and no offsetting changes in other revenue streams, parishes could obtain as much as 33% of their revenues from the local tax. Finally, on the use of funds, revenues raised within a given parish mostly remain in that parish, and so tax payments can be thought of as contributing directly to the local public good of church services.

We now describe three institutional features that are central to our study.

1. **Tax base and tax schedule:** the local church tax is a progressive income tax as shown in Figure A1. The schedule is a step function with an exemption level of €8,005 in annual income followed by six tax brackets in which the tax liability varies from €5 in the lowest bracket to €100 in the highest bracket. The tax base is a broad income measure (wages, business income, capital income, pensions, etc.) with no deductions. Importantly, the income components included in the church tax base are also taxable under the personal income tax and must be reported separately to state tax authorities. By defining the true taxable income for the church tax as reported taxable income for the personal income tax, the Church District is essentially leveraging on the far larger

\(^2\)The local church tax also exists in the states of Saxony, Lower Saxony, and Rhineland-Palatinate.

\(^3\)Moreover, we additionally note the finding of Kleven et al. (2011) that Danish church members are not more compliant than non-church members once one conditions on deterrence (third-party information) variables.
administrative capacity of the state tax authority. Reported taxable income might of course be subject to misreporting due to personal income tax evasion, but it is still defined as true income for the church tax. Given the small magnitude of church tax liabilities compared to personal income tax liabilities, it is extremely unlikely that reported taxable income for the personal income tax is misreported due to a desire to evade the local church tax.

2. **Tax collection and enforcement:** the Church District mails a tax notification (shown in the Appendix) to all resident church members in May of each year in order to collect the local church tax. A bank transfer form pre-filled with the church’s bank account information and the individual’s local church tax number is attached to the notice. The mail-out asks church members to self-assess their income and taxes owed according to the tax schedule, and to transfer the appropriate amount to the church’s bank account by September. Although the church has the legal right to cross-check self-assessed income against information from personal income tax returns held by the state tax authorities (which would detect church tax evasion with certainty), they have never exercised this right in the past. In other words, prior to the treatments implemented in our field experiment, there was zero deterrence in this tax system. We use this feature to pin down the share of taxpayers whose behavior is driven by some form of intrinsic motivation.4

3. **Mandatory taxes and voluntary donations:** in this setting it is possible for individuals to overpay their tax liability. Unlike conventional taxes, overpayments are encouraged and not refunded to individuals. As funds raised mostly remain within the parish, we can think of such overpayments as charitable donations to the local public good of parish services. This feature allows for the coexistence of tax evaders (who pay less than their legal obligation) and donors (who pay more than their legal obligation). We identify whether an individual is extrinsically or intrinsically motivated based on her actual past compliance behavior in the baseline setting.5

While we exploit these specific features to obtain novel insights, there is of course a potential trade-off with external validity: the features that make this setting well-suited to studying motives for tax compliance are also features that distinguish our setting from other tax systems. Three potential threats to external validity are worth discussing. First, if the local church tax funds a

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4 Individuals who do not pay their taxes before the September deadline receive a reminder in October, requesting the transfer of the appropriate amount by the end of the calendar year. There is no need to file a tax declaration when paying the local church tax. Hence there is no direct inter-linkage between the local church tax and filing for other taxes. This reinforces the zero deterrence at baseline characteristic of our setting.

5 Besides encouraging overpayments (donations), the social pressures to comply with church taxes are not very different from those related to standard personal income taxes: whether an individual makes a payment to the local church tax remains private information, and individual or aggregate information on compliance is not communicated within or across parishes. Finally, we note that the democratic participation of church members is largely limited to the election of members to local parish boards. Church members have little say in the tax collection practices of the Church District, which are subject to top-down oversight from the District Synod. Parishes with lower levels of compliance are not able to endogenously respond by improving tax collection methods.
specific service that taxpayers value more than the public expenditures funded by other taxes, this
could raise intrinsic motivations to comply relative to other contexts. To address this point, we
note that our baseline estimates do not differ much across church parishes that have high and low
levels of participation in religious services. Hence average behavior appears uncorrelated to the
extent to which public services are provided/utilized. Moreover, to reiterate, participation rates
in church activities are uniformly low and the vast majority are not regular churchgoers as adults.

Second, the fact the local church tax relies on zero enforcement may signal to taxpayers that,
even though the tax is a legal obligation, church authorities do not consider it an important
civic obligation. If so, this would undermine intrinsic motivation and imply that our finding of
substantial intrinsically motivated compliance is downwards biased relative to other tax settings.

Third, contrary to other tax systems, in our context it is possible that individuals contribute
through direct donations to the church instead of via the church tax system. This would lead us
to underestimate intrinsic motivation in the baseline (as some tax evaders could be contributing
directly) and potentially overestimate the effect of incentives on revenues (as some of the effect
could reflect substitution between direct contributions and tax payments). However, when we
investigate this using data on the revenue sources of the parishes in our sample, we find that
these potential biases are unlikely to be important in practice: (i) private individual donations to
the church parish outside of the church tax system contribute less than 4% of total revenues per
member; (ii) at the parish level, there is little correlation between changes in private donations
between 2011 and 2012 (the year of the field experiment) and any reasonable estimate of aggregate
changes in tax revenues caused by our treatments.

3 A Warm-Glow Theory of Tax Compliance

We develop a theory of tax compliance that unifies the standard model (Becker 1968, Allingham
Our framework embodies both extrinsic motivations (through deterrence) and intrinsic motivations
(through warm-glow). Amending the standard framework in this way provides a simple reduced-
form way in which to conceptually introduce the range of motivations for tax compliance that we
have labelled under the umbrella term of intrinsic motivations.

We consider taxpayers with true income \( \bar{\epsilon} \) facing a tax schedule \( T (\bar{\epsilon}) \) under truthful reporting.
They decide on reported income \( z \) and tax payment \( T (z) \) facing a probability of audit and penalty
for evasion. Denoting consumption by \( c \), utility is given by \( u (c, T (z), s) \) where the inclusion of
taxes paid \( T (z) \) as an explicit argument captures the warm glow of giving, or intrinsic motivation,
and $s$ is a preference parameter capturing the strength of such intrinsic motivation. We assume that the marginal rate of substitution between intrinsic and extrinsic (consumption) benefits $u_T'/u_c'$ is increasing in $s$ and equal to zero for $s = 0$. We allow for heterogeneity in intrinsic motivation, captured by a cdf $F(s)$. In this framework, the Allingham-Sandmo model corresponds to the special case in which all individuals have $s = 0$.\(^6\)

Agents choose reported income $z$ to maximize expected utility, which can be written as

$$
(1 - p) \cdot u(\bar{z} - T(z) - T(z), s) + p \cdot u(\bar{z} - T(z) - I\{z \leq \bar{z}\} [1 + \theta] [T(\bar{z}) - T(z)], T(z), s),
$$

where $p$ is the audit probability, $\theta$ is the penalty rate on tax evasion, and $I\{z \leq \bar{z}\}$ is an indicator for not overpaying taxes. We use the terms *evaders* for those who underpay ($z < \bar{z}$), *compliers* for those who pay exactly the right amount ($z = \bar{z}$), and *donors* for those who overpay ($z > \bar{z}$).

As described above, evaders and donors can coexist in our empirical tax setting. Conditional on audit, evaders have to pay the unpaid tax topped up by the penalty rate $\theta$, whereas donors are not reimbursed for the excess tax nor rewarded at rate $\theta$. This is consistent with our empirical setting where overpayments are encouraged and defined as donations.\(^7\) As described below, the asymmetric treatment of evaders and donors creates a *kink* in the consumption possibility set at the point of exactly truthful reporting $z = \bar{z}$, and so there will be excess bunching at exact compliance. Such bunching represents a compliance response to the penalty rate $1 + \theta$.

Finally, note that (1) specifies warm glow in terms of the *voluntary* tax payment $T(z)$ in both the audited and unaudited states. That is, an evader does not obtain warm glow from being forced to pay additional taxes $T(\bar{z}) - T(z)$ due to an audit. This formulation seems most consistent with the notion of intrinsically motivated tax compliance.

Conditional on an interior solution to the individual’s problem (either being a strict evader $z < \bar{z}$ or a strict donor $z > \bar{z}$), the choice of $z$ is governed by the following condition,

$$
(1 - p) u'_{c_N} + p (1 - I\{z \leq \bar{z}\} [1 + \theta]) u'_{c_A} = E[u'_T],
$$

where $u'_{c_N} \equiv u'_c(c_N, T(z), s)$ and $u'_{c_A} \equiv u'_c(c_A, T(z), s)$ denote marginal utilities of consumption in the non-audited and audited states, respectively, and $E[u'_T] \equiv (1 - p) u'_T(c_N, T(z), s) + p u'_T(c_A, T(z), s)$ is the expected marginal utility of tax payments due to intrinsic motivation.

\(^6\)Allingham and Sandmo (1972) considered a model allowing for social stigma associated with being caught evading taxes. The stigma idea is conceptually different from the warm glow idea we analyze here.

\(^7\)In most tax settings, excess tax payments would be interpreted as mistakes and reimbursed if detected, which would require a modification of the specification above.
This condition highlights the trade-off between the extrinsic (consumption) costs and the intrinsic (warm glow) benefits of increasing tax payments. In the Allingham-Sandmo model of tax evasion (corresponding to \( s = 0 \)), we have \( E[u'_T] = 0 \) and \( I \{ z \leq \bar{z} \} = 1 \) in which case (2) simplifies to the standard condition \( u'_{cT}/u'_c = (1 - p) / (p\theta) \).

In this framework individuals have an element of both extrinsic and intrinsic motivations, and so their behavior can be impacted either through changes in deterrence, or other channels that shift their warm glow from compliance. Individuals differ in the relative strength of their extrinsic and intrinsic motivations, as captured by the heterogeneity parameter \( s \). Our field experiment manipulates deterrence/warm glow from their baseline values to identify the existence and relative importance of extrinsic and intrinsic motivations for tax compliance.

The extensive margin decision of evading, complying or donating is characterized as follows:

**Proposition 1 (Extensive Margin)** Assuming smooth preferences, there exists cutoffs \( \bar{s}_1, \bar{s}_2 \) such that a fraction \( F(\bar{s}_1) \) of the population are evaders \( (z < \bar{z}) \), a fraction \( F(\bar{s}_2) - F(\bar{s}_1) \) are compliers \( (z = \bar{z}) \), and a fraction \( 1 - F(\bar{s}_2) \) are donors \( (z > \bar{z}) \). The cutoffs are given by,

\[
\frac{u'_T (\bar{z} - T(\bar{z}), T(\bar{z}), \bar{s}_1)}{u'_c (\bar{z} - T(\bar{z}), T(\bar{z}), \bar{s}_1)} = 1 - p[1 + \theta] \quad \text{and} \quad \frac{u'_T (\bar{z} - T(\bar{z}), T(\bar{z}), \bar{s}_2)}{u'_c (\bar{z} - T(\bar{z}), T(\bar{z}), \bar{s}_2)} = 1,
\]

(3)

implying \( \bar{s}_1 < \bar{s}_2 \) and therefore excess bunching at \( z = \bar{z} \) for any positive deterrence incentive, \( p[1 + \theta] > 0 \). We have:

(A) **Deterrence**: stronger deterrence (larger \( p \) or \( \theta \)) reduces \( \bar{s}_1 \) and does not affect \( \bar{s}_2 \). Hence, the fraction of evaders is decreasing, the fraction of compliers is increasing, and the fraction of donors is unaffected by deterrence.

(B) **Warm Glow**: stronger warm-glow (larger \( u'_T \) all else equal) reduces both \( \bar{s}_1 \) and \( \bar{s}_2 \). Hence, the fraction of evaders is decreasing, the fraction of compliers is indeterminate, and the fraction of donors is increasing in warm glow.

**Proof**: This follows from (2) and the fact that \( u'_T / u'_c \) is increasing in \( s \). We also use that there is a convex kink at \( z = \bar{z} \) as the marginal deterrence incentive falls discretely from \( p[1 + \theta] \) to 0.

This proposition provides three predictions that we study empirically. First, there will be excess bunching at exact compliance and the amount of bunching is increasing in deterrence as measured by \( p[1 + \theta] \). We can analyze such bunching as our data includes both reported and true income \( (z, \bar{z}) \), enabling us to precisely measure compliance. Second, the fraction of evaders is decreasing in deterrence, whereas the fraction of donors is unaffected by deterrence (as the deterrence constraint is not binding for those individuals). Our field experiment probes this prediction by manipulating...
the audit probability \( p \). Third, the fraction of evaders is decreasing while the fraction of donors is increasing in intrinsic motivation. Our field experiment probes this prediction through the provision of compliance rewards that may shift the warm glow from compliance.

Our empirical setting starts from a baseline of zero deterrence in which the tax authority never audits \((p = 0)\). It is therefore useful to explicitly describe this equilibrium:

**Corollary 1 (Zero Deterrence)** Under \( p = 0 \), we have \( \bar{s}_1 = \bar{s}_2 \) and therefore zero excess bunching at \( z = \bar{z} \), assuming that preferences are smooth. Reported income \( z \) for each agent satisfies \( u'_T / u'_c = 1 \) (evaluated at consumption \( \bar{z} - T(z) \)), and so compliance in this equilibrium is driven solely by intrinsic motivations.

The absence of bunching at \( z = \bar{z} \) under zero deterrence assumes smooth preferences: a continuous utility function \( u(\cdot) \) and a smooth distribution of \( s \). However, individuals might have discontinuous preferences for exact compliance, akin to a duty-to-comply. If so, there would be bunching even under zero deterrence. Given that we precisely measure compliance in a zero deterrence baseline, we will be able to empirically study whether such *intrinsically motivated bunching* exists and so evaluate the importance of duty-to-comply motivations. For future reference, we remark the following:

**Remark 1 (Duty-to-Comply)** Excess bunching at exact compliance \((z = \bar{z})\) under zero deterrence \((p = 0)\) reflects discontinuous intrinsic motivation to exactly comply with the law, which we label a “duty-to-comply”.

Having characterized the extensive margin decision to become an evader, complier or donor, we now turn to the *intensive margin* decision within each group. For this purpose, it is helpful to state the following (natural) assumption on preferences:

**Assumption 1** The MRS between consumption in the audited and non-audited states \( u'_{cA} / u'_{cN} \) and the MRS between warm glow and consumption \( E[u'_T] / u'_{cN} \) are both decreasing in \( T(z) \).

This assumption is consistent with, but stronger than, concavity of the utility function \((u''_{cA}, u''_{TT} < 0)\). That is, while concavity by itself creates the effect in Assumption 1, there could be an offsetting effect under either substitutability \((u''_{cT} < 0)\) or complementarity \((u''_{cT} > 0)\) between extrinsic and intrinsic motivations. For example, while higher tax payments directly reduce \( u'_{cA} / u'_{cN} \) by moving consumption from the non-audited to the audited state, the larger warm-glow benefits will have an indirect effect on \( u'_{cA} / u'_{cN} \) provided that \( u''_{cT} / u'_c \) is different between the two states (which depends
on a third-order derivative of the utility function). Assumption 1 rules out situations where the indirect effect goes against the direct effect and is strong enough to overturn it.\footnote{Formally, for the MRS between consumption in the audited and non-audited states \( u'_{cA}/u'_{cN} \), the effect of \( T(z) \) coming through warm glow (holding consumption \( c_A, c_N \) fixed) is given by \( \frac{\partial}{\partial T} \left[ \frac{u'_{cA}}{u'_{cN}} \right]_{c_A, c_N} = \left( \frac{u''_{cAT}}{u'_{cA}} - \frac{u''_{cNT}}{u'_{cN}} \right) \frac{u'_{cA}}{u'_{cN}} \), where \( u''_{cAT} \equiv u''_{cT}(c_A, T(z), s) \) and \( u''_{cNT} \equiv u''_{cT}(c_N, T(z), s) \). Assumption 1 implies that this effect (which depends on \( u''_{cT(s)} \)) cannot be so strongly positive that it dominates the direct negative effect coming through diminishing marginal returns to consumption.}

With this assumption, we are able to state the following result on the intensive margin:

**Proposition 2 (Intensive Margin)** Under Assumption 1, we have:

(A) **Deterrence:** stronger deterrence (larger \( p \) or \( \theta \)) increases reported income \( z \) for evaders \( (s < \bar{s}_1) \), while it does not affect reported income \( z \) for donors \( (s > \bar{s}_2) \).

(B) **Warm Glow:** stronger warm-glow (larger \( u'_T \), all else equal) increases reported income \( z \) for both evaders and donors \( (s < \bar{s}_1 \text{ and } s > \bar{s}_2 \text{, respectively}) \).

**Proof:** The evader results follow from (2) for \( I \{ z \leq \bar{z} \} = 1 \) and Assumption 1. The donor results follow from (2) for \( I \{ z \leq \bar{z} \} = 0 \) in which case \( u'_{cN} = u'_{cA} = u'_c(\bar{z} - T(z), T(z), s) \) and \( E[u'_T] = u'_T(\bar{z} - T(z), T(z), s) \).\[1\]

The difference in deterrence responses between evaders and donors follows from the fact that enforcement is not a binding constraint for the latter group. We are able to empirically test this prediction directly in our field experiment by comparing responses to a higher audit probability among baseline evaders and baseline donors.

On intrinsic motivations, some of the treatments are designed to affect the warm-glow of giving, \( \Delta u'_T \neq 0 \), such as those that provide social recognition for paying taxes. It is important to note that there is no reason to expect baseline donors and evaders to respond similarly on the intensive margin to such treatments. This is because the exact form of intrinsic motivation may vary across individuals in a way that our reduced-form framework does not explicitly model: for example, donors may have a positive desire to contribute to the public good, while evaders may have a negative desire to avoid guilt or shame due to paying less taxes than they are legally obliged to do. Any specific social recognition treatment may interact in different ways with these underlying desires and therefore shock marginal intrinsic motivation \( u'_T \) in different ways across donors and evaders. We come back to this point when interpreting the heterogeneous responses to compliance rewards across different baseline compliance types.
4 Design, Data and Empirical Method

4.1 The Natural Field Experiment

The Protestant church mails out a tax notification to individuals liable for the local church tax in May of each year. In collaboration with the Church District, our field experiment manipulated the content of notifications sent out in 2012. Mail-out recipients in May 2012 were randomly assigned either to a control group, or one of three groups of treatment. The first group of treatments simplify the details of the tax, and correct any misperception individuals might have on audit probabilities. The second group of treatments manipulate deterrence parameters through the suggestion of strictly positive audit probabilities, and an audit probability notch. The third treatment group offers compliance rewards/recognition.9

The appendix shows the format and content of the mail-out letter for the control group (T1). The same mail-out design had been used in earlier years. This standard notification comprises a cover page (with the remittance slip at the foot of the first page) and an information leaflet about church activities. The standard mail-out clearly states on the front page that, “the local church tax forms part of the general church tax”, and that the “letter serves as a tax certificate”. On the second page it makes precise that the tax is “a compulsory contribution” and explicitly lists the legal foundations for the tax. However, in other regards, the standard mail-out appears poorly designed: important details such as the payment deadline and tax schedule are only mentioned on the second page. We now describe how the mail-out design varied in each treatment group.10

4.1.1 Treatment Group 1: Tax Simplification and Misperception

The tax simplification treatment (T2) makes two changes to the tax notification design, as shown in the Appendix: (i) it is significantly shorter and makes salient the legal obligation to pay; (ii) payment deadlines and the tax schedule are presented on the cover page. All other design aspects remained unchanged relative to the control group, including the payment deadline, the remittance slip provided, the accompanying information leaflet, the description of the legal foundations for the tax, and information on how tax revenues are spent. We might reasonably expect tax simplification to impact baseline evaders because some non-compliance might be driven by them being

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9 Following standard procedures in earlier tax years, a reminder was sent to non-payers in October 2012. The reminder letter is the same for all individuals and hence makes no mention of the original treatment assignment. The reminder sets a final payment deadline of December 31st 2012.

10 Cagala et al. (2014) present evidence from a small-scale survey among a random sample of those liable for the Catholic church tax in Bavaria: almost 90% of those receiving a tax notification confirmed they had read it. Hence, while our analysis focuses throughout on intent-to-treat effects, the corresponding average treatment effects should only be slightly scaled up.
misinformed/inattentive towards the local church tax.

All subsequent treatments then add one paragraph on the cover page of this simplified mail-out (as shown in the appendix). In this context it is well known among taxpayers that enforcement is lax. However, our next treatment corrects for any remaining misperception by making explicit that there is no enforcement of the tax. This misperception treatment (T3) corresponds to informing individuals that \( p = 0 \), which is communicated as follows:

“Please note that, according to Article 9 para. 4 of the Church Levy Collection Act, the Evangelical-Lutheran congregation can delegate the collection of the local church tax to the church tax authority. The church tax authority can officially assess your income. However, the Evangelical-Lutheran congregation does not make use of this option. There is no verification of church members’ own income assessment.”

As it is almost common knowledge that the local church tax is unenforced, we randomly assigned twice as many individuals to this treatment as for any other treatment to ensure we had statistical power to detect any updated beliefs over the audit probability \( p \). The natural comparison is with T2, the tax simplification treatment.

As with the simplification treatment, we might expect responses to this treatment to vary across taxpayer types: some baseline compliers might have been paying the tax because they previously misperceived \( p \) to be far higher. By making explicit \( p = 0 \), the treatment eliminates any extrinsic motivation for compliance. Once it is understood that \( p = 0 \), tax payments can only be driven by some form of intrinsic motivation, and treatment T3 therefore allows us to cleanly estimate the importance of such intrinsically motivated compliance. Moreover, as Remark 1 makes precise, if there is bunching at exact compliance even under a zero expected penalty, this can be explained by a discontinuity in intrinsic motivation at exact compliance: what we label a ‘duty-to-comply’.

4.1.2 Treatment Group 2: Deterrence

The second group of treatments inject deterrence into the tax system, directly revealing extrinsic motivations for tax compliance. We do so by informing mail-out recipients that the audit probability \( p \) is unconditionally set to some strictly positive value, namely (one of) \( p = .1, .2 \) or .5. These \( p \)-treatments are denoted T4, T5 and T6 respectively. This is communicated as follows:

“Please note that, according to Article 9 para. 4 of the Church Levy Collection Act, the Evangelical-Lutheran congregation can delegate the collection of the local church tax to the church tax authority. The church tax authority can officially assess your income. In order to ensure a fair tax collection, we consider it necessary to verify the church members’ own income assessment
for every tenth [fifth, second] church member. In other words, the self-assessment of 10% [20%, 50%] of church members will be verified."

These treatments make clear that the church has the legal right to delegate tax enforcement to the state church tax authorities, to whom a tax filer’s income is known. These \( p \)-treatments were truthfully implemented in that income self-assessment were verified, but in practice no monetary penalty followed if the individual was caught misreporting. Like previous tax enforcement field experiments, we do not observe individual beliefs about penalties. These beliefs are particularly difficult to gauge in our context, because the zero-audit policy of the church implies that taxpayers have never had to face penalties. However, the conceptual framework makes precise that any behavioral response to \( p > 0 \) must be a response to a positive expected penalty, \( p [1 + \theta] > 0 \). If agents believe \( \theta = -1 \), they should not respond to these \( p \)-treatments. We can directly test whether individuals perceive there to be penalties in this setting (so that \( \theta > -1 \)) based on our conceptual insight that the extent of bunching at exact compliance is increasing in \( p [1 + \theta] \). This implies that any increase in bunching at exact compliance as we increase \( p \) must reflect a perceived penalty \( \theta > -1 \).

The natural comparison group for the \( p \)-treatments is the \( p = 0 \) treatment, so that we pin down the precise comparative static impacts of deterrence through \( \Delta p \), all else equal.

A final deterrence treatment introduces an audit probability notch (Treatment T7): individuals face an audit probability of .5 if they pay less than or equal to €10, and face a zero audit probability otherwise, communicated as follows:

“Please note that, according to Article 9 para. 4 of the Church Levy Collection Act, the Evangelical-Lutheran congregation can delegate the collection of the local church tax to the church tax authority. The church tax authority can officially assess your income. While there will be no verification of church members’ own income assessment for payments above €10, there may be a verification of payments at €10 or lower. In order to ensure a fair tax collection, we consider it necessary to verify the church members’ own income assessment for every second church member paying €10 or less. In other words, the self-assessment of 50% of church members paying €10 or less will be verified."

There are two natural comparison groups to this notch treatment: the T3 misperception treatment that sets \( p = 0 \), and the T6 treatment that sets \( p = .5 \) for all payments.

4.1.3 Treatment Group 3: Compliance Rewards

The final group of treatments are designed to reveal motivations for compliance through the provision of rewards/recognition. These treatments differ in the exact form in which the reward
for compliance is provided, but have in common that the expected value of any reward is close to zero. The first offers a potential reward in the form of social recognition (T8), through a small probability of an individual’s timely compliance being publicly announced in a local newspaper, communicated as follows:

“Among all individuals paying a local church tax of at least €5 no later than September 30, 2012, we will randomly draw 100 church members. If you belong to the church members drawn by lot we will contact you and ask you for your consent before publishing your name in a newspaper advertisement. With this advertisement, published in the [names of three local newspapers], we are going to thank the allotted church members by name for funding our work. Funds for financing the advertisement have been kindly found to this end.”

The next two treatments offer entry into monetary prize draws as a reward for complying, a purely private form of recognition that is unannounced to others. There are two randomly assigned reward values (€250, €1000), denoted Treatments T9 and T10, communicated as follows:

“All individuals paying a local church tax of at least €5 no later than September 30, 2012 are going to take part in a lottery. From every 1,000 local church taxpayers one will be drawn to win a prize of €250 [€1,000]. The prize has been kindly funded to this end.”

The final form of reward combines social and private recognition for compliance, so taxpayers have the opportunity to be named in a local newspaper and to be entered in the higher valued prize draw. This treatment is denoted T11 and is communicated as follows:11:

“Among all individuals paying a local church tax of at least €5 no later than September 30, 2012, we will randomly draw 100 church members. If you belong to the church members drawn by lot we will contact you and ask for consent before publishing your name in a newspaper advertisement. With this advertisement, published in the [names of three local newspapers], we are going to thank the allotted church members by name for funding our work. In addition, out of the 100 church members mentioned above, we will randomly draw 15 members who will each win a prize of €1,000. Funds for financing the advertisement and the prizes have been kindly found to this end.”

For all these compliance rewards, the probability of winning the reward is close to zero: for the social recognition treatment this follows from the fact that many individuals pay some church tax and are therefore potentially eligible for the newspaper acknowledgement; for the monetary

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11 Rewards were offered for payments of at least €5 (not the true payment owed) to prevent individuals inferring any change in likelihood of being audited. The winners of all rewards were drawn by lot, before local church officials in December 2012 and immediately notified about their prize. Winners of the social reward had to provide consent for their name to be published. The advertisement thanking church members for their local church tax payment was published in early 2013 (after the final payment deadline of December 31st 2012 to avoid any impact on outstanding payments). Monetary prizes were paid in private in January 2013.
reward treatment the notification makes explicit that the probability of winning is 1/1000. As such, these compliance rewards have essentially no impact on the (expected) extrinsic incentives individuals face to comply, and so they should change compliance only if they impact intrinsic motivation. In particular, individuals may respond to the offer of such rewards if they affect perceptions about the nature of the tax institution. Indeed, a natural interpretation of such treatments is that rewarding taxpayers for contributing to the public good (rather than punishing them for not paying their taxes) signals the voluntary aspect of a poorly enforced tax system, and at the same time downplays the mandatory aspect of a legally binding tax system. If so, compliance rewards may have heterogeneous impacts across baseline types, with donor types being encouraged to respond positively and evader types being more negatively impacted.

Finally, we also implemented treatments to provide information on social norms over compliance, or using moral suasion. The literature has considered very similar treatments (Blumenthal et al. 2001, Fellner et al. 2013) and so we do not focus on them. In the Appendix we discuss fully the weak effects of such cheap talk letters, very much replicating findings in the literature.

4.2 Data Sources

Our analysis exploits linked panel data from two administrative data sources: church district records containing actual church taxes paid by each individual \( T(z) \), and state income tax records containing true church taxes owed \( T(z) \) as implied by reported taxable income to the federal state. Church taxes due in year \( t \) depend on reported taxable income to the federal state in year \( t - 1 \). The church district’s payment records cover 2008-12, which we have linked with the state’s income tax records for 2007-11 using information on names, date of birth, and zip code. The linked sample consists of 39,782 individuals that are included in the field experiment.\(^{12}\)

To investigate issues related to the external validity of our sample, Table A1 presents evidence on the representativeness of our sample relative to other subgroups of tax filers in 2007, the last year for which nationwide personal income tax statistics are available.\(^{13}\) This shows there to be

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\(^{12}\)Our administrative tax records allow us to observe tax compliance behavior across the income distribution. As the lower portion of Figure A1 highlights: 29% of our sample have an income below €24,999 (falling into the first two payment bins), while 13% of the sample has an income above €70,000 and lies in the highest payment bin. There are two restrictions on the data linkage. First, administrative records are available only for those that file a tax declaration. In the area our study is based in, 60% of Protestants file a tax declaration. Second, the tax base for the local church tax is individual taxable income. This raises an issue among joint filers: in the administrative records, individual shares of taxable household income are available only for joint filers who belong to different religious denominations. Hence we exclude married couples in which both spouses are Protestants (thus ameliorating concerns over within household treatment spillovers). Given the advice of the church, we also excluded individuals 75 years or older from the field experiment.

\(^{13}\)In Germany, individuals are obliged to file a tax return if they receive business income or income from self-employment: around 38% of the population files a tax return. Single filers comprise unmarried individuals and
only minor differences in gender, age, children, taxable incomes, and income sources between our sample (Columns 1a, 1b) and: (i) the general population in the same metro area (Columns 2a, 2b); (ii) non-church members in the same metro area (Columns 3a, 3b). These similarities are not altogether surprising: those liable for the church tax are individuals baptized, typically at birth, into the church; as adults, the vast majority of them do not attend church regularly and hence our sample is not much skewed towards overrepresenting religious individuals.

The other sampling concern relates to attrition from our linked panel. Individuals can attrit for multiple reasons: falling below the tax exemption threshold, relocating outside the Church District, not filing a tax return, or opting-out of the Protestant church. This last cause might be of most concern for the interpretation of our results. However, rates of attrition are relatively low: less than 3% of individuals attrit each year for any reason, and 87% of individuals are observed in all years 2008-12. In the Appendix and Table A2 we provide evidence on the correlates of attrition, and summarize those findings as showing: (i) attrition is uncorrelated to treatment assignment; (ii) there is no differential attrition across treatments by past compliance behavior. Our working sample is based on those 89% of individuals (35,603) for whom we observe taxable income for up to four years pre-treatment (2008-11).

Individuals were randomly assigned to treatment (within strata). Table A3 presents evidence on the sample characteristics and balance across treatments. In our sample around 51% are men, the average age is 45, 42% are married, about half have at least one child, and average taxable income is around €43,000. Column 10 shows a joint F-test of the significance of the covariate set from being assigned to that specific group relative to the T1 control group (in brackets) and the T2 Tax Simplification (in braces). The evidence shows that samples are balanced across treatments.

married couples who choose to file two separate tax returns. The vast majority of married couples are joint filers and benefit from the associated reduction in the progressivity of the personal income tax. One parent of each underage child is entitled to child allowances. Tax raising communities in Germany refer to religious communities that collect taxes within the scope of the personal income tax. The Protestant and Catholic churches are by far the largest tax raising communities and cover around 60% of the population.

14Two randomization strata were used: (i) the individual’s church tax bracket in 2011; (ii) the number of pre-treatment years in which the individual is observed in the administrative records. This improves the balance across treatments in terms of taxpayer’s true income and the accuracy of the baseline taxpayer type measure.

15The other key identifying assumption is that there are no spillovers across treatments. Four points bolster the credibility of our design on this point: (i) on within-household spillovers, we reiterate that our sample matched to administrative tax records only covers households in which one spouse is Protestant; (ii) individuals in the Church hierarchy were excluded from the field experiment, including administrative staff, priests, and a few historically generous donors; (iii) there was no media coverage of the field experiment; (iv) we set up a telephone enquiry line for individuals to call in case they had any comments/queries after receiving their tax notification: this received 162 calls in total (corresponding to .34% of treated individuals), with queries mostly relating to the tax base.
4.3 Identifying Evaders, Compliers and Donors

As we observe both actual tax payments $T(z)$ and true taxes owed $T(\hat{z})$, we can precisely measure compliance in any year: *evaders* pay less than true taxes owed ($T(z) < T(\hat{z})$); *compliers* pay exactly true taxes owed ($T(z) = T(\hat{z})$), while *donors* pay more than they are legally obliged to ($T(z) > T(\hat{z})$). This allows us to estimate extensive margin responses to the different experimental treatments (implemented in 2012) and compare the estimates with the theoretical characterization of the extensive margin in Proposition 1.

Our linked panel data also allows us to build *baseline* pre-treatment measures of individual compliance behavior, utilizing up to four years of tax payment data (2008-11). We use this observed behavior to classify individuals into *baseline types*: evader, complier or donor. These then proxy for an individual’s underlying motivation to comply in the pre-treatment period, namely whether they are extrinsically or intrinsically motivated. Proposition 2 predicts heterogeneous treatment responses on the intensive margin across these different baseline taxpayer types.

While information on past behavior can obviously be combined in many ways to define types, we propose a simple approach based on individual behavior in 2011, the year immediately preceding our field experiment. Columns 11 to 13 in Table A3 show the samples across treatments to be balanced within each of these baseline types. Using one year of data to classify individuals into baseline types is reliable because of a high degree of persistence in individual behavior across years. To see this, note that for the balanced panel of individuals in our control group that are observed for all years 2008-11: (i) evaders in 2011 had on average evaded for 2.79 out of the previous three years, while compliers/donors in 2011 had on average complied/donated for 2.09 out of the previous three years. Table A4 documents the high degree of persistence in individual behavior over time using a multinomial logit model. To summarize, we find: (i) the best predictor of current compliance type is lagged type: for example, those who evaded in 2010 are 87 times more likely to evade in 2011 relative to complying; (ii) most other covariates have no predictive power on being an evader or a donor relative to a complier.

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16 If there are high transactions costs of compliance, individuals might choose to periodically pay large amounts, and so over time on average, pay the total payment owed. To check for this we examined whether those that donated in any given tax year are significantly less likely to make a payment in the following year: we find no evidence for this pattern of tax payments.

17 Older individuals are significantly more likely to donate. Those with wage income or liable for trade tax (a proxy for being an entrepreneur) are significantly more likely to evade, all else equal. However, the marginal impacts of these covariates are far smaller than the impact of the individual’s own past compliance.
4.4 Empirical Method

Guided by Proposition 1, we first focus on the extensive margin of whether individual $i$ is an evader, complier or donor in response to their treatment. For baseline evaders we estimate the following linear probability model, where robust standard errors are calculated,

$$\text{Prob (i evades) = } \alpha + \beta I(T_i = j) + \pi E_{i,\text{pre}} + \lambda_s + u_i,$$

where $I(T_i = j)$ is an indicator equal to one if individual $i$ is assigned to treatment $j$, $E_{i,\text{pre}}$ is the number of times individual $i$ has evaded in the pre-treatment years, $\lambda_s$ are dummies for randomization strata, and $u_i$ is an error term. The coefficient of interest, $\hat{\beta}$, measures the percentage point impact of treatment on the probability of evasion. For baseline donors we estimate an analogous specification of whether the individual donates in response to treatment $T_i = j$ (conditioning on the number of times the individual donated in pre-treatment years, $D_{i,\text{pre}}$).

Proposition 2 focuses on the intensive margin responses conditional on the extensive margin choice (evader, complier or donor). This margin cannot be consistently estimated because of standard selection concerns: conditioning on the extensive margin choice when attempting to estimate the intensive margin response only generates consistent estimates under strong assumptions that our conceptual framework highlights are unlikely to hold. Hence we estimate total responses that combine the treatment effects operating through both the intensive and extensive margins. These total responses are estimated using the following OLS specification, where robust standard errors are calculated,

$$y_i = \delta + \gamma I(T_i = j) + \theta \bar{y}_{i,\text{pre}} + \lambda_s + \epsilon_i,$$

where $y_i$ is compliance outcome $y$ for individual $i$ post-treatment, $\bar{y}_{i,\text{pre}}$ is $i$’s average compliance outcome pre-treatment, and $I(T_i = j)$ and $\lambda_s$ are as defined above.

For the baseline evaders, the main compliance outcome that we consider is the evasion rate, i.e.

$$\text{Evasion Rate}_i = \max \left\{ 0, \frac{T(z_i) - T(\bar{z}_i)}{T(\bar{z}_i)} \right\} \in [0, 1].$$

For the baseline donators (whose evasion rate is zero in the baseline), we consider the donation rate as the compliance outcome:

$$\text{Donation Rate}_i = \max \left\{ 0, \frac{T(z_i) - T(\bar{z}_i)}{T(\bar{z}_i)} \right\} \in [0, \infty).$$

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\textsuperscript{18}All the extensive margin results reported are also robust to estimating a multinomial logit model for choice type $k$ (evader, complier, donor), conditioning on treatment assignment, the number of times individual $i$ has been of type $k$ (evader, complier, donor) in the pre-treatment years, and dummies for the randomization strata.
We cap the donation rate at two (trimming 1.5% of observations) to prevent results from being driven by outliers. As the model only pins down the direction of change in the donation rate (not its magnitude), we consider a slightly coarser outcome that gives us more statistical power: a dummy variable equal to one if the individual increases the donation rate over its pre-treatment level.

5 Empirical Results

5.1 Compliance In the Zero Deterrence Baseline

We begin by exploiting a unique aspect of our setting: that we can accurately measure tax compliance in a legally binding tax system with a zero deterrence baseline. If such zero deterrence is well understood (as is largely confirmed using the T3 Misperception treatment below), then absent intrinsic motivations among taxpayers, there should be zero compliance. Table 1 documents actual compliance behavior using data from the T1 Control group.

Three points are of note. First, a significant fraction of individuals comply in the zero deterrence baseline: 20.9% of individuals make a payment greater than or equal to their true liability, while the remaining 79.1% make a payment smaller than their true liability. We refer to the former group as intrinsically motivated compliers/donors (Column 1), and refer to the latter group as extrinsically motivated evaders (Column 2). Second, among the extrinsically motivated, 91.9% of them are full evaders and pay zero tax (corresponding to those with $s \leq 0$ in our conceptual framework), while the remaining 8.1% are partial evaders and pay some tax (those with $s \in (0, \bar{s}_1)$). Given the vast majority of evaders pay nothing, their evasion rate is 96.3%, close to its maximum possible value. Third, among the intrinsically motivated, 55.5% are exact compliers (those with $s \in [\bar{s}_1, \bar{s}_2]$) and 44.5% are donors (those with $s > \bar{s}_2$). Among donors, the average donation rate is 47.1%, highlighting the considerable degree of overpayment among such intrinsically motivated types. These findings are starkly illustrated in Figure 1A, which shows the baseline distribution of payments made versus payments owed for the full sample, and also states the aggregate evasion rate (measured in money and people terms).\footnote{With regards to the precise level of intrinsic motivation, we note that this compliance rate to the local church tax is far higher than those typically observed in large-scale field experiments on charitable giving, where response rates typically vary between 2% and 5% for fundraising campaigns, despite those campaigns often being targeted to those with affinity towards the charitable cause (Karlan and List 2007, Huck et al. 2014). This suggests the local church tax is not viewed merely as a form of charitable donation, and that the legal obligation to pay has significant bite. This is reaffirmed if we recall that the vast majority of baptized individuals do not participate in church activities (with attendance rates less than 5% in the average parish). Hence intrinsic motivation does not appear entirely due to behaviors confined to the religious.}
The implications of these findings for the compliance puzzle debate are interesting: in our setting, the majority of individuals behave as extrinsically motivated taxpayers. Almost 80% of all individuals evade and 73% fully evade, and so the Becker-Allingham-Sandmo framework is 70-80% correct in our setting. At the same time, there coexists a substantial proportion of individuals among whom some degree of intrinsic motivation drives compliance behavior: about 20% comply or overpay and about 27% pay at least something even though the tax system is completely unenforced. Hence, both sides of the compliance puzzle debate may feel justified: the Becker-Allingham-Sandmo model is a good approximation for the behavior of 70-80% of individuals in our setting, but it does leave out a non-trivial element of intrinsic motivation for tax compliance driving the behavior of the remaining 20-30%.

5.1.1 Duty-to-Comply

As the conceptual framework makes clear, individuals have no extrinsic incentive to bunch at exact compliance in the zero deterrence baseline. Such bunching therefore requires either a discontinuity in intrinsic motivation at exact compliance—naturally labelled as ‘duty-to-comply’ (Remark 1)—or that the point of exact compliance represents a natural focal point for intrinsically motivated taxpayers.

Figure 1B presents descriptive evidence on such bunching by showing, for those that make some positive payment, the histogram of differences between taxes paid and taxes owed in the T1 Control group. This shows extremely strong bunching precisely at \( T(z) = T(\bar{z}) \) despite no extrinsic incentive to locate there. Going one step further, we can use the bunching methodology developed by Saez (2010) to precisely quantify the amount of excess bunching at exact compliance: the bunching estimate shown in Figure 1B, \( \widehat{b} = 7.2 \), implies over seven times as many taxpayers are observed at exact compliance than would be otherwise expected given smooth preferences as inferred from other parts of the distribution of \( T(z) − T(\bar{z}) \). The strong tendency of intrinsically motivated taxpayers to comply exactly with the letter of the law can also be gauged from Table 1. This table shows that, among the 20% of individuals who feature some form of intrinsic motivation to comply, more than half of them locate at the point of exact compliance.

It is conceptually difficult to distinguish between duty-to-comply and attention/focal point explanations for the observed bunching at exact compliance among intrinsically motivated taxpayers, and to some extent this can be viewed as a matter of labelling rather than substance. Nevertheless, in the next section we will attempt to make progress on the distinction between the two explanations by considering how bunching changes in response to our simplification treatment, which makes the point of exact compliance more salient.
Finally, while the behavior of around half the intrinsically motivated taxpayers appears to be driven by duty-to-comply/attention effects, Figure 1B shows that the remaining intrinsically motivated taxpayers behave in a way that is consistent with continuous warm-glow intrinsic motivations to comply. We explore such motives later using compliance rewards as a lever through which to manipulate the warm glow such individuals face from complying.

5.2 Compliance Responses to Treatment

Table 2 presents our core results on how tax compliance is causally affected by tax simplification (Panel A), misperception (Panel B), deterrence (Panel C), and compliance rewards (Panel D). For each panel we show both extensive margin responses and total responses in three samples: the full sample, baseline evaders (the extrinsically motivated), and baseline donors (the intrinsically motivated). The extensive response estimates are based on the linear probability model (4) (and shown in columns 1, 3, 5), while the total response estimates are based on (5) (and shown in columns 2, 3, 6). For the total response, the outcomes we consider are the evasion rate for baseline evaders and the probability of increased donation rate for baseline donors. All the treatment effects in the table are reported as percentages of the average outcome in the relevant comparison group, and at the foot of each panel we show the average outcome in the comparison group (making it straightforward to convert the estimates into absolute changes).

5.2.1 Tax Simplification

Panel A of Table 2 presents the results of the T2 Tax Simplification treatment. Pooling all taxpayers, Columns 1 and 2 show that simplification (i.e. making salient the legal obligation to pay and making deadlines and the tax schedule more prominent) significantly reduces the probability of evasion by 2.45% and reduces the evasion rate by 3.17%. The remaining columns in Panel A show the effects on both margins to be driven by baseline evaders. In this subsample, simplification of the tax notification significantly reduces the probability of evasion by 2.66% and reduces the evasion rate by 3.36%.

To probe further the total response among baseline evaders, Figure 2A shows the distributional effects of the simplification treatment. The figure plots the difference in the evasion rate densities of the simplification and control groups, in bins of 10%-points. We see that there is a large increase in evasion rates of 0% (i.e. perfect compliance) in the tax simplification group relative to the control group, and a corresponding large decrease in evasion rates of 100% (i.e. full evasion). In other words, the total response to the simplification treatment among baseline evaders is largely driven by such individuals changing their behavior from being full evaders to being exact compliers.
Switching attention to baseline donors, columns 5 and 6 show tax simplification has no significant impact on either margin of behavior. These null impacts suggest their tax compliance is not driven by them being confused. All the findings in Panel A are very robust to changes in the empirical specification as documented in Appendix Table A5.20

Taken together, the results of the tax simplification treatment imply that a considerable degree of tax evasion may be due to the complexity of tax notifications. Our results contribute to a nascent empirical literature examining the real world importance of salience/information costs for taxes and benefits (Chetty et al. 2009, Finkelstein 2009, Chetty and Saez 2013, Bhargava and Manoli 2014). Although not part of our framework, these findings can be couched in the notion that the complexity of a decision making environment drives status quo bias (Kahneman et al. 1991) or that subjects can only take a small number of tax rules into account (Eliaz and Spiegler 2011). Either interpretation is consistent with the documented responses to simplification and the high degree of persistence in behavior over pre-treatment years shown in Table A4 for example.21

Finally, we use the tax simplification treatment to probe further our finding of sharp excess bunching at exact compliance in the zero deterrence baseline. As stated earlier, it is in general difficult to distinguish between duty-to-comply and focal point/attention explanations for such excess bunching. One way to make headway on the distinction is to exploit our simplification treatment, which makes the point of exact compliance more salient. If attention is the main reason for bunching at exact compliance, one would expect bunching to increase in response to the simplification treatment. In Figure 3A we therefore show the difference in the densities of $T(z) - T(\bar{z})$ between the Tax Simplification and Control groups (among those taxpayers that paid some strictly positive amount). The graph clearly shows that the simplification treatment does not increase bunching at exact compliance, pushing further the interpretation towards such bunching being driven by duty-to-comply preferences.

20 As we describe in detail in the Appendix, Table A5 shows that our findings are robust to: (i) unconditionally estimated treatment effects; (ii) controlling only for randomization strata; (iii) excluding controls for pre-treatment behaviors; (iv) additionally controlling for the full set of individual controls shown in the balancing Table A3; (v) restricting the sample to the balanced panel of individuals observed in all tax years 2007-10.

21 Boyer et al. (2014) present evidence from a natural field experiment related to the equivalent Catholic Church tax in Bavaria. Their experiment is designed to make salient that the local church tax is legally binding. They find such manipulations of tax notifications significantly increase compliance among those identified to be extrinsically motivated, and actually reduce compliance of those identified to be intrinsically motivated. The first of these results closely mirrors our finding on tax simplification: some non-compliance is likely driven by misunderstanding of or inattention towards the local church tax. The second result links to our later study of compliance rewards, that highlight intrinsic motivations can be impacted by how the tax institution is viewed.
5.2.2 Misperception

Our ability to measure intrinsic motivations at baseline hinges on taxpayers being aware that there is zero deterrence. We now directly test this assertion using the T3 Misperception treatment where we make explicit that \( p = 0 \). On all other dimensions this treatment is identical to the T2 Tax Simplification letter, which is therefore the natural comparison group.

Panel B of Table 2 shows the results. Columns 1 and 2 show that averaging across all taxpayers, there are no significant effects of correcting for misperceptions on either the extensive or total response margins. However, breaking down the impacts across taxpayer types, the remaining columns show that correcting misperception does have a modest and statistically significant effect on the behavior of baseline evaders: they become more likely to evade when they are explicitly told there is zero deterrence, and their evasion rate increases by 1.41%. These responses among baseline evaders underpin the credibility of our experimental design as they suggest the notification letters are viewed authentically by such taxpayers: they are willing to evade more when told that the tax system is not enforced. Figure 2B digs deeper by showing the distributional effects of the treatment: we see that correcting for misperceptions over audit probabilities causes baseline evaders to be far more likely to move to a 100% evasion rate and pay none of their legal tax obligation.

Still, the overall effect of making zero deterrence explicit is quantitatively small: our estimates imply that correcting potential misperception would shift the average evasion rate in the population (evaders and donors) by less than one percentage point, corresponding to just 5% of all baseline compliance. These weak impacts are unlikely to be driven by lack of statistical power, given that twice as many taxpayers were assigned to the misperception treatment as to other treatments.

These findings confirm that compliance in the zero deterrence baseline is virtually unaffected by misperception and therefore must be intrinsically motivated. That there is little misperception at baseline is not very surprising: the complete absence of enforcement in this established tax system is unlikely to go unnoticed, especially since this has been the status quo for a long time. Of course, while these findings help rule out misperception as a confounder in our setting, they do not imply that misperception is a non-trivial issue in other enforcement settings. In systems with non-zero deterrence, given that deterrence strategies are typically confidential, there remains scope for misperception among taxpayers (Scholz and Pinney 1995, Chetty 2009, Del Carpio 2014).

5.2.3 Deterrence

In the standard Becker-Allingham-Sandmo framework, tax compliance is driven by extrinsic incentives due to audit probabilities \( (p) \) and penalties \( (\theta) \). In this subsection we focus on audit
probabilities and in the next we examine penalties.

Panel C of Table 2 documents the compliance impact of higher audit probabilities by pooling together all the treatments that inject strictly positive audit probabilities into the zero enforcement baseline, namely treatments T4-T6 that implement uniform audit probabilities of \( p = .1, .2, \) or .5. To make the variation completely unambiguous and increase power, we compare all these positive \( p \)-treatments to the T3 Misperception treatment in which \( p = 0 \). This eliminates noise from idiosyncratic variation in perception. If individuals are extrinsically motivated to comply as in the standard Becker-Allingham-Sandmo framework, then they should respond to these treatments in entirely predictable ways on the extensive and intensive margins as described in Propositions 1A and 2A.

Considering first the full sample of taxpayers, Columns 1 and 2 show that increased deterrence causes significant reductions in both the probability of evasion and the total evasion rate. Considering heterogeneous treatment responses in the remaining columns, we see that the deterrence effects on both margins are nearly entirely driven by their impacts on baseline evaders (the extrinsically motivated). These results are consistent with our conceptual model, which predicts positive deterrence effects on the extrinsically motivated and zero deterrence effects on the intrinsically motivated for whom enforcement is not a binding constraint (Propositions 1A and 2A). Figure 2C shows the distributional effects of these treatments among baseline evaders. In each case, we see that the reduction in the evasion rate is mostly driven by baseline evaders turning fully compliant.

Two further points are of note. First, the magnitude of each impact is quantitatively similar to those documented in Panel A on Tax Simplification, as are the distributional consequences of the two treatments on baseline evaders (compare Figures 2A and 2C). Second, the weak response to these deterrence treatments among the baseline intrinsically motivated (Columns 5 and 6, Panel C) speak directly to the literature examining the potential crowd-out of intrinsic motivations through the provision of extrinsic incentives. For example, if intrinsically motivated taxpayers know that under the \( p \)-treatments, other individuals are now motivated to pay because of increased deterrence, this could potentially crowd-out their own intrinsic motivation to comply because it creates doubt about any given individual’s true motive for compliance. Our results suggest that no such extrinsic-intrinsic crowd-out exists in this setting; if anything we observe a slight crowd-in of intrinsic motivations.

In Table 3, Panel A we break down the pooled impact into the separate impacts of each of the uniform audit probability treatments. This reveals the additional insight that the deterrence effects are quite similar across treatments T4 to T6. In fact, we cannot reject the null of equal effects
of treatments T4 to T6. This lack of gradient could be an artefact of how individuals perceive audit-threat letters like T4-T6: they may respond to the general message of stronger deterrence rather than the specific probability provided. Audit probabilities communicated through such letters are likely to be perceived differently than audit probabilities inferred from actual audit experiences over time. This is of course a generic issue for all tax enforcement experiments, not just ours. In the Appendix we provide an analysis of a different kind of audit-threat letter than what has been considered in the previous literature—namely the audit notch treatment T7 described earlier—which works very powerfully and suggests that there is a gradient.

5.2.4 Penalties

As shown by our conceptual framework, the asymmetric treatment of evaders (who face an expected penalty of $p[1+\theta]$ at the margin) and donors (who face no monetary incentive at the margin) produces a kink in the consumption possibility set at the point of exact compliance $T(z) = T(\bar{z})$. As a result, the model predicts excess bunching at exact compliance whenever the expected penalty $p[1+\theta]$ is positive, and that the amount of bunching is increasing in $p$ if and only if there is a perceived cost of being caught evading ($\theta > -1$). As we have already established the presence of bunching even under $p[1+\theta] = 0$ (what we labelled ‘duty-to-comply’), we identify penalty effects by considering the change in bunching due to the positive $p$-treatments. This constitutes a novel approach to uncovering an effect of penalties; field evidence on such effects is essentially non-existent due to the difficulties of finding exogenous variation in penalties outside lab settings.

Figure 3B presents our findings: it shows the difference in the densities of $T(z) - T(\bar{z})$ between the T4-T6 Positive Audit Probability groups and the T2 Tax Simplification group. A compliance response to penalties corresponds to a spike in this density difference at exact compliance. We do indeed find such a spike, which implies that there must be a perceived penalty (i.e., $\theta > -1$). This result underpins the interpretation of the audit probability treatments as operating through a deterrence effect of expected penalties. As far as we know, the evidence in Figure 3 represents the first non-parametric evidence of penalty responses from the field.\footnote{We obtain qualitatively similar results if we compare the positive audit probability letters to the zero audit probability letter, but there is slightly more noise at other parts of the distribution away from exact compliance.}

5.2.5 Compliance Rewards

We complete our analysis by using the rewards/recognition treatments to probe motivations for tax compliance. We first pool together all such rewards treatments (T8-T11), and then later
consider the individual impacts of each type of reward (social recognition, monetary prize draws, and a combination of the two). The comparison group is the T2 Tax Simplification treatment. As discussed earlier, the probability of actually winning each reward is very close to zero. We therefore view the salient feature of these rewards as being what they signal about the institution of the local church tax system. In particular, the offer of rewards for compliance (in contrast to punishment for non-compliance) highlights voluntary aspect of an unenforced tax system, which may have very different effects across different compliance types.

Panel D in Table 2 presents our findings. For the full sample, we show in Columns 1 and 2 that the offer of compliance rewards has no significant impact on either the extensive or total response margins of tax compliance. However, the remaining columns show that pooling taxpayers masks the considerable heterogeneity in compliance responses to rewards across taxpayer types. More precisely, among baseline evaders (the extrinsically motivated) the offer of rewards/recognition for compliance causes them to: (i) significantly increase their probability of evasion by 1.27%; (ii) significantly increase their evasion rate by 1.20%. Among baseline donors (the intrinsically motivated) the offer of rewards/recognition: (i) does not significantly impact their probability of donating; (ii) significantly increase the likelihood that they increase the size of their donation. This is remarkable given the considerable levels of donation/overpayment among this type of taxpayer at baseline.23

Two further points are of note. First, the sharply heterogeneous effects of rewards across taxpayer types again highlights the importance of being able to cleanly classify individuals as extrinsically or intrinsically motivated for the study of tax compliance. Pooling all taxpayers leads to the (incomplete) conclusion that the provision of rewards does not impact tax compliance. Second, by highlighting the voluntary aspect of an unenforced tax system, among baseline evaders these reward treatments induce qualitatively similar responses to those documented for the misperception treatment that made explicit $p = 0$ and thus also emphasized that tax payments are effectively voluntary. Baseline donors, on the other hand, respond as if these rewards positively shock their warm glow and thus crowds-in their intrinsic motivations.

In Table 3 we report the separate impacts of each form of reward. Recall that these rewards are of three types: (i) T8: provides individuals with a purely social reward through the possibility of their name being publicly announced in a local newspaper; (ii) T9-T10: provide individuals a purely private reward through their entry into small/high valued monetary prize draws; (iii) T11: combined social and private rewards so taxpayers have the opportunity to be recognized in a local

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23 The spirit of these results match findings from other contexts in which very low-value rewards motivate prosocial behavior. For example, Goette and Stutzer (2008) find that offering lottery tickets increases blood donations; Chetty et al. (2014) report offering a $100 gift card to journal referees significantly reduces the time taken to send reports.
newspaper and to be entered in the high valued monetary prize draw. The key differences across these forms of reward are the extent to which: (i) the reward takes the form of social or private recognition; (ii) the value of the private reward. All other dimensions are held constant across rewards: the number of individuals named in the social recognition component of T8 and T11 remains the same; and in T9-T11 the identity of monetary prize winners and their prize value remains private information.

Panel B of Table 3 documents a rather uniform set of impacts across all forms of reward: (i) among the extrinsically motivated, each type of reward increases the probability of evading and the evasion rate; (ii) among the intrinsically motivated, each reward type increases the likelihood of larger donations, with the point estimates being larger and more statistically significant for the two treatments involving social recognition in a newspaper (T8 and T11); (iii) if all taxpayers are pooled together, no significant effects of any type of reward are found. To more closely examine the anatomy of responses to the different rewards, Figure 2D shows the distributional effects of each treatment on the extrinsically motivated (for expositional ease we pool together the two monetary rewards treatments T9 and T10). This shows that the total response to each reward type in Table 3 is driven by baseline evaders turning to full evasion.

Our findings thus highlight that the offer of rewards can significantly impact tax compliance: the first order impact will depend on a taxpayer’s underlying motivation; the form in which rewards are offered are far less consequential in our setting.24 These results also shed more light on the potential crowd-out/in between extrinsic and intrinsic motivations. We earlier documented that the manipulation of deterrence parameters (extrinsic incentives) had little impact on the intrinsically motivated, consistent with the absence of strong cross-effects between forms of motivation. Our results on the provision of compliance rewards are consistent with this insight: the qualitative similarity of responses to social and monetary rewards, as well as their interaction, suggests that intrinsically motivated tax compliance is not crowded-out by the provision of monetary rewards.

6 Conclusion

This paper contributes to the large literature on tax compliance, and specifically to a nascent literature on intrinsic motivations to comply with taxes (as reviewed by Luttmer and Singhal 2014). We provide novel insights on the existence and relative importance of extrinsic and intrinsic

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24 As such, there is little value added in discussing further the interpretation of the different types of reward. It remains an open question for future research whether social and private recognition can have different effects on tax compliance in other settings, say because social rewards leverage against intrinsically motivated individuals contributing to the tax because they have social image concerns or a desire to signal to others their type or conspicuous generosity (Benabou and Tirole 2003, 2006, Ellingsen and Johannesson 2011).
motivations for tax compliance in a large representative sample of German taxpayers. We shed light on each motivation and their interaction using experimental manipulations of deterrence, tax simplification, misperception, and rewards/recognition.

We make headway on these questions because of novel aspects of the data and setting. Our data allows us to precisely measure tax compliance in contrast to many earlier studies (Slemrod and Weber 2012), and to cleanly identify extrinsically and intrinsically motivated taxpayers based on their pre-treatment compliance behavior in a zero deterrence baseline. Furthermore, the tax system studied is one in which overpayments are encouraged, thus creating the coexistence of evaders and donors and allowing us to integrate the study of tax compliance with the study of charitable giving. While these topics have so far been studied separately by economists, they naturally belong together as any imperfectly enforced tax system involves an element of voluntary giving.

We conclude by highlighting four general lessons of our study that may have implications for compliance in other tax systems and for the future research agenda in this area. First, a non-trivial proportion of individuals comply with their legal tax obligation due to some form of intrinsic motivation: 20% of individuals pay at least true taxes owed in a zero deterrence baseline in which there is no pecuniary incentive to comply. On the other hand, the remaining 80% of individuals evade taxes (mostly fully evading), consistent with the assumption of self-interested extrinsically motivated taxpayers in the Becker-Allingham-Sandmo framework. Among those that are intrinsically motivated, around half of them (or 10% of taxpayers overall) appear intrinsically motivated by a duty-to-comply preference, as identified by sharp bunching at exact compliance in the zero deterrence baseline. Future empirical studies would benefit from building in measures of taxpayers’ motivational types, as we show that behavioral responses to policy parameters cannot otherwise be fully understood. Future theoretical work needs to accommodate both forms of motivation: the framework we developed combined the standard tax evasion model (Becker 1968, Allingham and Sandmo 1972) with a warm-glow model of public goods donations (Andreoni 1989, 1990). This is a simple reduced-form way in which to conceptually introduce a range of non-pecuniary motivations for tax compliance that we labelled under the umbrella term of intrinsic motivations. An agenda for future research is to more finely develop models of tax evasion that precisely elaborate between a rich array of intrinsic or social motivations that have been much discussed both in the context of tax compliance (Luttmer and Singhal 2014) and pro-social behaviors more generally (Benabou

25It is instructive to compare the levels of intrinsic motivation we document to those in DellaVigna et al. (2012): they combine a natural field experiment and a structural model to estimate the share of potential donors to a charitable cause that are intrinsically motivated. Despite their very different setting, they report a quantitatively similar share of individuals who are intrinsically motivated to give (25%) as we find in our zero deterrence baseline.
Second, we highlight the impact of rewards on tax compliance: we find that the first-order impact depends on a taxpayer’s underlying motivation; the form in which rewards are offered are far less consequential for understanding compliance behavior. The heterogeneous responses across taxpayer types to such policies reveals a subtle trade-off for a social planner. The net benefit of offering such rewards depends both on the magnitude of responses for extrinsically and intrinsically motivated taxpayers, and on the underlying distribution of those types in the population. This is a timely insight given the use of rewards or recognition for tax compliance is becoming more prevalent, especially in developing countries. Moreover, over half of US states have utilized ‘name and shame’ programs revealing top debtors (Luttmer and Singhal 2014).

A third broad insight relates to the nature of cross-effects between extrinsic and intrinsic motivations. When documenting the deterrence effects of audit probabilities, we showed that such extrinsic incentives do not crowd-out the motivations of the intrinsically motivated. Given the mixed empirical evidence on this question from other (non-tax) settings, there remains a need for future work to better understand what are the key underlying features of economic environments/tax systems that drive the cross-effects between extrinsic and intrinsic motivations of individuals.26

Finally, while we find significant effects of deterrence and reward incentives on compliance behavior, the effect of these marginal incentives are relatively modest compared to the baseline evasion rate of 80%. When pooling the effect of all of our incentive treatments, we find that collectively they reduce the aggregate evasion rate by only about 4pp. In contrast, previous work has shown that third-party information reporting and tax withholding is able to reduce evasion to almost zero (e.g. Kleven et al. 2011). Hence, while incentives on the margin undoubtedly matter, this paper along with the recent literature shows it is not possible to make a tax system fully successful without information and tax collection systems that make compliance more or less automatic. The next generation of compliance studies should therefore provide more direct comparisons between the impact of incentives—be they economic or social in nature—and the impact of mechanisms related to information and administrative procedures. The longer term aim would be to help unify separate strands of the economics literature, which have now each identified the importance of institutional/administrative features for individual behavior in contexts as diverse as pro-social behavior, benefits take-up, savings, and voting.

26 Gneezy et al. (2011) review the field evidence on extrinsic-intrinsic crowd-out. Studies that find no such cross-effects (in a variety of non-tax contexts) include Dal Bo et al. (2013), Ashraf et al. (2014), and Chetty et al. (2014).
References


669-723.


Summary: Panel A shows that most individuals underpay. The people evasion rate is 80%, and in aggregate the money evasion rate, a measure of foregone tax revenue, is 77%. Panel B shows that, among individuals with strictly positive payments, the difference between payment made and payment owed is zero for more than 40% of taxpayers. The mode of the distribution clearly is at exact compliance. Bunching at exact compliance even under zero deterrence is in line with a duty to obey the law as proposed by the conceptual framework.

Notes: Panel A displays the difference in empirical densities between payments made (red bars) and payments owed (black line with triangles) for all individuals in the Control Group (T1) in the year of the natural field experiment (2012). Panel B displays the raw distributions of the difference between payment made and payment owed for the control letter. In panel B, the sample consists of compliers and donors with strictly positive payments. The bin size in both panels is 5 Euro.

Summary: Panel A shows that most individuals underpay. The people evasion rate is 80%, and in aggregate the money evasion rate, a measure of foregone tax revenue, is 77%. Panel B shows that, among individuals with strictly positive payments, the difference between payment made and payment owed is zero for more than 40% of taxpayers. The mode of the distribution clearly is at exact compliance. Bunching at exact compliance even under zero deterrence is in line with a duty to obey the law as proposed by the conceptual framework.
Summary: Panel A shows that individuals receiving the simplified letter are more likely to exhibit a zero evasion rate and are less likely to exhibit a 100% evasion rate, with only very small effects in the middle of the distribution. Panel B shows that individuals receiving the zero audit probability letter are less likely to exhibit a zero tax gap and are more likely to exhibit a 100% tax gap, with only very small effects in the middle of the distribution. Panel C shows the impact of positive audit probabilities is to shift baseline evaders to full compliance. Panel D shows the impacts of social and monetary rewards to shift baseline evaders to full evasion.

Notes: The figure displays the difference in the empirical density distributions of the evasion rate (difference between payment owed and payment made as percentage of payment owed). Panel A shows the effect of tax simplification on the evasion rate by comparing the density distribution of the simplified letter to the density distribution of the control letter. Panel B shows the effect for correcting misperception about the audit probability by comparing the density distribution of the zero audit probability letter to the density distribution of the simplification letter. Panel C compares the $p$-treatments with strictly positive audit probabilities with the T3 Misperception treatment that states $p=0$. Panel D compares the various rewards treatments with the T2 Tax Simplification treatment. In all panels: (i) the dashed horizontal line denotes zero difference in density distributions between the compared letter groups; (ii) the sample consists of baseline evaders, who paid less than or exactly the amount owed prior to treatment; (iii) the bin size is 0.1.

Figure 2: Distributional Effects Of Treatments on Evasion Rate (%)

A: Effect of Tax Simplification on Evasion Rate (Baseline Evaders)
T2 Simplification Letter – T1 Control Letter

B: Effect of Correcting Misperception on Evasion Rate (Baseline Evaders)
T3 Zero Audit Probability Letter – T2 Simplification Letter

C: Effect of Deterrence on Evasion Rate (Baseline Evaders)
T4-T6 Audit Probability Letters – T3 Zero Audit Probability Letter

D: Effect of Compliance Rewards on Evasion Rate (Baseline Evaders)
T8-T11 Social and Monetary Rewards - T2 Tax Simplification Letter
Notes: The figure plots differences in the densities of tax payments made - tax payments owed between different treatment groups. The objective is to see if bunching at exact compliance (demarcated by the vertical line at zero) responds to the tax simplification treatment (Panel A) or the audit threat treatments (Panel B). Hence, Panel A shows the difference between the T2 simplification group and the T0 control group, while Panel B shows the difference between the T4-T6 positive audit probability groups and the T2 simplification group. In both panels the sample consists of individuals who make strictly positive payments and the bin size is 5 Euro.

Summary: Panel A shows that bunching at exact compliance does not increase in response to the simplification/salience treatment, suggesting that bunching is not driven by attention affects (but rather by duty-to-comply). Panel B shows that bunching at exact compliance significantly increases in response to positive audit probabilities, implying that individuals perceive a positive penalty of being caught evading.
## Table 1: Compliance Under Zero Deterrence (Control Group)

Mean, column percentage in brackets

<table>
<thead>
<tr>
<th></th>
<th>Compliers/Donors (Intrinsically Motivated)</th>
<th>Evaders (Extrinsically Motivated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Number of Individuals</td>
<td>528</td>
<td>2004</td>
</tr>
<tr>
<td>Percentage of All Individuals</td>
<td>20.9%</td>
<td>79.1%</td>
</tr>
<tr>
<td>Complete Evaders: $s \leq 0$</td>
<td></td>
<td>72.8% [91.9]</td>
</tr>
<tr>
<td>Partial Evaders: $s \in (0, s_1)$</td>
<td></td>
<td>6.40% [8.08]</td>
</tr>
<tr>
<td>Exact Compliers: $s \in [s_1, s_2]$</td>
<td>11.6% [55.5]</td>
<td></td>
</tr>
<tr>
<td>Donors: $s &gt; s_2$</td>
<td>9.28% [44.5]</td>
<td></td>
</tr>
<tr>
<td>Payment Amount</td>
<td>42.4 Euro</td>
<td>1.87 Euro</td>
</tr>
<tr>
<td>Evasion Rate</td>
<td>0%</td>
<td>96.3%</td>
</tr>
<tr>
<td>Donation Rate</td>
<td>47.1%</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Notes:** The sample of individuals included is all those assigned to the T1 Control Group in 2012 (2532 individuals). The column headings refer to behavior of individuals in 2012, the year of the field experiment. Compliers are defined to be those that pay exactly their true liability; donors overpay. An evader is defined to be an individual that pays strictly less than their true tax liability. Column percentages are reported in brackets. The evasion and donation rates are defined as in the main text, where the donation gap is capped at two.

**Summary:** This shows that in our baseline setting where the audit probability is zero it is well understood that there is zero deterrence: almost 80% of all individuals evade and 73% fully evade. At the same time, there coexists a substantial proportion of individuals among whom some degree of intrinsic motivation drives compliance behavior: about 20% comply or overpay and about 27% pay at least something even though the tax system is completely unenforced.
### Table 2: Treatment Effects

<table>
<thead>
<tr>
<th>Panel</th>
<th>Treatment Effect</th>
<th>Full Sample</th>
<th>Baseline Evaders (Extrinsically Motivated)</th>
<th>Baseline Donors (Intrinsically Motivated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Probability of Evading</td>
<td>Evasion Rate</td>
<td>Probability of Evading</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td><strong>Panel A: Tax Simplification</strong></td>
<td>Simplification vs Control Letters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tax Simplification</td>
<td>-2.45**</td>
<td>-3.17***</td>
<td>-2.66***</td>
<td>-3.36***</td>
</tr>
<tr>
<td>Outcome in omitted reference group</td>
<td>79.29%</td>
<td>76.35%</td>
<td>94.98%</td>
<td>92.35%</td>
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<tr>
<td>Number of Observations</td>
<td>5076</td>
<td>5076</td>
<td>4007</td>
<td>4007</td>
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<tr>
<td><strong>Panel B: Misperception</strong></td>
<td>Zero Audit Probability vs Simplification Letters</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Correcting Misperception</td>
<td>0.942</td>
<td>0.957</td>
<td>1.53**</td>
<td>1.41*</td>
</tr>
<tr>
<td>Outcome in omitted reference group</td>
<td>77.30%</td>
<td>73.37%</td>
<td>92.35%</td>
<td>88.69%</td>
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<td>Number of Observations</td>
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<td>7641</td>
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<td>6049</td>
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<tr>
<td><strong>Panel C: Deterrence</strong></td>
<td>Positive Audit Probability vs Zero Audit Probability Letters</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Deterrence</td>
<td>-3.13***</td>
<td>-2.80***</td>
<td>-3.12***</td>
<td>-2.81***</td>
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<td>Outcome in omitted reference group</td>
<td>78.04%</td>
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<td>Number of Observations</td>
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<td>9979</td>
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<tr>
<td><strong>Panel D: Compliance Rewards</strong></td>
<td>Reward vs Simplification Letters</td>
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<td>Compliance Rewards</td>
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<td>1.20*</td>
</tr>
<tr>
<td>Outcome in omitted reference group</td>
<td>77.30%</td>
<td>73.37%</td>
<td>92.35%</td>
<td>88.69%</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>12632</td>
<td>12632</td>
<td>9909</td>
<td>9909</td>
</tr>
</tbody>
</table>

**Notes:** Estimations at the individual taxpayer level. *** denotes significance at 1%, ** at 5%, and * at 10% level. Robust standard errors are in parentheses. Strata variables: payment owed and the number of times the individual was observed in the panel at the time of the intervention. Estimations with controls include parish fixed effects and individual controls (compliance behavior in the previous period, age, sex, joint filing, number of (taxable) children as well as dummy variables for wage income, capital income, and income liable for local trade tax). We use pre-treatment compliance behavior in 2011 to split the sample into evaders (paid less than the amount owed), donors (paid strictly more than the amount owed), and compliers (paid the amount owed, results not shown).
### Table 3: Individual Treatment Effects

#### Panel A: Deterrence
**Positive Audit Probability vs Zero Audit Probability Letters**

<table>
<thead>
<tr>
<th>Deterrence, Pooled Effect</th>
<th>Probability of Evading</th>
<th>Evasion Rate</th>
<th>Probability of Evading</th>
<th>Evasion Rate</th>
<th>Probability of Donating</th>
<th>Increased Donation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td></td>
<td>0.660</td>
<td>0.627</td>
<td>0.536</td>
<td>0.534</td>
<td>4.22</td>
<td>22.20</td>
</tr>
<tr>
<td>Deterrence, Individual Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Audit probability = .1</td>
<td>0.898</td>
<td>0.852</td>
<td>0.741</td>
<td>0.732</td>
<td>5.76</td>
<td>30.20</td>
</tr>
<tr>
<td>Audit probability = .2</td>
<td>0.923</td>
<td>0.870</td>
<td>0.773</td>
<td>0.752</td>
<td>5.39</td>
<td>28.01</td>
</tr>
<tr>
<td>Audit probability = .5</td>
<td>0.912</td>
<td>0.870</td>
<td>0.749</td>
<td>0.744</td>
<td>5.66</td>
<td>29.69</td>
</tr>
<tr>
<td>Outcome in omitted reference group</td>
<td>78.04%</td>
<td>74.52%</td>
<td>93.80%</td>
<td>90.43%</td>
<td>61.72%</td>
<td>8.16%</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>12692</td>
<td>12692</td>
<td>9979</td>
<td>9979</td>
<td>1261</td>
<td>1261</td>
</tr>
</tbody>
</table>

#### Panel B: Compliance Rewards/Recognition
**Reward vs Simplification Letters**

<table>
<thead>
<tr>
<th>Compliance Rewards, Pooled Effect</th>
<th>Probability of Evading</th>
<th>Evasion Rate</th>
<th>Probability of Evading</th>
<th>Evasion Rate</th>
<th>Probability of Donating</th>
<th>Increased Donation Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
<td>(6)</td>
</tr>
<tr>
<td></td>
<td>0.821</td>
<td>0.789</td>
<td>0.664</td>
<td>0.666</td>
<td>4.95</td>
<td>32.80</td>
</tr>
<tr>
<td>Compliance Rewards, Individual Effects</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social reward</td>
<td>0.185</td>
<td>0.889</td>
<td>1.02</td>
<td>1.20</td>
<td>3.17</td>
<td>108.81**</td>
</tr>
<tr>
<td>Small private reward</td>
<td>0.450</td>
<td>0.723</td>
<td>1.22</td>
<td>1.41*</td>
<td>4.56</td>
<td>50.63</td>
</tr>
<tr>
<td>Large private reward</td>
<td>1.02</td>
<td>0.981</td>
<td>2.09**</td>
<td>1.93**</td>
<td>2.72</td>
<td>69.50</td>
</tr>
<tr>
<td>Social and private reward combined</td>
<td>-0.618</td>
<td>-0.803</td>
<td>0.777</td>
<td>0.300</td>
<td>7.38</td>
<td>106.97**</td>
</tr>
<tr>
<td>Outcome in omitted reference group</td>
<td>77.30%</td>
<td>73.37%</td>
<td>92.35%</td>
<td>88.69%</td>
<td>61.63%</td>
<td>5.71%</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>12632</td>
<td>12632</td>
<td>9909</td>
<td>9909</td>
<td>1247</td>
<td>1247</td>
</tr>
</tbody>
</table>

Notes: Estimations at the individual taxpayer level. *** denotes significance at 1%, ** at 5%, and * at 10% level. Robust standard errors are in parentheses. Strata variables: payment owed and the number of times the individual was observed in the panel at the time of the intervention. Estimations with controls include parish fixed effects and individual controls (compliance behavior in the previous period, age, sex, joint filing, number of (taxable) children as well as dummy variables for wage income, capital income, and income liable for local trade tax). We use pre-treatment compliance behavior in 2011 to split the sample into evaders (paid less than the amount owed), donors (paid strictly more than the amount owed), and compliers (paid the amount owed, results not shown).
A Online Appendix (Not For Publication)

A.1 Attrition

To investigate the correlates of attrition from our panel data, we estimate a linear probability model that has a dependent variable equal to one if the individual is in our sample in year 2008, and has attritted by 2012, the year of the field experiment. This analysis is based on the 31,238 individuals observed in 2008: 86.5% are observed in all years 2008-12. We are primarily interested in how attrition is correlated to treatment assignment, and whether there is heterogeneous attrition across treatments. The most important form of individual heterogeneity considered in our analysis is by whether the individual is a baseline evader, complier or donor. Hence we control throughout for this individual type, as defined based on observed behavior in 2008.

Column 1 of Table A2 shows that those that evade in 2008 are 2.4 percentage points more likely to attrit by the 2012 tax year than exact compliers in 2008, an effect significant at the 1% level; 2008 donors are not significantly more or less likely to attrit than 2008 exact compliers. Column 2 shows this to be robust to including individual controls and parish fixed effects. Column 3 additionally controls for the treatment assignment dummies. An F-test of their joint significance does not reject the null \[p\text{-value } .872\]. Hence we find no evidence that individuals are more likely to attrit because of the treatment they are assigned to. This ameliorates concerns the field experiment caused individuals to opt-out of the Protestant church, that might have offset any gains from compliance among those that do not attrit. Finally, Column 4 includes a complete series of interactions between treatment assignments and the individual’s type based on their 2008 behavior. We find there is no differential attrition across treatments by past compliance behavior: the three F-tests on the joint significance of the treatment dummies, treatment dummy-evader 2008 interactions, and treatment dummy-donor 2008 interactions, all do not reject the null.

A.2 Persistence in Individual Type

To provide further evidence on the degree of persistence in individual compliance behavior over time, we use a multinomial logit model to estimate the correlates of behavior in 2011, the tax year immediately prior to our field experiment. We do so among those individuals assigned to our T1 Control group, and we report relative risk ratios where the omitted base category is exact compliance in 2011. In Column 1 of Table A4 we only condition on the individuals lagged type, namely whether they evaded or donated in the 2010. This evidence suggests a high degree

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28The individual controls are whether the individual is male, their age, the number of children, whether they are a joint filer, receive wage income, are liable for trade taxes, and their church tax payment bin.
of persistence over time in individual types: For the extrinsically motivated, those that evade in 2010 are 83.3 times as likely to evade the following year as comply. For the intrinsically motivated, those that donate in 2010 are 10.8 times as likely to continue donating the following year than comply. Column 2 shows this finding to be robust when we additionally control for individual characteristics. The relevant relative risk ratio for persistence in evasion is 87.1, and for persistence in donating it is 9.01. We further note that most of the individual controls do not predict compliance behavior, and those that do have relatively small relative risk ratios compared to the individual’s own past compliance behavior.

A.3 Robustness Checks

Table A5 presents robustness checks related to the T2 Tax Simplification total response impacts documented in Panel A of Table 2. These probe the sensitivity of our findings to small changes in controls and the sample of individuals considered in specifications (4) and (5). As a point of comparison, the first row shows our baseline extensive margin and total response estimates for all taxpayers, the subsample of baseline evaders and the subsample of baseline donors. In each robustness check, we report the p-value on the cross-equation test of whether the estimated treatment effect differs significantly from our preferred baseline estimate. The remaining rows show the sign, significance and magnitude of these estimates to be almost unchanged if: (i) our specifications are estimated unconditional on all other controls except the indicator for assignment to T2, $I(T_{11} = 2)$; (ii) we condition only on the randomization strata, $\lambda_s$; (iii) we exclude the control for past compliance behavior, $\bar{y}_{i,pre}$; (iv) we additionally control for a full set of individual controls given in Table A4; (v) we estimate (4) and (5) based only on the balanced panel of individuals observed in all years. This final result very much affirms the earlier result that attrition is uncorrelated to treatment assignment, and nor is there differential attrition between baseline evaders and baseline donors.

A.4 Notched Audit Probabilities

In this subsection we consider in more detail compliance responses to a notched audit probability as communicated by the tax notification letter T7. This letter announces $p = .5$ for payments less than or equal to €10 and $p = 0$ for payments above €10. Such a notch provides a strong incentive for individuals who would otherwise pay less than or equal to €10 to pay just above €10, thereby creating a hole in the payment distribution below the cutoff and excess bunching in the payment distribution just above the cutoff. The theory of notches and how to use them to estimate behavioral responses has been developed by Kleven and Waseem (2013). Here we build
on their methodology by taking advantage of the fact that the notch is randomized.

The top panels of Figure A2 illustrate conceptually how individuals should respond to notches by comparing (hypothetical) density distributions of payments for individuals in the audit notch treatment group (solid red line in Panel A) and the control group (dashed black line in Panel A). The density for the audit notch group features missing mass at and below the cutoff along with excess bunching just above, whereas the density for the control group is smooth around the cutoff as they do not face the notch. Panel B shows the difference in densities between the treatment and control groups: this difference will be zero above the bunch due to random assignment.

The bottom panels of Figure A2 show empirical density differences between the audit notch treatment group and different comparison groups. The comparison group in Panel C is the T2 Tax Simplification treatment, while the comparison group in Panel D is the T3 Misperception treatment. Since the raw distributions are lumpy because most individuals pay in one of the statutory tax bins (0, 5, 10, 25, 45, 70, 100), we show the distributions in €5 bins with averaging of densities within statutory tax bins. The qualitative findings are similar for the two comparison groups and consistent with the conceptual model: there is a large hole in the bins below €10 and large excess bunching just above €10. The amount of excess bunching between €10-€25 (scaled by the average density in the comparison group below the notch) is shown by the estimate $b$, with bootstrapped standard errors as in Chetty et al. (2011) and Kleven and Waseem (2013). When comparing to the tax simplification treatment in Panel C, we have $b = .42$: the excess mass above the notch is 42% of the average density in the comparison group below the notch. When comparing to the zero audit probability treatment in Panel D, the effects are even stronger: the excess mass above the notch is 62% of the average density in the comparison group. These bunching estimates are highly significant, much more so than the uniform audit probability treatments considered above (and in the previous literature). That is, randomizing a notched audit probability vastly increases power compared to conventional randomizations of uniform audit probabilities.

Table A6 digs deeper by comparing both the T7 Notched Audit Probability treatment (with $p = .5$ below a cutoff) and the T6 Uniform Audit Probability (with $p = .5$ everywhere) to the T3 Misperception treatment (with $p = 0$). To begin with, Column 1a considers the total average treatment effect of the notched and uniform audit probabilities. The effects are roughly similar in size (slightly larger for the notch) and highly significant for both treatments. However, the audit notch estimate obtained this way is attenuated, because it does not account for the fact that individuals initially above the cutoff (where $p$ remains zero) are untreated. Hence, Column 1b uses the bunching estimate in Figure A2D to obtain the correct local average treatment effect on tax payments. The estimated audit notch impact of 45% constitutes the correct comparison
with the uniform audit probability impact of 29%, and so the notched audit-threat letter induces a much stronger response than the uniform audit-threat letter.

A.5 Social Norms and Moral Suasion

We here present more detailed evidence on our treatments related to social norms and moral suasion. These mirror treatments implemented in Blumenthal et al. (2001): while Blumenthal et al. (2001) found such treatments to have limited impact, we revisit the issue by probing further whether there are heterogenous impacts across baseline extrinsically and intrinsically motivated tax payers. Our social norms treatment, denoted T12, provides individuals information on the average payments of those that made some strictly positive payment in the previous tax year, and is communicated as follows:29

“In 2011, payers of the local church tax paid $31, on average.”

Our moral suasion treatment emphasizes the social benefits of making a payment to the local public good of parish services (and specifically naming the parish the individual belongs to). This treatment is denoted T13 and is communicated as follows:

“With the local church tax you notably fund the work of your parish, the [PARISH NAME].”

Table A7 presents the results following the same format as earlier, where the natural comparison is with the T2 Tax Simplification treatment. When considering the intrinsically motivated, we again focus on baseline donors and thus remove baseline compliers whom the evidence suggests are largely motivated by a duty-to-comply.

In all three samples, pooling all taxpayers or considering baseline evaders and donors separately, we find both treatments have weak impacts on behavior on both the extensive and total response margins.30 Taken together, these findings suggest that such forms of intervention are unlikely to induce large changes in tax compliance. As such, our findings on moral suasion are in line with some of the earlier literature (Blumenthal et al. 2001, Fellner et al. 2013), and confirm these non-responses uniformly apply even when extrinsically and intrinsically motivated tax payers can

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29 We might expect such norms treatments to be effective if individuals are conditional cooperators, or they have a preference for conformity. Benabou and Tirole (2011) overview the evidence on the effectiveness of such appeals in various contexts related to prosocial behavior. More recently, Hallsworth et al. (2014) provide evidence from a natural field experiment that providing information on norms and moral appeal accelerates actual payments among UK tax payers.

30 We also probed both results to further explore heterogeneous responses. Among baseline donors, we tested whether the social norm treatment had heterogenous impacts among those that paid more or less than the stated norm in 2011. We found no evidence that either subset of baseline donors responds to this information (not shown). On moral suasion, we explored whether this treatment had differential impacts depending on the church membership, or the involvement of church members in church activities, across the parishes in our data. Again, no robust heterogeneous impacts were found.
be identified based on their pre-treatment behavior. Such uniform null effects of these kinds of treatment are perhaps not altogether surprising in the context of tax compliance: as discussed by Luttmer and Singhal (2014), individual views on the value of public services provided through taxation are formed through a lifetime of experiences, and these kinds of treatment are unlikely to be powerful enough to induce changes in such beliefs.31

**Additional References for Appendix**


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31 This is of course not to suggest that appeals to social norms would not be effective in determining other forms of prosocial behavior. For example, such social norms treatments have been found to effectively raise political contributions (Frey and Meier 2004). Perez-Truglia and Cruces (2014) show how this is driven by which peers are expected to observe such contributions. Besley *et al.* (2014) present evidence from the UK on how the short-lived switch to the politically unpopular poll tax on property, led to a short run spike in non-compliance in property taxes and had long term impacts on compliance with property taxes even when the regime was subsequently altered. This suggests social norms can be shifted when shocked by sufficiently large changes to the design of the tax system.
Figure A1: Local Church Tax Schedule

<table>
<thead>
<tr>
<th>Level</th>
<th>Annual income or benefits</th>
<th>Annual Church Tax</th>
<th>% of Sample in Tax Bracket, 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>€ 8,005 to € 9,999</td>
<td>€ 5</td>
<td>2.37</td>
</tr>
<tr>
<td>2</td>
<td>€ 10,000 to € 24,999</td>
<td>€ 10</td>
<td>26.5</td>
</tr>
<tr>
<td>3</td>
<td>€ 25,000 to € 39,999</td>
<td>€ 25</td>
<td>32.0</td>
</tr>
<tr>
<td>4</td>
<td>€ 40,000 to € 54,999</td>
<td>€ 45</td>
<td>16.8</td>
</tr>
<tr>
<td>5</td>
<td>€ 55,000 to € 69,999</td>
<td>€ 70</td>
<td>9.43</td>
</tr>
<tr>
<td>6</td>
<td>€ 70,000 and above</td>
<td>€ 100</td>
<td>12.9</td>
</tr>
</tbody>
</table>

Notes: Figure A1 shows the local church tax schedule: the x-axis shows taxable income. This is a progressive tax schedule with six payment bins. The lower table shows the percentage of the sample in the year of the field experiment that falls into each payment bin.
Figure A2: Distributional Effects of Audit Probability Notch on Tax Gap

**Notes:** Panel A provides a conceptual illustration of the distribution of tax payments that we expect under the audit probability notch treatment (compared to the smooth distribution of payments in the control group), while Panel B illustrates the expected difference in densities between the audit probability notch treatment and the control group. Panels C and D display the difference in density distributions between the audit probability notch letter group and the simplification letter group in Panel C and to the density distribution of the zero audit probability letter group in Panel D. In both lower panels, the dashed horizontal line denotes zero difference in density distributions between the compared letter groups. The vertical line denotes the threshold at which the audit probability dips from 50% (payments below) to 0% (payments above). Bunching is the excess mass just above the threshold scaled by the average counterfactual density below the notch. In both panels, the sample consists of baseline evaders, who paid less than the amount owed prior to treatment (baseline year 2011). The bin size is 5 €. We account for differences in the size of tax brackets below and above the threshold by averaging densities within tax brackets.

**Summary:** Panels C and D show that individuals receiving the audit probability notch letter are less likely to pay taxes below the notch (where the audit probability is 0.5) and instead move to the payment bin just above the notch (where the audit probability is 0). Excess bunching equals 42% of the height of the counterfactual distribution in Panel C and 62% of the height of the counterfactual distribution in Panel D. These bunching estimates translate into large effects on tax payments of 27% and 45%, respectively.
Table A1: Sample Representativeness
Personal Income Tax Statistics 2007 and Our Sample in 2007

<p>|                                | Sample (Metropolitan Area Studied, Protestants) | Metropolitan Area Studied | Metropolitan Area Studied, Non Church Members |</p>
<table>
<thead>
<tr>
<th></th>
<th>Single Filers (1a)</th>
<th>Joint Filers (1b)</th>
<th>Single Filers (2a)</th>
<th>Joint Filers (2b)</th>
<th>Single Filers (3a)</th>
<th>Joint Filers (3c)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of taxpayers</td>
<td>21,353</td>
<td>24,950</td>
<td>353,248</td>
<td>448,686</td>
<td>156,734</td>
<td>151,872</td>
</tr>
<tr>
<td>Share of taxpayers that are men</td>
<td>44.1%</td>
<td>50.0%</td>
<td>48.8%</td>
<td>50.0%</td>
<td>53.9%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Share of taxpayers with children entitled to child allowances</td>
<td>15.1%</td>
<td>59.1%</td>
<td>16.1%</td>
<td>53.0%</td>
<td>18.9%</td>
<td>52.3%</td>
</tr>
<tr>
<td>Average number of children entitled to child allowances</td>
<td>0.2</td>
<td>1.0</td>
<td>0.2</td>
<td>0.9</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>Average age</td>
<td>40.4</td>
<td>47.0</td>
<td>43.3</td>
<td>49.2</td>
<td>42.9</td>
<td>46.8</td>
</tr>
<tr>
<td>Share of Protestants</td>
<td>100.0%</td>
<td>50.0%</td>
<td>16.0%</td>
<td>14.4%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Share of Catholics</td>
<td>0.0%</td>
<td>50.0%</td>
<td>39.5%</td>
<td>41.5%</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Share of taxpayers who are not member of a tax raising community</td>
<td>0.0%</td>
<td>50.0%</td>
<td>44.4%</td>
<td>43.9%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Average taxable income</td>
<td>39,034</td>
<td>85,090</td>
<td>40,709</td>
<td>73,942</td>
<td>46,177</td>
<td>72,126</td>
</tr>
<tr>
<td>Share of declarations with wage income</td>
<td>87.8%</td>
<td>87.8%</td>
<td>83.2%</td>
<td>91.0%</td>
<td>81.4%</td>
<td>91.8%</td>
</tr>
<tr>
<td>Share of declarations with capital income</td>
<td>21.8%</td>
<td>31.0%</td>
<td>26.6%</td>
<td>31.2%</td>
<td>23.3%</td>
<td>23.0%</td>
</tr>
<tr>
<td>Share of declarations with business income liable for trade tax</td>
<td>2.5%</td>
<td>4.8%</td>
<td>4.5%</td>
<td>7.0%</td>
<td>5.8%</td>
<td>7.2%</td>
</tr>
</tbody>
</table>

Notes: This table shows the mean characteristics (separately for single and joint files) in three groups: our sample (filing Protestants in the large metropolitan area in Bavaria, Columns 1a and 1b), the overall population of single and joint filers in the large metropolitan area in Bavaria (Columns 2a and 2b), and filing non-church members in the same large metropolitan area in Bavaria (Columns 3a and 3b). The source of data is in Columns 2a onwards are personal income statistics for 2007 (the last year of available data). Single filers comprise unmarried individuals and married couples who choose to file two separate tax returns. The vast majority of married couples are joint filers and benefit from the associated reduction in the progressivity of the personal income tax. One parent of each underage child (and of each child who is not older than 25 years and studies/or is in apprenticeship) is entitled to child allowances, which can either be a tax credit or a cash transfer. Tax raising communities in Germany refer to religious communities that collect taxes within the scope of the personal income tax. The Protestant and Catholic churches are by far the largest tax raising communities and cover about 60% of the population; 3.3% of the population belong to other tax raising communities.

Summary: There are relatively minor differences in gender, age, the presence of children entitled to child allowances, taxable incomes and income sources, between our sample and these others subpopulations considered.
Table A2: Correlates of Attrition

<table>
<thead>
<tr>
<th></th>
<th>(1) Individual Type As Defined in 2008</th>
<th>(2) Individual Controls</th>
<th>(3) Treatment Assignment in 2012</th>
<th>(4) Heterogeneity Within Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evader in 2008 [yes =1]</td>
<td>.024***</td>
<td>.025***</td>
<td>.025***</td>
<td>.046**</td>
</tr>
<tr>
<td></td>
<td>(.006)</td>
<td>(.006)</td>
<td>(.006)</td>
<td>(.021)</td>
</tr>
<tr>
<td>Donor in 2008 [yes=1]</td>
<td>.008</td>
<td>-.005</td>
<td>-.004</td>
<td>.023</td>
</tr>
<tr>
<td></td>
<td>(.009)</td>
<td>(.009)</td>
<td>(.009)</td>
<td>(.032)</td>
</tr>
<tr>
<td>Parish Fixed Effects</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Individual Controls</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Joint F-test of Significance [p-value]</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment Dummies</td>
<td>No</td>
<td>No</td>
<td>Yes [.872]</td>
<td>Yes [.628]</td>
</tr>
<tr>
<td>Treatment Dummy x Evader in 2008 Interactions</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes [.324]</td>
</tr>
<tr>
<td>Treatment Dummy x Donor in 2008 Interactions</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes [.706]</td>
</tr>
<tr>
<td>Observations</td>
<td>31238</td>
<td>31238</td>
<td>31238</td>
<td>31238</td>
</tr>
</tbody>
</table>

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. The dependent variable is a dummy equal to one if the individual is in our linked sample in 2008, but has attrited by 2012, the year in which our field experiment takes place, and zero otherwise. The analysis is based on the 31,238 individuals observed in 2008. A linear probability model is estimated throughout with robust standard errors reported in parentheses. In Column 1 we control for whether the individual is an evader or donor in 2008 (exact compliers being the omitted group). Column 2 additionally controls for whether the individual is male, their age, the number of children, whether they are a joint filer, receive wage income, are liable for trade taxes, their payment bin for the local church tax and parish fixed effects. Column 3 additionally controls for the series of treatment assignment dummies, and reports the p-value on an F-test of their joint significance. The specification in Column 4 includes a complete series of interactions between treatment assignments and the individual’s type based on their 2008 behavior. We report the p-values on three F-tests on the joint significance of the treatment dummies, all treatment dummy-evader 2007 interactions, and all treatment dummy-donor 2008 interactions.

Summary: Attrition from our sample is uncorrelated to treatment assignment, and there is no differential attrition across treatments by past compliance behavior.
### Table A3: Random Assignment to Treatment

<table>
<thead>
<tr>
<th>Number of individuals</th>
<th>Male</th>
<th>Age</th>
<th>Married</th>
<th>Number of Children</th>
<th>Joint Filer [yes=1]</th>
<th>Wage Income [yes=1]</th>
<th>Liable for Trade Tax [yes=1]</th>
<th>Income (in Euro)</th>
<th>$F$-test on Joint Sign. $p$-value, Full Sample (Relative to Control)</th>
<th>$F$-test on Joint Sign. $p$-value, Baseline Evaders (Relative to Control)</th>
<th>$F$-test on Joint Sign. $p$-value, Baseline Compilers (Relative to Control)</th>
<th>$F$-test on Joint Sign. $p$-value, Baseline Donors (Relative to Control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1: Control Group</td>
<td>2532</td>
<td>.511</td>
<td>45.5</td>
<td>.421</td>
<td>.495</td>
<td>.368</td>
<td>.877</td>
<td>.030</td>
<td>43644</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>T6: Audit Probability p=.5</td>
<td>2533</td>
<td>.512</td>
<td>45.2</td>
<td>.423</td>
<td>.489</td>
<td>.368</td>
<td>.880</td>
<td>.022</td>
<td>43506</td>
<td>[.828]</td>
<td>[.739]</td>
<td>[.760]</td>
</tr>
<tr>
<td>T7: Audit Probability Notch</td>
<td>2551</td>
<td>.510</td>
<td>44.8</td>
<td>.412</td>
<td>.495</td>
<td>.353</td>
<td>.885</td>
<td>.022</td>
<td>42710</td>
<td>[.331]</td>
<td>[.325]</td>
<td>[.541]</td>
</tr>
<tr>
<td>T8: Social Reward</td>
<td>2533</td>
<td>.523</td>
<td>45.2</td>
<td>.415</td>
<td>.482</td>
<td>.363</td>
<td>.868</td>
<td>.025</td>
<td>44279</td>
<td>[.466]</td>
<td>[.044]</td>
<td>[.411]</td>
</tr>
<tr>
<td>T9: Small Private Reward</td>
<td>2521</td>
<td>.503</td>
<td>45.0</td>
<td>.412</td>
<td>.480</td>
<td>.358</td>
<td>.881</td>
<td>.026</td>
<td>42036</td>
<td>[.640]</td>
<td>[.512]</td>
<td>[.516]</td>
</tr>
<tr>
<td>T10: Large Private Reward</td>
<td>2525</td>
<td>.513</td>
<td>45.4</td>
<td>.442</td>
<td>.514</td>
<td>.392</td>
<td>.885</td>
<td>.022</td>
<td>44085</td>
<td>[.611]</td>
<td>[.763]</td>
<td>[.599]</td>
</tr>
</tbody>
</table>

Notes: This table presents randomization checks for all treatments in our natural field experiment. Column 1 shows the number of individuals assigned to each treatment. Approximately twice as many individuals were purposefully assigned to the T3 Misperception (p=0) treatment. Columns 2 to 9 present the average sample characteristics for 2012 (in which the field experiment took place), with standard errors in parentheses. Column 10 shows a joint $F$-test of the significance of the covariate set from being assigned to that specific group relative to the T1 control group (in brackets) and relative to T2 Tax Simplification (in braces). Columns 11-13 repeat this but for the subsamples of baseline evaders, baseline compliers and baseline donors (as defined by their behavior in 2011, the year that immediately precedes our natural field experiment).

Summary: The samples are well balanced on these observables across treatments. The same is true when looking among individual types, as shown in Columns 11 to 13.
### Table A4: Persistence of Type in Control Group
Multinomial Logit Estimates, Relative Risk Ratios Reported
(Base Category = Complier in 2010 Tax Year)

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>Evader in 2010</th>
<th>Donor in 2010</th>
<th>Evader in 2010</th>
<th>Donor in 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1) Past Behavior</td>
<td></td>
<td>(2) Individual Controls</td>
<td></td>
</tr>
<tr>
<td>Evader in 2009 Tax Year [yes =1]</td>
<td>83.3***</td>
<td>2.16***</td>
<td>87.1***</td>
<td>2.02***</td>
</tr>
<tr>
<td></td>
<td>(16.1)</td>
<td>(.563)</td>
<td>(17.5)</td>
<td>(.536)</td>
</tr>
<tr>
<td>Donor in 2009 Tax Year [yes=1]</td>
<td>2.32***</td>
<td>10.8***</td>
<td>2.45***</td>
<td>9.01***</td>
</tr>
<tr>
<td></td>
<td>(.601)</td>
<td>(2.50)</td>
<td>(.672)</td>
<td>(2.22)</td>
</tr>
<tr>
<td>Male</td>
<td>.916</td>
<td>1.04</td>
<td>.168</td>
<td>(.223)</td>
</tr>
<tr>
<td></td>
<td>(.168)</td>
<td>(.223)</td>
<td>(.009)</td>
<td>(.109)</td>
</tr>
<tr>
<td>Age</td>
<td>1.00</td>
<td>1.03</td>
<td>.165</td>
<td>(.234)</td>
</tr>
<tr>
<td></td>
<td>(.008)</td>
<td>(.009)</td>
<td>(.009)</td>
<td>(.009)</td>
</tr>
<tr>
<td>Number of Children</td>
<td>1.23*</td>
<td>.786</td>
<td>(.152)</td>
<td>(.117)</td>
</tr>
<tr>
<td></td>
<td>(.152)</td>
<td>(.117)</td>
<td>(.008)</td>
<td>(.008)</td>
</tr>
<tr>
<td>Joint Filer [yes=1]</td>
<td>.771</td>
<td>1.03</td>
<td>.717</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td>(.165)</td>
<td>(.234)</td>
<td>(.165)</td>
<td>(.234)</td>
</tr>
<tr>
<td>Wage Income [yes=1]</td>
<td>1.85**</td>
<td>1.29</td>
<td>1.85**</td>
<td>1.29</td>
</tr>
<tr>
<td></td>
<td>(.539)</td>
<td>(.377)</td>
<td>(.539)</td>
<td>(.377)</td>
</tr>
<tr>
<td>Liable for Trade Tax [yes=1]</td>
<td>4.30***</td>
<td>3.07</td>
<td>4.30***</td>
<td>3.07</td>
</tr>
<tr>
<td></td>
<td>(2.32)</td>
<td>(2.33)</td>
<td>(2.32)</td>
<td>(2.33)</td>
</tr>
<tr>
<td>Payment Owed = €10 [Income Bracket €10000-€25000]</td>
<td>1.41</td>
<td>.858</td>
<td>1.41</td>
<td>.858</td>
</tr>
<tr>
<td></td>
<td>(.685)</td>
<td>(.434)</td>
<td>(.685)</td>
<td>(.434)</td>
</tr>
<tr>
<td>Payment Owed = €25 [Income Bracket €25000 - €40000]</td>
<td>1.47</td>
<td>1.30</td>
<td>1.47</td>
<td>1.30</td>
</tr>
<tr>
<td></td>
<td>(.743)</td>
<td>(.691)</td>
<td>(.743)</td>
<td>(.691)</td>
</tr>
<tr>
<td>Payment Owed = €45 [Income Bracket €40000 - €55000]</td>
<td>1.10</td>
<td>1.46</td>
<td>1.10</td>
<td>1.46</td>
</tr>
<tr>
<td></td>
<td>(.564)</td>
<td>(.837)</td>
<td>(.564)</td>
<td>(.837)</td>
</tr>
<tr>
<td>Payment Owed = €70 [Income Bracket €55000 - €70000]</td>
<td>1.70</td>
<td>1.24</td>
<td>1.70</td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td>(.953)</td>
<td>(.779)</td>
<td>(.953)</td>
<td>(.779)</td>
</tr>
<tr>
<td>Payment Owed = €100 [Income Bracket €70000+]</td>
<td>1.21</td>
<td>.292*</td>
<td>1.21</td>
<td>.292*</td>
</tr>
<tr>
<td></td>
<td>(.646)</td>
<td>(.198)</td>
<td>(.646)</td>
<td>(.198)</td>
</tr>
</tbody>
</table>

| Observations | 2521 | 2521 |

**Notes:** *** denotes significance at 1%, ** at 5%, and * at 10%. The sample is based on individuals assigned to the T1 Control Group. The outcome is the individual's compliance behavior on the extensive margin in 2011 (evader, complier, donor), the year preceding our natural field experiment. The table reports a multinomial logit model. We report relative risk ratios where the omitted base category is exact compliance in 2011. Robust standard errors are reported in parentheses. In Column 1 we only condition on the individuals lagged type, namely whether they evaded or donated in 2010 (where exact compliers in 2010 are the omitted category). Column 2 additionally control for the individual characteristics shown.

**Summary:** There is a high degree of persistence over time in individual types: For the extrinsically motivated, those that evade in 2010 are 83.3 times as likely to evade the following year as comply. For the intrinsically motivated, those that donate in 2010 are 10.8 times as likely to continue donating the following year than comply. Column 2 shows this finding to be robust when we additionally control for individual characteristics.
Table A5: Robustness Checks on Tax Simplification

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>Baseline Evaders (Extrinsically Motivated)</th>
<th>Baseline Donors (Intrinsically Motivated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probability of Evading</td>
<td>Evasion Rate</td>
<td>Probability of Evading</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>Baseline specification (randomization strata, past average compliance, parish fixed effects)</td>
<td>-2.45**</td>
<td>-3.17***</td>
<td>-2.66***</td>
</tr>
<tr>
<td></td>
<td>(0.971)</td>
<td>(0.910)</td>
<td>(0.747)</td>
</tr>
<tr>
<td>Unconditional</td>
<td>-2.60*</td>
<td>-4.02***</td>
<td>-2.66***</td>
</tr>
<tr>
<td></td>
<td>(1.47)</td>
<td>(1.53)</td>
<td>(0.807)</td>
</tr>
<tr>
<td></td>
<td>[0.917]</td>
<td>[0.580]</td>
<td>[0.997]</td>
</tr>
<tr>
<td>Randomization strata</td>
<td>-2.56*</td>
<td>-3.90**</td>
<td>-2.83***</td>
</tr>
<tr>
<td></td>
<td>(1.45)</td>
<td>(1.52)</td>
<td>(0.810)</td>
</tr>
<tr>
<td></td>
<td>[0.937]</td>
<td>[0.633]</td>
<td>[0.834]</td>
</tr>
<tr>
<td>Baseline specification excluding past compliance control</td>
<td>-2.62*</td>
<td>-4.01***</td>
<td>-2.71***</td>
</tr>
<tr>
<td></td>
<td>(1.45)</td>
<td>(1.52)</td>
<td>(0.807)</td>
</tr>
<tr>
<td></td>
<td>[0.906]</td>
<td>[0.585]</td>
<td>[0.953]</td>
</tr>
<tr>
<td>Baseline specification plus full set of individual controls</td>
<td>-2.49**</td>
<td>-3.22***</td>
<td>-2.68***</td>
</tr>
<tr>
<td></td>
<td>(0.970)</td>
<td>(0.910)</td>
<td>(0.749)</td>
</tr>
<tr>
<td></td>
<td>[0.964]</td>
<td>[0.957]</td>
<td>[0.981]</td>
</tr>
<tr>
<td>Baseline specification, balanced panel individuals</td>
<td>-3.16***</td>
<td>-3.77***</td>
<td>-2.94***</td>
</tr>
<tr>
<td></td>
<td>(1.12)</td>
<td>(1.04)</td>
<td>(0.879)</td>
</tr>
<tr>
<td></td>
<td>[0.524]</td>
<td>[0.567]</td>
<td>[0.749]</td>
</tr>
</tbody>
</table>

Outcome in omitted reference group | 79.29% | 76.35% | 94.98% | 92.35% | 62.34% | 9.09%
Number of Observations (balanced panel sample) | 3457 | 3457 | 2704 | 2704 | 348 | 348

Notes: *** denotes significance at 1%, ** at 5%, and * at 10%. The unit of observation throughout is the individual. We use pre-treatment compliance behavior in 2011 to split the sample into evaders (paid less than the amount owed), donors (paid strictly more than the amount owed), and compliers (paid the amount owed, results not shown). In these specifications we control for the individual’s average pre-treatment value of the outcome, and dummy variables for the randomization strata. Robust standard errors are in parentheses. As a point of comparison, the first row shows our baseline total response estimates among baseline evaders and baseline compliers/donors, for the impact of the T2 Tax Simplification treatment relative to the T1 Control Group. At the foot of each panel we report the level of the outcome in the T1 comparison group. We report each treatment effect (and its standard error) scaled as a percentage of this average in the comparison group. In each subsequent robustness check, we report the p-value on the cross-equation test of whether the estimated treatment response differs significantly from our preferred baseline estimate. The first robustness check row estimates our baseline specification unconditional on all other controls except the indicator for assignment to T2. The next additionally conditions on the randomization strata, the third excludes the control for past compliance behavior, the fourth augments our baseline specification with additionally controls for individual characteristics (male, age, number of children, joint filer, receive wage income, liable for trade taxes, and payment bin for the local church tax). The final row estimates our baseline specification in the balanced subsample of individuals that are observed in all years 2008-11.
Table A6: Deterrence Effects of an Audit Probability Notch
Sample: Baseline Evaders

<table>
<thead>
<tr>
<th>Compared to T3 Zero Audit Probability Letter</th>
<th>Effect on Payment (in %)</th>
<th>Number of Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1a) Mean Comparison</td>
<td>(1b) Bunching Estimate</td>
</tr>
<tr>
<td>T7: Audit probability = .5 if payment ≤ 10 Euro and 0 for payment above</td>
<td>32.1***</td>
<td>45.13***</td>
</tr>
<tr>
<td></td>
<td>(9.66)</td>
<td>(5.72)</td>
</tr>
<tr>
<td>T6: Audit probability = .5</td>
<td>28.6***</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>(9.68)</td>
<td></td>
</tr>
<tr>
<td>Outcome in omitted reference group</td>
<td>4.05 Euro</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes: Estimations at the individual taxpayer level. *** denotes significance at 1%, ** at 5%, and * at 10% level. Robust standard errors are in parentheses. Regressions include strata variables (payment owed and the number of times the individual was observed in the panel at the time of the intervention) as well as parish fixed effects. The bunching estimates in column (2) are based on the analysis in Figure 3, Panels C and D, and show by how much (in %) the average buncher increases the payment in order to locate above the notch point at 10 Euro. All regressions are based on the sample of baseline evaders with a non-negative tax gap prior to treatment (2011).

Summary: The results show that the audit probability notch significantly increases individuals’ probability of paying and payments. Compared to the uniform audit probability treatment, the audit probability notch treatment increases both the size and the precision of the estimated effect.
Table A7: Treatment Effects of Social Norm and Moral Appeal

<table>
<thead>
<tr>
<th></th>
<th>Full Sample</th>
<th>Baseline Evaders (Extrinsically Motivated)</th>
<th>Baseline Donors (Intrinsically Motivated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probability of Evading</td>
<td>Probability of Evading</td>
<td>Probability of Donating</td>
</tr>
<tr>
<td></td>
<td>Evasion Rate</td>
<td>Evasion Rate</td>
<td>Increased Donation Rate</td>
</tr>
<tr>
<td>Panel A: Social Norm</td>
<td>(1)</td>
<td>(3)</td>
<td>(5)</td>
</tr>
<tr>
<td>Social Comparison</td>
<td>0.904</td>
<td>1.50*</td>
<td>12.20*</td>
</tr>
<tr>
<td></td>
<td>(1.03)</td>
<td>(0.824)</td>
<td>(6.95)</td>
</tr>
<tr>
<td>Outcome in omitted</td>
<td>77.30%</td>
<td>92.35%</td>
<td>61.63%</td>
</tr>
<tr>
<td>reference group</td>
<td>73.37%</td>
<td>88.69%</td>
<td>5.71%</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>5123</td>
<td>4031</td>
<td>492</td>
</tr>
</tbody>
</table>

Panel B: Moral Appeal

<table>
<thead>
<tr>
<th></th>
<th>Baseline Evaders (Intrinsically Motivated)</th>
<th>Baseline Donors (Intrinsically Motivated)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Probability of Evading</td>
<td>Probability of Donating</td>
</tr>
<tr>
<td></td>
<td>Evasion Rate</td>
<td>Increased Donation Rate</td>
</tr>
<tr>
<td>Moral Appeal</td>
<td>-0.136</td>
<td>3.89</td>
</tr>
<tr>
<td></td>
<td>(1.05)</td>
<td>(6.93)</td>
</tr>
<tr>
<td>Outcome in omitted</td>
<td>77.30%</td>
<td>61.63%</td>
</tr>
<tr>
<td>reference group</td>
<td>73.37%</td>
<td>5.71%</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>5052</td>
<td>477</td>
</tr>
</tbody>
</table>

Notes: Estimations at the individual taxpayer level. *** denotes significance at 1%, ** at 5%, and * at 10% level. Robust standard errors are in parentheses. Strata variables: payment owed and the number of times the individual was observed in the panel at the time of the intervention. Estimations with controls include parish fixed effects and individual controls (compliance behavior in the previous period, age, sex, joint filing, number of (taxable) children as well as dummy variables for wage income, capital income, and income liable for local trade tax). We use pre-treatment compliance behavior in 2011 to split the sample into evaders (paid less than the amount owed), donors (paid strictly more than the amount owed), and compliers (paid the amount owed, results not shown).
T1 (Control) Letter

Dear Ms/Mr [addressee's family name],

As every year, we kindly ask you herewith for your annual local church tax payment, with which you directly support the work of your Evangelical-Lutheran congregation and the social work of the deaconry. The local church tax forms part of the general church tax and is collected once yearly by the Evangelical-Lutheran Church in [...].

What do you get from the local church tax?
Many congregations and services use the local church tax funds for very elementary purposes, such as church maintenance or to cover heating costs. With your local church tax you help the churches to stay open and offer a home to those who need it.

Be it the Baptism and Confirmation of your children, or a church wedding, we are always there when you need us. Or when tragedy or a crisis hits. You will always find someone who listens and provides concrete support in your congregation and at our Evangelical counselling centres. With your local church tax, you also support more than 60 Evangelical kindergartens that instil Christian values in our children and thus provide a solid basis for the development of their character.

The Evangelical Church is also engaged in the region's social hotspots. Your local church tax supports important on-going projects dedicated to the social reintegration of troubled youths, keeping them from sliding into social alienation. Your contribution also helps to sustain 17 nursing services for elderly and sick people. You can also find further examples of our work in the enclosed bulletin.

Why is the local church tax so important?
The local church tax has become increasingly important for the Church District of the Evangelical-Lutheran Church of [...] because the grants received by the local parishes have declined over the years. 60% of the gross revenue goes to the congregations, 28% to the deaconry and 12% to supra-congregational services (such as counselling centres). In 2011, the local church tax collected 1.7 million euros. We express our heartfelt gratitude to all those who, with their contribution, make possible the continued provision of the various church services in [...].

How much Local church tax do you have to pay?
The local church tax is staggered according to income and ranges from € 5 to € 100 annually, depending on your own income assessment. This letter has the legal status of a tax bill. We would therefore kindly ask that each tax bill recipient in a household (e.g., husband and wife) transfer the respective amount of local church tax separately, specifying your local church tax number (cf. remittance slip). We apologise for any inconvenience in this regard.

You will find further information on the back of this page. If you have any questions, we would be glad to answer them at our service hotline [...] or per e-mail at [...]. We appreciate your financial support.

With kind regards,

[signature in handwriting]

Regional Dean of the Church District

[bank transfer slip printed on lower part of letter]
Information regarding the local church tax

1. The local church tax

is, together with the church payroll tax and the church income tax, a compulsory contribution that is collected once a year and that benefits your local congregation directly. All congregation members over 18 years of age receive the local church tax payment notice, so that a family can receive several such notices. (For technical reasons, it is not possible to do otherwise. We apologize for any inconvenience.) The local church tax revenues remain in the Church District of [...] and are then allotted to the local congregations as well as to supra-congregational and deaconry projects in the [...] district, in accordance with the guidelines set forth by the District Synod. In Bavaria, the rate for both the church payroll tax and the church income tax is at 8%, lower than in most other federal states (where it is 9% of the general payroll and income tax). In Bavaria, the church collects the local church tax in addition to the aforementioned taxes.

2. The legal foundation

for collecting the local church tax is the Kirchensteuergesetz (KirchStG) as published on November 21, 1994 (GVBI, p. 250), last amended on 22 December 2008 (GVBI, p. 973) and the Kirchensteuererhebungsgesetz of December 9, 2002 (KABI. 2003, p. 19), as well as by the Implementing Regulation on the Kirchensteuererhebungsgesetz of October 15, 2003 (KABI. 2003 p. 306). You can find the corresponding legal texts at [...]. We would also be happy to send them to you upon request.

3. Subject to the local church tax

are all members of the Evangelical-Lutheran Congregation who, as of January 1st, fulfill all the following conditions (Article 7 para. 3 of the Church Levy Collection Act):

• Have turned 18 years old before January 1st of the current year
• Had an income of more than € 8,004 (the tax-exempt amount in accordance with Article 32a para. 1 No. 1 of the Income Tax Law [ESTG]). As a general rule, this is the taxable income, but other income such as alimony or child support, benefit payments, pensions or regular stipends must also be considered.
• Residence within the area of the [...].

4. Exempt taxation are

• All congregants under the age of 18,
• Congregants above the age of 18 whose income does not exceed € 8,005 (see point 3 above).

Should any of the conditions above apply, you can file an objection within one month of receipt of this notification. To this end, simply return the notification, together with a short explanation, to [...], or send an e-mail with an explanatory statement, including your local church tax number (indicated on the bank transfer form), your first and family names and your address to [...].

5. The amount of local church tax

is staggered according to income from €5 to €100. We suggest that, in making the self-assessment, you take as a basis the yearly income used to sustain your livelihood (see Point 3 above). We ask you to make your payment no later than September 15, 2012. We thank you in advance.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Yearly Income or Benefits</th>
<th>Annual Local Church Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>€ 8,005 to € 9,999</td>
<td>€ 5</td>
</tr>
<tr>
<td>2</td>
<td>€ 10,000 to € 24,999</td>
<td>€ 10</td>
</tr>
<tr>
<td>3</td>
<td>€ 25,000 to € 39,999</td>
<td>€ 25</td>
</tr>
<tr>
<td>4</td>
<td>€ 40,000 to € 54,999</td>
<td>€ 45</td>
</tr>
<tr>
<td>5</td>
<td>€ 55,000 to € 69,999</td>
<td>€ 70</td>
</tr>
<tr>
<td>6</td>
<td>€ 70,000 and above</td>
<td>€ 100</td>
</tr>
</tbody>
</table>

6. Tax-reducing expenditure

The local church tax payment can be claimed as a deductible church tax in your tax filing.

7. Donations

Every sum above €100 is considered a donation, which we gratefully appreciate. For donations between €100 and €300, the tax office accepts a plain certificate of donation, such as a bank transfer slip where the beneficiary institution and the intended purpose are shown. For donations above €300, we will automatically send you a donation certificate.

8. Payment already effected

Should you have already paid the local church tax, please disregard this notice. For technical reasons, it is not possible for us to identify payments made before the payment notice is issued and thus exempt you from receiving it.

9. Further information

is available at [...]


Dear Ms/Mr [addressee’s family name],

With this letter, we want to inform you that your annual local church tax payment is due. The local church tax forms part of the general church tax and is a compulsory payment that is collected once yearly by the Evangelical-Lutheran Church in the [...] region.

Subject to the local church tax are all members of the Evangelical-Lutheran congregation who are at least 18 years of age by January 1st of the current year, earned an income of more than €8,004, and who reside within the area of the Church District. The amount of the local church tax is staggered according to income and ranges from €5 to €100 annually, depending on your own income assessment. We suggest that, in making the self-assessment, you take as a basis the yearly income used to sustain your livelihood. As a general rule, this is your taxable income, but other sources of income such as alimony or child support, benefit payments, pensions or regular stipends must also be considered.

<table>
<thead>
<tr>
<th>Tier</th>
<th>Yearly Income or Benefits</th>
<th>Annual Local Church Tax</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>€ 8,005 to € 9,999</td>
<td>€ 5</td>
</tr>
<tr>
<td>2</td>
<td>€ 10,000 to € 24,999</td>
<td>€ 10</td>
</tr>
<tr>
<td>3</td>
<td>€ 25,000 to € 39,999</td>
<td>€ 25</td>
</tr>
<tr>
<td>4</td>
<td>€ 40,000 to € 54,999</td>
<td>€ 45</td>
</tr>
<tr>
<td>5</td>
<td>€ 55,000 to € 69,999</td>
<td>€ 70</td>
</tr>
<tr>
<td>6</td>
<td>€ 70,000 and above</td>
<td>€ 100</td>
</tr>
</tbody>
</table>

This letter has the legal status of a tax bill. We would therefore kindly ask that each tax bill recipient in a household (e.g., husband and wife) transfer the respective amount of local church tax separately, specifying your local church tax number (cf. remittance slip). We request that your payment be made no later than September 30, 2012.

You will find further information on the back of this page. If you have any questions, we would be glad to answer them at our service hotline [...] or per e-mail at [...].

With kind regards,

[signature in handwriting]

Regional Dean of the Church District

[bank transfer slip printed on lower part of letter]
Information regarding the local church tax

1. The local church tax
   is, together with the church payroll tax and the church income tax, a compulsory contribution that is collected once a year and that benefits your local congregation directly. The local church tax revenues remain in the Church District of [...] and are then allotted to the local congregations as well as to supra-congregational and deaconry projects in the [...] district, in accordance with the guidelines set forth by the District Synod. In Bavaria, the rate for both the church payroll tax and the church income tax is at 8%, lower than in most other federal states (where it is 9% of the general payroll and income tax). In Bavaria, the church collects the local church tax in addition to the aforementioned taxes.

2. The legal foundation
   for collecting the local church tax is the Kirchensteuergesetz (KirchStG) as published on November 21, 1994 (GVBI, p. 1026), last amended on December 22, 2008 (GVBI, p. 973), and the Kirchensteuererhebungsgesetz of December 9, 2002 (KABI. 2010, p. 9), as well as the Implementing Regulation on the Kirchensteuererhebungsgesetz of December 7, 2006 (KABI. 2007 p. 18). You can find the corresponding legal texts at [...]. We would also be happy to send them to you upon request.

3. What do you get from the local church tax?
   Many congregations and services use the local church tax funds for very elementary purposes, such as church maintenance or to cover heating costs. With your local church tax, you help the churches to stay open and to offer a home to those who need it. With your local church tax, you also support more than 60 Evangelical kindergartens that instil Christian values in our children and thus provide a solid basis for the development of their character. The Evangelical Church is also engaged in the region's social hotspots. Your local church tax supports important on-going projects dedicated to the social reintegration of troubled youths, keeping them from sliding into social alienation. Your contribution also helps to sustain 17 nursing services for elderly and sick people. You can also find further examples of our work in the enclosed bulletin.

4. Why is the local church tax so important?
   The local church tax has become increasingly important for the Church District of the Evangelical-Lutheran Church of [...] because the grants received by the local parishes have declined over the years. 60% of the gross revenue goes to the congregations, 28% to the deaconry and 12% to supra-congregational services (such as counselling centres). In 2011, the local church tax collected 1.7 million Euros.

5. Exempt from taxation are
   • all congregants under the age of 18,
   • congregants above the age of 18 whose income does not exceed € 8,005.
   Should any of the conditions above apply, you can file an objection within one month of the receipt of this notification. To this end, simply return the notification, together with a short explanation, to the Church District of [...], or send an e-mail with an explanatory statement, including your local church tax number (indicated on the bank transfer form), your first and family names and your address to [...].

6. Tax-reducing expenditure
   The local church tax payment can be claimed as a deductible church tax in your tax filing.

7. Donations
   Every sum above €100 is considered a donation, which we gratefully appreciate. For donations between €100 and €300, the tax office accepts a plain certificate of donation, such as a bank transfer slip where the beneficiary institution and the intended purpose are shown. For donations above €300, we will automatically send you a donation certificate.

8. Payment already effected
   Should you have already paid the local church tax, please disregard this notice. For technical reasons, it is not possible for us to identify payments made before the payment notice is issued and thus exempt you from receiving it.

9. Further Information
   is available at [...]


T1 (Control) Letter in German

Sehr geehrte/r Frau/Herr [Nachname],


Was haben Sie vom Kirchgeld?
Viele Gemeinden und Dienste verwenden das Kirchgeld für ganz elementare Dinge wie die Instandhaltung ihrer Kirchen oder für Heizkosten. Mit dem Kirchgeld tragen Sie dazu bei, dass die Kirchen offen sind und den Menschen ein Zuhause bieten.


Warum ist das Kirchgeld so wichtig?
Das Kirchgeld gewinnt für die [...] zunehmend an Bedeutung, weil die Zuweisungen der Landeskirche an die Gemeinden zurückgegangen sind. 60 % des Reinetrags gehen an die Gemeinden, 28 % an die Diakonie und 12 % an die übergemeindlichen Dienste (z.B. Beratungsstellen). Im Jahr 2011 wurden 1,7 Millionen Euro Kirchgeld eingezahlt. Herzlichen Dank sagen wir allen, die mit ihrem Beitrag die vielfältigen Angebote der evangelischen Kirche in der Region [...] ermöglicht haben.

Wie hoch ist der Kirchgeldbeitrag?
Der Pflichtbeitrag Kirchgeld ist nach Einkommen gestaffelt und beträgt einmal jährlich entsprechend Ihrer Selbsteinstufung 5 bis 100 Euro. Da der Kirchgeldbrief ein Steuerbescheid ist, bitten wir Sie, den entsprechenden Betrag für jeden Bescheid gesondert (z.B. Herr und Frau) und mit Angabe der Kirchgeldnummer (siehe Überweisungsformular) zu überweisen. Vielen Dank für Ihr Verständnis.

Weitere Hinweise finden Sie auf der Rückseite. Bei Fragen wenden Sie sich gerne an unser Servicetelefon [...] oder schreiben Sie eine E-Mail an [...]. Wir bitten Sie um Ihre finanzielle Unterstützung.

Mit herzlichen Grüßen

Ihre

[signature in handwriting]

Stadtdekanin

[bank transfer slip printed on lower part of letter]
Informations zum Kirchgeld

1. Das Kirchgeld

2. Gesetzliche Grundlage

3. Kirchgeldpflichtig
sind evangelisch-lutherische Gemeinde glieder, die am 1. Januar alle folgenden Voraussetzungen erfüllen (§ 7 Abs.3 KirchensteuererhebungsGesetz)
• Vollendung des 18. Lebensjahres vor dem 1. Januar des laufenden Jahres
• Jährlich mehr als 8.004 € eigene Einkünfte (Grundfreibetrag gemäß §32a Abs.1 Satz 2 Nr.1 EStG) , in der
• Regel das zu versteuernde Einkommen. Zu berücksichtigen sind aber auch andere Bezüge zur Bestreitung
• des Lebensunterhalts wie Unterhaltsleistungen, Versorgungsbezüge, Renten oder regelmäßige Stipendien.
• Wohnsitz im Bereich der [...] .

4. Befrei vom Kirchgeld sind
• Alle Gemeinde glieder unter 18 Jahren
• Gemeinde glieder über 18 Jahre, wenn ihre jährlichen Einkünfte (s. Punkt 3) unter 8.005 € liegen.
Sollten einer dieser Punkte auf Sie zutreffen, können Sie innerhalb eines Monats Einspruch einlegen. Dazu schicken Sie einfach diesen Brief mit einer kurzen Begründung zurück an die Evangelisch-Lutherische [...] , [...] , oder eine entsprechende E-Mail mit Angabe Ihrer Kirchgeldnummer (s. Überweisungsträger), Ihrem Vor- und Nachnamen und Ihrer Anschrift an [...] .

5. Die Höhe des Kirchgelds

<table>
<thead>
<tr>
<th>Stufe</th>
<th>Jährliche Einkünfte oder Bezüge</th>
<th>Jährliches Kirchgeld</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8.005 bis 9.999 €</td>
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</tr>
<tr>
<td>6</td>
<td>70.000 € und mehr</td>
<td>100 €</td>
</tr>
</tbody>
</table>

6. Steuermindernde Sonderausgabe
Die Kirchgeldzahlung können Sie bei Ihrer Steuererklärung als Kirchensteuer geltend machen.

7. Spenden
Jeder Betrag, der die Höchstgrenze von 100 € übersteigt, gilt als Spende (Zuwendung), für die wir herzlich danken. Bei Zahlung eines Betrages zwischen 100 € und 300 € gilt der vereinfachte Zuwendungsnachweis. Hier genügt die Buchungsbestätigung des Kreditinstitutes für das Finanzamt, wenn daraus die begünstigte Körperschaft und der Zweck ersichtlich sind. Bei Zahlung über 300 € erhalten Sie von uns automatisch eine Zuwendungsbescheinigung.

8. Bereits erfolgte Zahlung

9. Weitere Informationen
finden Sie im Internet unter [...].
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Ihre

[signature in handwriting]

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4. Warum ist das Kirchgeld so wichtig?

Das Kirchgeld gewinnt für die Evangelisch-Lutherische [...] zunehmend an Bedeutung, weil die Zuweisungen der Landeskirche an die Gemeinden zurückgegangen sind. 60 % des Reinertrags gehen an die Gemeinden, 28 % an die Diakonie und 12 % an die übergemeindlichen Dienste (z.B. Beratungsstellen). Im Jahr 2011 wurden 1,7 Millionen Euro Kirchgeld eingezahlt.

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