European Journal of Political Economy 26 (2010) 89–103

Contents lists available at ScienceDirect

European Journal of Political Economy

journal homepage: www.elsevier.com/locate/ejpe

Social norms and conditional cooperative taxpayers

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ARTICLE INFO

Article history:
Received 16 August 2007
Received in revised form 2 November 2009
Accepted 2 November 2009
Available online 10 November 2009

JEL classification:
H26
Z13
K42

Keywords:
Tax evasion
Social norms
Multiple equilibria
Conditional cooperation
Belief management

ABSTRACT

This paper incorporates tax morale into the Allingham and Sandmo (1972) model of income tax evasion. Tax morale is modeled as a social norm for tax compliance. The strength of the norm is shaped endogenously, depending on the share of evaders in the society. Taxpayers act conditionally cooperative as their evasion depends on the others' compliance. We characterize the equilibrium which accounts for this interdependence and study the implications for tax and enforcement policies. The analysis is extended to the case of a society consisting of heterogenous communities. Individual evasion decisions are then embedded in a complex social structure and behavior is influenced by the norm compliance among morale reference groups. Within this framework, we highlight the role of belief management as an alternative policy tool.

1. Introduction

In the past two decades, a huge body of empirical literature emerged which highlights the importance of tax morale – taxpayers' attitudes, perceptions and moral values – for individual evasion decisions.[1] Tax evasion seems to be more than a risky gamble of rational individuals, who trade off the costs from detection with the chance of getting away undetected (Allingham and Sandmo, 1972).[2] As expressed by Agnar Sandmo (2005, p.649), "people refrain from tax evasion […] not only from their estimates of the expected penalty, but for reasons that have to do with social and morale considerations." One crucial factor which systematically influences such moral considerations is the (perceived) compliance of other taxpayers. Individuals, who believe that most fellow citizens are honest, consider evasion as a more serious wrongdoing than those, who presume tax evasion to be more widespread.[3] As recently discussed by Frey and Torgler (2007), this link appears to be causal: higher expectations about the level of evasion trigger, ceteris paribus, a lower tax morale.

In this paper we take up these findings and incorporate tax morale into Allingham–Sandmo's analysis of income tax evasion. Tax morale is modeled as an internalized social norm for tax compliance (Elster, 1989), which renders evasion 'costly'. If a taxpayer deviates from the norm and conceals income, conduct is not in line with the individual's self-image as a 'good' member of society,

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[1] See, e.g., Alm et al. (1992), Lewis (1982, 1986), Orviska and Hudson (2003), Torgler (2007) as well as chapter 6 in Cowell (1990). For a general discussion of the interplay of formal and informal institutions see, among many others, Ahlerup et al. (2009) and Kube and Traxler (2009).

[2] See Andreoni et al. (1998) and Cowell (1990) for comprehensive discussions of the classical evasion model.

[3] See, e.g., Frey and Torgler (2007), Porcano (1988), Spicer and Hero (1985).

0176-2680/$ – see front matter
doi:10.1016/j.ejpoleco.2009.11.001

who complies with societal norms and expectations. The strength of the norm – and thereby the self-imposed sanctions associated with a norm violation – is determined by two factors. First, by an exogenously given, individual specific degree of norm internalization. Second, by the endogenously determined share of evaders in the society. The more people deviate from the norm, the weaker the norm becomes. This creates an interdependency of evasion decisions. An increase in evasion will trigger a bandwagon effect as it lowers the strength of the norm and thereby raises other taxpayers' disposition to dodge taxes. Hence, individuals act conditionally cooperative – they condition their compliance on the behavior of other members of the society.[4]

We first discuss the policy implications of this framework for the case of a homogenous society. In the next step, we extend our analysis to the case of a more structured society, consisting of different subgroups. The strength of the social norm is not only determined by the behavior among the own peers, but also by the compliance in other subgroups. Within such a structured society, different communities can end up with quite different levels of tax compliance. Hence, this framework captures community specific 'tax subcultures', as discussed in Lewis (1982). Moreover, we show that group-specific policies may create spillovers on other communities. The intuition for this result – which is, to the best of our knowledge, novel in the literature – is that conditional cooperation works not only within but also between groups.

If, for instance, looser tax enforcement among one specific group results in more evasion, this creates an externality on the norm strength in other groups. The more a community takes over the position of a social reference group, the more detrimental are norm violations within this group on the perceived norm strength in the rest of the society. In order to maintain a strong social norm, it is therefore crucial to enforce a high level of tax compliance among 'morale leaders', i.e., members of moral reference groups. If the 'leaders' adhere to the norm, this will trigger conditional compliance among the 'followers'. This last result can be neatly linked to recent experimental evidence which studies the impact of leader behavior in groups. Gächter and Renner (2006), for example, show that higher contributions by a leader (first-mover) in a sequential public good game make followers expect higher levels of cooperation. In turn, this results in more contributions among the followers. The importance of such a leader–follower interaction is also emphasized by Hammar et al. (2009). They discuss a study by the Swedish Tax Agency which found that "the most common argument legitimizing tax evasion among Swedens is that those in leading positions in society violate the social norms" (p.5). This suggests that the recent wave of high-profile evasion cases in Europe – e.g., the case of the former CEO of Germany's *Deutsche Post AG*, Klaus Zumwinkel – might have non-negligible impact on the overall level of tax evasion. Our paper is the first which incorporates this aspect into the formal analysis of tax evasion.

Compared to the standard model of tax evasion, we solve several shortcomings of the latter. First, the standard theory cannot explain that a majority of households fully comply with tax laws. As most fiscal systems are characterized by rather low audit rates and penalties, a rational, immoral taxpayers with a reasonable degree of risk aversion should conceal at least some income (Bernasconi, 1998). Obviously, we can account for the high levels of compliance documented in many countries (Alm et al., 1992; Andreoni et al., 1998) once we allow tax morale to play a role. Second, the Allingham–Sandmo model can hardly explain huge differences in tax compliance between countries or regions with comparable monetary incentives for evasion. In terms of Rothstein (2000), standard theory fails to explain why 'Palermo is not Milan and Stockholm is not Moscow'. As noted above, the evasion decisions in our model are interdependent, typically resulting in a multiplicity of equilibria. An economy with a given tax and enforcement policy can either end up in a state with a strong social norm, where most taxpayers pay all their taxes honestly, or a state with a weak social norm, where evasion is more widespread. In this vein, our analysis provides an explanation to the 'Palermo-Milano' puzzle.

Thirdly, our model solves another weakness of the standard model. For decreasing absolute risk aversion, the standard theory implies that higher taxes will lead to a lower level of evasion (Yitzhaki, 1974). We demonstrate that this counterintuitive result – which is also at odds with most empirical studies (e.g., Clotfelter, 1983) – vanishes, when individuals are sufficiently sensitive to social norms. Finally, our framework also allows for quite unusual responses to policy changes, if agents are not perfectly rational in the formation of their beliefs about others' behavior. If, for instance, a stricter deterrence policy is accompanied by a shock in agents' beliefs such that they expect a level of norm violations which is above the true level, these initially false beliefs can become self-fulfilling. In the context of multiple equilibria, stricter deterrence could then trigger more evasion. This finding also points out the role of belief management as an important policy instrument (Fehr and Falk, 2002; Gächter, 2006).

It is important to note that several existing contributions propose behavioral models of tax evasion (Gordon, 1989; Myles and Naylor, 1996; Kim, 2003).[5] Each of these papers separately accounts for some of the problems of the standard theory highlighted above. As discussed in more detail in Section 2, however, our analysis combines and generalizes several aspects of earlier models and provides entirely new results on the role of belief spillovers. Kim (2003), for instance, studies the role of stigmatization. While the properties of his framework are comparable to ours, he uses numerical simulations to show results that we can derive analytically. A recent experimental study by Fortin et al. (2007) sketches a general model of tax evasion and social interaction. The model is tailored to their experimental design and the authors focus on testing it in the lab. A detailed formal analysis and a discussion of policy implication, as it is presented in this paper, is beyond their focus. Myles and Naylor (1996) consider a social custom of tax compliance. In contrast to our approach, however, they assume that the disutility from a violation of the custom is independent of the amount of evasion. This implies that those who cheat on taxes choose the level of evasion predicted by Allingham and Sandmo (1972). Hence, Myles and Naylor neither capture heterogenous levels of non-compliance nor a positive relationship between the tax rate and evasion.

[4] Gächter (2006) provides a comprehensive survey of law as well as field evidence on conditional cooperative behavior.
[5] See also Bordignon (1993), Erard and Feinstein (1994).

The analysis from Gordon (1989) is most closely related to our study. As we will discuss below, the preference structure considered in the present paper is less specific than the one in Gordon. In addition, we provide a detailed examination of tax and deterrence policies in the context of interrelated evasion decisions which is missing in Gordon. In particular, our discussion of belief management is entirely novel in the tax evasion literature. Moreover, we provide a tractable framework to study evasion in a multi-group setting, that allows for heterogeneity in income levels as well as group-specific tax and enforcement policies. Non of the other studies discusses the case of 'tax subcultures' or the spillover from group-specific policies in a structured society.

The remainder of the paper is structured as follows. In the next section we present the Allingham and Sandmo (1972) model as well as several extensions of their approach. Section 3 introduces a tax compliance norm and studies individual evasions behavior within this framework. Section 4 solves for a social equilibrium with a heterogenous population. In Section 5, we extend our model to a society consisting of different subgroups and study the impact of group-specific policy measures. The paper concludes with the discussion of policy implications.

2. Theories of tax evasion

2.1. The Allingham–Sandmo model

Following Allingham and Sandmo (1972) (hereafter labeled AS), we consider individuals with an exogenous gross income y. Each taxpayer i decides on how much of this income to declare and how much to conceal. Income concealed is labeled $e_i \in [0, y]$. The declared income, $y - e_i$, gets taxed with a proportional income tax at rate τ. With a fixed probability p the evasion gets detected. In this case, the tax evader has to pay the full taxes and a penalty which is proportional to the taxes evaded (Yitzhaki, 1974). With probability $1 - p$ the evasion remains undetected and the evader only pays taxes on the declared income. The corresponding levels of net income x_i for state a – getting detected – or state b – escaping undetected – are given by

$$x_i^a = x^a(e_i) = y - (y - e_i)\tau - \tau e_i - \tau e_i s = (1-\tau)y - \tau e_i s$$
$$x_i^b = x^b(e_i) = y - (y - e_i)\tau = (1-\tau)y + \tau e_i$$

where $s > 0$ denotes the penalty rate. The expected (monetary) utility from evasion is given by the von Neumann–Morgenstern

$$E[u(x(e_i))] = p\,u(x^a(e_i)) + (1-p)u\left(x^b(e_i)\right) \tag{1}$$

with $u'(x) > 0$ and $u''(x) < 0$. Agents choose e that maximizes the expected utility. Note that the decision is equivalent to an optimal portfolio choice problem, as individuals decide on how much of their income to declare — and thereby invest in a safe asset — and how much to conceal — and thereby invest in a risky asset. The first- and second-order condition to this problem are given by

$$E[u]' \equiv -ps\tau\, u'\left(x^a\right) + (1-p)\tau\, u'(x^b) = 0, \tag{2}$$

$$E[u]'' \equiv p(s\tau)^2 u''\left(x^a\right) + (1-p)\tau^2 u''(x^b) < 0. \tag{3}$$

Condition (2) characterizes e^{AS}, the optimal level of income concealed. We will assume in the following that such an interior solution $e^{AS} \in [0, y]$ always exists.

Implicitly differentiating $E[u]'$ with respect to p and s, one can easily show that the level of evasion decreases as tax enforcement becomes stricter, i.e., $de^{AS}/dp < 0$ and $de^{AS}/ds < 0$. The effect of a marginal increase in τ is given by

$$\frac{de^{AS}}{d\tau} = \frac{(1-p)\tau\, u'(x^b)\left[(y-e)\left(\rho(x^b) - \rho(x^a)\right) - e(s+1)\rho(x^b)\right]}{-E[u]''} \tag{4}$$

where we made use of Eq. (2) and the Arrow–Pratt measure of absolute risk aversion, $\rho(x) = -u''(x)/u'(x)$. For non-increasing absolute risk aversion (an assumption which is maintained throughout the paper), there holds $\rho' \leq 0$ and thereby $\rho(x_i^a) \geq \rho(x_i^b)$. Hence, the sign in the squared brackets in Eq. (4) is negative. We get the paradoxical result $de^{AS}/d\tau < 0$. According to the AS framework, taxpayers with constant or decreasing absolute risk aversion conceal less income, if the tax rate rises. This counterintuitive finding is driven by the structure of the fine. Here we follow Yitzhaki (1974), who assumes that the penalty is assessed on the level of taxes evaded, rather than on income concealed as in the original AS paper. An increase in taxes will therefore raise both, the marginal gain from undetected evasion, i.e. taxes saved, as well as the marginal costs associated with higher fines in the case of detection. In the optimum, these two effects exactly offset each other. There is no substitution effect and the impact of a tax increase on the optimal evasion level is solely driven by the income effect. With decreasing absolute risk aversion, a rise in taxes will then reduce evasion, as a lower income makes taxpayers less willing to bear risks.

2.2. Customs, stigma and social interaction

Several contributions have extended the classical portfolio choice model, considering an additive preference structure of the form

$$U(e_i) = E[u(e_i)] + S(e_i, .). \tag{5}$$

While $E[u(.)]$ represents the expected utility as defined in Eq. (1), $S(.)$ is motivated by taxpayers' preferences over different non-pecuniary payoffs associated with tax evasion. The study of Gordon (1989) considers morality and reputation concerns. He studies the case of

$$S^G = -e_i(\alpha_i + \beta(1-n))$$

where $\alpha_i \geq 0$ captures the individual specific (marginal) moral or 'psychic costs' of concealing, and $\beta(1-n)$, with a fixed $\beta > 0$, reflects the (marginal) 'reputation costs'. These costs are linearly decreasing in n, the fraction of evaders in the society. Hence, the less 'costly' it is to conceal, the more others do so. The model presented in the next section will generalize the structure from Gordon.

A similar approach is taken up in Myles and Naylor (1996). They analyze a social custom for tax compliance, expressed by

$$S^{MN} = \begin{cases} \gamma_i + \delta_i R(n) & \text{for } e_i = 0 \\ 0 & \text{for } e_i > 0 \end{cases}$$

with $\gamma_i \geq 0$, $\delta_i \geq 0$ and $R(n) \geq 0$. When taxpayers fully comply ($e_i = 0$) they derive a conformity payoff consisting of a fixed component, γ_i, and $\delta_i R(n)$. The authors assume $R' < 0$, arguing that the less attractive it is to follow the social custom the more people evade taxes. The crucial distinction to Gordon's model is that the conformity payoff is lost, once a single Euro is underreported. The marginal non-pecuniary costs from evading a second Euro are zero. Taxpayers who decide to evade will thus conceal e^{AS}, the amount predicted by the AS model. In contrast to AS, Myles and Naylor's approach predicts more corner solutions with $e_i = 0$.

Kim (2003) focuses on the impact of stigmatization. He employs the functional form

$$S^K = -p\,P(e_i, 1-n)$$

with $P(.)$ increasing in both arguments and convex in e_i. S^K reflects the expected costs from stigmatization, which are decreasing in n and increasing in the detection probability p. Hence, taxpayers are assumed to be risk neutral regarding stigmatization costs but risk averse over pecuniary payoffs. Note further, that Kim does not allow for heterogeneity in $P(.)$. Instead, he introduces heterogenous incomes which imply heterogenous levels of underreporting.

The study in Fortin et al. (2007) sketches a more general structure, with

$$S^{FLV} = -e_i K(\bar{e}_{-i}, \bar{t}_{-i}, \bar{p}_{-i}, \eta).$$

The marginal non-pecuniary costs of underreporting income, $K(.)$, depend – either positively or negatively – on the other taxpayers' average level of evasion ($\bar{e}_{-i}$). Hence, the authors allow for either a 'conformity' or for an 'anti-conformity' effect. In addition, $K(.)$ is increasing in the average tax and auditing rate faced by others ($\bar{t}_{-i}, \bar{p}_{-i}$), capturing fairness motives. Finally, the vector η contains individual and group-specific characteristics that might affect $K(.)$. The structure considered by Fortin et al. is tailored to their experimental set-up (e.g., assuming precise knowledge about the others' evasion behavior). It is concerned with interaction among a small, well-defined group rather than evasion in a large society.

3. A social norm for tax compliance

Our approach focuses on the impact of tax morale on income underreporting. Tax morale is modeled as an internalized social norm for tax compliance. Declaring all income correctly is considered to be the 'morally right' behavior, while cheating on the taxes represents a violation of a social norm. Each member of the society has internalized these moral connotations to a certain degree. If a taxpayer conceals income, behavior is in conflict with morals. Evasion is then accompanied by internal sanctions, associated with emotions like guilt or remorse (Elster, 1989). The strength of these sanctions depends on the endogenous strength of the norm. Following the literature (Akerlof, 1980; Lindbeck et al., 1999), we assume that the stronger a norm is perceived, the more people adhere to it. If tax evasion becomes more common, the social norm is less powerful and individuals' costs to deviate from the norm decline. When it becomes easier for taxpayers to justify their wrongdoing to themselves, the more other people violate the societies' code of conduct.[6]

Preferences are represented by an additive structure as in Eq. (5), where

$$S(e_i, n) = -\theta_i e_i c(n)$$

captures the 'moral costs' of tax evasion. These costs are assumed to depend on (i) $\theta_i \geq 0$, the individual specific degree of norm internalization, as well as (ii) the continuous function $c(n)$ which captures the strength of the norm for a given share of evaders n. We assume that $0 < c(n) < \infty$ and $c'(n) \leq 0$ for $n \in [0,1]$. The more taxpayer deviate from the norm, the lower are the moral costs of evasion. Moreover, (iii) the moral costs are linearly increasing in e_i, the amount of income concealed.

The second assumptions generalizes the model in Gordon (1989), who implicitly assumes $c'(n) = -\beta$. At the same time we just use one parameter, θ_i, which simplifies his two parameter approach. Our third assumption, which is supported by evidence in, e.g., Aitken and Bonneville (1980) and Lewis (1986), is equivalent to those made in Gordon (1989) and Fortin et al. (2007), but different to Myles and Naylor (1996). Assuming a non-linear relation as in Kim (2003) would only change our results quantitatively. Finally, note that $S(e_i)$ does not depend on whether evasion is detected or not. Hence, in contrast to Kim (2003), there is no risk associated with this latter payoff.

3.1. Optimal evasion decision

Taking the policy variables and the number of evaders n as given, an agent maximizes $E[u(e_i)] + S(e_i, n)$ with respect to e_i.[7] The first-order condition for an interior solution is

$$-ps\tau\, u'\left(x_i^a\right) + (1-p)\tau u'\left(x_i^b\right) = \theta_i c(n). \tag{6}$$

The second-order condition is equivalent to Eq. (3). As the left hand side of Eq. (6) equals $E[u]'$ from Eq. (2), we can express condition (6) as $E[u]' = \theta_i c(n)$. Norm guided taxpayers will choose a level of evasion such that the marginal expected utility equals $\theta_i c(n)$, the marginal moral costs from concealing income. *Homo oeconomicus* does not care about norms or morals, i.e., $\theta_i = 0$. Such an agent chooses an optimal portfolio according to Eq. (2), increasing evasion up to the point where the marginal expected utility is equal to zero. This yields the level of evasion predicted by the AS framework, e^{AS}. In contrast, taxpayers with high levels of θ_i may be in a corner solution and refrain from evasion. Let us define the marginal expected utility for the first unit of evasion,

$$z \equiv E[u(x(0))]' = (1-p(1+s))\tau u'((1-\tau)y), \tag{7}$$

with $z > 0$.[8] From Eqs. (3) and (6) it follows that taxpayers with $\theta_i c(n) > z$ do not conceal any income. This implies the threshold

$$\hat{\theta}(n) \equiv \frac{z}{c(n)}, \tag{8}$$

which allows us to characterize the optimal individual evasion behavior $\hat{e}_i$ for a given level of n:

$$\hat{e}_i = \begin{cases} 0 & \text{for } \theta_i > \hat{\theta}(n) \\ e_i^* & \text{for } \theta_i \leq \hat{\theta}(n) \end{cases}. \tag{9}$$

Individuals with $\theta_i > \hat{\theta}(n)$ will stick to the compliance norm. On the other hand, those with $\theta_i \leq \hat{\theta}(n)$ will choose an interior solution e_i^* according to condition (6). A graphical representation of the optimal evasion level is provided below.

Fig. 1 pictures the expected utility as well as the marginal moral costs of evasion on the vertical axis against income concealed, plotted on the horizontal axis.[9] While an agent with $\theta_i = \hat{\theta}(n)$ will adhere to the compliance norm, taxpayers with $\theta_i = 0$ will choose e^{AS} which maximizes the expected utility $E[u]$. Individuals with $0 \leq \theta_i \leq \hat{\theta}(n)$, however, will choose an intermediate level of evasion, $e_i^* \in [0, e^{AS}]$. Note that e_i^* depends – next to the policy variables p, s, τ, income y and norm sensitivity θ_i – also on n, the share of evaders in a society. Hence, evasion decisions are interdependent. Before we characterize an equilibrium which accounts for this interdependency, we first provide a brief comparative static analysis.

[6] This line of reasoning is supported by empirical evidence which shows that when individuals consider tax evasion more justifiable, the more they believe that other citizens cheat on taxes (Frey and Torger, 2007). In contrast, the lab experiment by Fortin et al. (2007) does not find any significant interdependence between evasion decisions. However, the authors themselves remark that the generalization of their findings to the 'real', non-lab context is unclear. This concern is in line with the field evidence from Fellner et al. (2009), which suggests that people indeed condition their behavior on others' compliance.

[7] We focus on homogenous incomes levels – an assumption which could be easily relaxed at the cost of analytical tractability (compare Kim, 2003). The case of heterogeneous incomes is studied in Section 5.

[8] For $z < 0$ there would have to hold $(1-p(1+s)) < 0$. If this were the case, evasion would not be a 'fair gamble', in the sense that concealing income yields a negative expected return. The enforcement policy would be deterrent, as no taxpayer would conceal any income.

[9] While in general $E[u]'$ is non-linearly decreasing in e_i, we plotted a linear form for the sake of graphical simplicity.

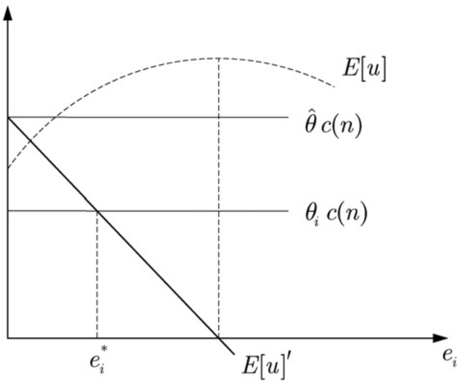

Fig. 1. Optimal evasion with a social norm.

3.2. Partial equilibrium analysis

Let us treat for the moment the frequency of evaders n as an exogenous variable. Applying the implicit function theorem on Eq. (6), one obtains

$$\frac{\partial e_i^*}{\partial p} = \frac{s\tau\, u'(x_i^a) + \tau u'(x_i^b)}{E[u]''} < 0, \tag{10}$$

$$\frac{\partial e_i^*}{\partial s} = \frac{p\tau\left(u'(x_i^a) - s\tau e_i^* u''(x_i^a)\right)}{E[u]''} < 0, \tag{11}$$

$$\frac{\partial e_i^*}{\partial \theta_i} = \frac{c(n)}{E[u]''} < 0, \tag{12}$$

$$\frac{\partial e_i^*}{\partial n} = \frac{\theta_i c'(n)}{E[u]''} \geq 0, \tag{13}$$

with $E[u]''$ as defined in Eq. (3). As in the AS framework, stricter enforcement will reduce evasion. Increasing the penalty or the audit rate will induce agents to declare more income. Next to the formal tax enforcement institution also the social norm has a deterrent effect. An exogenous shock in the norm sensitivity θ_i will result in a lower level of evasion. In terms of Fig. 1, the $\theta_i c(n)$ line would shift upwards and e_i^* would decline. Furthermore, Eq. (13) shows that taxpayers condition their evasion on the behavior of others. As more people evade taxes, agents with $0 < \theta_i \leq \hat{\theta}(n)$ react by concealing more income. The more taxpayers deviate from the compliance norm, the weaker is the social norm, and the lower are the moral cost of concealing. In this sense, any new tax evader creates a positive externality on all other cheaters — it makes their wrongdoing more justifiable, and thereby provide an incentive to evade more. From Eq. (8) we can derive

$$\frac{\partial\, \hat{\theta}(n)}{\partial n} = -\,\hat{\theta}(n)\frac{c'(n)}{c(n)} \geq 0 \tag{14}$$

since $c'(n) \leq 0$. With a higher level of n, the compliance threshold $\hat{\theta}(n)$ rises. Some agents with $\theta_i \geq \hat{\theta}(n)$, who used to refrain from evasion, will start to conceal income after an increase in n. These taxpayers condition their compliance with the tax law on the behavior of others. They act as *conditional cooperative taxpayers*. We will elaborate on the implications of this behavior in the following section.

Let us now turn to the impact of a tax increase. From Eq. (6) we obtain

$$\frac{\partial e_i^*}{\partial \tau} = \frac{1}{-E[u]''}\left\{\frac{\theta_i c(n)}{\tau} + ps\tau\, u''(x_i^a)(y + se_i^*) - (1-p)\tau\, u''(x_i^b)(y - e_i^*)\right\}. \tag{15}$$

Note that for $\theta_i = 0$ the first term in the curly brackets is zero, and the right hand side is equivalent to the effect derived in the AS framework, depicted in Eq. (4). In this case, we would get $\partial e_i^*/\partial\tau < 0$. However, for positive values of θ_i the result might turn around. In Appendix A.1, we derive from Eq. (15) a threshold $\tilde{\theta}(n)$, such that

$$\frac{\partial e_i^*}{\partial \tau}\begin{cases} \geq 0 & \text{for } \theta_i \geq \tilde{\theta}(n) \\ < 0 & \text{for } \theta_i < \tilde{\theta}(n) \end{cases} \tag{16}$$

While for low levels of θ_i the counterintuitive effect from the AS model carries over to our framework, the result turns around for agents with a sufficient strong tax morale. As $\theta_i > \tilde{\theta}(n)$ we get the more plausible result that tax evasion increases with a higher tax rate. Moreover, in the Appendix we show that $\tilde{\theta}(n)$ is increasing in the levels of norm deviations. The lower the share of tax evaders in the society, the lower is $\tilde{\theta}(n)$ and thereby $\partial e_i^* / \partial \tau \geq 0$ holds for a broader range of θ-values. Note, however, that a non-increasing absolute risk aversion implies $\tilde{\theta}(n) > 0$. Hence, there is always a range $\theta \in [0, \tilde{\theta}(n)]$ where the counterintuitive comparative static from AS carries over to our framework.

The intuition for this finding is straightforward. As we have discussed above, a tax increase will raise the marginal benefits from evasion, as well as the marginal costs (associated with higher expected fines). For the optimal evasion level predicted by AS these two effects offset each other. There is no substitution effect and the income effect from higher taxation triggers a reduction in the evasion level. In our context we observe a positive substitution effect for all agents with $\theta_i > 0$ (depicted in the first term in the curly brackets in Eq. (15)). These agents will choose an evasion level such that $E[u]' > 0$. Marginal expected benefits from concealing are above marginal expected costs. In terms of optimal portfolio choice, moral taxpayers 'over-invest' in the safe asset — they conceal too little and declare too much income. Any increase in the tax rate then raises the wedge between marginal expected benefits and cost even further. This raises the marginal expected utility $E[u]'$ for all agents with $\theta_i > 0$ (or $e_i^* < e^{AS}$). As we have assumed moral costs of evasion to depend on income concealed rather than taxes evaded, these costs are not affected by a tax change. Hence, the substitution effect provides a clear incentive to increase evasion.[10] While the negative income effect is still present, the positive substitution effect dominates for $\theta_i > \tilde{\theta}(n)$. For these agents, tax evasion increases as taxes rise. Note that this result is not new in the literature. Our analysis solely replicates the result from Gordon (1989) in a more compact framework.

Fig. 2 provides a graphical representation of the partial equilibrium effects associated with an increase in the tax rate. From the definition of z one can easily derive $\partial z / \partial \tau > 0$ and from the AS model we know that $E[u]'$ evaluated at e_i^{AS} is decreasing in the tax rate. Hence, the $E[u]'$ curve turns clockwise as we increase τ, with the turning-point somewhere between e_i^{AS} and $e_i = 0$. (This implies $0 < \tilde{\theta}(n) < \tilde{\theta}$.) The intersection of the marginal expected utility curve before and after the change in the tax rate defines the threshold $\tilde{\theta}(n)$. In the example from Fig. 2, individuals with $\theta_i < \tilde{\theta}(n)$ will reduce evasion as the tax rate raises. The taxpayer with $\theta_1 > \tilde{\theta}(n)$, however, will conceal more income. The largest increase in underreporting will be observed for the taxpayer with $\theta_i = \tilde{\theta}$, who did not evade before the tax increase. Moreover, taxpayer 2, who has been paying all taxes honestly before the tax increase, will switch to an interior solution after the policy change. From this example one can also see that a change in one policy variable typically has an impact on the shareof evaders. In the following we study this effect in an equilibrium framework.

4. Social equilibrium

We consider a continuum population with unit mass. The norm parameter θ is distributed according to a continuously differentiable, cumulative distribution function $F(\theta)$ which has full support on the interval $[0, \bar{\theta}]$. The corresponding density function is $f(\theta)$ and the inverse of the distribution function is denoted $F^{-1}(n)$. As we know from Eq. (9), people choose to evade taxes if $\theta_i \leq \hat{\theta}(n)$. The equilibrium population share of evaders n^* is then given by the fixed-point equation

$$n^* = F\left(\frac{z}{c(n^*)}\right) \tag{17}$$

The right hand side of Eq. (17) is a continuous function in n, mapping the compact interval [0, 1] into itself. Assuming $\bar{\theta}\, c(1) \geq z$ assures that there always exists at least one asymptotically stable equilibrium $n^* \in (0, 1]$,[11] where stability requires

$$\left.\frac{\partial F^{-1}(n)}{\partial n}\right|_{n^*} \geq \left.\frac{\partial\, \hat{\theta}(n)}{\partial n}\right|_{n^*}. \tag{18}$$

For an exogenous policy $\mathbf{P} = (\tau, p, s)$, an equilibrium characterizes a self supporting share of evaders. For n^*, the strength of the norm is such that a population share of $1 - n^*$ will declare their income honestly whereas the remaining n^* will choose an interior solution e_i^* as characterized by Eq. (6). While there is at least one solution to Eq. (17), the system is typically characterized by a multiplicity of equilibria. Such a case is illustrated in Fig. 3. If evasion has become prevalent, the compliance norm has practically eroded and society finds itself in an equilibrium where nearly everybody cheats on taxes. For the same policy **P** and distribution $F(\theta)$, however, the society could in principle coordinate on a different equilibrium, where most agents adhere to the norm. The social norm would be stronger and the level of tax evasion in the society would be smaller.

In Fig. 3 we plot the share of norm violators n on the horizontal axis against the degree of norm internalization θ and the threshold $\hat{\theta}(n)$, respectively, on the vertical axis. In the example, we consider a uniform distributed of θ.[12] The shape of $\hat{\theta}(n)$ is defined by the function $c(n)$. In Fig. 3 there are two asymptotically stable equilibria — a 'good' one, where only a small fraction n_l^* deviates from the norm and a 'bad' equilibrium with widespread evasion, n_h^*. Between these two stable equilibria, there is a third,

[10] If moral costs would depend on the level of taxes evaded, a higher tax rate would also raise the evasion costs. As long as the increase in marginal expected utility dominates the increase in costs, we would still observe a raise in the evasion level for some levels of θ.

[11] The existence of an equilibrium hinges on $\bar{\theta} \geq \hat{\theta}(1)$ as well as $\hat{\theta}(0) > 0$. Note, that an equilibrium with $n^* = 0$ is not supported, as we allow for taxpayers with $\theta_i = 0$ who always choose to evade $e^{AS} > 0$ for any level of n.

[12] Note that in Gordon's (1989) analysis, there is no scope for a multiplicity of equilibria under a uniform distribution. This is due to assuming a linear relationship between S^G and n.

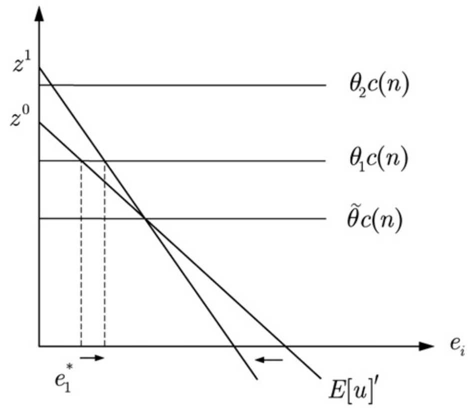

Fig. 2. Partial equilibrium effect of a tax increase.

unstable one, with n_m^*. Such an unstable equilibrium marks the boundary of a stable equilibriums' basin of attraction. In our example, society would converge into the good equilibrium, starting from any share $n \in [0, n_m^*]$, or into the bad equilibrium, for any $n \in [n_m^*, 1]$. We will come back to this point in Section 4.2.

4.1. Equilibrium effect of policy changes

Let us turn to the equilibrium effect from an increase in the tax rate. As we addressed above, individuals with $\theta_i > \hat{\theta}(n)$ may switch from a corner solution to an interior solution after a tax increase. These new evaders will weaken the social norm, moral costs of evasion decline and further taxpayers will start concealing income. The equilibrium effect is captured by an upward shift of the $\hat{\theta}(n)$-curve in Fig. 3: the marginal expected utility from concealing the first unit of income increases ($\partial z / \partial \tau > 0$). Accordingly, the evasion threshold $\hat{\theta}(n)$ rises for any n which results in an increase in the stable equilibrium share of evaders. Analytically, we can derive this from Eq. (17) and get

$$\frac{dn^*}{d\tau} > 0 \tag{19}$$

for any stable equilibrium (see Appendix A.2). The equilibrium impact on the optimal level of evasion is then given by

$$\frac{de_i^*}{d\tau} = \frac{\partial e_i^*}{\partial \tau} + \frac{\partial e_i^*}{\partial n}\frac{dn^*}{d\tau} \tag{20}$$

with $\partial e_i^* / \partial n$ and $\partial e_i^* / \partial \tau$ from Eqs. (13) and (15), respectively. As shown by Eq. (16), the sign of the first-order effect is ambiguous and depends on the norm parameter θ_i. In contrast, the second-order effect is unambiguously positive for all $\theta_i > 0$. We can derive a new threshold $\tilde{\theta}^*(n^*)$ (see Appendix A.2) such that

$$\frac{de_i^*}{d\tau}\begin{cases} \geq 0 & \text{for } \theta_i \geq \tilde{\theta}^*\left(n^*\right) \\ < 0 & \text{for } \theta_i < \tilde{\theta}^*\left(n^*\right) \end{cases} \tag{21}$$

In the equilibrium, there are now two effects which tend to raise evasion. First, there is a positive substitution effect, discussed in the partial equilibrium analysis above. Second, a tax increase is accompanied by an increase in the equilibrium share of norm breaking individuals. This second effect lowers the moral cost of evasion and thereby provides a further incentive to conceal more income. For taxpayers with $\theta_i \geq \tilde{\theta}^*(n^*)$ these two effects dominate the negative income effect — they will react with more evasion on an increase in the tax rate. From this discussion also follows that $\tilde{\theta}^* < \tilde{\theta}$ for any n^*.[13] Hence, compared to the partial equilibrium analysis, $de_i^*/d\tau \geq 0$ holds for a broader range of θ-values.

Regarding the enforcement variables s and p we derive in Appendix A.2 that there holds

$$\frac{dn^*}{dp} < 0, \ \frac{dn^*}{ds} < 0 \tag{22}$$

[13] As this new effect is strictly positive, $de_i^*/d\tau > 0$ also holds when the income dominates the substitution effect.

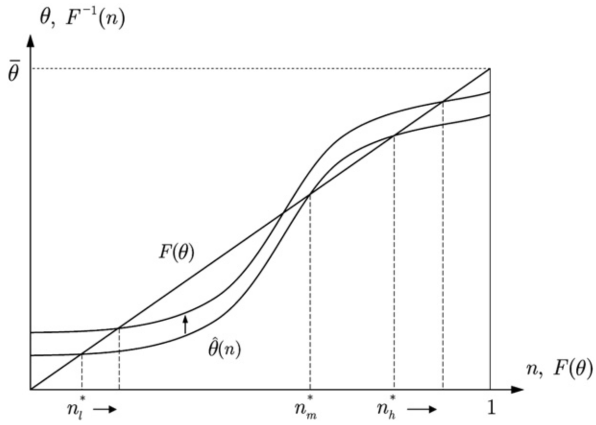

Fig. 3. Social equilibrium — impact of a tax increase.

in any stable equilibrium. As the deterrence policy becomes stricter, the marginal expected utility from evasion – and therewith z – falls and the threshold $\hat{\theta}(n)$ decreases (compare Eqs. (7) and (8), respectively). The $\hat{\theta}(n)$-curve shifts downward and the population share of evaders drops. Using Eq. (22), we then get the equilibrium impact of a stricter enforcement policy,

$$\frac{de_i^*}{dp} = \frac{\partial e_i^*}{\partial p} + \frac{\partial e_i^*}{\partial n}\frac{dn^*}{dp} < 0, \tag{23}$$

$$\frac{de_i^*}{ds} = \frac{\partial e_i^*}{\partial s} + \frac{\partial e_i^*}{\partial n}\frac{dn^*}{ds} < 0 \tag{24}$$

In addition to the first-order effects $\partial e_i^*/\partial p$ and $\partial e_i^*/\partial s$ from Eqs. (10) and (11), respectively, the deterrence policy now has a second effect. As auditing becomes more frequent or if the penalty rates increase, the resulting drop in the share of evaders makes the social norm for tax compliance stronger — the moral costs of tax evasion increase. This will trigger a further reduction in the level of evasion. Hence, in our framework, the equilibrium impact of tax enforcement is stronger than suggested by the partial equilibrium analysis and the AS model.[14]

4.2. Beliefs and multiple equilibria

So far, we have considered the case where a (marginal) policy change results in a marginal adjustment of n^*. In the context of multiple equilibria, however, this is not necessarily true. Our analysis implicitly assumes (a) that there always exists a stable equilibrium in the close neighborhood of the previous one and (b) that society indeed coordinates on this particular equilibrium. The first assumption is fulfilled, as long as the stability condition from Eq. (18) holds with strict inequality. Regarding the second point, one could argue that – at least for minor policy changes – an equilibrium which is 'proximate' to the former one is more salient than an alternative, more distant equilibrium. Following this line of reasoning, the equilibrium in the neighborhood of the previous one becomes a focal point equilibrium (Schelling, 1960). If this is the case, Eqs. (19)–(24) provide the valid marginal effects of the policy variables. If assumption (b) is violated one might obtain different results.

To illustrate this point, assume that individual behavior is based on beliefs rather than the true level of norm violations. Let us denote a taxpayer's belief about n at time t by $b_i^t = b(n^{t-1}, \phi_i^{t-1}, \mathbf{P})$.[15] Beliefs depend on the past level of norm violations, the policy $\mathbf{P}$, as well as a parameter ϕ_i^{t-1} which captures individual specific perceptions at time $t-1$. We assume $\partial b^t/\partial n^{t-1} > 0$ and $\partial b^t/\partial \phi^{t-1} > 0$. Hence, with a 'positive' shock in beliefs, $\phi_i^{t-1} > 0$, a taxpayer tends to overestimate the level of evaders and vice versa for a 'negative' shock, $\phi_i^{t-1} < 0$. In equilibrium there holds $\phi_i^{t-1} = 0$ and $b_i^t = b(n^*, 0, \mathbf{P}) = n^*\ \forall i$. It is worth noting that – in the absence of shocks – beliefs would always adapt such that they would be fulfilled in the long run, i.e., $b_i^t = n^*$ as $t \to \infty$. Starting from any off-equilibrium level n within the basin of attraction of a particular, stable equilibrium (e.g., $n \in [0, n_m^*]$ for equilibrium n_l^* in Fig. 3), the updating of beliefs based upon n^{t-1} will lead the society towards this equilibrium.

Consider now the case where stricter tax enforcement – for instance, an increase in the auditing frequency – is announced at period t. Assume first, that there is no shock on agents' beliefs ($\phi_i^t = 0$). Starting from an equilibrium n_0^*, perfectly informed taxpayer would adjust their behavior according to the new, weaker evasion incentives. The level of evaders drops, and so will agents' beliefs in the following period. The social norm becomes stronger, providing a further incentive to reduce evasion. Society

[14] An equivalent result would be obtained with the assumptions from Fortin et al. (2007) (reflected in S^{FLV} from Section 2.2). When agents condition their compliance on $\bar{e}_{-i}$ rather than n, however, we would predict a different equilibrium effect from a tax increase since the aggregate effect of higher tax rate on $\bar{e}_{-i}$ are in general ambiguous.

[15] Allowing for heterogeneity in beliefs is not crucial for the following discussion. One could simply consider $b^t = b(n^{t-1}, \phi^{t-1}, \mathbf{P})$.

gradually move towards the new stable equilibrium $n_1^* < n_0^*$. This case is illustrated in Fig. 4. Stricter enforcement shifts the $\hat{\theta}(n)$-curve downwards which reduces the level of non-compliance in any stable equilibrium.

Let us now allow for shocks in beliefs. More frequent audits are announced ‘as a response to the high level of non-compliance’ and some agents take this as a signal that the current evasion level is higher than originally believed, $\phi_i^t > 0$. If their ‘mistake’ ϕ_i^t is large enough, their belief in $t+1$, after the policy change $\mathbf{P} \rightarrow \mathbf{P}'$, fulfills $b_i^{t+1}(n_0^*, \phi_i^t, \mathbf{P}') > b(n_0^*, 0, \mathbf{P})$. Hence, these agents perceive an *increase* in the level of norm deviations. The compliance norm becomes weaker which provides an incentive to conceal more rather than less income. Given that this latter incentive dominates the direct effect from stricter auditing, the number of evaders would raise among those with $\phi_i^t > 0$. As a result, we might observe an overall increase in norm violations, i.e., $n^{t+1} > n_0^*$.

Society would nevertheless converge towards the equilibrium n_1^*, if n^{t+1} is still within the basin of attraction of the equilibrium n_1^* (and if no further shock occurs, i.e., $\phi_i^{t+1} = \phi_i^{t+2} = \ldots = 0$). In a society with many stable equilibria, however, each equilibrium's basin of attraction becomes relatively small. Already minor shocks could then be sufficient to push n^{t+1} into the attraction area of a different equilibrium. In Fig. 4 it would be sufficient if $n^{t+1} > n_m^*$. If norm violations after the shock overshoot this level (the upper limit of the basin to n_1^*), society converges towards the stable equilibrium n_2^* – an equilibrium with *more* evaders than before the policy change.[16]

As this thought experiment shows, stricter tax enforcement can trigger more evaders, such that the results from Eq. (22) turn around. This also renders the enforcement variables' impact on the actual level of evasion ambiguous. The negative direct effect from an increase in p or s, depicted in the first terms on the RHS of Eqs. (23) and (24) respectively, would work against the positive effect from a weakening of the social norm, related to an increased norm violations. For evaders with a high norm sensitivity θ, the latter effect is more likely to dominate the deterrence incentives.

As we have seen, policy adjustments in the context of multiple equilibria can trigger counterintuitive behavioral responses, once we allow for belief shocks. The original incentives related to a policy change are more likely to be turned around, either if shocks are large or in the case where many stable equilibria exist. The immediate policy implication of this discussion is straightforward: Taxpayers' beliefs matter! Hence, the management of these beliefs becomes a policy tool. New policies should therefore be communicated in a way which either tries to avoid shocking beliefs at all or tries to shape beliefs in a direction which supports the policy change. Turning back to the example from above, it might be more efficient to announce increased auditing efforts as a means ‘to further improve the high level of compliance’ rather than as response to ‘a recent increase in tax evasion’. More generally we can conclude that any policy action that leaves economic incentives (reflected in $\mathbf{P}$) unaffected, but nevertheless shocks belief ‘downwards’ ($\phi_i^{t-1} < 0$) will contribute to maintain or even increase overall tax compliance. We will come back to the impact of *belief management* in the following section.

5. Social structure and inter-group spillovers

This section extends our basic framework and analyzes a more complex structure of society. In particular, we consider a population consisting of $M \geq 2$ subgroups. One could think of these groups as local communities or social classes with similar education, income or social status. In the following we focus on the case where individuals within a group $j \in \{1,\ldots,M\}$ have the same income y_j and face the same policy $\mathbf{P}_j = (\tau_j, p_j, s_j)$. The net income of agent i from group j for the case of detected or undetected evasion is then given by

$$x_{ij}^a = x_j^a(e_{ij}) = (1-\tau_j)y_j - \tau_j e_{ij} s_j \quad \text{and} \quad x_{ij}^b = x_j^b(e_{ij}) = (1-\tau_j)y_j + \tau_j e_{ij},$$

respectively, and preferences are described by

$$U_j(e_{ij}) = E[u(e_{ij})] - \theta_{ij} e_{ij} \sum_{k=1}^{M} \alpha_{jk} c(n_k) \tag{25}$$

with

$$\begin{aligned} E[u(e_{ij})] &= p_j u(x_j^a(e_{ij})) + (1-p_j) u(x_j^b(e_{ij})), \\ \textstyle\sum_k \alpha_{jk} &= 1 \forall_j \end{aligned} \tag{26}$$

and $n_k \in [0, 1]$ denotes the share of evaders in group $k \in \{1,\ldots,M\}$. In Eq. (25) we allow the moral costs of evasion to depend upon the compliance behavior in the own as well as in the other groups of society. The parameter $\alpha_{jk} \in [0, 1)$ thereby captures the sensitivity of the norm strength in community j with respect to norm deviations in group k. We exclude the special case $\alpha_{jj} = 1$, i.e., where the norm is group specific in the sense that its strength depends exclusively on the behavior within the own group. Hence, there always exists (at least) one subgroup $k \neq j$ with $\alpha_{jk} > 0$ which works as a *moral role model* or *moral reference group* for agents from j.[17]

[16] See Borck (2004) for a political economy approach which shows that stricter enforcement may increase tax evasion.

[17] If moral costs were shaped by the pattern of *direct* social interactions we could relate α_{jk} to the degree of population segregation or *viscosity* (Myerson et al., 1991). If α_{jk} is high, the interaction frequency between types from groups j and k is high.

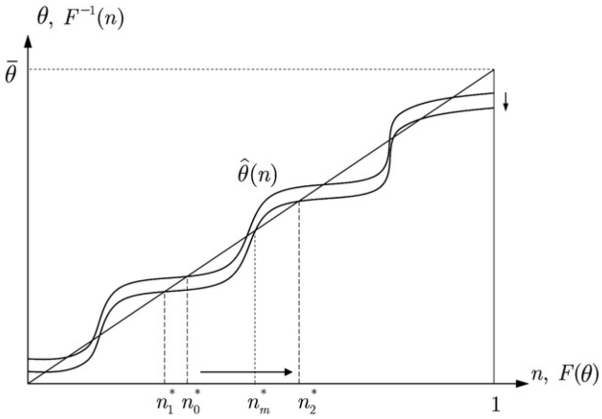

Fig. 4. Response to stricter enforcement — belief shocks.

5.1. Optimal evasion and social equilibrium

Assuming that communities are large and policies as well as non-compliance levels are taken as given, individuals choose e_{ij} in order to maximize Eq. (25). Analogous to Eq. (6), the first-order condition for an interior solution is

$$-p_j s_j \tau_j u'(x_{ij}^a) + (1-p_j)\tau_j u'(x_{ij}^b) = \theta_{ij} \sum_k \alpha_{jk} c(n_k). \tag{27}$$

The threshold for an interior solution becomes

$$\hat{\theta}_j(n_j, n_{-j}) = \frac{z_j}{\sum_k \alpha_{jk} c(n_k)} \tag{28}$$

with $z_j \equiv (1-p_j(1+s_j))\tau_j u'((1-\tau_j)y_j)>0$ and $n_{-j}=(n_1,\ldots, n_{j-1}, n_{j+1},\ldots, n_M)$. For $\theta_{ij} \le \hat{\theta}_j(n_j,n_{-j})$, condition (27) characterizes the optimal evasion level e_{ij}^*. All agents with θ_{ij} above this threshold are in a corner solution and fully comply with tax laws.

We can now describe a social equilibrium for a society structured in M groups. Let the degree of norm internalization within each group be distributed according to a continuously differentiable, cumulative distribution function $F_j(\theta)$ with $\theta_{ij} \in [0,\bar{\theta}]$ and the inverse F_j^{-1} is well defined on the unit interval. A social equilibrium is then characterized by (n_j^*, n_{-j}^*) with

$$n_j^* = F_j(\hat{\theta}_j(n_j^*, n_{-j}^*) \quad \forall_j \tag{29}$$

and stability is given iff

$$\left.\frac{\partial F_j^{-1}}{\partial n_j}\right|_{n_j=n_j^*} \ge \left.\frac{d\,\hat{\theta}_j(n_j, n_{-j})}{dn_j}\right|_{n_j=n_j^*, n_{-j}=n_{-j}^*} \quad \forall_j. \tag{30}$$

Assuming that $\hat{\theta}_j(1,n_{-j})<\bar{\theta}$ holds for $n_{-j}=(1,\ldots,1)$, there always exists at least one stable equilibrium.[18]

The analysis of Section 4 focussed on one equilibrium associated with a homogenous norm strength for the whole society. The extended framework now allows for equilibria where the perceived strength of the social norm and compliance behavior strongly differs between the heterogeneous subgroups of society. In particular, social structure and inter-group links can support social equilibria where some groups predominantly cheat on taxes while most members of other communities act according to the norm. The model thereby captures what Lewis (1982, p.144) described as different coexisting 'tax subcultures'.

5.2. Policy spillovers and belief leadership

We now study the impact of policy changes within this extended framework. To simplify exposition we consider a society with only two groups, $M=2$. Let us first study an increase in the tax rate for group j. As before, one can show that

$$\frac{dn_j^*}{d\tau_j} > 0 \tag{31}$$

[18] As $c(0)$ is finite, there holds $\hat{\theta}_j(0,n_{-j})>0$ for all n_{-j}. This implies the existence of a stable social equilibrium.

holds in any stable equilibrium.[19] A tax increase still induces more people to cheat on taxes. However, a higher level of n_j^* now has a negative impact on the perceived norm strength in the other group $k \neq j$ and thereby triggers further norm deviations. In particular, we get from Eq. (29)

$$\frac{dn_k^*}{dn_j^*} > 0. \tag{32}$$

As taxpayers condition their compliance also on the behavior in the other group, norm deviations within j create a spillover on community k.

The adjustment in evasion among members from the subgroup targeted by the tax increase is given by

$$\frac{de_{ij}^*}{d\tau_j} = \frac{\partial e_{ij}^*}{\partial \tau_j} + \left(\frac{\partial e_{ij}^*}{\partial n_j} + \frac{\partial e_{ij}^*}{\partial n_k} \frac{dn_k^*}{dn_j^*} \right) \frac{dn_j^*}{d\tau_j}. \tag{33}$$

One can derive the partial equilibrium effects $\partial e_{ij}^* / \partial \tau_j$ and $\partial e_{ij}^* / \partial n_j > 0$ analogously to the ones presented in Section 4. The impact of an increase in τ_j on the evasion level of agents from group j is similar as before. Next to the direct impact on the monetary incentives to evade, higher taxes will raise the share of norm violations within the own group. In turn, the compliance level in the other subgroup will decrease as well. With a higher share of evaders in both communities the strength of the social norm declines. Since $\partial e_{ij}^* / \partial n_k \geq 0$, this provides a similar second-order incentive to increase e_{ij}^* as discussed in the previous section. In addition, however, the group-specific tax policy creates an externality on compliance in the other group:

$$\frac{de_{ik}^*}{d\tau_j} = \left(\frac{\partial e_{ik}^*}{\partial n_j} + \frac{\partial e_{ik}^*}{\partial n_k} \frac{dn_k^*}{dn_j^*} \right) \frac{dn_j^*}{d\tau_j} \geq 0. \tag{34}$$

Although the change in the tax rate does not alter the monetary incentives of these taxpayers, they react with an increase in evasion. As more taxpayers from the other community start cheating, tax morale among the own peers – and thereby compliance – drops as well. Again, this result is triggered by conditional cooperative taxpayers. In the basic framework this effect occurred within one group – a homogenous society. Now it works between different subgroups of the population. As a consequence, any group-specific policy change will causes a spillover on other communities within the society. The magnitude of the externality from a change in policy $\mathbf{P}_j$ on the level of evasion in group $k \neq j$ is determined by the social role a community k plays for the members of j. The higher is α_{jk}, the more weight is attributed to the behavior of agents from k in determining tax morale within group j, the stronger is the spillover. Hence, the more a group works as a moral reference group for others, the more crucial are norm violations among that group.[20]

This observation has several important implications. First, the behavior of those with high social and moral prestige can have a huge impact on tax compliance in the rest of the population. Empirical evidence which supports this conjecture is discussed by Hammar et al. (2009). They report on a study by the Swedish Tax Agency which found that "the most common argument legitimizing tax evasion among Swedens is that those in leading positions in society violate the social norms" (p.5).

Second, the spillovers provide new arguments for optimal policy choice. A revenue maximizing enforcement policy, for example, should ceteris paribus devote more resources on auditing members from moral reference groups. Enforcing high levels of compliance among these groups creates strong, positive spillovers and thereby yields high tax revenues. Furthermore, the spillovers could also present a limitation for optimal redistributive taxation. Given that social prestige is associated with higher incomes, the analysis suggests that taxing the rich could also cause a decline in tax morale and therewith compliance in the rest of the society. This argument could turn around if the fairness aspects also contribute to tax morale (compare footnote 20). A thorough analysis of this tradeoff is left for further research.

Note further that the 'leading groups' in a society are typically rather small. Hence, the norm violations of a few could lead to a sharp erosion of tax morale within the whole society. We could easily find examples where rather small shifts in the behavior within a moral reference group eliminate the existence of 'good' equilibria (with a high level of norm compliance) for other subgroups. Some few tax evasion cases among 'morale leaders' – societies' high-profile members like politicians or top-level CEOs – could then shift a bulk of the population from an equilibrium state with a large extent of tax compliance to a state with widespread evasion. This suggests that the recent wave of high-profile evasion cases in Europe (e.g., Germany's Zumwinkel case) could have a non-negligible impact on the overall level of tax compliance.

The crucial role of leadership is also highlighted by recent experimental studies. For instance, Gächter and Renner (2006) show how contributions of a leader (first-mover) in a sequential public good game affect the followers' beliefs and thereby their behavior. Higher contributions by the leaders make followers expect higher levels of cooperation which triggers more

[19] All results of this section are derived in Appendix A.3.

[20] Note that very similar results would be obtained if one allows for inter-group fairness preferences regarding a fair tax or auditing rate for group k. One could incorporate these aspects by a function $c(n, \mathbf{P}_j, \mathbf{P}_k)$, which depends on the policies for the different groups. This extension, which is also proposed by Fortin et al. (2007), is left for future research.

contributions among conditional cooperators. Similar evidence is discussed in Arbak and Villeval (2007). Hence, these studies provide evidence pointing out the role of *belief leadership* as one possible way to manage beliefs (Fehr and Falk, 2002; Gächter, 2006).

6. Conclusion

In order to design appropriate policies to ensure tax compliance, it is essential to carefully examine taxpayers' motivation to comply with tax laws. This paper studies the incentives related to tax morale, interpreted as a social norm for compliance. Empirical evidence suggests that the taxpayers' inclination to cheat on taxes depends on the (perceived) behavior of their fellow citizens. The more others evade taxes, the easier it is justifiable to conceal income. In this vein, individual decisions become interdependent. Taxpayers act conditionally cooperative: they condition their compliance on the behavior of other members of society.

Our framework improves upon the classical tax evasion model in several respects. We can explain high levels of compliance despite weak tax enforcement. As an endogenous norm strength typically implies the existence of multiple equilibria, the model also allows for different levels of evasion for one fixed monetary incentive to conceal income. In a society which consists of several distinct communities, this implies the possibility of different, coexisting tax subcultures. Finally, our approach also allows for a positive and thereby more intuitive relation between tax rates and the level of evasion.

Next to the assessment of conventional fiscal policy variables, our analysis also offers a formal discussion of belief management. In a world of conditional cooperative taxpayers, not only monetary incentives but also individual beliefs regarding others' behavior shape the evasion decision. Any policy measure which corroborates beliefs in high compliance levels thus forms a potentially important policy instrument. Belief leadership constitutes one tool to manage beliefs. As we have analyzed for the case of a structured, multi-group society, the norm compliance in moral reference groups is of crucial importance for tax morale in many other communities. If 'moral leaders' such as politicians or high-profile CEOs start to violate the norm, strong detrimental spillovers on the perceived norm strength in the whole society can occur. Our analysis thus suggests that the recent wave of prominent tax evasion cases in Germany or the (what is considered to be) 'unmoral behavior' among members of Gordon Brown's government could cause substantially negative effects on the behavior of norm guided taxpayers. Enforcing high levels of compliance among 'leaders' seems essential to ensure compliance among the large fraction of 'followers' in a society.

The applicability of belief management was recently demonstrated by Fellner et al. (2009). In a natural field experiment, they sent mailings to 50,000 potential evaders of a specific fee (TV licence fees) and measured how many started to pay the fee in response to different treatments. Among others, they compared the effect of a benchmark letter with that from an information letter which informed about the high level of compliance. Their evidence suggests that – within the sample of individuals who were surprised by the high compliance rate – the information letter was more successful in raising compliance than the benchmark. This finding indicates the potential of belief management as an attractive, complementary enforcement strategy. Clearly, further research is needed to study the scope and limits of this new policy tool.

Acknowledgments

I would like to thank Andreas Haufler, Tim Krieger, two anonymous referees and seminar participants at the Universities of Munich for helpful comments. Financial support by the German Research Foundation (DFG Research Grant SPP 1142) is acknowledged.

Appendix A

A.1. Appendix to section 3

From Eq. (16) we can easily derive

$$\tilde{\theta}(n) = \frac{-\tau^2}{c(n)}\left\{ps\, u''(x_i^a)(y + se_i^*) - (1-p)u''(x_i^b)(y - e_i^*)\right\}. \tag{A.1}$$

Using $\rho(x)$, the Arrow–Pratt measure of absolute risk aversion, rearranging and substituting for Eq. (6), we get

$$\tilde{\theta}(n) = \frac{(1-p)\tau^2 u'(x_i^b)\left\{\rho(x_i^a)(y + se_i^*) - \rho(x_i^b)(y - e_i^*)\right\}}{c(n)(1 + \tau\rho(x_i^a)(y + se_i^*))} > 0. \tag{A.2}$$

Non-increasing absolute risk aversion is sufficient for $\tilde{\theta}(n) > 0$ to hold, since from $\rho'(x) \leq 0$ follows that $\rho(x_i^a) \geq \rho(x_i^b)$. Note further that $c'(n) \leq 0$ implies $\partial\tilde{\theta}(n)/n \geq 0$.

A.2. Appendix to section 4

Applying the implicit function theorem on Eq. (17) yields

$$\frac{dn^*}{dp} = \frac{-(1+s)\tau u'((1-\tau)y)\frac{1}{c(n)}}{\frac{\partial F^{-1}}{\partial n} - \frac{\partial \hat{\theta}(n)}{\partial n}} < 0. \tag{A.3}$$

where we used Eq. (7) to derive $\partial z/\partial p$. As we know from Eq. (18), the denominator must be positive in a stable equilibrium. This determines the sign of Eq. (A.3).

Following the same steps as before, we get

$$\frac{dn^*}{ds} = \frac{-p\tau u'((1-\tau)y)\frac{1}{c(n)}}{\frac{\partial F^{-1}}{\partial n} - \frac{\partial \hat{\theta}(n)}{\partial n}} < 0, \tag{A.4}$$

$$\frac{dn^*}{d\tau} = \frac{\frac{\partial z}{\partial \tau}\frac{1}{c(n)}}{\frac{\partial F^{-1}}{\partial n} - \frac{\partial \hat{\theta}(n)}{\partial n}} > 0 \tag{A.5}$$

with

$$\frac{\partial z}{\partial \tau} = (1-p(1+s))[u'((1-\tau)y) - \tau y\, u''((1-\tau)y)] > 0. \tag{A.6}$$

Equilibrium threshold $\tilde{\theta}^*(n^*)$. Substituting for Eq. (13) we can express Eq. (20) as

$$\frac{de_i^*}{d\tau} = \frac{1}{-E[u]''}\left\{\frac{\theta_i c(n^*)}{\tau} + ps\tau\, u''(x_i^a)(y+se_i^*) - (1-p)\tau\, u''(x_i^b)(y-e_i^*) - \theta_i c'(n^*)\frac{dn^*}{d\tau}\right\}. \tag{A.7}$$

The sign of the expression is determined by the term in the curly brackets. Using $\rho(x)$ and Eq. (6), we get the threshold

$$\tilde{\theta}^*(n^*) = \frac{(1-p)\tau^2 u'(x_i^b)\left\{\rho(x_i^a)(y+se_i^*) - \rho(x_i^b)(y-e_i^*)\right\}}{c(n^*)\left(1 + \tau\rho(x_i^a)(y+se_i^*) - \tau\frac{c'(n^*)}{c(n^*)}\frac{dn^*}{d\tau}\right)}. \tag{A.8}$$

For $\theta_i > \tilde{\theta}^*(n^*)$ the term in the curly brackets is positive and hence $de_i^*/d\tau > 0$. Finally, we compare this threshold with the partial equilibrium threshold, $\tilde{\theta}(n^*)$ from Eq. (A.2). As the numerator of Eqs. (A.2) and (A.8) are the same, but the denominator of Eq. (A.8) is bigger, it immediately follows that $\tilde{\theta} > \tilde{\theta}^*$ for any n^*. Moreover, from Eq. (A.5) also follows that the denominator of Eq. (A.8) is strictly positive. Therefore $\tilde{\theta}^*(n^*) > 0$.

A.3. Appendix to section 5

From Eqs. (28) and (29) we can derive

$$\frac{dn_j^*}{d\tau_j} = \frac{\frac{\partial z_j}{\partial \tau_j}}{\left(\sum_k \alpha_{jk} c(n_k^*)\right)^2 \left(F_j'(\hat{\theta}_j)\right)^{-1} + z_j \alpha_{jj} c'(n_j^*)} > 0. \tag{A.9}$$

From Eq. (30) we know that in any stable equilibrium the denominator must be positive. As $\partial z_j/\partial \tau_j > 0$, we get $dn_j^*/d\tau_j > 0$. Implicitly differentiating Eq. (29) further yields

$$\frac{dn_j^*}{dn_k^*} = \frac{-z_j \alpha_{jk} c'(n_k^*)}{\left(\sum_k \alpha_{jk} c(n_k^*)\right)^2 \left(F_j'(\hat{\theta}_j)\right)^{-1} + z_j \alpha_{jj} c'(n_j^*)} > 0 \tag{A.10}$$

as the denominator must be positive in any stable equilibrium. Given that $c'(n_k^*) < 0$, dn_j^*/dn_k^* is strictly positive as long as $\alpha_{jk} > 0$. Since we assume $\alpha_{jj} < 1$, this always holds in the case of the two groups due to Eq. (26).

Finally, from the first-order condition (27) we obtain

$$\frac{\partial e_{ij}^*}{\partial n_k} = \frac{\theta_{ij}\alpha_{jk}c'(n_k)}{E[u_j]''} \geq 0. \tag{A.11}$$

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