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Tax Compliance Policy Reconsidered

by

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Abstract: Strong empirical evidence suggests that, contrary to standard criminal choice theory, deterrence does not increase tax compliance. A model based on a peculiarity of the mixed-strategy Nash equilibrium in 2-by-2 games is used to explain this observation theoretically: The strategy choice of a player is not affected by the changes in his or her payoffs induced by deterrence. Moreover, as empirical observations show that increased deterrence tends to undermine tax morale under relevant conditions, it follows that tax policy should not so much try to deter but should make an effort to maintain and raise citizens' tax morale.

1. Introduction

Empirical evidence strongly suggests that higher penalty rates do not decrease tax evasion. "Most studies have failed to demonstrate that higher penalty rate encourage compliance" (Roth, Scholz, and Witte, 1989, p. 6). The size of the deterrence effect (in the few cases where it has been found statistically significant) is very small, and less consequential than the impact of other factors (see, e.g., Paternoster, 1989). Calculation based on empirical magnitudes for the United States show that "taxpayers would have to exhibit risk aversion far in excess of anything ever observed for compliance predicted by expected utility theory to approximate actual compliance" (Alm, McKee and Beck, 1990, p. 24). As a reaction to similar calculations for different periods, other authors go so far as to state "that most of the theoretical work to date is not particularly useful either for policy analysis or empirical study" (Graetz and Wilde, 1985, p. 357).

The standard economic theory of tax evasion was first formulated by Allingham and Sandmo (1972) based an Becker's (1968) model of criminal choice.[1] Tax payers

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are assumed to maximize expected utility which depends on noncompliance detection probabilities, on the magnitude of punishment and on income and tax rates. While the effects of higher income and higher tax rates on tax evasion depend on additional factors (in particular relative risk aversion), virtually all models subscribe to the notion underlying the economics of crime; an increase in the probability of being detected and punished *ceteris paribus* decreases tax evasion. Rational tax payers react to the higher cost of cheating by cheating less.

As pointed out, the empirical findings, however, suggest that deterrence does not work as expected in the important case of tax evasion. This challenges the standard criminal choice model developed in, as well as the compliance policy advocated by, standard economics. Section 2 presents a game theoretical model which demonstrates that, in the case of the Nash equilibrium, a reduction of the payoffs of a tax payer due to punishment has no effect on the choice of the tax payer if the Nash equilibrium is mixed. In section 3, we propose that more intensive monitoring and higher fines may crowd out tax morale so that an increase in deterrence may under some conditions have a perverse effect on compliance, i.e., tax evasion may increase. Section 4 discusses alternative tax compliance policies. Our results indicate the importance of citizens' morale for a successful tax policy.

2. *A Strategic Approach to Tax Compliance*

In this section, an explanation for the ineffectiveness of deterrence based on a game theoretic model is presented. The model assumes that the tax payer sees himself or herself in a decision situation where (i) the outcome results from decisions of the tax payer and the tax authority, (ii) the tax authority forms expectations about the behavior of the tax payer, (iii) the tax payer forms expectations about the behavior of the tax authority, (iv) tax payer and tax authority know about (i), (ii), and (iii), and (v) they know their own strategy set and their preferences on the outcome of the tax game as well as the strategy set and the preferences of their opponent in the game (i.e., we assume complete information). The strategy set of the tax payer (player *TP*), S_1, contains two pure strategies: cheat (*C*) and not cheat (*NC*). The strategy set of the tax authority (player *TA*), S_2, contains two pure strategies: deter (i.e., audit and punish if noncompliance is detected) (*D*) and not deter (*ND*). We allow for mixed strategies, i.e., we assume that (1) *TP* may expect *TA* to randomize on choosing between *D* or *ND* with

[1]Reviews of the theoretical developments of microeconomic models of tax (non-) compliance are provided, e.g., in Witte and Woodbury (1985), Cowell (1985, 1990), and Roth, Scholz and Witte (1989) with a large number of references to the literature. A stronger psychological orientation is given in Hessing et al. (1988) and Robben et al. (1990).

probability q for D, and (2) TP may randomize on C and NC with probability p for strategy C. There are four outcomes, each implemented by one of the four pairs of pure strategies. The evaluation of the outcomes and the corresponding strategies are summarized by the payoff matrix in Figure 1.

		Tax authority (TA)	
		Deter (D)	Not deter (ND)
Taxpayer (TP)	Cheat (C)	(a,α)	(b,β)
	Not cheat (NC)	(c,γ)	(d,δ)

Figure 1: The taxpayer / tax authority game

It seems plausible to assume the following ranking of the payoffs:

(A.1) (i) $b > a,\ b > d,\ c > a,\ c > d$ for tax payers

and (ii) $\alpha > \beta,\ \alpha > \gamma,\ \delta > \beta,\ \delta > \gamma$ for the tax authority.

Most payoff relationships are rather straightforward and need not be commented on any further. The relation $c > d$, however, does not seem to be obvious; it implies that TP prefers deterrence to non-deterrence in case that TP does not cheat - which parallels the pleasure potential smugglers enjoy at the border when they get searched by the custom officer but do not carry hot goods with them. Honest tax payers may prefer deterrence for equity reason: they want tax cheaters to be punished so that such people do not enjoy advantage compared to themselves. The motivation corresponds to the notion of tax morale which, as we have argued in the previous section, tends to be undermined if the tax authorities do not treat tax payers equally, i.e., in a fair manner.

The relation $\alpha > \gamma$ may express a catch premium given by the policy maker to the tax officials if they detect a cheating tax payer. We will come back to this interpretation in section 4. There is, however, also a motivational interpretation of the relation $\alpha > \gamma$. Tax officials would feel superfluous and would become frustrated if tax payers were completely honest. The tax officials can only justify their deterrence policy and the use of resources in fighting tax evasion (to themselves as well as to the public) if indeed some tax payers cheat.

A policy maker, P, say the parliament or the government, cannot perfectly control the tax authority, however, it is assumed to be able to manipulate payoff a which results from cheating (C) and deterrence (D) within the limits given by (A.I). Alternatively, we will consider that P can offer a catch premium, implied by an increase of a. P's preferences on the outcomes of this game[2] follow the ranking (NC,ND) > (NC,D) > (C,D) > (C,ND), i.e., $x_1 > x_2 > x_3 > x_4$ in Figure 2. Thus, irrespective of the decision of the tax authority, P prefers the tax payer to choose NC instead of C. This ranking of P's preferences also takes care of the fact that auditing and paying a catch premium are costly to P.

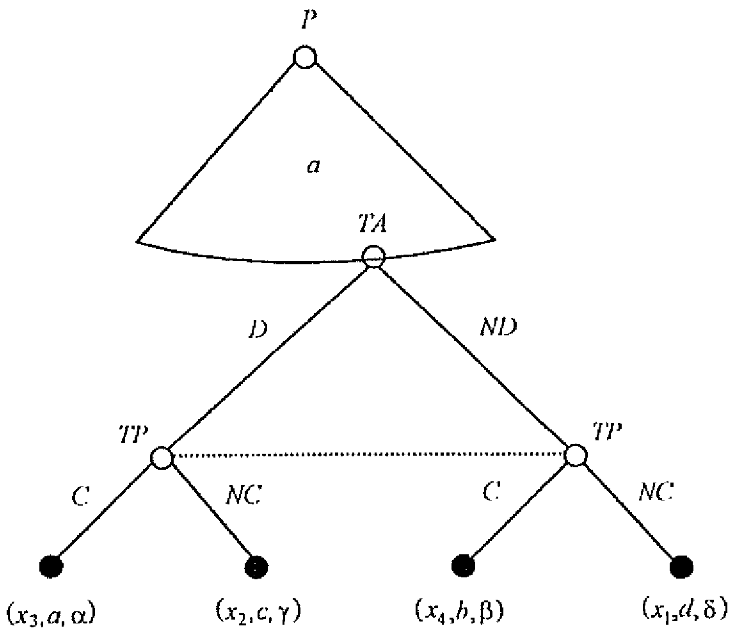

Figure 2: The principal-agent-controller model

The principal's preferences: $x_1 > x_2 > x_3 > x_4$

The informational structure of this game is characterized by the following assumptions: (i): P determines the level of a, before TP and TA make their strategy choices and (ii) the payoff matrix in Figure 1 is known to TP and TA before they simultaneously, i.e., without knowing the other's strategy choice, decide on their strategies. The interactive decision situation can be illustrated by the game tree in Figure 2.

[2]The discussed model is a version of the principal-agent-controller model as applied in Holler (1993).

The dotted line between the two nodes of TP expresses that TP does not know whether the tax authority TA has chosen D or ND when making his decision on C and NC. This structure depicts the imperfect information of TP in the game. The imperfect information of TA is captured by the sequence of the game tree: By assuming that TA is first to make its decisions, we exclude that TA knows which strategy TP selects. Obviously, there is a second tree which equivalently illustrates the strategic decision situation of our model. It results from exchanging TP and TA and the corresponding strategies in Figure 2.

The strategic situation in which an individual tax payer and a tax official see themselves are considered as of one-shot, i.e., both agents assume that a previous specific decision situation will not repeat itself in future periods. This assumption can be justified by the structural anonymity of large numbers typical for taxation in larger communities, or by the strategic anonymity stemming from bureaucratic rules designed to minimize reputation effects, so that cooperation from repeated interaction is restricted. One of these rules is that the material of a specific tax payer will never be checked by the same tax official in two subsequent years.

If the political decision maker P can manipulate payoff a over a continuous interval of values, then Figure 2 expresses an infinite set of games consistent with our model. It is up to P to decide what game TA and TP play. In order to select the preferred game, P has to know what strategies TP and TA will choose in the various settings corresponding to alternative values of a. This problem is not easy to solve. To answer the question how TP will decide implies that TP can form expectations on how TA decides, given that TP is a (Bayesian) rational player. (See Tan and Werlang (1988).) The corresponding view holds for TA, provided TA is rational.

To form expectations is equivalent to applying solution concepts to the game in order to break down the complexity created by the interrelationship of the choices, via outcomes and payoffs, and the information of the players. Various solution concepts can serve as indicators for the players to grasp the strategic interdependency inherent to an interactive decision situation as described in Figure 1 and prepare for an analysis of the decision making. Given the constraints in (A.1), the game in Figure 1 has no pure strategy Nash equilibrium (and thus, of course, no equilibrium in dominating strategies). The pure maximin strategy of TP is determined by the relative size of a and d while the pure maximin strategy of TA depends on whether $\beta > \gamma$ or $\beta > \gamma$ holds. Since we have no immediate justification for any of these relations, the application of the pure-strategy maximin solution seems somewhat vacuous. Given condition (A.1), we do not have to specify these relations. Let us assume that the payoffs of the players are of von Neumann Morgenstern type, and thus characterized by cardinality. This allows us to calculate mixed strategy pairs for the Nash equilibrium and for the maximin solution of the game in Figure 1. (Note since the von Neumann Morgenstern utility functions, U_i (i = TP,TA), satisfy the expected utility hypothesis,[3] no distinction has to be made between "payoffs" and "expected payoffs" in what follows.)

If p is, as defined, the probability of TP selecting strategy C and q is the probability of TA selecting D, then the (mixed strategy) Nash equilibrium is characterized by the pair (p^*,q^*) such that

(1) $$U_{TP}(p^*,q^*) \geq U_{TP}(p,q^*) \text{ for all } p \in [0,1] \quad \text{and}$$

$$U_{TA}(p^*,q^*) \geq U_{TA}(p^*,q) \text{ for all } q \in [0,1].$$

Condition (1) is fulfilled if q^* satisfies

(2a) $$qa + (1-q)\,b = qc + (1-q)\,d$$

and if p^* satisfies

(2b) $$p\alpha + (1-p)\,\gamma = p\beta + (1-p)\,\delta.$$

Satisfying (2a), q^* makes TP indifferent with respect to all $p \in [0,1]$ and thus also for p^*. That is, TA's strategy q^* fixes the payoff value of TP to a constant value. The corresponding result applies to p^*: TP's strategy p^* fixes the payoff value of TA.

Solving (2a) and (2b) we get

(3a) $$p^* = (\delta - \gamma) / (\alpha - \beta - \gamma + \delta)$$

(3b) $$q^* = (d - b) / (a - b - c + d)$$

From (3a) and (3b) the following result is immediate:

Result 1: In 2-by-2 (two-person matrix) games, player i's Nash equilibrium strategy is independent of i's payoff values if it is mixed.

The mixed strategy maximin solution, characterized by the probability pair (p^+,q^+), derives from the equations

(4a) $$pa + (1-p)\,c = pb + (1-p)\,d$$

[3]The von Neumann-Morgenstern utility function is defined by the fact that it satisfies the expected utility hypothesis (see, e.g., Harsanyi, 1977, p. 32).

(4b) $$q\alpha + (1-q)\,\beta = q\gamma + (1-q)\,\delta.$$

TP's strategy p^+, which satisfies (4a), fixes *TP*'s payoff value and makes it independent of the strategy choice of *TA*. Similarly, *TA*'s strategy q^+, which satisfies (4b), fixes *TA*'s payoff value and makes it independent of the strategy choice of *TP*. Thus we have

(5) $$U_{TP}\,(p^+,q) \geq \min U_{TP}\,(p,q) \text{ for all } q \in [0,1] \quad \text{and}$$

$$U_{TA}\,(p,q^+) \geq \min U_{TA}\,(p,q) \text{ for all } p \in [0,1].$$

Solving (4a) and (4b) we get

(6a) $$p^+ = (d - c)\,/\,(a - b - c + d)$$

(6b) $$q^+ = (\delta - \beta)\,/\,(\alpha - \beta - \gamma + \delta).$$

In order to calculate the payoffs of *TP* and *TA* for the Nash equilibrium and for the maximin solution, we plug p^* and q^* into (2a) and (2b) and p^+ and q^+ into (4a) and (4b), alternatively. We get

(7a) $$U_{TP}\,(q^*) = (ad - bc)\,/\,(a - b - c + d) = U_{TP}\,(p^+)$$

(7b) $$U_{TA}\,(p^*) = (\alpha\delta - \beta\gamma)\,/\,(\alpha - \beta - \gamma + \delta) = U_{TA}\,(q^+)$$

Thus we have

Result 2: In 2-by-2 (two-person matrix) games, player i's Nash equilibrium payoff is identical to i's maximin payoff if both solutions contain mixed strategies.

Result 2 (which is derived in Holler (1990)) says that the Nash equilibrium is "unprofitable" (see Harsanyi, 1977, pp. 104-107). It raises the question why, e.g., *TP* should play Nash equilibrium strategies if the expected payoff of the Nash equilibrium is identical to the payoff of playing maximin, i.e., identical to the payoff which *TP* can guarantee himself, irrespective of what strategy *TA* selects - while the Nash equilibrium payoff of *TP* is exclusively determined by *TA*'s strategy choice. To justify p^* as a best reply assumes that *TA* plays q^*. That is, p^* is only optimal, if *TA* chooses q^*. In this case, however, any other p (including the pure strategies $p = 1$ and $p = 0$) would also be a best reply. The Nash equilibrium (p^*,q^*) is weak; thus it does not "hurt" a player choosing an alternative strategy.

The maximin solution, however, prescribes strategies which are, in general, not best replies to each other. That is, given the maximin strategy of *TA*, *TP* could do better by choosing an alternative strategy to maximin, and vice versa. If the game is one-shot, then players have no possibility to revise their strategies. Does it matter under these circumstances that they might regret what they have done after implementing the maximin outcome? And if they regret and play the *Gedankenexperiment* of revisions in order to end up in a strategy pair of mutually best replies, i.e., the Nash equilibrium, what are the payoffs from the solution? The answer is: The same payoffs as in the maximin solution.

We do not further discuss here which solution concept is the right one (for arguments, see Holler, 1990; 1993) but accept both the Nash equilibrium and the maximin solution as a point of departure to discuss *P*'s policy with respect to manipulating payoff a. Of course, the optimal policy of P in choosing a will depend on what solution concepts *P* assumes *TP* and *TA* will follow in case *TP* and *TA* think strategically, i.e., whether they are expected to be Nash players (choosing strategies in accordance with (3a) and (3b), respectively) or maximin players (choosing strategies in accordance with (6a) and (6b), respectively).

Case 1: Both *TP* and *TA* are Nash players. A decrease of a motivates *TA* to reduce the probability of deterrence, q^*, while the probability of cheating, p^*, remains unchanged. That is (*C*,*D*) becomes less likely while the probability of the strategy pair (*C*,*ND*) increases.[4] - This result is counter-productive for P since *P* prefers (*C*,*D*) to (*C*,*ND*).

Case 2: Both *TP* and *TA* are maximin players. A decrease of a motivates *TP* to reduce the probability of cheating, p^+, while q^+ remains unchanged. That is (*C*,*D*) becomes less likely while the probabilities of the strategy pairs (*NC*,*D*) and (*NC*,*ND*), both preferred by *P* to (*C*,*D*), increases. This result is favourable to *P*.

Case 3: *TP* is a maximin player and *TA* is a Nash player. A decrease of a motivates *TP* to reduce the probability of cheating, p^+, while *TA* will reduce the probability of deterrence, q^*. Thus (*C*,*D*) becomes even less likely than in CASE 1 and in CASE 2, given a is reduced by the same amount, while the probability of the strategy pair (*NC*,*ND*), *P*'s preferred choice, increases. - This result is "very favorable" to *P*.

Case 4: *TA* is a maximin player and *TP* is a Nash player. A decrease of a has no impact on the probabilities q^+ and p^* and thus leaves the behavior of both parties unchanged.

[4]A series of similar paradoxical results are discussed in Brams (1992) and Tsebelis (1989, 1993). For a theoretical analysis, see Wittman (1985, 1993).

		Tax authority (*TA*)	
		Maximin	Nash
Taxpayer (*TP*)	Maximin	$p^+\downarrow, q^+$	$p^+\downarrow, q^*\downarrow$
	Nash	p^*, q^+	$p^*, q^*\downarrow$

Figure 3: Changes of Maximin and Nash strategies induced by a reduction of payoff a

Figure 3 summarizes the effects of a decrease of a on the strategy choices which derive for alternative behavioral assumptions.

We can confront these four cases of strategic interaction with cases where *TP* is assumed to be a naive utility maximizer as implied by standard criminal choice theory. This case can, however, be summarized as follows: Because of a reduction of a, cheating becomes a less likely choice, i.e., the probability p of strategy C decreases, if *TP* assumes the probabilities of *TA* for choosing D and ND (q and 1-q) to remain unchanged. The latter assumption holds if *TA* is a maximin player or a naive utility maximizer, the latter assuming the probabilities of C and NC to be unaffected by the decrease of a. This result is positively evaluated by P. However, if *TA* is a Nash player, *TA* will reduce the probability of deterrence, q^*, which corresponds to an increase of the probability of non-deterrence. Depending on the magnitude of the probabilities (i.e., of the magnitudes of *TP*'s payoffs in Figure 1, the probability of the strategy pair (C,ND), which is the least preferred result to P, will increase, decrease, or remain constant.

If, however, *TP* expects *TA* to be a Nash player then we are back to strategic reasoning and CASE 1: while D will become less likely due to a decrease of a, the Nash strategy of *TP*, p^*, will not be affected by a change of a. Moreover, any decision of *TP* will be a best reply to *TA*'s Nash strategy q^*. Thus we have to conclude from the preceding analysis that deterrence does not work if tax payers and the tax authority see themselves involved in a game situation characterized by the strategies and payoffs represented in Figure 1 and by condition (A.1). This outcome is consistent with the empirical observations cited. However, given the equality of expected payoffs in Nash equilibrium and maximin solution we may argue that, for this game, maximin is a more plausible solution concept than Nash equilibrium. A decrease of payoff a through deterrence then induces a decrease of the probability of cheating (i.e., p^+). This result corresponds to the result of standard criminal choice theory, although it is motivated by a rather different reasoning, but it is inconsistent with the quoted empirical observations. On the one hand, this falsifies the arguments which support maximin.[5] On the other hand, it questions the game model above which described the strategic relationships between tax payers and tax authorities.

Let us follow the path of mainstream game theory, however, and accept the result suggested by the Nash equilibrium concept. Is there a strategy which frees the policy maker from the strategic trap which deterrence policy builds up? We may consider a catch premium, implied by an increase of a as an alternative to the unsuccessful deterrence policy of reducing a. The results of this policy (e.g., analysed in Holler (1993)) are summarized in Figure 4.

		Tax authority (*TA*) Nash	Tax authority (*TA*) Maximin
Taxpayer (*TP*)	Nash	$p^{*}\downarrow, q^{*}$	$p^{*}\downarrow, q^{+}\downarrow$
	Maximin	p^{+}, q^{*}	$p^{+}, q^{+}\downarrow$

Figure 4: Changes of Maximin and Nash strategies induced by a reduction of payoff α

Naive (non-strategic) policy suggests that an increase of α is followed by an increase of the probability q of auditing (implying an increase of expected deterrence) inducing a lower probability p of cheating. Indeed, the Nash equilibrium strategy of *TP* implies a reduction of p - although q remains constant. If, however, *TP* follows the *maximin* solution concept, the probability of cheating remains constant since p^{+} does not depend on α. It is, however, peculiar to see that *TA* will reduce the auditing probability, q, if α increases and *TA* follows the maximin recipe. That is, auditing becomes less likely - but the probability of cheating will remain constant, if *TP* follows maximin, or even decrease, if *TP* follows Nash.

To summarize: a decrease or an increase in the catch premium α and therewith a variation in deterrence is not a reliable policy for the tax authority to influence tax compliance. To ensure compliance within the postulated strategic framework, noncheating (*NC*) has to be made a dominant strategy. Since (A.I) assumes $c > a$ the do-

[5]See Holler and Host (1990) for empirical results and theoretical arguments which support maximin.

minance of *NC* hinges on generating $d > b$. So far, however, $d < b$ expresses the benefits of tax evasion. Moreover, it seems that nothing can be done by the taxpayers to change this relationship. One possibility is to raise citizens' tax morale by so much that the monetary gain from tax evasion in the case of non-deterrence is overcompensated. If this holds, non deterrence is a *best-reply strategy* of the tax authority. Is it plausible to assume that the tax authority is able to increase d so that $d >$ b follows? This question will be discussed in the following section.

It is immediate from Holler (1990) that the paradoxical results which derive from mixed-strategy Nash equilibria in 2x2 games are due to the linear functional relation of probability and utility which characterizes von Neumann-Morgenstern utilities and the corresponding weakness of the Nash equilibrium. As a consequence, we cannot derive well-determined predictions of how agents will behave in real-world decision situations. In fact, it is the assumption of the linearity of von Neumann-Morgenstern utilities which leads to nonlinear reactions in the case that the mixed-strategy equilibrium will not be achieved. The pattern of results are quite similar to the behavior of nonlinear systems: "a minuscule change in the input can have a catastrophic change in the output" (West, 1997, p. 106; see also von Gert, 1997). Cheng and Zhu (1995) demonstrate that strict Nash equilibria for mixed-strategies exist if players have "quadratic utility". Then there are unique best replies and the results are no longer paradoxical.

3. *Tax Morale and Compliance*

Empirically oriented econometric, survey and experimental research has, at least in part, acknowledged the importance of tax morale.[6] What has so far not been considered is that deterrence in the form of both stricter auditing and higher punishment may, under specific conditions, systematically reduce *intrinsic motivation* to pay taxes, i.e., as an increase in a may reduce d (so-called "crowding-out effect"). This makes tax morale an endogenous factor in a model of compliance (see, in general, Frey, 1992, 1997). Cognitive experimental social psychology has identified two general circumstances in which deterrence reduces intrinsic motivation: violation of a basic norm of reciprocity (see, e.g., Gouldner, 1960) and reduction of overjustification (see, e.g., Pittman and Heller, 1987).

[6]See, e.g., Tittle (1980), Westat (1980), Scott and Grasmick (1981), Friedland (1982), Lewis (1982), Grasmick and Scott (1982), Wärneryd and Walerud (1982), Webley and Halstead (1985), Graetz and Wilde (1985), Graetz, Reinganum and Wilde (1986). A pioneering study comparing the tax morale of various European countries was undertaken by Strümpel (1969) and Schmölders (1970) at the University of Cologne. Song and Yarbrough (1978) measured the tax ethics among residents of a North Carolina city.

Reciprocity implies that a tax payer considers his or her particular tax balance. If the exchange between the tax paid and the government services performed are found to be equitable, the tax payer is more inclined to comply to the law than if he or she evaluates the exchange to be unfair. An increase in deterrence disrupts this balance for an honest tax payer. This feeling is strongest when a tax payer who personally considers himself to have paid a fair due, is audited and fined; or when he or she notes that other tax payers violating the tax law do not get punished. When such errors of type I (fining an honest tax payer) and of type II (not fining a dishonest tax payer) occur the intrinsic motivation to comply to tax law is undermined and a higher extent of tax evasion is observed than if no such moral effect existed.

Reduction of overjustification states that when people are extrinsically rewarded for a task which they are ready to undertake for their own satisfaction, the intrinsic reason is negatively affected or crowded out. As a result, when the extrinsic reward is discontinued, less of the task will be performed. (Such "hidden costs of rewards" or, more generally, crowding-out effects are reported and discussed in, e.g., McGraw (1978), Deci and Ryan (1985) and Lane (1991); for experimental evidence see also Deci and Ryan (1980) or Eichberger and Cameron (1996); for econometric evidence see Barkema (1995), Frey and Oberholzer-Gee (1997).) This implies that tax payers, who consider themselves honest, feel "overjustified" when their high tax morale is not required because the auditing and fining scheme of the tax authorities force compliance upon them anyway. Thus, when deterrence is raised, the tax payers are rational to reduce their tax morale in order to regain the least cost equilibrium, i.e., to produce performance at the lowest possible costs.

Taking the effect of increased deterrence on tax morale into account within the framework of a standard economic model allows us to derive empirically testable propositions of the tax evasion phenomena. In the following, we will discuss three propositions and relate them to empirical findings.

Proposition 1: The insignificant and/or ambiguous effect of deterrence on tax compliance can be explained by the fact that the effect of deterrence on tax morale has been disregarded.

To illustrate this proposition we use the following standard equation for tax compliance estimation as a point of departure:

$$T = \alpha_0 + \alpha D + \beta Z \qquad (8)$$

where T measures the extent of tax compliance, D represents deterrence (i.e., auditing an detection probabilities as well as the magnitude of punishment) and Z summarizes other influences on tax-compliance including income and tax rates. Criminal choice theory assumes that deterrence works, i.e. $\alpha > 0$.

Now we consider an alternative model in which tax morale M influences tax compliance and in which deterrence undermines tax morale (for simplicity, in a linear way):

$$(9) \qquad T = \alpha_0 + \alpha_1 D + \alpha_2 M + \beta Z \quad \text{with } \alpha_2 > 0$$

$$(10) \qquad M = m_0 - m_1 D \quad \text{with } m_0, m_1 > 0.$$

Thus we get

$$(11) \qquad T = \delta_0 + \delta_1 D + \beta Z$$

where $\delta_0 = (\alpha_0 + \alpha_2 m_0) > 0$ and $\delta_1 = (\alpha_1 - \alpha_2 m_1) \gtrless 0$. If the deterrence effect is smaller than the undermining effect on tax morale ($\alpha_1 < \alpha_2 m_1$), deterrence reduces compliance ($\delta_1 < 0$). A number of studies have found a negative deterrence effect. It is no fluke that many of them are survey studies, which do pay attention to tax morale (e.g., Spicer and Lundstedt, 1976; Westat, 1980; Yankelowich et al., 1984). An Internal Revenue Service study (1973) - not based on surveys but on the effect 1967-69 audit histories of tax payers on 1968-69 - reports tax liabilities: For three out of four medium-income and high-income classes (which have the best opportunities to conceal income), the audits were associated with lower reported tax liabilities, thus also observing a perverse effect of deterrence on tax compliance.

The negative effect can of course be attributed to many different causes (such as selection biases) but is consistent with a model in which, under specific conditions, the undermining effect of deterrence on tax morale (captured by $\alpha_2 m_1$) dominates the effects of deterrence (expressed by $\alpha_1 > 0$) as suggested by standard criminal choice theory. Whether this relation applies cannot always be unambiguously shown, However, there is some empirical evidence which supports the following proposition.

Proposition 2: A cooperative relationship between tax payers and tax authorities may lead to the same level of tax compliance as a coercive relationship based on deterrence.

In their comparative study of the European tax system, based on surveys of 1.000 individuals, Schmölders (1970) and Strümpel (1969) studied the effects of different enforcement levels on compliance and attitudes. They found a striking difference between Germany and Britain. The German system is strict and stresses coercive enforcement while the British one is relatively cautions, more lenient and the atmosphere between tax payers and tax officials is more cooperative. However, the general level of tax compliance achieved in the two countries was quite similar. Indeed, Schmölders and Strümpel observed that tax morale in Germany was significantly lower than in Britain. - The reason why the two tax authorities pursued a different policy is based on historical and institutional conditions specific to the two countries. British citizens with their long democratic tradition and respect for private rights tend to resent intrusions by the tax authorities more strongly than do the Germans who are used to believe in authoritarian structures and in government doing what is good for them.

We can model the differences of aversion to deterrence on optimal compliance policy. Let us assume that tax authorities want to maximize tax compliance; and that tax compliance depends on both deterrence and tax morale so that

(12) $$T = T(D, M) \text{ with } T_D \geq 0,\ T_M \geq 0$$

and $$T_{DD} < 0,\ T_{MM} < 0$$

Tax authorities will decide on the quantity of auditing and punishment (i.e., deterrence) so that

(13) $$T_D + T_M (dM/dD) = 0$$

Obviously, it depends on the sign of dM/dD of whether the tax authority should increase, reduce or keep constant deterrence D. If, following the above discussion, we assume that $dM/dD = -m_1 < 0$ then rational tax administrators will employ less deterrence than in the standard criminal choice model.

From the analyses of Schmölders (1970) and Strümpel (1969) we conclude that the British had a stronger aversion to raising taxes by deterrence than the Germans, i.e., the product - $(dM/dD)T_M$ was larger for Britain than for Germany. If we assume a similar marginal effectiveness of deterrence on compliance T_D in both countries, the model suggest a lower optimal degree of deterrence in Britain than in Germany. This is consistent with the empirical evidence found by Schmölders (1970) and Strümpel (1969).

A generalization of this results is captured by

Proposition 3: The cooperative atmosphere between tax payers and tax authorities, resulting in high tax morale, is the larger, the more extensive the democratic participation possibilities are.

The amount of cooperation and trust between tax payers and tax authorities varies greatly between nations; in some countries it scarcely exits, while it seems to be of considerable importance in countries such as Britain and the United States. For Switzerland, it has been shown by econometric cross section estimates that in cantons with more developed institutions of direct democratic participation (referenda and initiatives), in which a higher tax morale can be expected, tax compliance is *ceteris paribus* significantly larger (Pommerehne and Frey, 1992). Breaking the relationship of trust one-sidedly by imposing stricter auditing and higher fines, would make many tax payers feel that their tax morale is not adequately recognized by the tax authorities. This induces tax payers to reduce what they consider to be their 'excess' tax morale leading them to more strongly underreport their taxable income.

4. *Tax Policy and Tax Morale*

Our analysis based on a game theoretical model suggests that deterrence is an ineffective policy to raise citizens' tax compliance. Moreover, if deterrence indeed reduces tax morale, as argued in section 3 of this paper, non-deterrence raises the payoff of the tax payer because his high tax morale is acknowledged by the tax authority. If this effect is strong enough to compensate the monetary gains from tax evasion in the case of non-deterrence, then non-deterrence is a *best reply strategy* of the tax authority.

The policy maker may be well advised to strengthen tax morale instead of trying to increase tax compliance by payoff policies. To rely on moral persuasion may, however, result in a too optimistic policy and of course its success depends on the general level of morale existing in the tax-paying community. It was Machiavelli who stated that "in the province of Germany it is quite clear that goodness and respect for religion are still to be found in its peoples" and "when these republics have need to spend any sum of money on the public account ... each person presents himself to the tax-collectors in accordance with the constitutional practice of the town. He then takes an oath to pay the appropriate sum, and throws into a chest provided for the purpose the amount which he conscientiously thinks that he ought to pay; but of this payment there is no witness save the man who pays" (1983, pp. 244-245). For his beloved Italy no such traits existed and Machiavelli therefore suggested oppressive policies and rules to the "Principe" to be applied in order to stabilize society by tyrannical power. With respect to the strategic situation given by Figure 1, tyrannical policy coincides with increasing deterrence and manipulating the payoffs of the tax officers so that *D* becomes a dominating strategy and *NC* (i.e. compliance) becomes the only best reply.

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