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Paid to Quit, Cheat, and Confess

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Paid to Quit, Cheat, and Confess

Belonen van ontslag, bedrog, en bekentenissen

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by

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Acknowledgments

Luck. This is the first word that comes to mind when I wonder why I have the privilege of writing these lines. I grew up in a world of material abundance, social warmth, and intellectual freedom. I already won the lottery before I got to make the first decisions of my life. With this outset and endless options to shape my trajectory, perhaps a big remaining challenge in finishing a project like this book was to keep up the necessary spirit. As a consequence, a good share of my effort went into creating the right mindset to pursue this goal. I remember a night during my first year at Tinbergen Institute (TI). There would be an exam the next morning and at some point I found myself just lying on our alma mater's couch, reading a magazine and indulging in half a liter of Häagen-Dazs. To the outside world, this must have looked as if I did not care or was the personification of confidence. The opposite was the case, as I was trying to overcome the anxiety that would inhibit me from continuing to study. In these next paragraphs, I would like to thank some of the people who have seen beyond my apparent coolness and lent me a much needed helping hand on this journey.

It was during my time in Spain, where in all likelihood the – admittedly – lower work load of an exchange student also played a role, that I learned to love economics enough to pursue a PhD. I am particularly grateful to Pedro Álvarez Causelo, who provided nourishment in and beyond his excellent classes in Game Theory and Industrial Economics. After finishing my bachelor's, Johannes Schwarze invited me to work on a

project at the University of Bamberg. I was amazed at the laid-back, yet collaborative environment he created in his research group, making me confident that submerging myself into academia would be a good idea. I wouldn't have gotten this far, though, without the help of Christoph Wunder, who always had the patience to give me valuable guidance not only then, but also during my studies before.

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Heiner Schmittdiel

Amsterdam, May 2016

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Chapter 1

Introduction

Well, just like the rest of us, you have to make choices with your money. Do you want a bike, or do you want to not be depressed?

— Randy Marsh

When being offered a (supposed) remedy to his (alleged) depression, the little boy addressed in this quote is confronted with a fact of life. His father points out that he must come to a decision on how to allocate a scarce resource – his personal savings. This constitutes a common description of what lies at the core of the questions investigated by economists: how do people and organizations behave when they want it all, but their means are limited? Very often, economic actors can get better off when they interact with each other in voluntary exchange. Even when their interests are in conflict, a mutually beneficial agreement may be found. Nonetheless, the pursuit of self-interest by one side may harm the other as soon as there is a discrepancy in the information available to both parties. In this book, we study the incentives that organizations set for individual actors, such as employees or taxpayers, to overcome these problems.

The second chapter is joint work with Robert Dur and is inspired by a firm that does something unusual: instead of offering their employees money to do a good job, they offer them money to quit. This practice has caught the attention of several business writers and we have picked up their key arguments and incorporated them into a model that explains if and under what conditions such a pay-to-quit program is a good idea. In an ever more complex work environment, the carrots and sticks prescribed by classical economics can sometimes not be used. This is when finding workers who are intrinsically motivated can help a firm to make sure that the worker's interests are aligned with the company's: when people like what they do, they typically do it well. This notion is a well established fact for various jobs, but naturally applies to situations far beyond the workplace.

The firm's task may then switch from providing the right incentives to its workers to making sure to select the right workers in the first place, namely the motivated ones. This endeavor can prove to be non-trivial when unmotivated workers feel induced to mimic their motivated colleagues. In our model, the firm must offer a steep wage profile so that only workers with a long-term interest in a job consider applying. As a consequence, some unmotivated workers are reluctant to quit after finding out they do not like the job. In that situation, offering the right amount of money to people that decide to leave can ensure that unmotivated workers quit. At the same time, the motivated ones prefer to remain at the firm because of the motivational rents they enjoy. Our model shows that this exit bonus only increases the firm's profits when workers do not anticipate it. Furthermore, we show that a firm only finds an exit bonus useful when motivation plays not too big of a role.

As important as intrinsic motivation is for some occupations, almost all publicly traded firms provide extrinsic motivation to their executives in the form of equity and bonuses. While the provision of stock and stock options generally aligns the executive's income with the value of the firm, cash bonuses can be used to reward differently specified goals. This can be a useful tool when equity does not provide sufficient incentives for an executive to engage in certain activities. Reducing the firm's tax burden, for example, can amount to a substantial increase in net profits, but doing so can be a risky undertaking for a manager. If some of the firm's tax sheltering activities are illegal, an executive can even be held personally liable when such fraud is detected. As a consequence, a profit-maximizing firm may find it in its best interest to provide explicit incentives for tax sheltering.

While firms do have to report the level of bonuses paid out to their executives, the exact contract structure usually remains a secret. We thus do not know exactly what behavior is rewarded with a cash bonus. In the third chapter, I use data from the

1,500 most important firms that are publicly traded in the United States to investigate if there is a relationship between corporate taxes and chief executive officer (CEO) bonus payments. I find evidence that the average bonus contract rewards tax savings excessively when compared to other measures that increase corporate net profits, which confirms the hypothesis that managers require compensation for the additional risk inherent in running an aggressive tax strategy. In accordance with previous literature, I document a substantial heterogeneity in compensation practices across industries. It appears that the main result is driven by firms in the Industrial and Retail sectors. I further find that companies with greater tax planning opportunities are more likely to condition the CEO's bonus on corporate income taxes.

Just like a CEO who engages in tax sheltering for his firm, citizens who cheat on their personal tax reports face the risk of getting caught. Compared to the potential benefits of evading taxes, this risk is rather low, so that a neoclassical analysis of the monetary costs and benefits of tax evasion fails to explain why most people pay their taxes. Considering social preferences, such as the rise of a feeling of guilt when evading taxes, can be a solution to this puzzle. Nonetheless, the aggregate amount of taxes withheld is rarely negligible. In an attempt to increase tax revenue, many governments allow tax offenders the possibility to dodge punishment when they turn themselves in, some even permanently do so. It is clear that this practice yields additional government receipts when it comes as a one-time offer, but can a standing voluntary disclosure program also be profitable?

If people had the same information at the time when they decide to withhold taxes as when they are offered to come clean about it, nobody would make use of such a program. In the fourth Chapter, I analyze the implications of a possible change in people's feeling of guilt after handing in their tax report. My analysis provides insights into the costs and benefits for the government of offering their citizens the possibility

to make a voluntary disclosure. I show that governmental leniency not only increases tax revenue when it comes as a surprise, but even when taxpayers anticipate it.

Chapter 2

Paid to Quit

Joint work with Robert Dur

2.1 Introduction

Recently, an online vendor in the United States has caught attention with an unusual hiring practice; Zappos of Henderson, Nevada has been running a scheme offering all newly hired employees after their first four weeks a one-off payment of $4,000 if they decide to quit. According to the CEO of Zappos, the idea behind this policy is to provide newcomers with an additional incentive to leave the company if they find out that they do not completely fit in with the corporate culture (cf. Hsieh 2010). A few other tech companies have copied the practice in the meanwhile, including Amazon, Lot18, and Riot Games (see Taylor 2014, Jeffries 2012, and Edwards 2014).

Reactions to this uncommon policy have been mixed. In a Harvard Business Review Blog entry titled "Why Zappos Pays New Employees to Quit – And You Should Too", Taylor (2008) attributes the online shoe store's fast growth to the quality of their customer service. He suggests that the exit bonus has been essential in selecting the right employees for this task and recommends other companies to copy Zappos' practice: "[Offering the exit bonus is] a small practice with big implications: Companies don't engage emotionally with their customers – people do. If you want to create a memorable company, you have to fill your company with memorable people" (Taylor 2008). A Bloomberg Businessweek article is, however, more critical about Zappos' hiring practice, wondering: "[What] if hordes of people are going to start queueing up outside Zappos [...], what's to keep every young hopeful with gas money to roll in, attend part of the training, and head down the highway to the casinos with $2,000 in his pocket? It will be interesting to see what the impact of word-of-mouth will have on this odd HR process" (McFarland 2008).[1]

This chapter explores under what conditions an exit bonus could be part of a profit-maximizing personnel policy. Our theory picks up key aspects of the two articles quoted

[1] Note that the exit bonus has increased to $4,000 in the meanwhile.

above. We show that it can be optimal for a firm to offer an exit bonus, because it promotes self-selection of unmotivated workers out of employment, as suggested by Taylor (2008). On the other hand, this practice can be dangerous because it may attract workers without intentions to remain with the firm, as pointed out by McFarland (2008). In line with this, and consistent with Zappos' conduct, we show that the exit bonus needs to come as a surprise for workers in order to function well.

In our principal-agent model, agents differ in three respects: their commitment to the job, their outside opportunities, and their intrinsic motivation to work for the principal. All of these aspects are private information of the agents, which gives rise to two adverse selection problems. First, the principal would like to avoid hiring uncommitted agents who know beforehand that they only want to work for her for a short while. She can resolve this first problem by setting a low wage for an initial period. This, however, necessitates offering a high wage for the remaining time in order to satisfy the committed agents' participation constraint, similar to the classic model in Lazear (1979). The heterogeneity in outside options affects the severity of the first adverse selection problem and thereby influences the wage differential between periods.

At the time of application to the job, agents are already aware of the realizations of the first two dimensions of heterogeneity, namely their level of commitment and their outside opportunities. However, they only learn about their intrinsic motivation to work for the principal during the initial period. We thus follow Jovanovic (1979) in treating a job as an experience good – the only way of finding out whether the job is a good match, or in our case whether an agent is intrinsically motivated to work in this particular job, is experiencing it. The agent's motivation cannot be readily observed by the principal. This precipitates the second adverse selection problem, because the principal prefers to retain only motivated agents. Handy and Katz (1998) and Delfgaauw and Dur (2007) show that such an adverse selection problem could be mitigated from the outset by

offering a low wage so that only motivated agents find it worthwhile to apply for the job. This is, however, not possible in our setting, because the job is an experience good. Thus the overall wage profile needs to be attractive enough to convince agents to apply before it is clear to them whether they will enjoy the job. Consequently, the firm inevitably hires some agents who discover that they are unmotivated and do not enjoy the job. The principal could prompt these agents to quit by offering a lower wage once agents have discovered their motivational type. Such a policy, however, conflicts with the solution to the adverse selection problem concerning agents' commitment, which calls for a steep wage-tenure profile. As a result, unmotivated agents may, despite their lack of motivation, find it in their best interest to stay at the firm if the wage profile is sufficiently steep. A solution to this problem is offering an exit bonus after the initial period, which persuades unmotivated agents to quit. We show that such an exit bonus is part of a profit-maximizing personnel policy if solving the first adverse selection problem necessitates a sufficiently steep wage profile and if intrinsic motivation plays a comparatively minor role.

As pointed out by McFarland (2008), the exit bonus may attract uncommitted agents. Our analysis validates this concern: we find that the exit bonus can only be a viable instrument if it is kept secret ex ante. This is so because it would be a perfect substitute for the wage-tenure profile if it were anticipated. Hence, the principal cannot resolve both adverse selection problems anymore if agents take into account that they will be offered an exit bonus later on. Consistent with this, Zappos does not advertise the exit bonus. While Zappos does confirm its practice in interviews and on its website, these sources are directed at interested outsiders rather than potential future employees. Most importantly, there is no mention of the exit bonus in job descriptions or on the recruitment website (see e.g. Zappos 2013a; the same holds for the companies that copied Zappos' policy that we mention above).

The remainder of this chapter is structured as follows. The next section provides an overview of the related literature. Section 2.3 describes the model. Results are presented and discussed in Section 2.4, followed by a concluding section.

2.2 Related Literature

The recent attention Zappos and others have received for their practice to pay an exit bonus (cf. Taylor 2008 and 2014, McFarland 2008, Jeffries 2012, and Edwards 2014) suggests it is an uncommon, perhaps surprising, policy. We do agree with this notion and only know of a handful of firms using such an instrument. Then again, our theory predicts that it should not be advertised, so not knowing about firms using an exit bonus may simply be due to the fact that they try to keep such practices in the dark. Nonetheless, another closely related phenomenon can be observed in compensation packages, most prominently in those of executive officers: severance pay. Crucial differences between the exit bonus offered by Zappos and severance pay packages are that the former is offered to all recent hires to stimulate voluntary quits, while the latter are incidentally granted upon involuntary departure of employees. A commonly used term for severance pay in executive contracts is the Golden Parachute, whereas a Golden Handshake labels severance pay that is awarded on a discretionary basis. Theoretical literature on severance pay explains why it may arise in a principal-agent setting and what the welfare implications of its introduction are.

Lazear (1990) analyzes effects of a state-mandated severance pay on the labor market. His theoretical prediction is that compulsory severance pay should not matter in a frictionless world: in a competitive labor market, employers will require workers to pay a fee upfront to offset the expected severance pay. However, this result may be nullified by, for example, restrictions on the borrowing and lending opportunities of employees. Lazear's (1990) empirical analysis of a 22-country panel suggests that the introduction of severance pay requirements indeed leads to a lower employment rate.

Rather than from legal coercion, severance pay may emerge voluntarily for several reasons. Much of the theoretical literature incorporates the idea that a risk-neutral principal offers a form of insurance against unstable income to risk-averse agents. This

insurance may be provided either by a contract with guaranteed employment (Baily 1974, Gordon 1974, Azariadis 1975, Akerlof and Miyazaki 1980) or by a contract that warrants severance pay in case of a layoff (Grossman and Hart 1981, Hart and Holmstrom 1987, Pissarides 2001; see Parsons 2007 for a discussion of the differences between these two types of insurance). In fact, a focus in this research has been set on explaining why such insurance is not offered more extensively (see for example Kahn 1985, or Ito 1988). Similar to the insurance argument, Booth and Chatterji (1989) develop a model in which a worker who partially bears the cost of firm-specific training requires to be compensated in case of dismissal. It is important to note that the exit bonus we study is only paid after a voluntary quit, not if the employee is fired. As such, it does not provide insurance against unemployment. Furthermore, if it were offered for insurance reasons, it would be advertised and made part of the contract ex ante rather than come as a surprise.[2]

Another reason why severance pay could be observed lies in a change of outside opportunities of the agent. Lazear (1981) considers a setup where principals incentivize agents to exert effort with a steep wage-tenure profile. A situation may arise where agents are paid above their marginal product towards the end of their careers. When an agent receives an unanticipated outside offer, the principal may choose to offer a one-off payment for efficient separation in lieu of the above-productivity wage. Note that this payment is made after a voluntary quit, a situation quite similar to that considered

[2]According to Yermack (2006), severance pay to CEOs is most often granted in the form of a Golden Handshake. He adds to the insurance argument, possibly in the form of an implicit contract: "In cases of risk aversion or effort avoidance, CEOs would be more likely to pursue value maximizing strategies due to the security provided by severance pay" (p. 241). In the case of Golden Parachutes, severance pay can help to make sure that a CEO does not prevent a take-over of the firm that is in the interest of the shareholders (cf. Lambert and Larcker 1985). On top of this, Yermack (2006) offers three more reasons for paying a departing executive: rent extraction – a powerful manager may be able to expropriate shareholders; ex post settling up – severance pay may be used to compensate a successful CEO at the end of his career for being underpaid before; and damage control – severance pay may be made in exchange for a confidentiality or non-litigation agreement by the manager. None of these arguments seem to bear much relevance in our context.

in our model. There are two crucial differences though. First, the exit bonus in our model needs to come as a surprise, whereas in Lazear's (1981) model it pays off for the principal to announce that severance pay may be offered after a shock to the agents' outside options. This is so because the anticipation of a possible severance payment would make it easier to convince the agent to accept the job. Second, the severance pay in Lazear (1981) would only occur for agents who are in the later stages of their careers, whereas the exit bonus that we study is offered to new hires.

Other papers have studied a scenario where a change of market conditions makes an employer want to reduce the number of employees. Sometimes, simply firing employees is not possible or prohibitively costly, for example in the public sector, in markets with strong labor rights, or where (potential) customers may be strongly opposed to large layoffs. Levy and McLean (1996), Jeon and Laffont (1999), and Rama (1999) deal with the question of how to reduce the work force in such a situation and all include a form of severance pay in their analyses.

The paper that comes closest to our approach is that of Inderst and Mueller (2010), who consider the effect of Golden Parachutes on information revelation by CEOs. As mentioned above, such agreements are usually only put into effect upon involuntary departure. Inderst and Mueller (2010), however, argue that the replacement of a CEO must be incentive compatible for him, because he is often the only person that could disclose information to the board that would lead to his termination. As such, severance pay may be used as a tool to make CEOs reveal when they are a bad match to the firm, in which case they would be fired. The central finding of their theoretical paper is that steep incentive pay may be a less costly instrument to this end than severance pay. Our approach differs from Inderst and Mueller's (2010) in four ways: First, we assume that the principal cannot make use of a performance measure, thus there is no way to implement an incentive pay scheme. Instead, the agent's utility is linked to

the principal's profits through intrinsic motivation to exert effort.[3] Second, our model incorporates an additional adverse selection problem at the moment of hiring. We argue that uncommmitted agents must be deterred from applying, a problem that is less of an issue when hiring a CEO, as more information about him is available to the principal. Third, Inderst and Mueller (2010) impose a limited liability constraint, which is not necessary in our setup. Fourth, we find that the exit bonus needs to be a secret at the time of hiring.

Finally, our work relates to an emerging literature arguing that full transparency of personnel policies can be suboptimal. Jehiel (2015) shows that it can pay off for a firm to leave workers in the dark concerning what performance measures they will be evaluated on, how their coworkers' incentive schemes are set up, and what exactly the production function of the firm is. He finds that non-transparency becomes advisable as soon as the dimensionality of moral hazard problems is larger than that of one agent's action space. The idea behind this is that it may be cheaper for the principal to resolve several moral hazard problems with one single incentive constraint. In simple words, if a worker knows his performance will be assessed, but does not know how, he might exert more effort (see also Lazear 2006 and Ederer et al. 2013 for related arguments). Likewise, Von Thadden and Zhao (2012) find that it can be a good idea to offer incomplete contracts concerning the agent's action space, arguing: "if [...] the employee is unaware of some shirking behavior, then it may not be optimal [...] to regulate this kind of activity in the contract, since this makes [him] aware of the activity and necessitates the provision of costly incentives" (p. 1152).

[3] As we shall argue in the next section, this fits well with the case of Zappos.

2.3 The Model

Our model features two periods: Period 1 consists of one term, whereas Period 2 consists of n terms. At the beginning of Period 1, the principal can hire particular agents if she offers a wage profile that satisfies their participation constraint and deter other types of agents from applying with a wage profile that violates their constraint. Agents differ along three dimensions (commitment, motivation, and outside option), none of which is readily observable to the principal. The principal's payoff increases in an agent's effort and decreases in his compensation. Agent i's utility in term t when employed by the principal is given by

$$U_{it} = w_t + f_i\left(e_{it}\right),$$

where w_t denotes the wage, and $f_i\left(e_{it}\right)$ captures the impact on utility of effort e_{it} that the agent exerts when working for the principal. We avail ourselves of the following functional form

$$f_i\left(e_{it}\right) = \gamma_i e_{it} - \frac{1}{2}\theta e_{it}^2,$$

which allows for agents to experience a certain joy of work, as long as their motivation parameter γ_i is positive. A key assumption in this chapter is that agents only learn the value of their motivation parameter by working for the principal for one term. Ex ante, the agent only knows he can be the motivated type, with $\gamma = \bar{\gamma} > 0$, or the unmotivated one, with $\gamma = 0$; these two cases can occur with probabilities $0 < q < 1$ and $1 - q$, respectively. Motivated agents' incentives are thus partially aligned with those of the principal, because they enjoy exerting effort to some extent, as in e.g. Benabou and Tirole (2003), Besley and Ghatak (2005), and Delfgaauw and Dur (2007). The principal in our model has no means of monitoring effort.[4] Hence, an agent's pay or retainment

[4] As a matter of fact, Zappos explicitly condemns performance measures; the reasoning behind this is that employees are supposed to deliver better work, e.g. a friendlier customer service, when they are not monitored and can act freely (Hsieh 2010).

cannot be conditioned on his effort. The principal can commit to a wage-tenure profile and, if she wishes, to offering an exit bonus.

When not working for the principal, agents derive per-term utility V_i, posing another source of heterogeneity. We allow the outside option utility of agents to be $\overline{V}$ or $\underline{V}$, with $\overline{V} > \underline{V}$. The principal has the opportunity to augment the outside option of her agents in Period 2 by offering an exit bonus b. We rule out indentured servitude; that is, we assume that $b \geq 0$. Furthermore, we assume that the exit bonus comes as a surprise to agents if the principal decides not to advertise it. Finally, agents differ in their commitment to the principal: uncommitted agents know for sure they are looking for employment with the principal for Period 1 only, whereas committed agents are potentially interested to work for both periods. We assume that the principal wants to avoid hiring uncommitted agents, for example because of training and other turnover costs.

The sequence of events is as follows:

1. Nature draws types.
2. The principal designs a compensation plan consisting of a first period wage, a second period wage, and possibly an exit bonus, and decides whether to advertise the exit bonus or not.
3. Agents decide whether to apply for a job with the principal.
4. Agents are hired and make an effort choice for the first period, during which they learn about their intrinsic motivation to work for the principal. The first period wage is paid out.
5. The principal decides whether to offer an exit bonus or not.

6. Agents decide whether to quit or continue working for the principal. Those who quit enjoy their second period outside option utility and, if it was offered in Stage 5, the exit bonus.

7. Agents who continue make an effort choice for the second period and receive the second period wage.

2.4 Analysis

We solve the model by backward induction.

2.4.1 Period 2

At the start of Period 2, each employed agent needs to decide on whether to continue employment with the principal or to quit, which may depend on his realization of motivational type. The agent has learned his type in Period 1, so in case he stays at the firm, makes his effort choice according to whether or not he is motivated. The unmotivated agent derives utility

$$U_{i2} = n\left(w_2 + 0 - \frac{1}{2}\theta e_{i2}^2\right),$$

so he has no reason to put in effort:

$$e_{i2} = 0. \tag{2.1}$$

The motivated agent on the other hand maximizes

$$U_{i2} = n\left(w_2 + \bar{\gamma} e_{i2} - \frac{1}{2}\theta e_{i2}^2\right),$$

which yields the following optimal effort level:

$$e_{i2} = \frac{\bar{\gamma}}{\theta}. \tag{2.2}$$

Agents decide on whether to continue employment with the principal based on the realization of their motivation parameter and the wage the principal offers, compared to their outside opportunities. In the absence of an exit bonus, which will be introduced

in subsection 2.4.3, a motivated agent stays iff

$$n\left(w_2 + \frac{\bar{\gamma}^2}{2\theta}\right) \geq nV_i.$$

An unmotivated agent, who earns no motivational rents, continues iff

$$nw_2 \geq nV_i.$$

Hence, the principal should offer $w_2 < V_i$ in order to induce all unmotivated agents with at most outside option utility V_i to quit. As we shall see in Subsection 2.4.3, this solution to the adverse selection problem regarding agents' motivation sometimes conflicts with solving the adverse selection problem regarding agents' commitment to the job.

2.4.2 Period 1

At the start of Period 1, agents need to decide whether they find it worthwhile to apply for the job offered by the principal. This decision is based on the expected utility in Period 2, the effort choice in Period 1, and the wage profile offered by the principal.

When the agent starts working for the principal, he does not know what motivational type he is. Since effort is not monitored, effort in Period 1 has no effect on the agent's expected utility in Period 2, other than through learning his motivational type (which happens for any $e_{i1} > 0$). Hence, an agent will choose a level of effort that maximizes his expected utility in Period 1, which is described by:

$$\begin{aligned} \mathbb{E}U_{i1} &= w_1 + q\left(\bar{\gamma}e_{i1} - \frac{1}{2}\theta e_{i1}^2\right) + (1-q)\left(0 - \frac{1}{2}\theta e_{i1}^2\right) \\ &= w_1 + q\bar{\gamma}e_{i1} - \frac{1}{2}\theta e_{i1}^2. \end{aligned} \tag{2.3}$$

Utility maximization yields

$$e_{i1} = q\frac{\bar{\gamma}}{\theta}. \tag{2.4}$$

Comparing this result to the effort choices in Period 2, where agents are aware of their type, it can be seen that the effort choice of the uncertain agent lies in between that of an unmotivated agent, $e_{i2} = 0$, and that of a motivated agent, $e_{i2} = \frac{\bar{\gamma}}{\theta}$. The higher the probability of being a motivated agent, q, the more effort will be provided to reap the benefits of that possibility.

Applying at the firm is beneficial to an agent if his expected utility from having the job exceeds his opportunity costs. The agent is aware of his outside option V_i and knows when he is uncommitted, i.e. he wants to work in Period 1 only. Using Equations (2.3) and (2.4), it follows that uncommited agents can be deterred from applying iff

$$\mathbb{E}U_1 \leq V_i \iff w_1 + \frac{q^2\bar{\gamma}^2}{2\theta} \leq V_i.$$

Hence, the wage in the first period should be sufficiently low, as in Lazear (1979). Committed agents decide to apply iff

$$\begin{aligned} & \mathbb{E}U_1 + \mathbb{E}U_{i2} \geq (1+n)\,V_i \\ \iff\ w_1 + \frac{q^2\bar{\gamma}^2}{2\theta} + n\left(q\left(w_2 + \frac{\bar{\gamma}^2}{2\theta}\right) + (1-q)\max\{V_i, w_2\}\right) & \geq (1+n)\,V_i, \end{aligned} \tag{2.5}$$

where we have substituted the optimal effort levels described in Equations (2.1), (2.2), and (2.4). Note that Condition (2.5) implies that, quite naturally, we focus on a case in which the contract is designed such that agents who find out that they are motivated expect to continue employment with the principal.[5] The unmotivated agents on the

[5]This is consistent with the principal's aim to deter uncommitted agents, because she wants (some) agents to continue employment into Period 2. Note that, if Condition (2.5) is satisfied, motivated agents prefer to continue: when the second period wage is designed to make an agent apply for the job before he knows whether he is motivated, he will be happy to continue once he learns that he will

other hand may choose to quit, but only if their outside option is higher than the wage paid by the principal in Period 2.

2.4.3 Contract Design

In this subsection we focus on the most interesting case where the principal wants to deter all – that is, irrespective of their outside options – uncommitted agents from applying and wants to attract all committed agents. We deal with other possible cases in Subsection 2.4.4.

The adverse selection problem regarding agents' commitment is resolved when the participation constraint of the uncommitted agents with low outside options is violated (the participation constraint of the uncommitted agents with high outside options is then violated too). Hence, the principal sets:[6]

$$w_1 = \underline{V} - \frac{q^2\bar{\gamma}^2}{2\theta}. \tag{2.6}$$

That is, she must make sure the wage in Period 1 does not exceed the lower one of the outside options, $\underline{V}$, net of the expected motivational rent in the first period $\frac{q^2\bar{\gamma}^2}{2\theta}$. Similarly, the participation constraint for all committed agents will be satisfied when it is satisfied for the committed agents with a high outside option:

$$w_1 + \frac{q^2\bar{\gamma}^2}{2\theta} + n\left(q\left(w_2 + \frac{\bar{\gamma}^2}{2\theta}\right) + (1-q)\max\left\{\overline{V}, w_2\right\}\right) \geq (1+n)\,\overline{V}. \tag{2.7}$$

We need to distinguish two cases. We will later derive the conditions under which each case becomes relevant. In the first case, when Equations (2.6) and (2.7) imply $w_2 < \underline{V}$, all unmotivated agents quit after Period 1 and the second period wage is set

earn motivational rents.

[6] To be sure, the principal could of course also set a lower wage in the first period, and adapt the second period wage to compensate for this. This does not affect our key results qualitatively.

at:

$$w_2 = \overline{V} - \frac{\bar{\gamma}^2}{2\theta} + \frac{\overline{V} - \underline{V}}{nq}. \tag{2.8}$$

That is, the second period wage, which is paid nq times in expected terms, needs to compensate for the outside option $\overline{V}$, but can extract the motivational rents $\frac{\bar{\gamma}^2}{2\theta}$, while compensating for the relatively low wage in the first period.

In the second, more interesting, case, where Equations (2.6) and (2.7) necessitate $w_2 > \overline{V}$, all agents expect to stay, even those who have discovered in Period 1 that they are unmotivated.[7] The second period wage needed to attract all committed agents reads:

$$w_2 = \overline{V} - \frac{q\bar{\gamma}^2}{2\theta} + \frac{\overline{V} - \underline{V}}{n}, \tag{2.9}$$

which, together with the condition $w_2 > \overline{V}$, implies that for this case to occur, it must hold that

$$\overline{V} - \underline{V} > nq\frac{\bar{\gamma}^2}{2\theta}. \tag{2.10}$$

Very similar to Equation (2.8), the second period wage in this more interesting case, as described by Equation (2.9), compensates for the outside option, extracts motivational rents, and compensates for the low wage in Period 1. The only difference is that it accounts for the fact that now all, even the unmotivated, agents expect to receive it. Rather than extracting full motivational rents as in the case where only motivated agents expect to continue, it extracts the expected motivational rents. Likewise, the compensation for the low first period wage does not need to be as high, because the expected duration of employment is longer. In this second case, even the unmotivated agents prefer to remain employed by the principal, the second adverse selection problem.

[7] We treat the third case, where $\underline{V} < w_2 < \overline{V}$, in the next subsection.

It occurs because the second period payoff exceeds the outside option, even in the absence of motivational rents. Recall that the principal cannot solve this problem by reducing the second period wage in exchange for an increase in the first period wage, as this would contravene the solution to the first adverse selection problem described by Equation (2.6).

The principal can overcome the adverse selection problem by offering a one-off payment to all employees that quit at the start of Period 2, the exit bonus b. In order for it to induce unmotivated agents to leave, it needs to violate their continuation constraint. She can offer a relatively low exit bonus such that only the unmotivated agents with high outside opportunities quit, or a higher one that also induces those with low outside opportunities to leave. We will first analyze the implications of a relatively low exit bonus. Unmotivated agents with high outside opportunities will quit if the exit bonus is set such that:

$$nw_2 \leq n\overline{V} + b \iff b \geq n\left(w_2 - \overline{V}\right). \tag{2.11}$$

When this condition is set binding, some unmotivated agents will self-select and quit, while all motivated agents will continue because of the motivational rents they earn. Substituting Equation (2.9) into Equation (2.11) gives after some rewriting:

$$b = \overline{V} - \underline{V} - nq\frac{\bar{\gamma}^2}{2\theta}. \tag{2.12}$$

Offering this exit bonus increases the principal's profits by $nw_2 - b = n\overline{V}$ for each unmotivated worker who quits.[8] Note that Equation (2.12) implies a strictly positive exit bonus whenever the second adverse selection problem occurs, namely when Condition (2.10) holds. The outside option dispersion $\overline{V} - \underline{V}$ is a representation of the severity of the first adverse selection problem. If it is large, it is relatively hard to attract all

[8] Recall that unmotivated workers do not exert effort and, therefore, do not produce any valuable output for the principal.

committed agents while deterring all uncommitted agents, thus requiring a steeper wage profile. This is so because w_1 increases in $\underline{V}$, whereas w_2 decreases in it, while increasing in $\overline{V}$ (see Equations (2.6) and (2.9)). Only if this outside option dispersion is larger than the expected motivational rents earned in Period 2, an exit bonus is useful. This case becomes less likely when the probability of being the motivated type q or the duration of the second period n increases. The intuition is that higher expected motivational rents enable the principal to offer a lower second period wage, thus discouraging the unmotivated agents to stay. Note that the principal would prefer to pay a negative exit bonus when Condition (2.10) is violated, that is *unexpectedly* charge agents who want to quit. We rule this out, however, by not allowing the principal to deprive agents of their freedom to leave, i.e. $b \geq 0$.

The principal may also choose to offer a higher exit bonus such that all unmotivated agents quit. This can be achieved by satisfying the following condition:

$$b \geq n\left(w_2 - \underline{V}\right). \tag{2.13}$$

Once again setting this condition binding and substituting Equation (2.9) yields the following expression:

$$b \;=\; (1+n)\left(\overline{V} - \underline{V}\right) - nq\frac{\bar{\gamma}^2}{2\theta}. \tag{2.14}$$

Offering this exit bonus results in an increase in the principal's profits of $nw_2 - b = n\underline{V}$ for each unmotivated worker who leaves.[9] Quite naturally, this exit bonus deterring all unmotivated agents from staying exceeds the one in Equation (2.12) by exactly n times the dispersion in outside opportunities. This is problematic, however, because such a

[9]Note that this is a smaller amount than in the case of the lower exit bonus analyzed above. However, more unmotivated workers will accept the offer, which may render the higher exit bonus a more profitable alternative.

high exit bonus may also induce some motivated agents to quit. Indeed, motivated agents with high outside opportunities quit if

$$b \geq n\left(w_2 + \frac{\bar{\gamma}^2}{2\theta} - \overline{V}\right). \tag{2.15}$$

Using Equations (2.9) and (2.14), one can see that this condition is met whenever $\overline{V} - \underline{V} \geq \frac{\bar{\gamma}^2}{2\theta}$. It follows that, keeping in mind Condition (2.10), the high exit bonus to deter all unmotivated agents from staying can only be implemented without losing any motivated agents when $nq < 1$.[10]

In summary, we have derived an expression for the first period wage that solves the adverse selection problem regarding agents' commitment to the job. In order to satisfy the participation constraint of the committed agents, a certain second period wage needs to be offered. Depending on parameters, this wage profile may lead to an adverse selection problem concerning agents' motivation. We have shown that an exit bonus can alleviate the second adverse selection problem.

As long as no motivated agents are encouraged to quit by an exit bonus, it is clearly optimal to offer it. This is so because the unmotivated agents' optimal effort choice is $e_{i2} = 0$, yielding no production. Under this assumption it follows immediately from Equation (2.11) that it is more profitable for the principal to induce some unmotivated agents to quit by offering the exit bonus, amounting to costs of $n(w_2 - \overline{V})$, rather than keeping them and paying out the second period wage n times, amounting to nw_2. The same holds for the exit bonus described by Condition (2.13), provided that Condition (2.15) is violated so that motivated agents do not quit.

[10] If $nq > 1$, designing a contract with a high exit bonus is not profit-maximizing in our framework for the following reason. Our analysis rests on the assumption that the principal is in need of motivated agents for Period 2. If she were not interested in keeping the motivated agents with high outside opportunities, she could have deterred all agents with high outside opportunities from the very beginning by offering a lower second period wage (see Subsection 2.4.4).

Generally speaking, the exit bonus could serve as a form of insurance for the agents against the possibility to turn out unmotivated. Since this benefits the agents, announcing the exit bonus should enable the principal to save on the wages that need to be offered.[11] However, if the exit bonus were announced, the uncommitted agents could only be deterred from applying if the first period wage is even lower, namely taking into account that they will always take advantage of the exit bonus after working for the first period. Naturally, this requires that the principal set an even higher second period wage such that committed agents find it worthwhile to apply despite the low first period wage. Such a high second period wage would in turn necessitate an increase in the exit bonus in order to induce unmotivated agents to quit, requiring yet another decrease in the first period wage and so forth. Since the exit bonus and the first period wage are perfect substitutes for the uncommitted agents, it follows that the principal cannot solve both adverse selection problems once that agents anticipate an exit bonus. A formal exposition of this argument is contained in the Appendix. The important conclusion is that the exit bonus needs to come as a surprise, and hence should not be advertised, in order to function well.

2.4.4 Other cases

The previous section has been confined to the most interesting case where the principal wants to hire all committed agents and none of the uncommitted agents at the start of the first period, and where either all or none of the unmotivated agents expect to quit at the beginning of the second period. Here we briefly deal with the other possible cases.

[11] Note that both the principal and the agents are risk-neutral towards income, so insurance could not lead to a Pareto improvement. Nonetheless, by offering the exit bonus the principal incurs expenses that are beneficial to the agents, so she should be able to extract these benefits by offering lower wages.

First, we have so far disregarded the case where $\underline{V} \leq w_2 \leq \overline{V}$. It implies that agents who find out that they are unmotivated will quit when they have high outside opportunities, but expect to stay when their outside option is low. Maintaining the assumption that the principal wants to attract all committed agents, she chooses to offer such a second period wage for a certain parameter interval. As in the previous subsection, the conditions on parameters can be found by substituting the second period wage.[12] After some rewriting, this yields:

$$\frac{nq}{nq+1}\frac{\bar{\gamma}^2}{2\theta} \leq \overline{V} - \underline{V} \leq nq\frac{\bar{\gamma}^2}{2\theta}.$$

When the principal is in this situation she may choose to offer an exit bonus in order to also induce unmotivated agents with low outside opportunities to quit. Naturally, the principal will offer it after the unmotivated agents with high outside options have left already. It should then be set at:

$$b = \frac{1+nq}{q}\left(\overline{V} - \underline{V}\right) - n\frac{\bar{\gamma}^2}{2\theta}.$$

Note that, again, this exit bonus may prompt some motivated agents to quit. As before, the condition for some motivated agents to quit under this exit bonus would be $\overline{V} - \underline{V} > \frac{\bar{\gamma}^2}{2\theta}$.

Second, in all cases treated so far, the principal could increase the exit bonus to a level that prompts some, or even all, motivated agents to quit after Period 1. As noted in the previous subsection, this would conflict with the assumption that the principal is in need of motivated agents for Period 2. If she were not interested in employing all motivated agents in Period 2, but only those with low outside opportunities, she can offer a wage profile that circumvents the adverse selection problem regarding agents'

[12] Note that the expression for the second period wage to be used is the same as in Equation (2.8), the first case treated in the previous subsection.

motivation. It would consist of a first period wage as described by Equation (2.6) and a second period wage that is sufficient to induce the motivated agents with low outside opportunities to stay:

$$w_2 = \underline{V} - \frac{\bar{\gamma}^2}{2\theta}.$$

When offering this second period wage, agents who find out they are not motivated prefer to quit and no exit bonus is needed.

Third, the principal may wish to tolerate some uncommitted agents in the first period. She will already attract uncommitted agents with low outside opportunities by marginally increasing the first period wage. As a consequence, she could decrease the second period wage while still making the committed agents apply. This, however, gives the adverse selection concerning agents' motivation less bite, so the exit bonus can also be decreased. This process could be continued until the exit bonus reaches its natural downward boundary $b = 0$. Thus, when allowing for some uncommitted agents to apply, she can alleviate the adverse selection problem concerning agents' motivation the same way the lower exit bonus would do by offering a simple flat wage:

$$w_1 = w_2 = \overline{V} - \frac{q^2 + nq}{1 + nq} \frac{\bar{\gamma}^2}{2\theta}.$$

Note that at this wage profile, uncommitted agents with high outside opportunities still prefer not to apply.

Last, the principal may wish to hire all agents at the start of the first period. The principal can do so by offering a first period wage marginally above

$$w_1 = \overline{V} - \frac{q^2 \bar{\gamma}^2}{2\theta}.$$

The following second period wage is then sufficient to retain all motivated agents:

$$w_2 = \overline{V} - \frac{\bar{\gamma}^2}{2\theta}.$$

Note that this is less than what is paid in the first period. It is just sufficient to keep the motivated agents with high outside opportunities from leaving the principal. At the same time, it may convince all unmotivated agents to quit, namely when $\overline{V} - \underline{V} < \frac{\bar{\gamma}^2}{2\theta}$. The optimal scheme for the principal will eventually depend on these parameters, the costs associated with employing uncommitted agents, and the relative mass of agents with high or low outside opportunities.

2.4.5 Discussion

The key findings of our analysis are twofold. First, using an exit bonus is only optimal when the outside option dispersion is large and intrinsic motivation plays a comparatively minor role. The intuition behind this finding is that keeping out uncommitted agents necessitates a steep wage profile, in which the wage difference is driven by the dispersion in outside options. Returning to our motivating example of Zappos, one could hypothesize that the supply of uncommitted labor is particularly high in a vice industry-driven economy like Nevada's (see e.g. The Economist 2010).

The adverse selection problem regarding agents' motivation, on the other hand, only becomes pertinent when the wage difference between periods is large compared to the difference in motivation. Zappos does not offer a salary increase right after training; however, it has been growing rapidly over the last years and has thus been able to offer career opportunities that may act in lieu of wage increases (cf. Lazear 1979, Witkin 2012, and Geron 2009).

The economics literature on intrinsic motivation typically does not focus on low skilled, repetitive jobs like those of a customer service representative. Taylor (2008), however, suggests that Zappos has created a work environment in which motivation plays a role. This relates to its policy of avoiding performance measurement with the tools common to this industry in favor of having motivated, empowered employees (cf. Hsieh 2010). While Zappos reportedly creates a pleasant work environment (see e.g. Fortune 2012 and Glassdoor 2013), the actual tasks of working in customer service have been shown to be emotionally exhausting (cf. Singh et al. 1994), giving rise to the notion that a motivated employee may enjoy the job not much more than an unmotivated employee.

So far, we have only considered the potential effect of the pleasant working conditions at Zappos on workers' intrinsic motivation. It may, however, very well be that some people do find out that they enjoy working at this firm, but at the same time are not inclined to exert effort. As a consequence, even an employee who finds out to be unmotivated may, in view of the career opportunities or the pleasant work environment at Zappos, prefer to remain in the firm. In line with the predictions of our model, this would be a situation where an employer finds it profit increasing to offer an exit bonus.

Second, we predict that the exit bonus needs to come as a surprise to the agents in order to function well. The question of whether or not potential applicants do anticipate that Zappos may offer an exit bonus is an empirical one. We do, however, have reason to believe the exit bonus is not commonly anticipated. While Zappos does confirm the existence of the exit bonus publicly (see e.g. Hsieh 2010 and Zappos 2013b), these sources are directed at interested outsiders rather than potential future employees. Most importantly, there is no mention of the exit bonus in job descriptions or on the recruitment website (see e.g. Zappos 2013a). Another indication that McFarland's (2008) concern about word-of-mouth has not (yet) materialized is that the exit bonus

is only accepted by a one-digit percentage of new hires (see e.g. Hsieh 2010 and Zappos 2013b). If the exit bonus were anticipated by a large fraction of the local labor force, one would expect this number to be higher, despite Zappos' screening efforts.

Furthermore, we have made some conjectures concerning the production function of the firm and concerning conditions in the labor market that lead to the emergence of an exit bonus. Zappos asserts to be interested in its employees remaining in the firm for long periods (cf. Geron 2009), a fact that supports the notion that it is costly to grant short-term employment, which is the reason why the principal in our model chooses to deter uncommitted agents from applying. Our model shows that a profit-maximizing principal in need of some new motivated agents may hire agents with low outside opportunities and design a flat wage that will prompt agents who find out that they are unmotivated to quit. If, however, the principal is in need of many new motivated agents,[13] the second period wage needed is "too high", such that an exit bonus emerges. We believe a fast growing firm with a pronounced emphasis on customer service like Zappos fits this scenario very well.

[13]Note that the satisfaction of this need comes hand in hand with the necessity to tolerate some unmotivated agents in the second period, unless $nq < 1$.

2.5 Concluding Remarks

We have put forward a model that shows under which circumstances a firm may find it optimal to use exit bonuses to convince intrinsically unmotivated employees to quit. We show that such a situation may arise when a firm offers a steep wage profile, in our example due to an adverse selection problem caused by potential job applicants with a short horizon. In particular, this problem needs to be severe in comparison to the expected motivational rents earned during an applicant's career. As a consequence, an exit bonus is more likely to be offered when potential applicants do not expect to enjoy working in this particular job too much.

Alternative explanations as to why we observe the exit bonus appear to fail. For example, the exit bonus may be used by an employer to signal that employees can earn motivational rents when working for her, rather than as a means to solve the adverse selection problem concerning agents' motivation. However, in that case, we would expect Zappos to advertise the exit bonus actively. The same is true when exit bonuses are used to solve a commitment problem on the side of the employer. For instance, an employer may be able to commit to creating a pleasant work environment by offering an exit bonus. The first adverse selection problem that we identified may apply here too, making advertised exit bonuses not profit-maximizing.

Indeed, our analysis suggests that an exit bonus must not be advertised. As such, the exit bonus may be considered an out of equilibrium phenomenon. If offering it became a common HR practice, our model predicts that it would no longer have the desired effect. One would have to expect an influx of uncommitted applicants who are (only) interested in receiving the exit bonus after a short training period. This would require increasing screening efforts by HR departments to filter out such job candidates which – at least in some environments – may not be feasible or prohibitively costly.

An analogy to the dynamics described above can be found in a rather delicate area: In 2012, Switzerland started to offer Tunisian asylum seekers money if they decide to return to their country of origin (cf. NZZ 2012).[14] Applications for asylum from Tunisian citizens are rarely accepted in the Swiss Confederation and refugees are only eligible for the "return assistance" before their application for asylum has been decided on. It could be argued that the information structure in this example is comparable to that in our model. Applicants have private information on their chances to receive refugee status, and are willing to await the ruling in the relatively bad living conditions of an asylum seeker (cf. Hatton 2004). If offered money upon return, some applicants may decide to return, namely those who are relatively "unmotivated", because they deem their chances of being accepted as low. Just as in our setup, it is crucial that this policy is not widely known. Otherwise, one could expect refugee numbers to rise, or even non-immigrants starting to apply for asylum in the hope of receiving a return assistance.

The motivation to develop the model presented in this chapter originated in an observation of one single firm. Even though several other firms have followed Zappos' lead in the meanwhile, this could raise concerns about the relevance of the HR policy we analyze. We can, however, conceive a few arguments to put the scarcity of observations into perspective. While it is of course possible that using an exit bonus is not profit maximizing, our model yields conditions under which its use would be the optimal strategy. It may be that these conditions are just not satisfied at other firms. Secondly, other firms may simply not be aware of this innovation in compensation policies. This is supported by the attention that Zappos and the other tech firms' conduct has received

[14]Note that Switzerland and other countries offer several forms of return assistance to refugees and other migrants (see e.g. Swiss Confederation 2015, Rijksoverheid 2015, or UK Border Agency 2014). The Swiss program for Tunisian asylum seekers, however, exposes most parallels to our study.

in the press.[15] Finally, a key result of our analysis is that the exit bonus needs to come as a surprise. In light of this, it may very well be that firms use tools such as exit bonuses without outsiders knowing about it.

[15]We also note an increased academic interest in pay-to-quit schemes, see e.g. the experimental study by Harris (2015).

2.A Appendix

In Subsection 2.4.3 we have given an intuitive account as to why the exit bonus must not be anticipated by the agents. Formally, the argument runs as follows. With an anticipated exit bonus, the first period wage must fulfill the following condition in order to still deter all uncommitted agents from applying:

$$w_1 \leq \underline{V} - b - \frac{q^2\bar{\gamma}^2}{2\theta} \tag{2.16}$$

When the principal advertises the exit bonus, it becomes common knowledge that it will always be set such that at least the unmotivated agents with high outside opportunities leave after Period 1. As a result, the overall participation constraint of the committed agents collapses to:

$$w_1 + \frac{q^2\bar{\gamma}^2}{2\theta} + n\left(q\left(w_2 + \frac{\bar{\gamma}^2}{2\theta}\right) + (1-q)\left(\overline{V} + \frac{b}{n}\right)\right) \geq (1+n)\,\overline{V}.$$

Combined with Equation (2.16), this gives us the following expression for the second period wage:

$$\begin{aligned} w_2 &\geq \frac{(1+n)\,\overline{V}}{nq} - \frac{w_1}{nq} - \frac{1}{nq}\frac{q^2\bar{\gamma}^2}{2\theta} - \frac{1-q}{q}\left(\overline{V} + \frac{b}{n}\right) - \frac{\bar{\gamma}^2}{2\theta} \\ \Rightarrow w_2 &= \frac{1+nq}{nq}\overline{V} - \frac{w_1}{nq} - \left(\frac{q}{n}+1\right)\frac{\bar{\gamma}^2}{2\theta} - \frac{1-q}{nq}b, \end{aligned} \tag{2.17}$$

where the equality sign follows from profit-maximization by the principal. So, in comparison to the previously found expressions, the principal can indeed extract the expected value of exit bonus payments $\frac{1-q}{nq}b$ in the second period wage. Finally, the exit bonus needs to violate the continuation constraint of the committed unmotivated agents

with high outside opportunities:

$$b \geq n\left(w_2 - \overline{V}\right).$$

Using Equation (2.17), it follows that:

$$\begin{aligned} b &= n\left(\frac{1+nq}{nq}\overline{V} - \frac{w_1}{nq} - \frac{q+n}{n}\frac{\bar{\gamma}^2}{2\theta} - \frac{(1-q)}{nq}b - \overline{V}\right) \\ \iff b &= \overline{V} - w_1 - q\left(q+n\right)\frac{\bar{\gamma}^2}{2\theta}. \end{aligned}$$

Setting Condition (2.16) binding, we get an expression for w_1 that we substitute:

$$\begin{aligned} b &= \overline{V} - \underline{V} + b + \frac{q^2\bar{\gamma}^2}{2\theta} - q\left(q+n\right)\frac{\bar{\gamma}^2}{2\theta} \\ \iff 0 &= \overline{V} - \underline{V} - nq\frac{\bar{\gamma}^2}{2\theta}. \end{aligned}$$

That is, the exit bonus cannot be set optimally anymore. An announced exit bonus b and the first period wage w_1 become perfect substitutes so that it is impossible to solve both adverse selection problems at once.

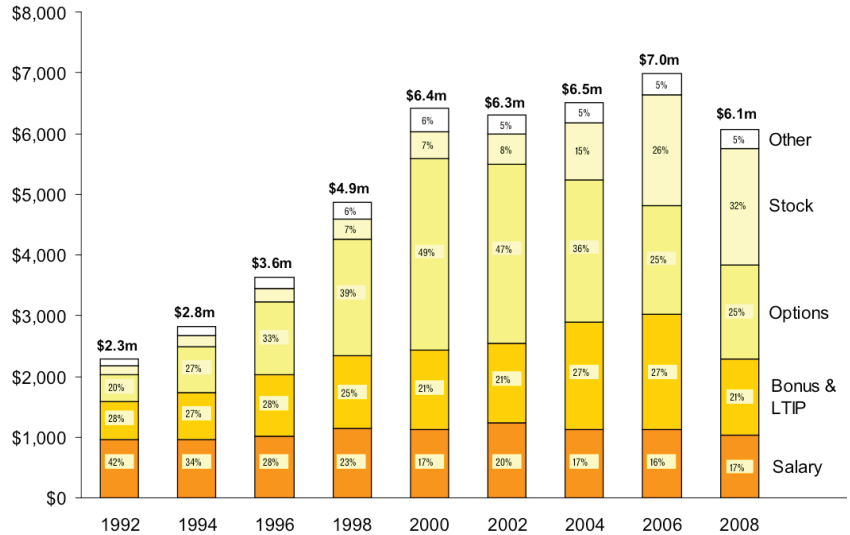
Chapter 3

Paid to Cheat

3.1 Introduction

One of the central questions in corporate governance is how to align the incentives of the CEO with those of the owners of a firm. An apparent method to do so is tying the executive's compensation to corporate performance, for example by means of equity pay or a bonus based on accounting measures.[1] Previous studies confirm that CEO pay is indeed related to firm performance and find total CEO wealth to increase by median values of 3.25 dollars (Jensen and Murphy 1990) or 5.29 dollars (Hall and Liebman 1998) following a 1,000 dollar increase in shareholder wealth.[2] Not only do the level and the composition of executive compensation vary greatly across firms and industries (cf. Murphy 1999), but they also change quite remarkably over time (see Figure 3.1).

Figure 3.1: Components of CEO Compensation



Level and structure of CEO Compensation in S&P 500 firms, in thousands of year-2000 dollars (Source: Frydman and Jenter 2010).

Investors care about the return on their investment in a firm, that is, the sum of stock

[1] Executive compensation packages can generally consist of a number of parts: a base salary, an annual bonus based on accounting measures, stock options, long-term incentive plans such as restricted stock plans, and other benefits such as perquisites, insurances, pensions, or severance pay.

[2] These studies focus on changes in executive wealth rather than just on income in order to take into account the effect of corporate performance on the CEO's equity holdings.

price changes and paid dividends, relative to the principal investment. Assuming the CEO disposes of means to reduce his company's tax obligations and that the expected gains of such conduct exceed the expected costs for the shareholders, it would be rational for the owners of a firm to set corresponding incentives for top management. Dyreng et al. (2008) note that "[a]voiding taxes does not imply anything improper. Indeed, firms (and individuals) can avoid Federal [sic] income taxes through means as simple as holding municipal bonds that generate tax-exempt interest income" (p. 65). Apart from making use of such tax exemptions, firms may reduce their tax burden by exploiting differences in local tax rates, by financing themselves with debt rather than equity, or simply by misreporting revenue or business expenses.[3] If the CEO can avail himself of such a measure to reduce tax payments, an apparent question is how the shareholders can effectively encourage such behavior.[4]

Firms can ensure that the CEO acts in the shareholders' interest by making him a shareholder himself (for example by paying him in firm equity and limiting his possibility to sell it). Nonetheless, according to Murphy (1999) almost all for-profit companies make use of bonuses in addition to or instead of equity incentives. Assuming the stock price correctly evinces the value of a firm, equity incentives implicitly motivate the CEO to reduce corporate tax payments, since this will lead to a higher net income of the company, and thus to a higher firm value. However, it is unclear whether bonus contracts set such incentives. This depends on what accounting measure a bonus is based on. The literature suggests that the most prevalent performance measure used in bonus contracts is firm profits. Murphy (2000) finds 91% of large firms to tie the CEO's bonus to either net or gross accounting profits. Ittner et al.'s (1997) text-search of proxy statements only finds 25.3% of firms to use pre-tax and 27.2% post-tax income

[3]Corporate tax rates do not only vary internationally, but also between states and municipalities.

[4]The analysis in this chapter is largely independent of the question of whether or not a firm's tax sheltering activities are legal. When a distinction needs to be made, tax *avoidance* refers to lawful conduct, whereas tax *evasion* refers to an illegal activity.

as performance measures. It must be noted, however, that other measures can indirectly set incentives to increase profits and/or reduce taxes.[5]

In this chapter, I test empirically whether CEOs' bonus payments are related to corporate income taxes. I do so by running regressions of bonus payments on income taxes, controlling for firms' net profits. While public corporations are required to disclose the amount and composition of executive compensation, the exact remuneration contract is generally unobserved. Studies on managerial bonus contracts therefore rely on information that some firms communicate voluntarily, for example in their proxy statements. I add to the literature in two ways. First, I make use of panel data with a sample of firms that is much broader than that in other studies which are constrained by the number of firms for which enough information is available. This approach gives this study more external validity. Second, the approach of estimating the nature of bonus contracts, rather than conducting a survey or otherwise making use of information controlled by the firm, allows us to rule out concerns such as nonresponse bias, selection bias, and even firms or their consultants intentionally giving misleading information (cf. Slemrod 2007). The next section provides an overview of the related literature. Section 3.3 describes the data and the econometric framework. Results are presented and discussed in Section 3.4, followed by a concluding section.

[5] According to Ittner et al. (1997) and Murphy (2000), other popular financial performance measures in bonus plans are earnings per share, return on equity, sales, cash flow, return on assets, and cost reduction.

3.2 Related Literature

If corporate income taxes were determined in an inexorable fashion, there would be little justification for conducting this study. However, recent research suggests that companies have an array of possibilities to manipulate their income tax payments, both legally and illegally. This section summarizes three streams of literature, beginning with some theoretic implications of including tax considerations in a principal-agent framework. The second group of studies aims at investigating whether firms pay less taxes when the CEO is incentivized accordingly, which further motivates this study. Finally, I derive some indications for the empirical analysis from two papers that examine what kind of firms engage in income tax sheltering.

Theory of Incentives to Avoid Taxes

Allingham and Sandmo (1972) develop a model of individual tax evasion based on Becker's (1968) notion that a person will commit an unlawful act whenever the expected utility from doing so exceeds the expected disutility of punishment. In a corporate setting ownership and control are separated, making the problem more complex. Crocker and Slemrod (2005) use a costly state falsification framework in the formalization of the contract between shareholders and the executive, in which the executive can avoid corporate taxes legally (costless) or engage in illegal tax evasion (costly to shareholders and executive).[6] The degree to which he can avoid taxes is a random variable and private information for him. The central finding of the model is that tax evasion decreases with higher penalties to either shareholders or the executive, but that penalizing the executive is generally more effective. This is so because the information asymmetry concerning the possibilities of tax avoidance necessitates a second-best compensation

[6]Crocker and Slemrod (2005) base their arguments on the contract of the Chief Financial Officer (CFO). While the CFO may have a more direct say in a firm's tax issues, Phillips (2003) and Dyreng et al. (2010) support the view that focussing on the CEO can be justified with his predominant position in the company.

contract. Note that Crocker and Slemrod (2005) assume not only the shareholders but also the executive to be risk-neutral agents.

This last concern is addressed by Chen and Chu (2005) who model the executive to be risk-averse. Unlike Crocker and Slemrod (2005), they further assume that the firm owners can observe whether or not tax evasion is carried out. When tax evasion is detected by the authorities, the CEO incurs a cost.[7] However, firm owners cannot credibly condition the compensation contract on whether or not tax evasion is detected, because the contract would not hold up in court.[8] As a consequence, the shareholders must reward the executive for tax evasion ex ante, regardless of whether or not it is detected and punished. While this signifies an efficiency loss compared to a scenario where detection is contractable, it may still be worthwhile for firm owners to incentivize tax evasion.

Desai and Dharmapala (2006) develop a model that incorporates the two following considerations: 1) Incentive compensation aligns the executive's incentives with those of the shareholders, so that he tries to reduce tax payments whenever this increases firm value. 2) Tax sheltering and managerial rent extraction are complementary activities. Thus, it is unclear whether incentive compensation leads to an aggressive tax strategy or not.

Do such Incentives Work?

One commonly used measure of the extent of tax sheltering is the book-tax gap: the difference between income reported to shareholders (as laid out in the United States

[7]The paper also studies the case of a non-liable CEO, which I do not discuss for the sake of brevity.

[8]The relevance of this argument can be questioned, however. First of all, it does not play a role in legal tax evasion. Second, the CEO may enforce the payment of higher compensation when illegal evasion is detected, for example by threatening to disclose other information that is harmful to the shareholders.

Generally Accepted Accounting Principles) and that reported to tax authorities. Another, very similar, approach is to look at the effective tax rate (ETR) of a firm which is equal to the ratio of cash taxes to pretax income. In their empirical application with Compustat and ExecuComp data from the years 1993 to 2002, Desai and Dharmapala (2006) find that higher stock-based compensation is associated with a lower level of tax sheltering, as measured by the book-tax gap that does not stem from accounting accruals. They argue that this negative effect is driven by poorly-governed firms, for which the authors assume that there is a positive feedback between diversion of funds and tax sheltering, in other words: an increase in the manager's participation in firm value will lead him to divert less funds, which, in weakly-governed firms, is assumed to make tax sheltering more costly.[9]

Rego and Wilson (2012), on the contrary, state that for an executive to follow an aggressive tax strategy, high levels of equity risk incentives need to be put in place. They argue that if the CEO holds stock options of his firm, their value increases with stock return volatility so that he is incentivized to undertake risky activities with a positive net present value; one such risky activity may be an aggressive tax strategy. Using data from Compustat, ExecuComp, and CRSP for the years 1992 to 2006, Rego and Wilson (2012) find a positive relationship between several measures of tax aggressiveness, such as discretionary book-tax differences or the average ETR, and the manager's equity risk incentives, which are modeled as the change in the value of stock options held by the CEO. Similar in spirit, Armstrong et al. (2012) make use of a proprietary data set from a human resource consultant for the years 2002 to 2006 and find a positive relation between several measures of tax sheltering and the compensation mix. They define this

[9] They offer a case study to illustrate the intuition of such a positive feedback mechanism between tax sheltering and diversion of funds, stating that "features of [a tax-oriented] transaction designed to make it more opaque to the capital markets were justified on the basis of secrecy, supposedly necessitated by tax objectives" and that "actions that served as the origins of the conspiracy to mislead the auditors were also justified on this same basis" (p. 157).

variable as the ratio of variable compensation to total compensation.[10] While this can serve as an approximation of the intensity of the manager's general incentivation, it is unclear what part of it puts it in the executive's interest to reduce his firm's income tax payments.

In summary, the empirical evidence on whether equity risk incentives can induce corporate tax sheltering is unclear. Desai and Dharmapala's (2006) analysis can serve as one explanation why shareholders cannot always rely on equity incentives to encourage a reduction of the tax burden. As a result, they may choose to resort to bonus contracts that incentivize management to run an aggressive tax strategy. Another explanation could be that shareholders choose a bonus plan to set these incentives because accounting measures are a less noisy signal of managerial actions than the stock price (cf. Murphy 1999).

Focussing on accounting-based compensation, Phillips (2003) investigates if after-tax incentives – that is, compensation that is based on an after-tax accounting measure – lead executives to conduct a more aggressive tax strategy. Using a combination of Compustat and proprietary survey data, he estimates a two step model with the firm's ETR and dummy variables indicating whether the corresponding executives are remunerated based on after-tax measures as endogenous variables. The undertaken survey allows him to include not only an indicator variable for the CEO's compensation, but also for that of business unit managers within the firm. It was sent to 829 firms, of which 209 yielded usable data, but the author states that (unreported) descriptive statistics suggest that there is no nonresponse bias as measurable with some observable variables. The surveyed firms do, however, significantly differ from the whole sample of

[10]Note that this approach is similar to that of Desai and Dharmapala (2006), even though it yields contrary results. The difference is that Desai and Dharmapala (2006) use the ratio of stock options to total compensation, rather than the ratio of variable compensation (stock options and bonus) to total compensation.

Compustat firms in terms of size, capital intensity, leverage, and ETR. Having about two-thirds of CEOs and one third of business unit managers compensated based on after-tax measures, he finds that this leads to a lower ETR in the case of business unit managers, but not for CEOs.

Phillips (2003) does, however, postulate that when the CEO considers the tax department as a profit center, he will hence make sure that the business unit managers also have the proper incentives. Dyreng et al. (2010) also note that CEOs may indirectly influence corporate tax policy by "setting the tone at the top" (p. 1164). Gaertner (2013) offers an alternative explanation for the lack of a relationship between CEOs' after-tax incentives and ETRs in Phillips' (2003) study: low statistical power. Gaertner (2013) overcomes this problem by hand-collecting information on whether or not a CEO receives incentives on an after-tax basis from companies' proxy statements. This generates a larger sample than that in Phillips' (2003) study and comes about with higher statistical power. Gaertner's (2013) analysis yields two main results. First, he does indeed find a negative relation between companies' ETRs and the use of after-tax incentives in CEO compensation. Second, he shows that CEO cash compensation is higher in firms that set after-tax incentives, ceteris paribus. He rationalizes this result with an increased risk for the CEO, for which he demands to be compensated.

Which Firms Avoid Taxes?

Turning to the question of which firms engage in tax sheltering, Dyreng et al. (2008) find that while the average firm in their 1995 to 2004 Compustat sample hardly reduces its tax burden below the statutory tax rate of 35 percent, about a fifth of these firms do so by maintaining an ETR of less than 20 percent. Their exploratory analysis yields 1) that these tax-avoiders are concentrated in service industries and in oil and gas extraction and 2) that large firms with incorporation in a tax haven, a high ratio of

physical capital, or high leverage tend to have a lower ETR. However, they leave out the question of whether and how CEOs are incentivized to produce these outcomes.

Atwood et al. (1998) analyze a cross section of Compustat data and conduct a text-search of the corresponding proxy statements. They generate a binary variable indicating whether the bonus determinants mentioned in the proxy statements are pre-tax or post-tax measures and aim to explain this variation in the choice of performance indicators with the firms' tax planning opportunities. Firms that employ "earnings", "net income", "return on assets", or "return on equity" as performance measures are considered to give after-tax incentives, with all other cases considered to induce before-tax incentives. Note that firms which use both before- and after-tax indicators are dropped from the sample. In their 1993-data, roughly two-thirds of the 406 firms employ after-tax measures, with the rest using before-tax accounting measures. Their results suggest that bigger, international, more capital intense, more diverse, and less levered firms have more means of manipulating tax obligations and are hence more likely to employ net rather than gross performance measures. The rationale behind the effect of these firm characteristics on tax planning opportunities and thus on the performance measure choice is as follows:

- Size: the bigger a firm is (measured in total sales or total assets), the higher are potential savings from proactive tax planning. As an example, consider a small firm whose total tax burden is so low that incentivizing the CEO to reduce it would be too costly.[11]

- Multinational Operations: international firms can allocate their income-generating processes to jurisdictions with lower corporate taxes.

[11] This argument requires a non-linear relationship between scale and the costs of tax reduction, for example a fixed cost.

- Capital Intensity: while a general investment tax credit has been abolished in the United States in 1986, firms that use relatively much capital in their operations have more tax planning opportunities "due to timing issues regarding asset acquisitions, asset dispositions and differences in the tax consequences of buying versus leasing" (Atwood et al. 1998, p. 31) and because they can exploit differences in local and state taxes.[12]

- Diversity: firms with more operating segments have the opportunity to offset gains in one business unit with losses in another.

- Leverage: using debt instead of equity reduces the tax burden because interest payments generally are a deductible business expense (cf. Internal Revenue Service 2013b). Atwood et al. (1998) argue that a high-levered firm will hardly have any leeway to further reduce tax payments, since the high deductions from interests exhaust the possibilities to lower taxes.

They also include inventory intensity (inventory per total assets) and 5 industry dummies in their regression, out of which only the coefficient for the service industry is significant: service providers seem to be more likely to employ after-tax performance measures.

While these studies give some insight for the design of the empirical analysis, they might be subject to a selection bias. One could for example argue that it is in the interest of the firms which incentivize their CEOs to reduce corporate tax payments to avoid that their conduct becomes public knowledge: if the tax authorities know that a firm sets incentives to keep taxes low, they might tend to increase auditing efforts at that particular firm. As a consequence, firms that actively encourage their managers to keep taxes low might be the same ones that give inconclusive information in their

[12]Furthermore, several investment tax credit programs still exist to implement public policy goals, such as renewable energy investment tax credits (cf. Internal Revenue Service 2013).

proxy statements (cf. Atwood et al. 1998 who had to drop 266 of their initial 672 observations), leading to a selective sample.

3.3 Data and Empirical Strategy

I test empirically whether managerial bonus payments are related to corporate income taxes, holding constant net profits. I do so by making use of a merged dataset on executive compensation and firm characteristics. A brief discussion of the dataset is given in Subsection 3.3.1, and the estimation approach is laid out in Subsection 3.3.2.

3.3.1 Compustat and ExecuComp Data

For the analysis I employ a dataset that was compiled from Standard & Poor's (S&P's) Compustat and ExecuComp databases. The majority of the firms for which ExecuComp data is available are listed in the S&P 1500 index. While it could be argued that the focus on such a dataset limits the generalizability of my results, I aim to offer an improvement over similar studies that were described in the last section; not only does the S&P 1500 represent some 90% of the United States market capitalization (cf. Standard & Poor's 2014), but it also lets us draw inferences concerning smaller firms, since it is comprised of the S&P 500 (large-cap firms), the S&P 400 (mid-cap firms), and the S&P 600 (small-cap firms). In accordance with the literature (Phillips 2003, Desai and Dharmapala 2006, Rego and Wilson 2012), I limit the analysis to firms with positive pre-tax income.[13] I further drop all firms that are not incorporated in the United States in order to ensure a common institutional framework for all analyzed firms. Finally, I discard observations that have a missing value for any of the variables that I use in the remainder of this chapter so that all estimations are undertaken with the same sample. This yields a dataset on 2,830 firms for the years 1992 to 2010, with some firms not covered in all years, yielding 21,921 datapoints. The sample attrition is documented in the Appendix.

[13] Note that we may still observe negative post-tax income.

A first overview of the variables used in the analysis is offered in Table 3.1, stating their means and ranges. The dependent variable *bonus* represents the total annual bonus paid to the CEO and is measured in thousands of dollars. Both explanatory variables are measured in millions of dollars and have been corrected for bonus expenses: *income*, the firm's net income, and *incometax*, the corresponding corporate income tax.[14] All firms have been matched to an industry according to four-digit Standard Industrial Classification (SIC) codes; when these were unavailable an industry has been assigned based on the Compustat variable *industry* or, if unavailable too, on information from the company website. The dummy variable $foreign$ indicates whether or not a firm generates income abroad. I further generate indicators based on the variables *size*, the firm's total assets, *capitalintensity*, the ratio of total property, plant, and equipment to total assets, and *leverage*, the ratio of debt to total assets.

Table 3.2 gives the means of the three key variables in subsamples based on different categories. It shows that bigger firms tend to have higher net profits and pay higher bonuses. The average bonus, however, increases relatively less than income, which could be an indication that the sensitivity of the bonus to net income decreases with firm size. Consistent with Murphy (1999), we can see notable differences between industries in terms of *bonus*, *income*, and *incometax*. The average firm in the Oil and Gas industry, for example, pays its CEO a bonus almost twice the size than its counterpart in the Software industry, while their net income is comparable. Interestingly, they also pay much lower taxes. Firms that generate income abroad have almost double the net income of domestic-only firms, while paying a higher bonus and relatively more taxes.[15] Highly-levered firms pay relatively less taxes in comparison with lowly-levered firms, while paying a higher bonus. With their net income almost exactly the same, firms

[14] The procedure for correcting for bonus expenses is documented in the Appendix.

[15] Note that this does not contradict Atwood et al.'s (1998) argument that firms with foreign operations have higher tax saving opportunities. An unobserved characteristic may cause these firms to have a high tax burden, while still having many opportunities for tax savings.

Table 3.1: Means and Ranges of Variables, n=21921

Variable	Mean	SD	Min	Max
bonus	900	1694	0	76951
income	372	1284	-1130	45223
incometax	65	317	-396	10655
Agriculture and Mining	0.012	1.720	0	1
Communication	0.024	0.148	0	1
Construction	0.012	0.104	0	1
Electrics and Electronics	0.092	0.281	0	1
Financial Institutions	0.094	0.296	0	1
Food, Beverages, Tobacco	0.033	0.178	0	1
Manufacturing	0.031	0.178	0	1
Oil and Gas	0.029	0.163	0	1
Other Industrials	0.238	0.429	0	1
Other Services	0.090	0.281	0	1
Real Estate	0.001	0.030	0	1
Software	0.056	0.237	0	1
Vehicles	0.030	0.178	0	1
Transportation	0.060	0.237	0	1
Utilities	0.066	0.252	0	1
Wholesale and Retail	0.132	0.341	0	1
foreign	0.472	0.503	0	1
size	10181	53989	0.148	2187631
capitalintensity	0.544	0.400	0	5.876
leverage	0.224	0.192	0	2.616

Table 3.2: Conditional Means, n=21921

Subsample	bonus	income	incometax
Small Firms	282.81	24.37	2.96
Medium-sized Firms	727.11	114.72	17.74
Large Firms	1874.00	1233.36	221.77
Agriculture and Mining	975.34	188.47	26.61
Communication	1803.71	975.65	175.25
Construction	2839.34	192.54	13.76
Electrics and Electronics	699.25	290.58	55.73
Financial Institutions	1712.16	632.62	49.69
Food, Beverages, Tobacco	1235.17	681.45	97.73
Manufacturing	629.50	317.67	19.27
Oil and Gas	1102.80	348.51	43.81
Other Industrials	817.51	454.98	101.73
Other Services	719.96	118.30	17.04
Real Estate	1698.86	202.14	19.21
Software	654.45	358.84	102.31
Vehicles	1117.69	511.10	91.15
Transportation	598.66	147.83	37.10
Utilities	526.39	284.37	76.15
Wholesale and Retail	718.37	247.14	29.59
No Foreign Income	783.36	251.20	37.35
Foreign Income	1036.44	506.82	96.07
Low Leverage	822.47	349.01	63.38
High Leverage	982.34	394.36	66.71
Low Capitalintensity	1005.18	372.51	56.50
High Capitalintensity	806.83	371.09	73.04

with a low capital intensity also pay a higher bonus and less taxes than companies with a high capital intensity.[16]

Note that these are univariate comparisons and that the differences in averages could also be driven by level effects. It may be that larger firms pay a relatively lower bonus because they can incentivize their CEOs more easily, either because the prospect of a certain absolute amount of bonus payments suffices, or because equity incentives are provided. It may just as well be the case that the relatively low bonus can be explained as a punishment for relatively high tax payments. Likewise, unobserved heterogeneity within an industry, or even within a firm, may necessitate a certain level of bonus payments. A regression framework with fixed firm effects allows me to relate variations in the bonus to variations in firm income and income taxes, rather than only comparing the levels of averages.

3.3.2 Econometric Framework

Each firm in the dataset has its own executive compensation plan and ideally one would be able to make inferences about each individual bonus plan. Unfortunately, there are less than eight observations per firm on average, not allowing me to do this.[17] I thus resort to estimating a model that lets me make statements about the average bonus contract and later refine the analysis by focussing on several subsamples. The baseline specification controls for time-invariant firm effects and firm-invariant time effects:

$$bonus_{it} = \beta_1 income_{it} + \beta_2 incometax_{it} + \lambda_i + \lambda_t + \varepsilon_{it}, \tag{3.1}$$

[16] Idem. High capital intensity may come about with higher average income taxes and thereby give more leeway to manipulate taxes.

[17] Note that in one of his robustness checks, Gaertner (2013) generates a variable indicating whether a firm uses after-tax incentives with this very technique. Due to the low number of observations, however, he needs to resort to an uncommon threshold of significance.

where $bonus_{it}$ denotes the realization of the bonus paid to the CEO by firm i in year t, $income_{it}$ the firm's net income before extraordinary expenses in that year, and $incometax_{it}$ the corresponding tax.

The company fixed effects account for unobserved heterogeneity that influences the level of bonuses in a particular firm. Macroeconomic and other factors that might affect the bonus in all firms in a given year are controlled for by the time effects.

We can now easily test the following hypothesis:
H0:

$$\beta_2 = 0,$$

holding net income constant, the bonus does not depend on corporate income taxes.

The coefficient β_2 tells us the impact of the firm's income tax payments on the CEO's bonus, holding constant firm income. If firm profits are taxed linearly, the regression framework would not allow us to deduce statements on this effect, since both explanatory variables would be perfectly collinear. Now, if we do find β_2 to be significantly different from zero, this is only caused by variations in *incometax* that arise independently of those in *income*. As an example, consider a firm who pays a bonus based only on net income. Now further assume that gross profits increase simultaneously with a raise in the tax rate such that net profits remain exactly the same. As a consequence, the CEO bonus remains unchanged while there was a change in *incometax*, yielding a coefficient estimate of $\beta_2 = 0$. If this weren't the case, we could deduce that the bonus must be tied to other measures than just net income, for example to gross income, to another measure that correlates with it, or even explicitly to tax payments themselves.

The following combinations of coefficient estimates appear to be conceivable:

- $\beta_1 = 0$; $\beta_2 = 0$: it cannot be shown that CEO bonus payments are associated with either corporate net income or corporate tax payments.
- $\beta_1 > 0$; $\beta_2 = 0$: while firms do incentivize their CEOs to increase net income, the null hypothesis that the CEO bonus is independent of corporate tax payments cannot be rejected.
- $\beta_1 > 0$; $\beta_2 > 0$; $\beta_1 \geq \beta_2$: firms set incentives related to a mixture of pre-tax and post-tax corporate income.
- $\beta_1 > 0$; $\beta_2 < 0$: in addition to rewarding increases in net rather than in gross income, the firm sets further incentives to reduce corporate tax payments.

My conjecture based on previous studies would be that we find a coefficient on *incometax* that is lower than that of *income*. Note that this would be an average result and would not mean it applies to all firms. While it might be possible that some firms mix pre- and post-tax incentives in their bonus contracts, I expect firms to use either one, possibly in combination with other incentives to reduce taxes. I will explore whether there are any regularities concerning the coefficient estimates conditional on observable firm characteristics with the following specification:

$$bonus_{ijt} = \sum_j \beta_{1j} * subsample_j * income_{ijt} + \sum_j \beta_{2j} * subsample_j * incometax_{ijt} + \lambda_{ij} + \lambda_t + \varepsilon_{ijt}. \tag{3.2}$$

The sample is divided into subsamples based on industry and size. For the sake of easier interpretation in a multivariate comparison of the coefficients of income and

incometax, let us reformulate Equation (3.2) to:

$$\begin{aligned} bonus_{ijt} = \quad & \beta_{11} * income_{i1t} + \beta_{21} * incometax_{i1t} + \textstyle\sum_{j\neq 1} \beta_{1j} * subsample_j * income_{ijt} \\ & + \textstyle\sum_{j\neq 1} \beta_{2j} * subsample_j * incometax_{ijt} + \lambda_{ij} + \lambda_t + \varepsilon_{ijt}, \end{aligned} \tag{3.3}$$

where the subsamples are generated based on tax planning opportunities in terms of foreign operations, leverage, size, and capital intensity. The reference subsamples are denoted by $j = 1$.

3.4 Results

This section exhibits the results obtained from regressing CEO bonus payments on the corresponding firms' net income and corporate income tax. The first subsection presents the results of the baseline specification and its extensions, followed by a discussion of possible limitations in Subsection 3.4.2.

3.4.1 Baseline Specification and Extensions

In this subsection, I present the results from estimating Equations (3.1), (3.2), and (3.3). The baseline regression yields the following results (Table 3.3):

Table 3.3: Baseline Specification, n=21921

Explanatory Variable	Coefficient
income	0.338***
	(0.013)
incometax	-0.258***
	(0.052)
Firm and Year effects	Yes
Number of Firms	2830

Notes: the dependent variable is the bonus paid to the CEO. *income* is the firm's net income corrected for bonus expenses. *incometax* is the corresponding payable income tax, also corrected for bonus expenses. The specification includes time-invariant firm effects and firm-invariant time effects. The sample period is 1992 to 2010. Standard errors are in parentheses and significance at the 1% , 5% , and 10% levels is indicated by ***, **, and *, respectively.

The results displayed in Table 3.3 imply that a one million dollar increase in a firm's net income is associated with an increase in the CEO's bonus of 338 dollars.[18] They further allow us to reject the hypothesis that tax payments do not play a role in any

[18]This estimate for the sensitivity of the bonus to firm income is considerably smaller than the estimates for the sensitivity of CEO wealth to shareholder wealth which were mentioned in the Introduction. Note that the bonus only accounts for a part of annual compensation and that it is a flow variable, whereas CEO wealth is a stock variable, comprising all previous stock and option grants among other elements. Furthermore, the value of these equity incentives is tied per definition to the stock yield, and thus to shareholder wealth, whereas the bonus can depend on various measures.

CEO's bonus contract: holding net income constant, a reduction of payable taxes by one million dollars comes about with a 258 dollar increase in the executive's bonus. This is a noteworthy result since it implies that shareholders reward an income increase that comes from tax savings more strongly than other net income increases. A possible explanation is that CEOs require to be compensated for the additional risk borne in tax sheltering activities (cf. Chen and Chu 2005, and Rego and Wilson 2012). Bonus contracts that are based on more than one performance measure are often designed in an additive fashion so that they can be thought of as a sum of separate bonus plans (cf. Murphy 1999). The coefficient estimates could be the result of such an additive bonus plan. Firms might, for example, base part of the bonus on net income and explicitly reward a reduction of corporate taxes in another part of the bonus.[19] Whatever the case may be, this is still an average result and the literature presented above suggests that firms' compensation practices differ across a number of variables.

Table 3.4: Subsamples: Firm Size, n=21921

Subsample	income	incometax
Small Firms	3.241***	1.980
	(0.816)	(3.725)
Medium-sized Firms	0.978***	-0.407
	(0.113)	(0.705)
Large Firms	0.337***	-0.251***
	(0.013)	(0.052)

Notes: the dependent variable is the bonus paid to the CEO. *income* is the firm's net income corrected for bonus expenses. *incometax* is the corresponding payable income tax, also corrected for bonus expenses. The specification includes time-invariant firm effects and firm-invariant time effects. Medium-sized firms are the 50% of firms around the median firm in terms of size measured by total assets. Small firms and large firms are the smallest and largest 25% of firms in terms of total assets, respectively. The sample period is 1992 to 2010. Standard errors are in parentheses and significance at the 1% , 5% , and 10% levels is indicated by ***, **, and *, respectively.

[19] Ittner et al. (1997) find that some 8% of bonus plans reward "cost reduction", which may comprise tax expenses.

Following Equation (3.2), I estimate the coefficients for income and incometax separately for subsamples based on firm size and industry. Table 3.4 depicts the results for the subsamples based on firm size and lets us draw two conclusions: 1) The larger a firm is, the lower is the sensitivity of the bonus to the firm's net income. While a one million dollar increase in net income leads to a bonus increase of 3241 dollars for small firms, the same increase in net income only leads to a bonus increase of 337 dollars for large firms. 2) Holding net income constant, we cannot reject the hypothesis that tax payments do not affect the bonus in small and medium-sized firms – it seems that CEOs in these companies are simply compensated based on net profits and taxes do not play a role. Apparently, the results from the baseline specification are driven by large firms, in which a one million dollar increase is associated with a 251 dollar bonus increase.

We now repeat the analysis for different industries (Table 3.5). As was put forward by Murphy (1999), there is quite some heterogeneity between the coefficient estimates for the different industries. The results can be grouped into four categories:

- Positive income, insignificant incometax coefficients:[20] While a higher net income is accompanied by a higher bonus, we cannot reject the null hypothesis, that is, we have no reason to believe tax payments have an impact on the CEO's bonus – over and above their direct effect on net income – for firms in the Agriculture and Mining, Communication, Food, Beverages and Tobacco, Oil and Gas, Real Estate, Vehicles, Utilities, and Other Service industries.

- Positive income, positive incometax coefficients: Firms in three industries pay their CEOs a higher bonus when incometax is high, holding constant income. One explanation could be that the bonus remuneration is based on gross-, rather than net-income, at least for Financial Institutions. For the Construction and

[20] I use the term "insignificant" when a coefficient is not significant at the 10% level.

Transportation industries, however, the incometax coefficient estimate is surprisingly high. One rationale behind this could be that CEOs are in fact incentivized to generate *high* tax payments. This scenario could be relevant if a company is (partly) under public ownership, like many public transportation firms, or otherwise has an interest in high tax payments. It could be argued that construction firms are exposed to a relatively high amount of regulation, bureaucracy, and also business from public infrastructure projects so that they might find it particularly opportune to propitiate the authorities with tax payments.[21]

- Insignificant income, insignificant incometax coefficients: For firms in the Manufacturing and Software industries I find no significant relationship between the CEO's bonus and either firm income or income taxes. This might be due to the notion that managers' interests in these sectors are only aligned with those of the shareholders by means of equity incentives.[22]

- Positive income, negative incometax coefficients: The results for firms in Wholesale and Retail, Other Industrials, and Electrics and Electronics suggest that on top of being remunerated on net- rather than gross income, CEOs are incentivized to consider taxes as a profit center and to reduce corporate tax payments. Especially for firms in the latter two industries, this seems plausible, since these companies often have tax saving opportunities, such as production facilities abroad.

Following the interpretation of the results of the last category, I estimate Equation 3.3 incorporating indicators for the firms' tax saving opportunities. The coefficient

[21] A report of Transparency International (2008) finds that the Construction industry is the one most prone to bribery of public officials. In a similar fashion, firms in this industry might also tend to "bribe" the authorities with high tax payments.

[22] Consider for example Google's former CEO and owner of a substantial amount of company stock, Eric Schmidt, who receives a one-dollar salary and declines to benefit from a bonus plan (cf. United States Securities and Exchange Comission 2011). However, in 2009, he still received a holiday bonus of 1660 dollars. Clearly, this amount is independent of firm income or incometax and can vary over time.

Table 3.5: Subsamples: Industries, n=21921

Subsample	income	incometax
Agriculture and Mining	0.886**	-0.091
	(0.343)	(2.058)
Communication	0.473***	-0.102
	(0.058)	(0.180)
Construction	9.970***	17.411***
	(0.399)	(2.379)
Electrics and Electronics	0.756***	-2.154***
	(0.056)	(0.275)
Financial Institutions	0.597***	0.362***
	(0.028)	(0.108)
Food, Beverages, Tobacco	0.729***	-0.581
	(0.076)	(0.395)
Manufacturing	0.033	0.347
	(0.053)	(1.678)
Oil and Gas	0.782***	0.928
	(0.097)	(0.871)
Other Industrials	0.155***	-0.161**
	(0.019)	(0.073)
Other Services	1.327***	0.937
	(0.234)	(0.899)
Real Estate	11.504**	27.947
	(5.227)	(23.748)
Software	0.080	0.054
	(0.051)	(0.192)
Transportation	0.387**	0.902*
	(0.182)	(0.512)
Vehicles	0.698***	-0.185
	(0.057)	(0.269)
Utilities	0.492***	0.335
	(0.139)	(0.431)
Wholesale and Retail	0.685***	-1.150***
	(0.060)	(0.397)

Notes: the dependent variable is the bonus paid to the CEO. *income* is the firm's net income corrected for bonus expenses. *incometax* is the corresponding payable income tax, also corrected for bonus expenses. The specification includes time-invariant firm effects and firm-invariant time effects. All firms have been matched to an industry based on SIC codes; when these were unavailable an industry has been assigned based on the Compustat variable *industry* or on the company name. The sample period is 1992 to 2010. Standard errors are in parentheses and significance at the 1% , 5% , and 10% levels is indicated by ***, **, and *, respectively.

Table 3.6: Tax Sheltering Opportunities, n=21921

Variable	(1)	(2)	(3)	(4)
income	0.348***	0.335***	0.447***	1.118***
	(0.026)	(0.019)	(0.018)	(0.130)
income*foreign	0.006			0.056**
	(0.027)			(0.028)
income*highleverage		0.059**		0.028
		(0.024)		(0.024)
income*highcapitalintensity			-0.166***	-0.138***
			(0.025)	(0.026)
income*small				2.226***
				(0.800)
income*large				-0.717***
				(0.126)
incometax	0.319***	-0.454***	-0.062	0.334
	(0.112)	(0.075)	(0.062)	(0.523)
incometax*foreign	-0.629***			-0.629***
	(0.114)			(0.117)
incometax*highleverage		0.474***		0.310***
		(0.096)		(0.097)
incometax*highcapitalintensity			-0.335***	-0.375***
			(0.098)	(0.102)
incometax*small				2.310
				(3.697)
incometax*large				0.039
				(0.510)

Notes: the dependent variable is the bonus paid to the CEO. *income* is the firm's net income corrected for bonus expenses. *incometax* is the corresponding payable income tax, also corrected for bonus expenses. The specification includes time-invariant firm effects and firm-invariant time effects. For the univariate results based on size-subsamples, see Table 3.4. The indicator variables are equal to one if: $foreign$ – the firm has nonzero foreign income (10340 firms), *highleverage* – the firm's leverage is above the median value, *highcapitalintensity* – the firm's capital intensity is above the median value, *small* – the firm belongs to the smallest 25% of firms in terms of total assets, *large* – the firm belongs to the largest 25% of firms in terms of total assets. The sample period is 1992 to 2010. Standard errors are in parentheses and significance at the 1% , 5% , and 10% levels is indicated by ***, **, and *, respectively.

estimates are shown in Table 3.6. The results in the first column are particularly interesting. The sensitivity of the bonus to income is not significantly different for firms that have foreign operations and for those that do not. This could be seen as an indication that the general CEO remuneration practices do not differ between firms that only operate domestically and firms that also generate income abroad. They do, however, differ vastly in the sensitivity of the bonus to incometax: after a tax reduction of one million dollars, CEOs in firms with foreign operations receive a bonus 629 dollars higher than a CEO in a domestic-only firm would receive. This can be interpreted as an indication that internationally active firms have more tax saving opportunities than their domestic-only counterparts. As a consequence, they reward tax savings more strongly. For CEOs in highly-levered firms (Column 2), the negative coefficient for incometax is almost exactly offset by the interaction term. Apparently the reasoning laid out in Atwood et al. (1998) seems to apply: firms that are financed with relatively more debt already save taxes by declaring interest payments as a business expense, limiting their possibilities to further reduce incometax. Thus, CEOs in those firms are not specifically incentivized to do so. Also in accordance with their findings, capital-intense firms highly encourage tax reductions in comparison with less capital-intense firms (Column 3).

Note that this is a univariate comparison of the coefficients for income and incometax. In order to alleviate this concern, I estimate the model with all tax saving indicators, in addition to firm size, at once (Column 4). The coefficients for the different interaction terms now give the slope effect of tax saving opportunities compared to the reference group of mid-sized companies with only domestic operations, low leverage, and low capital intensity. The effects of tax planning opportunities on the sensitivity of the bonus to corporate income taxes remain qualitatively unchanged. Nonetheless, the interaction terms of *incometax* and *size* are insignificant. The interpretation of this result is that, in comparison to mid-sized, domestic-only, low-levered companies with

low capital intensity, company size does not have a significant effect on the sensitivity of the bonus to income tax.

3.4.2 Discussion

After finding out which CEOs are given incentives to reduce corporate taxes, the obvious next step would be to find out whether these incentives work and such executives actually do reduce tax payments. Using different firm-level proxies for tax-reduction incentives, studies like Phillips (2003), Armstrong et al. (2012), or Gaertner (2013) find evidence on this, which could give rise to concerns about reverse causality. However, this chapter presents results of the relationship between intra-firm variations in taxes and variations of bonus payments, while the mentioned studies find an effect of variations in this very relationship on variations of a function of tax payments. One is generally confronted with a problem of reverse causality when one wants to estimate the effect of B on A, but in reality, A (also) causes variations in B. In our context, this could be the case when, for example, an increase in the sensitivity of the bonus to the firm's tax payments leads the CEO to reduce corporate taxes, which is not just a possibility, but a conjecture that motivates this study. Nonetheless, this concern does not pose a problem for the present study since the bonus contract specifies *ex ante* how variations in tax payments will impact the manager's bonus. The CEO observes this contract and undertakes the actions that maximize his utility. This will yield a realization of tax payments, according to which his bonus is calculated and paid out. We are interested in the contracted relationship between taxes and bonus and the data allow us to estimate this relationship, regardless of whether or not it induces the CEO to undertake actions aimed at reducing tax payments.

It could be argued that the analysis is prone to spurious results because of omitted variables that may affect CEO bonuses. In principle, it is conceivable that such left-out variables are correlated with both, income and tax. As an example, imagine a CEO's

bonus is tied to the total revenue and to the return on assets of his firm. While neither income nor tax are explicitly mentioned in his bonus contract, the present estimation setup could yield significant coefficients for both measures. This is so because total revenue determines both measures and return on assets is a function of net income. This is, however, acceptable for the analysis, since this mechanism entails that the CEO is in fact incentivized *implicitly* to manipulate net income and taxes.

Finally, it must be noted that when we cannot reject the hypothesis that the coefficient on *incometax* is equal to zero, this does not have to be the case because taxes do in fact not play a role in the CEO's bonus plan; it is possible that this occurs due to a lack of variations in *incometax* that are independent of variations in *income*. However, in most cases I do find significant coefficients on *incometax*, which allows us to dismiss this concern. If anything, it supports the view that I give a lower bound of the statistical significance of the coefficient estimates.

3.5 Concluding Remarks

The aim of this chapter was to test whether CEOs' bonus contracts set incentives to reduce corporate tax payments. The analysis shows this is indeed the case when looking at the whole sample, where I find that bonuses increase with tax reductions, while controlling for net income. In some instances, however, the contrary is the case; CEOs in the Construction and Transportation industries even seem to be incentivized to generate high tax payments. It appears that the result of the estimation over the whole sample is driven by firms in the Wholesale and Retail, Electrics and Electronics, and Other Industrial sectors, which account for almost half of the sample. In accordance with previous literature, I further find that a number of proxies for tax planning opportunities are related to a high negative sensitivity of the bonus to income tax payments.

These results provide a lower-bound estimate of the CEO's incentives to reduce corporate taxes, since equity compensation that is paid in addition to the bonus automatically sets such incentives. Keeping this in mind, the results are particularly noteworthy, since they imply that a profit increase from tax savings is rewarded more strongly than profit increases from other sources. A possible explanation could be that running an aggressive tax strategy is not only costly to the CEO in terms of effort, but that it could also bear additional risk for him. This hypothesis is in line with Gaertner (2013). Apart from a potentially higher volatility of firm fundamentals, and thus of the bonus payments, the executive might incur personal risks such as a loss of reputation (cf. Rego and Wilson 2012), or even the threat of legal prosecution. Federal law (cf. Office of the Law Revision Counsel 2010) subjects all *responsible persons* who *willfully* retain due taxes from the government to a penalty equal to the amount of taxes held back. A decision of the United States District Court Middle District of Florida Tampa Division (2009) shows that a CEO can indeed be considered a "responsible person" and can be held personally liable for withholding taxes from the government.

From a shareholders' perspective, setting such incentives makes sense if the expected gains from running an aggressive tax strategy exceed the expected costs from potential risk to firm value and from incentivizing the CEO. Graetz (2008) postulates that "a tax shelter is a deal done by very smart people that, absent tax considerations, would be very stupid" (p. 116). From an economist's perspective, the conduct of incentivizing a CEO to act in such a "very stupid" way can be seen as an instance of rent seeking; it is a costly activity that leads to a redistribution, rather than the production, of wealth.

3.A Appendix

3.A.1 Sample Attrition

The total number of observations is reached as follows.

Table 3.7: Sample Attrition

Observations with...	Number of Observations
Match in Compustat and Execucomp	29379
Missing values for any variable	-2205
Negative pre-tax income	-4824
Foreign incorporation	-428
Negative bonus	-1
Total	21921

3.A.2 Correction for compensation expenses

Since it would be counterintuitive if a company rewarded the CEO for tax savings due to expenses for his own bonus (cf. Chen and Chu 2005), I correct our two main explanatory variables *income* and *incometax* for bonus expense. Consider the following simple model of linear profit taxation:

$$\pi^{gross} = \pi^{net} + T = (1-\tau)\pi^{gross} + \tau * \pi^{gross} = R - C_1 - C_2,$$

where π denotes profits, τ the tax rate and T, R, C_1, C_2 are payable income taxes, revenue, business expenses, and CEO bonus expenses, respectively. We observe π^{net}, T, and C_2 and want to construct a measure of net profits before bonus expense, $\hat{\pi}^{net}$,

and a measure of income taxes before bonus expense, $\hat{T}$. Since

$$\pi^{gross} = \pi^{net} + T = (1-\tau)(R - C_1 - C_2) + \tau(R - C_1 - C_2),$$

we get that

$$\hat{\pi}^{net} = (1-\tau)(R - C_1) = (1-\tau)(R - C_1 - C_2) + (1-\tau)C_2 = \pi^{net} + (1-\tau)C_2,$$

and likewise

$$\hat{T} = \tau(R - C_1) = \tau(R - C_1 - C_2) + \tau C_2 = T + \tau C_2.$$

Using that $\tau = \frac{T}{\pi^{net}+T}$, these variables can readily be constructed with the variables in the dataset.

3.A.3 Variable Definitions

The variables used have the following relationship to Compustat / ExecuComp items.

Table 3.8: Variable Definitions

Variable	Compustat/ExecuComp Item
bonus	$BONUS + NONEQ\_INCENT$
income	$IB + (1 - \frac{TXP}{IB+TXP})(BONUS + NONEQ\_INCENT)$
incometax	$TXP + \frac{TXP}{IB+TXP}(BONUS + NONEQ\_INCENT)$
size	AT
foreign	1 if $PIFO \neq 0$
leverage	$\frac{DLTT+DLC}{AT}$
capitalintensity	$\frac{PPEGT}{AT}$

The variable *bonus* is measured in thousands of dollars; all other dollar-measures are given in millions of dollars. Throughout this chapter, the expressions "income" and "profits" are used interchangeably. Unless otherwise noted, they refer to the after-tax measure.

Chapter 4

Paid to Quit Cheating

4.1 Introduction

There are different ways a government can show mercy after a citizen has become clean about tax evasion: An amnesty is often granted for a limited time only, it may be confined to a certain group of perpetrators and may come with a fine, albeit lower than normal. It does, however, promise exemption from further criminal prosecution when evaded taxes are declared and paid. Sometimes, tax authorities also give tax offenders a break by allowing a remission of due taxes due to personal hardships. Over and above such temporary policies, many governments show permanent leniency towards perpetrators that turn themselves in (see OECD 2015 for an overview). The question arises whether such voluntary disclosure programs sustainably increase government revenue or whether they destroy the deterrence effect of the penal code.

Tax evasion has recently been a popular topic in international news. Particularly in Germany, where punishment can be up to ten years imprisonment for severe infractions, some prominent cases have emerged in the recent past (see e.g. Koschnitzke 2014). However, to many people's surprise, the German government has had a standing offer for tax offenders who turn themselves in. As a matter of fact, tax evasion is the only felony for which perpetrators can avoid criminal prosecution when they undo the crime (Fischer 2014). Below a certain threshold, a tax evader can dodge punishment altogether as long as he comes clean about all his misreportings; he only needs to pay his tax debt plus interest. Even though the rules have recently been tightened, punishment for tax evasion above the threshold remains quite lenient, with only a small fine added to the perpetrator's tax debt: from 2015 on, a fine of ten percent will be collected from 25,000 Euros of evaded taxes. It goes up to twenty percent for sums above 1,000,000 Euros (Bundesministerium der Finanzen 2014).

In a rational world with perfect information, there would be no room for these leniency programs. However, several things may cause a perpetrator to change his

mind after engaging in tax evasion: maybe his ethical convictions change, maybe he only realizes his true feeling of guilt once the deed has been done, maybe there is a shock on (his perception of) the probability to get caught. It may then be in the government's best interest to make it not too costly for tax evaders to turn themselves in. However, awareness of such a leniency policy may also cause more people to evade taxes in the first place.

Building on Becker (1968) and Allingham and Sandmo (1972), I develop a model in which agents evade taxes whenever the expected benefits of doing so exceed the expected punishment. As a variation on such classical models, however, I introduce another component to said punishment: in addition to potentially facing prosecution by the government, agents may also expose a feeling of guilt. I now assume that some agents may feel more or less guilty about cheating on their tax reports after handing them in. The analysis provides insights into the costs and benefits for the government of offering agents the possibility to make a voluntary disclosure. I show that leniency does not only increase government revenue when it comes as a surprise, but even when it is anticipated by the agents.

I thereby offer a new explanation as to why we can observe permanent voluntary disclosure programs. Malik and Schwab (1991) present a model in which agents are uncertain about their utility function. When they are risk-neutral, it is never optimal for the government to offer a guaranteed amnesty. Andreoni (1991), on the other hand, shows that a (partial) 'permanent amnesty' can increase efficiency in a model where agents use the amnesty as insurance against an otherwise uninsurable consumption shock. In a more recent contribution, Bayer et al. (2015) explain the occurrence of amnesties by agents who discount possible future fines too much. In a strategic game between taxpayers and government, an equilibrium with almost-certain amnesties could arise.

The study that comes closest to my approach is that of Langenmayr (2015). Just like her, I consider a set of agents heterogeneous in their feeling of guilt with regards to evading taxes. This results in three different classes of agents: those who are always honest, those who initially cheat and then turn themselves in, and those who feel so little guilt that they are dishonest throughout. However, the assumption that drives the profitability of the voluntary disclosure program in her model is that there is a shock to the probability to get caught. While I do believe that in many cases this is the reason why people make use of voluntary disclosure, a permanent leniency program would also require permanent volatility of the (perceived) detection probability. Furthermore, in Langenmayr's (2015) paper, the fine for users of the leniency program is endogenous, with the detection probability being fixed. While there are arguments to defend either modeling approach, I believe that the choice to endogenize the auditing probability better reflects reality. Her model predicts a lower fine for voluntary disclosure when a positive shock to the detection rate becomes more likely, which contrasts with the recent developments in Germany. This study adds another justification why governments may want to provide a standing leniency offer to risk-neutral agents, even in times when there is little variation in tax offender conviction rates.

The remainder of this chapter is structured as follows. The next section describes the model. Results are presented and discussed in Section 4.3, followed by a concluding section.

4.2 The Model

We set up a model in which agents base their decision to evade taxes on their feeling of guilt about cheating in their tax reports, on the fine when caught, and on whether or not there is a voluntary disclosure program in place. The tax authorities, on the other hand, are treated as a simple profit center of the government that only cares about maximizing revenue subject to enforcement costs (cf. Heesen 2003). The sequence of events is as follows:

1. Nature draws guilt-types; the legislature sets the legal framework, including a fine for tax evasion; agents receive taxable income.

2. Agents decide whether to evade taxes, based on their guilt parameter and their expectation of the probability to get audited.[1]

3. The tax authorities decide on how many audits will take place by fixing the staff assignment.[2]

4. After handing in their tax reports, a random set of agents draws a new guilt parameter; the tax authorities may offer a voluntary disclosure program; tax evaders decide whether to make use of it.

5. Audits take place; convicted perpetrators are fined; government revenue is collected.

Before handing in their tax reports, agents face the following utility function:

$$U_i = w - T + d_i - pfd_i - (1-p)\,0 - \theta_{i1} d_i,$$

[1] We will consider the case when agents anticipate a voluntary disclosure program and when they do not.

[2] Idem. In the model, there is informational symmetry concerning voluntary disclosure programs.

where w is the gross wage, T are taxes owed, d_i is the amount of taxes that agents can evade, p is the probability to get audited and caught, $f > 1$ is the penalty factor when caught, and $\theta_{i1} \sim \mathcal{U}[0,1]$ determines the exogenous cost of engaging in tax evasion, such as a feeling of guilt. Note that this means that we focus on the most interesting part of the population, namely those agents who may or may not choose to cheat, depending on the size of pf. Naturally, there is a (possibly quite large) set of taxpayers who would never consider cheating, thus having $\theta_{i1} > 1$. Hypothetically, one could also think of some agents with $\theta_{i1} < 0$, so a part of a population that feels joy, rather than guilt, when evading taxes. I disregard this possibility in this study. For simplicity, I assume that agents can choose to declare their taxes truthfully, i.e. $d_i = 0$, or cheat by a fixed amount $d_i = \bar{d}$.[3] There is a unit mass of agents, heterogeneous only in their uniformly distributed guilt factor θ_{i1}.

The tax authorities want to maximize revenue subject to enforcement costs. Net revenue is given by

$$R = HT + D\left(T - \bar{d} + pf\bar{d}\right) - \phi p,$$

where H stands for the mass of agents who are honest, D for the dishonest, and ϕ represents the auditing technology and hence the cost of increasing p.[4] I assume the penalty factor f is given by the institutional framework, so the tax authorities can only choose p. An interpretation for this could be that when we speak of the tax authorities, we mean an organ of the executive branch that, while working on a fixed budget, can make some adjustments to p over time, possibly due to a shift of priorities, whereas changes to f can only be made in the long-run by the legislature, or cannot be made at

[3] Of course, in this stylized model, the tax authorities could easily identify tax fraud: whoever declares $T - d_1$ rather than T must be evading taxes. This problem would be mitigated with sufficient heterogeneity in the tax burden, but implementing this would not yield additional insights in the scope of this analysis.

[4] Another facet of ϕ could be that too many audits (of innocent citizens) face public disapproval, see e.g. Leonard and Zeckhauser (1987).

all because of constitutional constraints. Another explanation would be that a sizeable part of the 'punishment' of getting caught cannot be set by the government in the first place: it could be argued that the reaction of society to convicted tax offenders far outweighs any punishment manifested in the penal code, an idea that was already implemented in the seminal work of Allingham and Sandmo (1972).

After handing in their tax reports, some agents draw a new guilt factor $\theta_{i2} \sim \mathcal{U}[0,1]$, which will not only affect their decision on whether or not to evade taxes in the future, but – if they cheated before – will also determine how they feel about the fact that there is a tax obligation that they concealed from the authorities. As a consequence an agent may have preferred to evade more or less taxes than he initially decided. I assume that, after handing in his tax return, an agent can only increase the amount he declares, that is declare T rather than $T - \bar{d}$, which may alleviate his feeling of guilt. If he does so and there is no leniency program in place, the agent would be treated as if he had been audited and caught, leading to a certain penalty of $f\bar{d}$. Clearly, an agent would never declare higher taxes, even when he feels more guilt than he initially thought, because $f > 1$ implies his change in utility from turning himself in, $\Delta U_i = -f\bar{d} + \theta_{i2}\bar{d}$, would be negative.[5]

However, the government may want to make use of the fact that some agents feel more guilty than they did when they handed in their tax return. Offering a voluntary disclosure program with little or no punishment could increase government revenue. I assume that agents anticipate they may draw a new θ, but are not sure whether they will and, if so, whether it will be higher or lower. An agent knows that his guilt parameter will remain the same, i.e. $\theta_{i2} = \theta_{i1}$, with probability q. With probability $1 - q$, he will receive a new draw $\theta_{i2} \sim \mathcal{U}[0,1]\,;\, \theta_{i2} \perp \theta_{i1}$. It is crucial whether the tax

[5]This assertion follows from the assumption that the new guilt factor is drawn from the same distribution as the old one. If we allowed $\theta_{i2} \geq 1$ we may very well observe agents turning themselves in, despite the absence of a leniency program.

authorities realize they may want to offer a leniency program in the future and whether agents anticipate that. My conjecture is that, when an agent is aware of the voluntary disclosure program ex ante, a particularly guilt-driven agent may still evade taxes in the 'hope' of feeling less guilty in the future. If his hope does not materialize, he can always turn himself in later. Agents with low morals, however, may or may not evade taxes. If they expect to draw a high θ in the next period, they could report truthfully, but it seems that cheating on the initial tax report is a superior strategy, because one cannot cheat retroactively.

4.3 Analysis

In order to develop some intuition for the model, we first consider a case in which agents receive only one draw of their guilt parameter. Since there is no variation that could affect the agents' choice to evade taxes, there is no use for the tax authorities to consider offering a voluntary disclosure program. We then allow some agents to receive a new draw of their guilt parameter and consider the implications of having a voluntary disclosure program when it is anticipated, and when it is not.

4.3.1 Benchmark with Static Guilt

It is straightforward to see that an agent will evade taxes whenever

$$pf + \theta_{i1} < 1,$$

that is the expected punishment factor pf and the agents' feeling of guilt θ_{i1} are perfect substitutes. Note that if $pf > 1$, nobody would cheat on taxes.[6] It may at first seem counter-intuitive that a government would choose an expected punishment that does not exceed the potential benefits from misbehavior, but it can be argued that this reflects reality, at least for some parts of the penal code concerning taxes. There are several reasons why this may be the case. Slemrod (1992) claims that "it is extraordinarily expensive to arrange an enforcement regime so that, from a strict cost-benefit calculus, noncompliance does not appear attractive to many citizens" (p. 7). There can also be a natural or ethical upper bound to both punishment and prosecution itself; Stigler (1970) has argued that marginal deterrence requires marginal punishment, making it impractical to deter people from certain behavior. Needless to say, we do observe tax evasion, so apparently the expected punishment does not always exceed the benefits.

[6] This of course relies on the assumption that there are no notorious cheaters with $\theta_{i1} < 0$.

In the absence of a voluntary disclosure program, the tax authorities can hence expect all agents below

$$\hat{\theta}_1 = 1 - pf$$

to evade taxes, with all others declaring truthfully. This leaves them with a mass of $1 - pf$ evaders, and a mass of $1 - (1 - pf) = pf$ truthful reporters, so net revenue becomes

$$R = (1 - (1 - pf))T + (1 - pf)\left(T - \bar{d} + pf\bar{d}\right) - \phi p. \tag{4.1}$$

It can already be seen that the cost of increasing p is accompanied by two different benefits. A higher probability to get caught leads to less agents avoiding taxes, but government revenue also increases on the intensive margin: agents that evade taxes are more often caught yielding additional revenue in the form of fines. Assuming the tax authorities can choose p directly, net revenue maximization yields the following first order condition:

$$\max_p R \Rightarrow 0 = f\bar{d} - pf^2\bar{d} + f\bar{d}\,(1 - pf) - \phi.$$

From left to right, the terms in this condition show that an increase in the audit probability results in: a higher tax yield from less agents evading, a decrease in fines collected when less agents evade, higher revenue from an increase in convictions of those who do evade, and higher auditing costs. Rearranging yields the optimal auditing probability:

$$p^* = \frac{2f\bar{d} - \phi}{2f^2\bar{d}}. \tag{4.2}$$

So the tax authorities will choose a positive auditing probability whenever $2f\bar{d} > \phi$, see the discussion below. Furthermore, $p^* < 1$ is always satisfied for $f > 1$, so whenever a fine is charged on top of the taxes that have been evaded. Let us see how the optimal audit probability p^* depends on the parameters of the model:

$$\frac{\partial p^*}{\partial \phi} < 0,$$

so, the cheaper it becomes to audit, the more often the tax authorities will do it;

$$\frac{\partial p^*}{\partial \bar{d}} = \frac{1}{2f^2\bar{d}^2} > 0,$$

so the higher the amount that perpetrators can evade, the more effort the tax authorities are going to put into detecting them;

$$\frac{\partial p^*}{\partial f} = \frac{1}{f^2} - \frac{4\left(2f\bar{d} - \phi\right)}{4f^3\bar{d}},$$

so it is not clear whether or not the tax authorities decrease the audit probability after increases in the exogenous fine factor. As a matter of fact, the negative effect of an increase in f starts to overrule its positive effect on p^* as soon as the total fine exceeds the total cost of increasing p, that is $\frac{\partial p^*}{\partial f} < 0$ iff $\phi < f\bar{d}$. In other words, when a low total fine is increased, it leads to an increase in the audit probability, whereas for sufficiently large values of f, a further increase starts to lead to decreases in p^*. Consider the two mechanisms at work: first, increases in f can make it worthwhile to increase p, because an increase in the audit probability may yield more net revenue, as can be seen in the numerator of Expression (4.2). To be more precise, the revenue for each p (also) increases in f because it implies less people evading taxes and at the same time a higher punishment when caught. Second, increases in f may allow the tax authorities to generate the same net revenue while setting a lower p. The downward effect of f can be seen in the denominator of Expression (4.2). It exists because the revenue for each p also decreases in f, for when less people evade taxes also less people will be fined; over and above this, the higher the fine f is, the bigger will be the loss from every person not fined, an effect that enters the equation multiplicatively. Now, when f is already at a high level, a further increase of p will actually decrease net revenue, because too few people will evade taxes, thus be caught and forced to pay this relatively high fine.

Using our result for p^*, we can see that the agent who is indifferent between evading taxes and reporting truthfully is characterized by:

$$\hat{\theta}_1 = \frac{\phi}{2f\bar{d}}.$$

Note that this implies an interior solution as long as $0 < \phi < 2f\bar{d}$. As we saw above, it must be reasonably "cheap" for the government to audit in order to pick a positive audit probability. When it becomes very cheap to audit, i.e. $\phi \to 0$, nobody will evade taxes. This is so because costless auditing leads the tax authorities to set $p^* = \frac{1}{f}$, which is sufficient to deter even the least guilt-driven of agents from cheating.[7]

For later comparison, the generated net revenue when implementing the optimal strategy, i.e. using Expression (4.2) in Equation (4.1) is equal to:

$$R(p^*) = T - \frac{\phi}{f} + \frac{\phi^2}{4f^2\bar{d}}. \tag{4.3}$$

4.3.2 Voluntary Disclosure after a New Draw of θ

When there is a chance that agents receive a new draw of θ, the government can make use of the fact that some agents feel more guilty and would have preferred to declare higher taxes by offering a voluntary disclosure program after the deadline for tax reports, but before the audits take place. If there is no penalty on declarations under voluntary disclosure, exactly those agents will retroactively declare their taxes truthfully who would have done so from the beginning, had their guilt parameter always been the one they newly drew. That is, the agents for whom the following holds will turn themselves in: $\theta_{i1} < \hat{\theta}_1 \wedge \theta_{i2} > \hat{\theta}_1$. In the remainder of this subsection, we will derive results for different information structures in order to find out when offering a voluntary disclosure program increases government revenue.

[7] Note that auditing everyone is not needed, even when it is free; this is so because agents base their decision to evade taxes on the expected punishment.

New Draw of θ without Voluntary Disclosure

We first analyze the implications of a new draw of the guilt parameter in the absence of a leniency program. I do assume that agents foresee that their guilt factor may change in the future. Their utility function thus becomes:

$$\begin{aligned} U_i &= w - T + d_i - pfd_i - (1-p)\,0 - \mathbb{E}\theta d_i \\ &= w - T + d_i - pfd_i - (1-p)\,0 - \left(q\theta_{i1} + (1-q)\,\mathbb{E}\theta_{i2}\right) d_i \\ &= w - T + d_i - pfd_i - (1-p)\,0 - \left(q\theta_{i1} + (1-q)\,\frac{1}{2}\right) d_i. \end{aligned}$$

Remember that agents cannot reverse their decision later, so they evade taxes if $pf + q\theta_{i1} + (1-q)\,\frac{1}{2} < 1$, leading to a cutoff value of

$$\tilde{\theta}_1 = \frac{1}{2} + \frac{\frac{1}{2} - pf}{q}. \tag{4.4}$$

It is instructive to see what this condition implies for two extreme cases: First, nobody will evade taxes if $0 > \frac{1}{2} + \frac{\frac{1}{2}-pf}{q}$ holds. This is equivalent to $pf > \frac{1}{2} + \frac{1}{2}q$, so an expected punishment factor between $\frac{1}{2}$ and 1 is sufficient to deter everyone from cheating, depending on q.[8] Second, everyone will cheat if $1 < \frac{1}{2} + \frac{\frac{1}{2}-pf}{q}$, or $pf < \frac{1}{2} - \frac{1}{2}q$, so, again depending on q, an expected punishment factor between 0 and $\frac{1}{2}$ will induce everyone to evade taxes. For given levels of p, the threshold guilt parameter reacts to changes in q as follows:

$$\frac{\partial \tilde{\theta}_1}{\partial q} = \frac{-\left(\frac{1}{2} - pf\right)}{q^2}.$$

So the marginal tax evader's guilt parameter increases in q for large values of pf and decreases for low levels. This means that for a large expected fine factor, more agents keeping their guilt parameter leads to more tax evasion. The reason for this is that an

[8] Note that the optimal audit probability derived later implies an interior solution for all $q > \frac{f\bar{d}}{f\bar{d}+2\phi}$. The tax authorities' response to very low levels of q is discussed below.

increase in q puts less weight on the expected guilt parameter of $\frac{1}{2}$, which favors honesty for high pf, and cheating for low values. Keep in mind, though, that this analysis disregards any impact that q may have on p. In the absence of a leniency program, the tax authorities fix the audit probability optimizing the following expression:

$$\begin{aligned} R &= (1-\tilde{\theta}_1)T + \tilde{\theta}_1\left(T - \bar{d} + pf\bar{d}\right) - \phi p \\ &= (\frac{1}{2} - \frac{\frac{1}{2} - pf}{q})T + \left(\frac{1}{2} + \frac{\frac{1}{2} - pf}{q}\right)\left(T - \bar{d} + pf\bar{d}\right) - \phi p, \end{aligned} \tag{4.5}$$

which would yield the following audit probability:

$$\tilde{p} = \frac{(q+3)\, f\bar{d} - 2q\phi}{4f^2\bar{d}} = \frac{q+3}{4f} - \frac{q\phi}{2f^2\bar{d}}. \tag{4.6}$$

Note that naturally, for $q = 1$, this result is consistent with what we found above for p^*.[9] For $q \to 0$ the distribution of expected guilt-types becomes more and more narrow, until all agents know they will draw a new θ and make their decisions based on $\mathbb{E}\theta = \frac{1}{2}$. The tax authorities can then simply deter everyone from engaging in tax evasion by setting $p = \frac{1}{2f}$, which is profitable when $\bar{d} \geq \frac{\phi}{2f}$. Generally, in the absence of voluntary disclosure, the audit probability reacts to changes in q as follows:

$$\frac{\partial \tilde{p}}{\partial q} = \frac{f\bar{d} - 2\phi}{4f^2\bar{d}}.$$

So, when the benefit from auditing, or more precisely the total fine $f\bar{d}$ collected from one convicted perpetrator, is high compared to the cost of auditing ϕ, a higher probability of agents keeping their type comes about with a higher audit probability. As we can see in Equation (4.4), increases in q lead to more tax evasion for large pf, and to less evasion for small values of pf, c.p. This is so because a large pf implies that only agents with a very low θ_{i1} consider to evade taxes; if now q increases, these agents are less 'afraid' that they will make a new draw θ_{i2}, which in expected terms they value

[9] Also note that, just like in the benchmark case, the audit probability always remains below 1 as long as $f > 1$. Naturally, it will be positive when the numerator is positive.

at $\frac{1}{2}$, a figure that would deter them from evading taxes. Likewise, for low pf, an increase in q means agents with a high θ_{i1} can more confidently make an honest tax report, because the chance of receiving a low draw of θ_{i2} that would encourage cheating decreases. Similarly, when the fine to be collected is rather high, increases in q warrant a lower p, in part due to the fact that there are already not so many perpetrators, and there is no need to further deter the increasingly heterogeneous population of expected types. When the fine is low, however, the increase in heterogeneity means there is a larger set of agents to be susceptible to deterrence, so p increases.

With this understanding of the impact of q on $\tilde{p}$, let us reconsider our analysis of the effect of q on $\tilde{\theta}_1$:

$$\frac{\mathrm{d}\tilde{\theta}_1}{\mathrm{d}q} = \frac{\partial\tilde{\theta}_1}{\partial q} + \frac{\partial\tilde{\theta}_1}{\partial\tilde{p}}\frac{\mathrm{d}\tilde{p}}{\mathrm{d}q} = \frac{-\left(\frac{1}{2} - \tilde{p}f\right)}{q^2} - \frac{f}{q}\left(\frac{f\bar{d} - 2\phi}{4f^2\bar{d}}\right).$$

Using our result from Equation (4.6) this yields after some rewriting:

$$\frac{\mathrm{d}\tilde{\theta}_1}{\mathrm{d}q} = \frac{1}{4q^2} > 0.$$

So when the tax authorities pick the optimal auditing probability, more agents keeping their initial guilt factor leads to an increase of the marginal tax evader's parameter, and thus to more tax evasion. In other words, the tax authorities design the auditing probability such that more uncertainty concerning agents' guilt parameters leads to more tax honesty.

Substituting Expression (4.6) into Equation (4.5), net revenue becomes, after some rewriting:

$$R(\tilde{p}) = T + \frac{-1 + 2q - q^2}{16}\bar{d} + \frac{-3 - 2q + q^2}{4}\frac{\phi}{f} + \frac{2q - q^2}{4}\frac{\phi^2}{f^2\bar{d}}. \tag{4.7}$$

Once again, this is a general form for which our benchmark in the previous subsection was a special case; substituting $q = 1$ into Equation (4.7) will yield exactly the result found in Equation (4.3).

Voluntary Disclosure is Not Anticipated

The tax authorities now offer a non-anticipated leniency program with no punishment for agents who turn themselves in. Everyone who has $\theta_{i2} > \hat{\theta}_2 = 1 - \tilde{p}f$ will either turn themselves in or never have evaded taxes in the first place. It is important to realize that offering a voluntary disclosure program comes at no immediate cost to the tax authorities when agents do not anticipate it will be offered. There is only the benefit of some agents making use of the program by retroactively declaring higher taxes. How many agents make use of voluntary disclosure depends on the absolute and relative size of $\tilde{\theta}_1 = \frac{1}{2} + \frac{\frac{1}{2} - \tilde{p}f}{q}$ and $\hat{\theta}_2 = 1 - \tilde{p}f$. To be more precise, when $\tilde{\theta}_1 > \hat{\theta}_2$ there is a mass of:

- $1 - \tilde{\theta}_1$ agents who were honest from the beginning,[10]
- $q\left(\tilde{\theta}_1 - \hat{\theta}_2\right)$ agents who evaded taxes, but turned themselves in after realizing their guilt parameter did not change,
- $(1-q)\left(\tilde{\theta}_1\left(1 - \hat{\theta}_2\right)\right)$ agents who turned themselves in after learning their new parameter,
- $q\hat{\theta}_2$ agents whose guilt parameter was low enough to cheat from the outset,
- $(1-q)\left(\tilde{\theta}_1\hat{\theta}_2\right)$ agents who, after receiving a new draw still find it worthwhile to evade taxes.

[10]Note that this contains a mass of $(1-q)\left(1-\tilde{\theta}_1\right)\hat{\theta}_2$ agents who would have liked to become cheaters, but cannot undo their honest tax report.

If, on the other hand $\tilde{\theta}_1 < \hat{\theta}_2$, a mass of:

- $1 - \tilde{\theta}_1$ agents make an honest report from the outset,[11]
- $(1-q)\,\tilde{\theta}_1\left(1-\hat{\theta}_2\right)$ agents turn themselves in after evading taxes, because they drew a higher guilt parameter,
- $q\tilde{\theta}_1$ agents cheat from the outset while keeping their parameter,
- $(1-q)\,\tilde{\theta}_1\hat{\theta}_2$ agents will not turn themselves in after evading taxes, in spite of receiving a new guilt parameter.

So offering a surprise voluntary disclosure program will simply increase the government revenue, as compared to the expression in Equation (4.7), by exactly

$$\Delta_{LR1}R = \left(\bar{d} - \tilde{p}f\bar{d}\right)\left[q\left(\tilde{\theta}_1 - \hat{\theta}_2\right) + (1-q)\left(\tilde{\theta}_1\left(1-\hat{\theta}_2\right)\right)\right]$$

in the case of $\tilde{\theta}_1 > \hat{\theta}_2$, and by

$$\Delta_{LR2}R = \left(\bar{d} - \tilde{p}f\bar{d}\right) * (1-q)\,\tilde{\theta}_1\left(1-\hat{\theta}_2\right)$$

if $\tilde{\theta}_1 < \hat{\theta}_2$. The only requirement for these expressions to be positive is that $pf < 1$, which has been discussed above. Nonetheless, one can see that the profitability of a surprise leniency program not only depends on q, but also on the relative size of $\tilde{\theta}_1$ and $\hat{\theta}_2$, and thereby also on $\tilde{p}f$. More precisely, we end up in the first case if $\tilde{\theta}_1 > \hat{\theta}_2$, which is equivalent to $\tilde{p}f < \frac{1}{2}$ or $1 < q\left(\frac{2\phi}{f\bar{d}} - 1\right)$. In order for this to be possible, we must have $2\phi > f\bar{d}$. The crucial difference between these cases is that in the first scenario, there is a group of agents making use of voluntary disclosure that is missing in the second scenario: those agents that evaded taxes in the hope of receiving a lower draw of the guilt parameter, but eventually turn themselves in when they realize their parameter

[11] Note that the contained mass of agents who would have liked to become cheaters, but cannot undo their honest tax report $(1-q)\left(1-\tilde{\theta}_1\right)\hat{\theta}_2 + q\left(\hat{\theta}_2 - \tilde{\theta}_1\right)$ is broader than in the case when $\tilde{\theta}_1 > \hat{\theta}_2$.

did not change. Analogously, there is group of agents in the second scenario that is missing in the first: those who regret their decision to make an honest tax report, even though their parameter did not change. For the intuition behind these decisions I refer to the discussion about the impact of q on $\tilde{p}$ in the previous subsection.

It could be argued that the tax authorities may want to revise the audit probability once voluntary disclosure has been offered and taken advantage of - either to catch the remaining perpetrators or to save resources from unnecessary audits. It is quite conceivable that the tax authorities consider offering voluntary disclosure before setting the audit probability, but I do not focus on such a situation here. While it may be possible to surprise agents with a leniency program, sudden changes in the auditing frequency may not be easy to implement and will hardly come unnoticed; the tax authorities would face yet another credibility problem. A brief sketch of the resulting corner solution is provided in the Appendix.

To summarize, if the tax authorities only consider offering a voluntary disclosure program after fixing the audit probability, their revenue will simply increase due to the agents who turn themselves in. Let us now look at what happens when agents anticipate that a leniency program will be offered.

Anticipated Voluntary Disclosure

An agent who anticipates a program will be offered by the tax authorities faces the following decision: When he decides to declare truthfully, he can expect:

$$U_i = w - T + (q)\,0 + (1-q)\,0,$$

when he decides to evade taxes in the first period, however, he derives an expected utility of

$$\mathbb{E}U_i = w - T + \bar{d} + (q)\max\left\{-\bar{d}, -pf\bar{d} - \theta_{i1}\bar{d}\right\} + (1-q)\,\mathbb{E}\max\left\{-\bar{d}, -pf\bar{d} - \theta_{i2}\bar{d}\right\}.$$

Clearly, the second strategy weakly dominates the first one, because it will always at least yield $w-T$. Note that this is regardless of any auditing probability the government may choose. As a consequence, all agents will decide to evade taxes in the first period. The tax authorities will then face two groups of agents that turn themselves in after a voluntary disclosure program has been offered: agents who had a high θ_{i1} and did not receive a new draw, and those who received a high new draw. More precisely, the following mass of agents will make use of the program:

$$H_2 = (q)\left(1-\hat{\theta}_1\right) + (1-q)\left(1-\hat{\theta}_2\right),$$

where $\hat{\theta}_1 = \hat{\theta}_2 = 1-pf$, which gives

$$H_2 = pf.$$

As a consequence, revenue is given by

$$R = T - \bar{d} + (pf)\,\bar{d} + (1-pf)\,pf\bar{d} - \phi p,$$

yielding

$$p^* = \frac{2f\bar{d}-\phi}{2f^2\bar{d}},$$

as in the benchmark case when agents keep their guilt parameter for sure, and thus also the same revenue, as described in Equation (4.3).

To summarize, when agents anticipate that a voluntary disclosure program is offered, the government will make exactly the same revenue as if there had not been (the possibility of) a new draw of agents' guilt parameter.

Comparison

When there is the possibility to offer an unanticipated voluntary disclosure program, it clearly raises revenue compared to a situation without a leniency program. The open

question is now whether even anticipated voluntary disclosure increases government revenue. Let us recall Equation (4.3), which not only describes net revenue when agents keep their guilt parameter with certainty, but also for the case when they do and voluntary disclosure is anticipated:

$$R(p^*) = T - \frac{\phi}{f} + \frac{\phi^2}{4f^2\bar{d}}.$$

To compare, the revenue when there is no leniency program from Equation (4.7) can be rewritten to:

$$R(\tilde{p}) = T - \frac{(1-q)^2}{16}\bar{d} + \left(\frac{(1-q)^2}{4} - 1\right)\frac{\phi}{f} + q\,(2-q)\,\frac{\phi^2}{4f^2\bar{d}}.$$

We can now see that net revenue with an anticipated voluntary disclosure program is larger than with none whenever $R(p^*) > R(\tilde{p})$, or

$$\frac{(1-q)^2}{16}\bar{d} > \left(-1 + 2q - q^2\right)\frac{\phi^2}{4f^2\bar{d}}.$$

It is noteworthy that, except for $q = 1$ of course, this is always satisfied, because $(-1 + 2q - q^2) < 0 \;\forall\; 0 \leq q < 1$. In other words, as soon as there is a small chance that agents draw a new guilt parameter, the government revenue even with an anticipated voluntary disclosure program is always larger than that with no leniency program at all. The reason for this is that offering an anticipated program allows the agents to adjust their decisions on tax evasion to their relevant guilt parameters once they are known. This yields more revenue than a situation where agents have to base their decisions on their expecations of guilt parameters. We have already seen that revenue with a surprise voluntary disclosure program is larger than with no leniency rule. We can thus conclude that, whenever there is a chance that agents' attitude towards tax honesty may vary over time, the tax authorities would always like to offer a voluntary disclosure program.

4.4 Concluding Remarks

This chapter presents a model that adds to the existing explanations as to why governments may offer voluntary disclosure programs for tax evaders. When parts of the populations feel more or less guilty about evading taxes after reports are due, government revenue can be increased by offering tax evaders a chance to turn themselves in, even when this is costless for them.

I have shown that the tax authorities' reaction to changes in the exogenously set punishment for tax evasion can go in two directions. When said fine is relatively low, increasing it will lead them to expanding their auditing efforts, with the opposite being true for high fines. I further show that the immediate effect of the volatility of people's feeling of guilt on evading tax is ambiguous: a higher amount of agents receiving a new draw may lead to more or less tax evasion, depending on how severely it is punished. In equilibrium, however, the tax authorities will set the frequency of audits such that more people making a new draw leads to less tax evasion.

The key result of this study is that government revenue not only rises with surprise voluntary disclosure, but even when such a program is anticipated. This holds true in spite of the concern that an anticipated program initially leads to more tax evasion, which is often stated in the literature and confirmed by my analysis. In a dynamic setting, however, things may change. If the gains from a surprise voluntary disclosure program are much larger than those of an anticipated one, the government may find it in their best interest to refrain from using voluntary disclosure at times (cf. Andreoni 1991, Bayer et al. 2015). The rationale behind this is that it may be worthwhile to forego the benefits of anticipated voluntary disclosure in some periods in order to alter agents' expectations and hence reap the possibly larger benefits of a surprise program in some other periods.

Discussing the welfare implications of voluntary disclosure is not an easy task. Slemrod (2007) makes the point that "[a]lthough the cost of [more auditing] is a true resource cost, the revenue brought in does not represent a net gain to the economy, but rather a transfer from private (noncompliant) citizens to the government" (p. 43). A leniency program expands the choice set of taxpayers, giving them another tool to maximize utility. At the same time, government revenue increases without incurring said additional resource costs, let alone the social cost of inevitably auditing a number of compliant citizens. On the other hand, the existence of voluntary disclosure programs may be perceived as unfair, because it grants criminals the opportunity to dodge punishment. The wish to avoid the long-term effects of this notion can be another explanation why leniency programs are not as ubiquitous as my analysis would prescribe.

4.A Appendix

4.A.1 Revised p after a Surprise Voluntary Disclosure Program

Assuming the tax authorities can revise their decision on the audit probability after offering an unanticipated voluntary disclosure program, they face the following revenue:

$$R = H\left(\tilde{p}\right) * T + D\left(\tilde{p}\right) * \left(T - \bar{d} + p_2 f \bar{d}\right) - \phi p_2$$

where the mass of agents that are (ex post) honest is

$$H = 1 - \tilde{\theta}_1 + q\left(\tilde{\theta}_1 - \hat{\theta}_2\right) + (1-q)\left(\tilde{\theta}_1\left(1 - \hat{\theta}_2\right)\right) = 1 - q\hat{\theta}_2 - (1-q)\,\tilde{\theta}_1\hat{\theta}_2,$$

and the mass of agents that are dishonest is

$$D = q\hat{\theta}_2 + (1-q)\,\tilde{\theta}_1\hat{\theta}_2,$$

with $\tilde{\theta}_1 = \frac{1}{2} + \frac{\frac{1}{2} - \tilde{p}f}{q}$ and $\hat{\theta}_2 = 1 - \tilde{p}f$. Since the mass of tax evaders does not depend on the revised audit probability p_2, the result will be a corner solution – as soon as $f\bar{d} > \phi$, the tax authorities want to audit everyone, and noone otherwise.

4.A.2 Allowing for a Higher Guilt Parameter

In the main text, we have focussed on those agents with $\theta \in [0, 1]$. This entails that when there is no expected punishment for tax evasion, $pf = 0$, even the agent with the highest possible guilt parameter would only marginally decide not to cheat. Naturally, it can be argued that there is a sizable part of society that would make an honest tax report even in the absence of punishment, namely those agents with $\theta > 1$. Allowing for such a broader distribution of types in the model does not have a qualitative impact on the results. What does change, is that there is a larger set of agents that is honest from the beginning.

Consider the benchmark case of subsection 4.3.1: when we allow $\theta \sim \mathcal{U}[0, b]; b > 1$, the tax authorities' revenue changes to

$$R = (b - (1 - pf))T + (1 - pf)\left(T - \bar{d} + pf\bar{d}\right) - \phi_1 p.$$

That is, the marginal considerations of the tax authorities remain unaffected, because their decisions do not have an impact on the additional agents with $\theta \in [1, b]$. There is simply a larger fraction of agents that is honest in their tax reports.

It is interesting to note, though, that even when there is no leniency program in place, we may observe some agents who turn themselves in once that agents draw a new θ. The reason for this is that it is possible that an agent who cheated on his tax report may find it in his best interest to come clean about it whenever his new draw of θ is very high. More specifically, it has to be so high that he does not mind the certain punishment when alleviating his guilt. The marginal cheater's guilt parameter from Equation (4.4) changes to:

$$\tilde{\theta}_1 = \frac{b}{2} + \frac{1 - \frac{b}{2} - pf}{q},$$

leading to a revenue function of

$$R = (\frac{b}{2} - \frac{1 - \frac{b}{2} - pf}{q})T + \left(\frac{b}{2} + \frac{1 - \frac{b}{2} - pf}{q}\right)\left(T - \bar{d} + pf\bar{d}\right) - \phi_1 p.$$

So unlike above, the larger dispersion of guilt-types does affect the number of cheaters, not only the number of honest tax payers. This is so because agents now realize they may draw a much higher parameter later, making cheating less attractive, c.p. Consequently, the optimal auditing probability also changes to:

$$\tilde{p} = \frac{4 - b + bq}{4f} - \frac{q\phi_1}{2f^2\bar{d}}.$$

Note that for all $b > 1$ this is always less than the result we found when $\theta \in [0, 1]$. It is only positive for $b < \frac{2q\phi_1}{fd(q-1)} - \frac{4}{q-1}$, which is only possible for $\frac{2q\phi_1}{fd} < 4$. Despite the lower

auditing probability, allowing for higher guilt parameters reduces overall cheating. This result extends to the other information structures discussed in the main text.

4.A.3 Voluntary Disclosure is Anticipated and Carries a Small Fine

In the main text, evading taxes was a weakly dominant strategy for all agents when the voluntary disclosure was anticipated, because it implied everyone could revise their decision on tax evasion costlessly. I now introduce a small fine factor Δf that is imposed whenever agents turn themselves in. The decision problem now looks as follows:

When an agent decides to declare truthfully, he can expect:

$$U_i = w - T,$$

when he decides to evade taxes in the first period, however, he derives an expected utility of

$$\begin{aligned}\mathbb{E}U_i = w - T + \bar{d} + (q)\max\left\{-\bar{d} - \Delta f\bar{d}, -pf\bar{d} - \theta_{i1}\bar{d}\right\} \\ + (1-q)\,\mathbb{E}\max\left\{-d - \bar{\Delta} f\bar{d}, -pf\bar{d} - \theta_{i2}\bar{d}\right\}.\end{aligned}$$

It is apparent that cheating no longer clearly dominates. The agents' choice depends on the parameters of the model and the magnitude of p. We need to distinguish up to four cases to determine the benefit of evading taxes for each agent, depending on whether or not they would make use of the program when they keep their guilt parameter, and whether or not they would when making a new draw.

Let us solve by backward induction and consider the case when an agent has already decided to evade taxes. Regardless of whether or not he made a new draw, he would make use of voluntary disclosure if the benefits outweigh the costs:$-\bar{d} - \Delta f\bar{d} > -pf\bar{d} - \theta_i\bar{d}$. This means the marginal user of the voluntary disclosure program will have a guilt

parameter of

$$\hat{\theta}_1 = 1 - (pf - \Delta f).$$

When agents make the decision to evade taxes in the first place, they compare this cutoff value to their current guilt parameter and their expected parameter in case they face a new draw, which is $\mathbb{E}\theta_2 = \frac{1}{2}$. Thus, when confronted with a new draw, agents expect to make use of the program only if $\frac{1}{2} < 1 - (pf - \Delta f)$.

We will now look at the four different cases. If an agent expects to use the leniency rule regardless of making a new draw, so if $\theta_{i1} > \hat{\theta}_1$ and $\frac{1}{2} > \hat{\theta}_1$, he will evade taxes if:

$$\bar{d} > q\left(\bar{d} + \Delta f \bar{d}\right) + (1-q)\left(\bar{d} + \Delta f \bar{d}\right).$$

Note that this is never satisfied. If he expects to use the leniency rule when making a new draw, but not when keeping his current draw, so if $\theta_{i1} < \hat{\theta}_1$and $\frac{1}{2} > \hat{\theta}_1$, he will evade taxes if:

$$\bar{d} > q\left(pf\bar{d} + \theta_{i1}\right) + (1-q)\left(\bar{d} + \Delta f \bar{d}\right).$$

This yields a cutoff value of $\tilde{\theta}_1 = 1 - pf - \frac{1-q}{q}\Delta f$. Note that this is always smaller than $\hat{\theta}_1$. When the agent expects to use the leniency rule when keeping his draw, but not when making a new one, so when $\theta_{i1} > \hat{\theta}_1$and $\frac{1}{2} < \hat{\theta}_1$, he will evade taxes if:

$$\bar{d} > q\left(\bar{d} + \Delta f \bar{d}\right) + (1-q)\left(pf\bar{d} + \frac{1}{2}\bar{d}\right).$$

When an agent does not expect to use the voluntary disclosure program, regardless of whether or not he makes a new draw, he will evade taxes if:

$$\bar{d} > q\left(pf\bar{d} + \theta_{i1}\right) + (1-q)\left(pf\bar{d} + \frac{1}{2}\bar{d}\right).$$

This yields a cutoff value of $\tilde{\theta}_1 = \frac{1}{2} + \frac{\frac{1}{2}-pf}{q}\Delta f$. With this information, the tax authorities can maximize their revenue, choosing p.

Chapter 5

Summary

The common theme in the chapters of this book is asymmetric information, which can create an imbalance of power between the two parties of a transaction. I describe a variety of instruments that the informationally disadvantaged organizations may use to overcome the resulting adverse selection and moral hazard problems. In the second chapter, workers dispose of information that would be crucial for the firm to have in order to select the right people to hire. Uncommitted agents may trick an employer into giving them a job, even though it is not profitable for the firm. While this can be averted with a steep wage profile, it triggers another adverse selection problem: some agents may wish to hide the fact that they are unmotivated in order to reap the high wage later in their careers. In that situation, a firm can offer an exit bonus to convince unwanted employees to quit. But even once the best possible employees are hired, it is impossible for a firm to monitor each and every one of their activities. An executive, for example, may prefer to avoid risky strategies, such as tax sheltering, even though this would be in the interest of the shareholders. This moral hazard problem can be overcome by setting appropriate incentives, such as the cash bonus analyzed in the third chapter. Similarly, a government that does not know everything about its citizens relies on penal deterrence in order to incentivize people to pay their taxes. As was argued in Chapter 4, however, the fear of punishment is not the only reason taxpayers refrain from cheating. When people's social preferences concerning tax evasion vary over time, the government can alleviate the fact that this is unobservable by offering a voluntary disclosure program.

In the two theoretical chapters of this book, we have considered several non-traditional elements when describing human behavior in our models. In Chapter 2, the reason why workers may work hard is not because they have monetary incentives to do so, but because some of them may enjoy their work. Similarly, the taxpayers in the fourth chapter not only fear punishment when considering to evade taxes, but are also afraid of their own conscience. In addition to these deviations from the assumption that peo-

ple are purely selfish in their behavior, this book also displays instances of the bounds to individual rationality. In Chapters 2 and 4, we allow the agents to be not fully aware of the action space of their counterpart. Doing so is an arguable undertaking, which may give rise to the notion that the validity of our results is only temporary. Indeed, we show that the firm in our framework should only offer an exit bonus when it comes as a surprise and I acknowledge the idea that a voluntary disclosure program for tax evaders may be more profitable when it is not anticipated. The more widespread these policies become, the harder it is to argue that agents are still surprised about them. When this concern materializes, a way out may be the randomization of the policy's application. Supplemental research could give insights as to what such a mixed strategy should optimally look like and if and when it can indeed replace the moment of surprise that the organizations in our models benefit from.

The empirical application in Chapter 3 aims at overcoming the fact that publicly traded firms do not have to disclose the exact details of their executives' remuneration plans. The legislature faces a dilemma here: on the one hand, it would be favorable to impede illegal – or undesirable – activities by prohibiting firms to set the corresponding incentives to their CEOs. On the other hand, doing so may force firms to reveal confidential information that they would like to conceal from the competition. It could be argued that it should be sufficient from a policy point of view to disallow the illegal activity itself, rather than also banning firms from providing the incentives to engage in such activities. Nonetheless, my analysis did not make a distinction between legal and illegal tax sheltering. It is possible to make a case for more transparency in executive compensation even when it concerns legal activities. First, consumers and other institutions may have preferences not only regarding their own tax morale (cf. Chapter 4), but also regarding that of their business partners. Making sure that the incentivization of tax sheltering is disclosed would thus allow them to make more informed decisions on whom to do business with. Second, it may be impossible to codify all the activities

that the policy maker would like to make illegal, so that more transparency together with a ban on incentivizing tax sheltering could act as a secondary deterrent against unwanted activities. Third, the existence of such incentives may give an indication as to which firms criminal investigation should target. Evaluating the total welfare implications of either approach is an empirical question that lies beyond the scope of the present analysis.

The focus in this book has been on monetary incentives, but of course they may not always be the right tools for organizations to reach their goals. Towards the end of Chapter 2, we argue that our explanation for the existence of an exit bonus appears to be superior to alternative interpretations. What we cannot claim, of course, is that this is really the key to the success of the firms that apply this policy. Our motivating example of Zappos for example applies a wide range of, sometimes unusual, policies, especially concerning the work environment and the management style. One could hypothesize that, maybe in lieu of or in addition to an exit bonus, it could be beneficial to create a work environment that only motivated workers enjoy, making it not worthwhile for the others to stay. In a sufficiently large firm, field experiments could be run with interventions for both exit bonuses and work environment characteristics. The way I modeled the voluntary disclosure program in Chapter 4, its application implies a financial gain for tax offenders who want to clear their conscience, as compared to a world without such a program. In reality of course, it also implies a relief from criminal prosecution and non-monetary punishment. The thought of running an experiment on the intensity of either the financial or non-financial effects of these programs will likely be dismissed on legal grounds. However, a letter experiment that randomly reminds citizens of the existence of a voluntary disclosure program could vary the awareness of the policy and hence give insights as to why and how these programs drive people to come forward with their past crimes.

Samenvatting
(Summary in Dutch)

Vrije handel is de hoeksteen van onze markt economie. Zowel personen als organisaties kunnen hun welvaart verhogen door het ruilen van goederen of diensten. Wanneer een partij meer informatie heeft over een transactie dan de andere partij, kan dit gebruikt worden voor het eigen belang. In dit proefschrift wordt gekeken naar de prikkels die organisaties inzetten voor individuele spelers, zoals werknemers of belastingbetalers, om voorgenoemde obstakels te overwinnen.

Het tweede hoofdstuk is gezamenlijk werk met Robert Dur en is geïnspireerd op een firma die iets ongebruikelijks doet: in plaats van werknemers te belonen voor prestaties, bieden ze werknemers geld om vrijwillig ontslag te nemen. Deze praktijk trok de aandacht van bedrijfswetenschappers en wij hebben de belangrijkste argumenten uit een aantal essays verwerkt in een model dat uitlegt onder welke voorwaarden een dergelijk plan voordelig is. In een steeds complexere werkomgeving, zijn de sancties en beloftes volgens de klassieke economische benadering soms niet toepasbaar. In dit geval kan een bedrijf werknemers willen vinden die intrinsiek gemotiveerd zijn om zich er van te verzekeren dat de belangen van de werknemer op een lijn liggen met die van het bedrijf: als mensen hun werk leuk vinden, doen ze het vaak ook goed. Dit is een algemeen aanvaard gegeven voor diverse banen, maar is natuurlijk van toepassinng op allerlei situaties.

De taak van het bedrijf kan dan verschuiven van het verschaffen van de juist prikkels voor zijn werknemers naar het selecteren van de meest geschikte werknemers, namelijk de gemotiveerde werknemers. Deze taak kan lastig blijken wanneer ongemotiveerde werknemers een belang hebben om hun gemotiveerde collegae te imiteren. In ons model moet het bedrijf een stijgend salaris bieden zodat alleen de werknemers met een lange termijn interesse in de baan overwegen te solliciteren. Een gevolg hiervan is dat sommige ongemotiveerde werknemers niet bereid zijn ontslag te nemen wanneer zij uitvinden dat ze het werk niet leuk vinden. In dat geval kan het bieden van het juiste bedrag

aan mensen die besluiten te stoppen, ervoor zorgen dat de ongemotiveerde werknemers ontslag nemen. Tegelijkertijd zullen de gemotiveerde werknemers willen blijven vanwege de *motivational rents* die ze ervaren. Ons model laat zien dat de exit bonus de winst van het bedrijf alleen doet toenemen wanneer werknemers deze niet anticiperen. Bovendien laten we zien dat een bedrijf de exit bonus alleen als nuttig ervaart wanneer motivatie niet een heel grote rol speelt.

Ofschoon intrinsieke motivatie belangrijk is voor sommige beroepen, verschaffen toch bijna alle beursgenoteerde bedrijven extrinsieke motivatie aan hun managers in de vorm van aandelen, opties en bonussen. Waar het verschaffen van aandelen en opties in het algemeen het belang van een manager op een lijn brengt met het belang van een bedrijf, kunnen geld bonussen gebruikt worden om andere specifieke doelen te belonen. Dit kan een handig middel zijn wanneer aandelen en opties een manager onvoldoende aansporen om zich met bepaalde activiteiten bezig te houden. Zo kan bijvoorbeeld het verminderen van de belastinglasten leiden tot een substantiele toename in netto winst, maar dit kan een risicovolle activiteit zijn voor een manager. Als de belastingontwijkende activiteiten van een firma illegaal zijn, kan een manager hier zelfs persoonlijk aansprakelijk voor worden gesteld als dit wordt ontdekt. Als gevolg hiervan kan het voor een winstmaximaliserend bedrijf zo zijn dat het in zijn belang is om duidelijke prikkels voor belastingontwijking te verschaffen.

Hoewel bedrijven moeten opgeven hoeveel bonussen zij uitbetalen aan hun managers, blijft meestal de exacte opmaak van de contracten vertrouwelijk. We weten daarom niet precies welk gedrag en welke uitkomsten worden beloond met een cash bonus. In het derde hoofdstuk worden data van de 1.500 belangrijkste beursgenoteerde bedrijven in de Verenigde Staten bestudeerd. Ik vind aanwijzingen dat de gemiddelde bonusregeling belastingbesparing buitensporig beloond wanneer dit wordt vergeleken met andere maatregelen die de netto winst van het bedrijf verhogen. Dit bevestigt de hypothese

dat managers compensatie verlangen voor het toegenomen risico dat zij lopen indien zij een agressieve belasting strategie volgen. In overeenkomst met bestaande literatuur, vind ik een aanzienlijke heterogeniteit in de compensatieregelingen in de verschillende bedrijfstakken. Mijn primaire resultaat wordt voornamelijk veroorzaakt door bedrijven in de sectoren Industrie en Handel. Ook blijkt dat bedrijven met grotere belastingsplan mogelijkheden eerder de bonus van hun CEO afhankelijk maken van de hoogte van de venootschapsbelasting.

Net als een CEO die zich bezig houdt met belastingvermijding voor zijn bedrijf, lopen ook burgers die belasting ontduiken op hun persoonlijke belastingaangifte het risico om gepakt te worden. Vergeleken met de potentiele voordelen van het ontlopen van belasting, is het risico tamelijk laag, waardoor een neoklassieke analyse van de monetaire kosten en voordelen van belastingontduiking niet in staat is te verklaren waarom de meeste mensen hun belasting betalen. Sociale voorkeuren, zoals het mogelijke schuldgevoel van een belastingfraudeur, kunnen hier een verklaring zijn. En toch lopen overheden regelmatig aanzienlijke inkomsten mis als gevolg van belastingontduiking. In veel landen worden belastingontduikers in de gelegenheid gesteld om van een inkeerregeling gebruik te maken. Vaak bieden deze programma's een strafvermindering of vrijstelling en soms zijn ze zelfs een vast onderdeel van het rechtssysteem. Het is duidelijk dat een dergelijk programma hogere belastinginkomsten faciliteert wanneer het onverwacht als eenmalig aanbod ingezet wordt. Toch rijst de vraag of een vergelijkbare permanente regelgeving ook een positief effect op de overheidsbegroting heeft.

Als mensen dezelfde informatie hadden op het moment dat zij besluiten belasting te ontduiken als wanneer hen een inkeerregeling aangeboden wordt, zou niemand hier gebruik van maken. In het vierde hoofdstuk bespreek ik de gevolgen van de mogelijke verandering in het ervaren schuldgevoel na het indienen van de belastingsaangifte. Mijn model geeft inzicht in de kosten en baten van een inkeerregeling voor een overheid die

zijn burgers deze mogelijkheid biedt. Ik toon aan dat een inkeerregeling de belastingsinkomsten niet alleen verhoogt wanneer het onverwacht wordt aangeboden, maar ook wanneer deze door de belastingbetaler geanticipeerd wordt.

Zusammenfassung (Summary in German)

Der freiwillige Tausch von Gütern und Dienstleistungen bildet die Grundlage unserer Marktwirtschaft. Individuen und Organisationen begeben sich aus eigenem Interesse in solche Tauschgeschäfte. Allerdings kann das Zustandekommen dieser Transaktionen gefährdet werden, wenn ein Beteiligter über mehr Informationen verfügt als der andere. Diese Arbeit befasst sich mit den Anreizen, die verschiedene Organisationen Personen wie zum Beispiel Angestellten oder Steuerzahlern geben, um diese Probleme zu umgehen.

Das zweite Kapitel entstand in Zusammenarbeit mit Robert Dur und wurde durch eine Firma inspiriert, die sich eine ungewöhnliche Personalpolitik zu eigen macht: anstelle einer erfolgsbasierten Bezahlung wird neuen Mitarbeitern Geld dafür geboten, das Unternehmen zu verlassen. Unsere Arbeit verwertet die Grundgedanken einiger betriebswirtschaftlicher Aufsätze und formuliert ein ökonomisches Modell, welches erklärt, unter welchen Bedingungen ein solches Kündigungsprogramm Teil einer optimalen Personalpolitik darstellen kann. In der heutigen komplexen Arbeitswirklichkeit versagen häufig die Instrumente, die die klassische Wirtschaftsforschung Unternehmen anbietet, um ihre Mitarbeiter anzuregen im Interesse der Firma zu handeln. Hier kann die Suche nach intrinsisch motivierten Mitarbeitern unerlässlich werden, denn Angestellte, die Freude an ihrem Beruf haben, leisten oftmals nachweislich bessere Arbeit.

Anstatt ihren Angestellten adäquate Anreize zu setzen, wird es in solchen Fällen zur Aufgabe einer Firma, überhaupt erst die richtigen Mitarbeiter zu finden und zu behalten. Dieses Unterfangen kann problematisch werden, wenn unmotivierte Mitarbeiter versuchen, ihre motivierten Kollegen zu imitieren. In unserem Model muss das Unternehmen zu Beginn einen niedrigeren Lohn anbieten, der mit der Zeit ansteigt, sodass sich nur Arbeitnehmer bewerben, die auch langfristig beschäftigt werden möchten. Dies führt allerdings dazu, dass – des hohen Lohns wegen – auch unmotivierte Mitarbeiter im Unternehmen verbleiben möchten, nachdem sie herausgefunden haben,

dass sie keine Freude an der Arbeit haben. In einer solchen Situation kann ein richtig dosiertes Kündigungsprogramm ermöglichen, dass unmotivierte Mitarbeiter kündigen, während die motivierten in der Firma verbleiben möchten um ihre Motivationsrenten abzuschöpfen. Unser Modell zeigt, dass ein solches Kündigungsprogramm für die Firma nur dann profitabel ist, wenn die Mitarbeiter davon überrascht werden. Wir zeigen außerdem, dass ein Kündigungsprogramm nur dann sinnvoll ist, wenn die Bedeutung von Motivation am Arbeitsplatz von begrenztem Ausmaß ist.

Auch wenn intrinsische Motivation in vielen Branchen eine wichtige Rolle spielt, so stellen doch die meisten Aktiengesellschaften extrinsische Motivation in der Form von Eigenkapitalanreizen und Boni für ihre leitenden Angestellten bereit. Während Aktien und Optionen das Einkommen eines Managers grundsätzlich an den Firmenwert binden, können Bonusprogramme genutzt werden, um das Erreichen anders spezifizierter Ziele zu belohnen. Insbesondere wenn die Eigenkapitalanreize nicht ausreichen, um einen Manager zu einem bestimmten Verhalten zu bewegen, können Boni ein sinnvolles Instrument sein. So können beispielsweise Bemühungen zur Reduzierung der Steuerlast einen erheblichen Einfluss auf das Nettoergebnis einer Firma haben, aber gleichzeitig ein hohes Risiko für den Manager darstellen. Insbesondere wenn die Grenzen zur Steuerhinterziehung überschritten werden, ist dies gefährlich, da der Manager in einem solchen Fall persönlich haftbar gemacht werden kann. Folglich kann es für ein Unternehmen sinnvoll sein, diesem erhöhten Risiko für den Manager mit gezielten Anreizen zur Steueroptimierung entgegenzutreten.

Firmen müssen zwar die Höhe der jährlich entrichteten Bonuszahlungen offenlegen, die genaue Vergütungsstruktur bleibt jedoch gewöhnlich unter Verschluss, sodass nicht bekannt ist, welches Managerverhalten genau mit einem Bonus belohnt wird. Im dritten Kapitel verwende ich Daten zu den 1.500 wichtigsten US-amerikanischen Aktiengesellschaften, um zu untersuchen, ob ein Zusammenhang besteht zwischen an-

fallenden Unternehmenssteuern und der an Vorstandsvorsitzende (*CEOs*) ausbezahlten Boni. Die Analyse zeigt, dass im durchschnittlichen Anreizprogramm Steuerersparnisse stärker belohnt werden als andere Maßnahmen, die das Nettoergebnis eines Unternehmens erhöhen. Dies kann ein Hinweis darauf sein, dass Manager tatsächlich für das zusätzliche Risiko, das mit der aktiven Steuergestaltung einhergeht, entschädigt werden müssen. Im Einklang mit der einschlägigen Literatur kann weiter gezeigt werden, dass die Entlohnungspraxis zwischen den verschiedenen Branchen stark variiert. Anscheinend wird das zentrale Ergebnis der vorliegenden Studie durch Unternehmen aus dem verarbeitenden Gewerbe und aus dem Handel bestimmt. Ferner kann nachgewiesen werden, dass Firmen mit stark ausgeprägten Steuergestaltungsmöglichkeiten eher dazu tendieren, ihre Managergehälter von den anfallenden Unternehmenssteuern abhängig zu machen.

Ähnlich wie ein Manager, der sich um Steuervermeidung für seine Firma bemüht, gehen auch Einzelpersonen, die in ihrer eigenen Steuererklärung unrichtige Angaben machen, das Risiko ein entdeckt zu werden. Zieht man die möglichen finanziellen Vorteile von Steuerhinterziehung in Betracht, ist dieses Risiko jedoch erstaunlich niedrig. Eine neoklassische Kosten-Nutzen-Analyse kann folglich nicht erklären, warum die meisten Bürger ihre Steuern tatsächlich bezahlen. Soziale Präferenzen, wie zum Beispiel die möglichen Schuldgefühle eines Steuerbetrügers, können hier als Erklärungsansatz dienen. Und doch entgehen dem Staat durch Steuerhinterziehung regelmäßig beachtliche Einnahmen. In vielen Ländern wird Steuersündern die Möglichkeit zur Selbstanzeige gegeben. Oft bieten diese Programme Straferleichterungen oder sogar -befreiung, manchmal sind sie überdies ein fortwährender Bestandteil der Rechtsordnung. Es ist offensichtlich, dass ein solches Selbstanzeigeprogramm das Steueraufkommen erhöht, wenn es singulär eingesetzt wird. Es stellt sich jedoch die Frage, ob sich auch eine entsprechende dauerhafte Regelung positiv auf den Staatshaushalt auswirkt.

Wenn Steuerpflichtige zum Zeitpunkt der (potentiellen) Steuerhinterziehung über die selben Informationen verfügten wie in dem Moment, in dem ihnen die Gelegenheit zur Selbstanzeige gegeben wird, so würde kein Gebrauch von der Möglichkeit zur Selbstanzeige gemacht werden. Im vierten Kapitel erörtere ich die Auswirkungen einer möglichen Variabilität von Schuldgefühlen nach Abgabe der Steuererklärung. Das entwickelte Modell gibt Auskunft über Kosten und Nutzen für einen Staat, der sich entscheidet, seinen Bürgern die Möglichkeit zur Selbstanzeige zu gewähren. Es wird gezeigt, dass ein Programm zur Selbstanzeige das Steueraufkommen nicht nur dann erhöht, wenn es überraschend angeboten wird, sondern auch wenn es vom Steuerzahler antizipiert wird.

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