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Tangible Non-Monetary Incentive Pay

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Abstract

The aim of this thesis is to theoretically investigate and identify the possibilities for a firm to offer tangible non-monetary incentives, and to make recommendations for firms having difficulties with implementing a tangible non-monetary incentive pay structure. The game-theoretic interaction analysis performed in this study provides important insights in the considerations of a firm figuring out whether to offer monetary or tangible non-monetary incentives to overcome the problems of moral hazard and adverse selection in the principal-agent relationship. The results of this study suggest that firms having trouble with overcoming the worker's aversion to tangible non-monetary incentives should consider obtaining the rewards with discounts or, in some specific cases, offer rewards produced by the firm itself in order to increase the observed value of the incentive. In case the firm succeeds to inflate the observed value of the tangible non-monetary reward substantially, it can acquire a significant comparative advantage over firms offering monetary incentives and, consequently, increase profits. Firms, however, need to take into account the fact that inflating the observed value of the tangible non-monetary incentive could take away the selective properties of an incentive based pay structure.

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2. SYMBOLS

w_{ij}	<i>fixed wage</i>
b_{ij}	<i>bonus</i>
P_t	<i>revenue</i>
e_t	<i>effort</i>
$c(e_t)$	<i>cost of effort</i>
U_{ti}	<i>utility</i>
π_{tij}	<i>profit</i>
α_k	<i>parameter for lower preference for non – monetary incentives</i>
d	<i>discount = $\frac{\%}{100}$</i>
z	<i>$\frac{1}{1-d}$ = parameter for additional non – monetary products buyable</i>
β	<i>parameter for decrease cost of effort</i>
δ	<i>discount rate</i>
$c(z)$	<i>cost of obtaining discount</i>
θ	<i>parameter for costs of obtaining discount</i>
$i(m \vee n)$	<i>type of reward</i>
m	<i>monetary</i>
n	<i>non – monetary</i>
$j(1 \vee 2)$	<i>period</i>
$k(h \vee l)$	<i>affinity</i>
$t(h \vee l)$	<i>type</i>
h	<i>high</i>
l	<i>low</i>

3. INTRODUCTION

Since the existence of incentive plans, economists focussed on promoting specific actions and desired behaviour by introducing incentives influencing the decision making process of individuals. The incentive programmes are introduced in many facets of human life and come in various forms. The economic literature had, and still has, a strong focus on the effectiveness, preferability and architecture of incentive pay plans in the principal-agent relationship. By aligning the incentives for the agent in an appropriate way, it is often assumed that the agent will alter his behaviour in the desired direction and act in the best interest of the principal. Many of these incentive pay plans have been proven to be of substantial value in the aimed adjustment of behaviour in the workspace.

As already mentioned, agents, in this case employees, are supposed to act in favour of the principal. This mainly implies that the agents should perform at their best in order to maximize their productivity which, obviously, is in favour of the principal. However, agents could have reasons to act in their own interest and neglect the consequences for the principal. Pay for performance programmes are used to overcome the classical problems in the principal-agent theory such as moral hazard and adverse selection, which primarily arise from information asymmetries. In the pay for performance programmes the workers are rewarded accordingly their performance or effort. By doing so, the worker has an incentive to perform at their best, which is in interest of the employer, in order to maximize their earnings. The effects of the incentives have been studied a lot and originally proved to be very effective. For example, Lazear (2000) showed in his empirical study that the introduction of a piece-rate compensation scheme, the classical example of an incentive pay programme, can be very effective. The increase in productivity as a result of the incentives, was estimated at 22 percent.

Monetary rewards, fixed or based on performance, are the main component in almost every contract. However, the use of non-monetary rewards has become more and more prevalent in workers' contracts. In the past decades the economics started focussing on the unique traits and psychological advantages of both tangible and intangible non-monetary incentives. The benefits of non-monetary incentives arise from a complex mix of psychological factors but are considered to be of great complementary value in contracts.

Tangible non-monetary incentives can be defined as physical, noncash incentives with a clear market value (Condly, Clark, & Stolovitch, 2003). Think for example of a car, gym membership or computer. Although the complexity of the motivational drivers of tangible non-monetary incentives, many firms spend considerable amounts on tangible non-monetary incentives, even though firms are aware of the stated preference by workers for monetary incentives. Schweyer, Landry & Whillans (2018) argue, logically, that the extent of the use of tangible non-monetary incentives may be the best evidence for the effectiveness of tangible non-monetary rewards. They state that 84% of all organizations in the United States use tangible non-monetary rewards and spend annually over \$100 billion on this kind of rewards.

Many research in this field focussed on the exact drivers for the success of tangible and intangible non-monetary incentives in performance pay plans. As already mentioned, the benefits arise from a complex, psychological mix of motivations. Nevertheless, the advantages can be considerable for both the firm and the worker. However, firms seem to have trouble with 'showing the money'. In many studies workers state a clear preference for monetary incentives over non-monetary ones. However, the tangible non-monetary incentives have unique traits which, ultimately, have positive effects for the workers and firm. The aversion to non-monetary incentives brings firms in a difficult position since the introduction of tangible non-monetary incentives can count on little support among workers. This demands a different kind of approach from firms to attract, maintain and motivate their workers by offering tangible non-monetary incentives.

This paper will provide a game-theoretic interaction analysis in the principal-agent relationship where the principal, in this case the firm, takes advantage of the opportunity to increase the observed value of a tangible non-monetary bonus for the agent. The firm can succeed in increasing the observed value by exploiting the cost advantage of obtaining the tangible non-monetary incentive while taking into account the stated preference of workers to receive monetary incentives. In fact, the cost advantage arises from the capability of the firm to receive discounts or provide their own produced non-monetary products. Additionally the advantage in future periods of tangible non-monetary incentives over monetary incentives will be added in the interaction analysis.

The analysis gives clear insights in the cost-benefit considerations the firm faces and comes to hand in an attempt to answer the question what firms could drive to spent considerable amounts on tangible non-monetary rewards. Furthermore, the analysis functions as a foundation for incentive pay contract design and displays the opportunity to select the best workers by offering a wage scheme with a non-monetary bonus component.

The structure of this paper will be as follows. To start off, a coherent literature review will be developed in chapter 4 to function as a solid framework for the theoretical analysis to build on. Chapter 5 will contain the theoretical analysis. In accordance with the findings in the previous chapters, a conclusion will be drawn in chapter 6 which includes implications, limitations and recommendations.

4. LITERATURE REVIEW

4.1 AGENCY THEORY

The traditional, economic approach to analyse the interaction between an employee and the employer often builds upon the classical Agency Theory, also referred to as the Principal-Agent Relationship. An intuitive and appropriate definition of an agency relationship is given by Jensen & Meckling (1976):

“An agency relationship can be defined as a contract under which one or more persons, the principal(s), engage another person, the agent, to perform some service on their behalf which involves delegating some decision making authority to the agent”.

Eisenhardt (1989) points out that the Agency Theory, as described above, is concerned with dealing with an important problem which arises in the Principal-Agent Relationships. The problem that arises is the conflict of interests of the agent and the principal. In the attempt of both parties to maximize their own utilities, and thus act in their own interest, it is not unthinkable that the agent may have incentives to not act in the best interest of the principal. In this particular type of situation, the worker wants to maximize his own earnings with as little effort as possible. On the other hand, the employer wants the worker to exert high effort in an attempt to maximize the productivity. Clearly a conflict of interests arises in the employee-employer relationship. The attempt of the worker to exert as little effort as possible, or at least not acting according the desires of the principal, is often referred to as moral hazard. In response, the employer could start actively monitoring and checking whether the employee exerts the desired amount of effort in exchange of the stated compensation. However, monitoring the employee could be difficult, imperfect and expensive for the employer. The employer lacks the ability to verify perfectly what the employee is doing. Therefore, the moral hazard originates from an information asymmetry between the worker and the employer.

The problem of moral hazard arises after a contract between the agent and principal has been signed. Another problem emerging from information asymmetries is the problem of adverse selection. Adverse selection can be described as the misrepresentation of the capabilities by the agent (Eisenhardt, 1989). The applicant has, indeed, incentives to maintain the information asymmetry when acting in their own interest in an attempt to get the job. The employer lacks the ability to screen a job applicant perfectly and therefore has difficulties with correctly observe the abilities of the applicant. The principal may, in consequence, acquire workers which do not fit the job and, as a result, the productivity will be lower than anticipated.

4.2 INCENTIVE PAY

As already mentioned, the principal could intensify the costly search for information to overcome the problems arising from the lack of information. However, another option for the principal is to make the compensation for the agent dependent on the outcomes of the behaviour of the agent (Arrow, 1984). The agent, therefore, has an incentive to actively focus on increasing his output since his rewarding depends on his performance. The interests of the principal and the agent can be aligned with a performance based wage structure, solving the moral hazard problem. An additional advantage of performance based compensation is the mitigation of the adverse selection problem. Workers knowing that their productivity is low, are likely to be less interested in a performance based wage structure since they need to exert disproportionately much effort to derive more utility than from their outside options.

The outcome based pay, from now onwards incentive pay or performance pay, seems to have great advantages for the principal based on the theoretical justification. One of the most intuitive performance pay wage schemes is the piece-rate compensation scheme. In this particular wage scheme workers are rewarded for every additional unit produced. The maximization of the amount of units produced is in the best interest of the principal. So, as the literature suggests, the compensation is based on the outcome of the behaviour of the worker and, as a result, the interests of the agent and principal are aligned. The research by Lazear (2000), already mentioned in the introduction of this paper, focussed on the advantages of piece-rate wage scheme and showed the superiority of incentive based pay over suboptimal wage schemes. A 22 percent increase in productivity is significant and indicates the need to optimize the wage schemes.

Many other performance pay systems exist besides the piece-rate pay system. Workers can be rewarded, for example, with an additional payment for extraordinary accomplishments. Gain sharing is also a popular tool to improve involvement and participation and consequently the firm's performance. The gain sharing plans are proven to be effective, both in broad-based implementation as well as in small-groups (Nickel & Oneal, 1990). Many empirical research, regarding gain sharing, has found strong effects on the overall firm performance. The study by Blasi et al. (2008) researched the effects of gain sharing plans and workplace performance. Gain sharing is linked to lower turnover, greater loyalty and higher willingness to work hard. The employee effort increased along several dimensions in the workspace.

That incentive pay plans can have considerably advantages over the conventional fixed pay wage schemes seem to be the case. However, the applicability of an incentive pay scheme depends on many factors and these should not be studied alone (Holmstrom & Milgrom, 1991). When the pay becomes dependent on the outcome, other important aspects of the production of the product may lose their importance. Producing products of high quality may, understandingly, become of less importance when the worker earnings only depend on the units produced. Lower quality standards among the workers could consequently outweigh the benefits of the increased productivity.

4.3 MONETARY OR NON-MONETARY INCENTIVES

Although considerable amounts are spent on tangible non-monetary incentives (Schweyer, Landry, & Whillans, 2018), monetary incentives are significantly more common. From the perspective of the firm rewarding employees with cash is intuitive. Firms pay their workers with cash and the worker decides upon what to buy. Firms simply do not have the ability to analyse every worker separately and provide the products it needs instead of the cash. Goldberg & Lewis (2000) argue that money provides the luxury of time, autonomy, freedom of choice, power and access to resources. The freedom of choice is important in the consideration whether to offer non-monetary or monetary rewards. From the standpoint of conventional economics monetary rewards are favoured because the individual can choose their own, optimal, consumption bundle and, thus, have freedom of choice.

The effectiveness of monetary rewards became an important topic in the last decades in economic research. Sorauren (2000) voiced criticism on the traditional economists because they based their models on the assumption that people are mainly interested in money and because of their reluctance to recognise the effectiveness of both tangible and intangible non-monetary incentives. In his paper he showed by using philosophical foundations that non-monetary incentives can be a strong motivator to work because these incentives develop intrinsic capabilities and increase their interest in the firm and in that way their willingness to exert effort. Non-monetary incentives come in many forms and all with specific traits. Given that non-monetary incentives rely on many philosophical and psychological foundations, gives reason to get more insights in the available theory regarding non-monetary incentives.

Both the monetary and tangible non-monetary incentive pay plans are introduced to increase the extrinsic motivation to perform well in their job. However, the extrinsic motivation is not the only driver of performance. Intrinsic motivation, existing within an individual, is the motivation based on the natural satisfaction one derives from performing a task and energizes a broad variety of behaviours (Deci & Ryan, 1985). Since incentive plans are introduced because of the motivational effects, many research in economics focussed on the consequences for the intrinsic and extrinsic motivation. One of the potential drawbacks of intensified incentive pay programmes is the occurrence of motivational crowding out (Kreps, 1997). According to this principle, intrinsic motivation can be destroyed by providing extrinsic incentives and may, consequently, be counterproductive. Many research in this field has focussed on the importance of non-monetary rewards in order to overcome the motivational crowding out problem. Research by Amabile (1998) has shown that intrinsic motivation can be influenced by changes in the organization's design. One of the proposed measures by Amabile is to use tangible non-monetary incentives since they, partly, diminish the crowding out problem.

Motivation is not the only psychological factor of importance. Jeffrey (2007) argues that tangible non-monetary rewards can be of high value in the wage scheme because of the psychological concepts of justifiability, social reinforcement, separability and evaluability which come with those incentives. Firms can use hedonic non-monetary rewards to inflate the observed value of the reward. Both monetary and non-monetary rewards are evaluated

differently and the hedonic non-monetary rewards are more prone to biases which influence the expected derived utility than a monetary equivalent would be. The concept of separability refers to the theory of mental accounting and diminishing marginal returns which indicates that tangible non-monetary rewards can have clear advantages over monetary rewards. Another reason for the firm to offer non-monetary rewards arises from the possible social difficulties a worker may face when consuming luxurious goods. The worker could have trouble with justifying the purchase of luxurious goods, even if the worker has sufficient funds to consume the items. Receiving an unobtainable good increases the utility of the worker and makes both the firm and worker better off. Social reinforcement is also often mentioned in behavioural economic literature. Sonawane (2008) mentioned, for example, that tangible non-monetary rewards are of additional value because of the higher recognition workers derive from the rewards. Acknowledgement for performance is important for workers and possibly one of the most vital aspects of a reward. Acknowledgment originates from the visibility of good performance. When the reward is observable in the social environment of the worker this increases the acknowledgement the worker receives. Tangible non-monetary rewards are observable and can be directly linked to the good performance.

Another important advantage of non-monetary incentives over monetary incentives is mentioned by Hein (1999): tangible non-monetary rewards are remembered longer and more distinctly than monetary rewards. Products bought with the monetary rewards earned lose their psychological value earlier in time and there lacks a direct connection with the related performance. The positive effects of a tangible non-monetary incentive are likely to last in the future which, obviously, should be taken in to consideration by the firm.

The effectiveness of tangible non-monetary incentives is proved in several empirical papers. Jeffrey (2009) performed an experiment and showed that tangible non-monetary incentives led to better performance than the monetary equivalent, even though participants stated clear preference for monetary rewards. Furthermore, adding non-monetary incentives in wage schemes where monetary incentives are already introduced, significantly increases performance (Dzuranin & Stuart, 2012). More interestingly, intensifying the monetary incentives in the same wage scheme did not significantly increase performance. Stolovitch, Clark, & Condly (2002) performed a meta-analysis to assess and evaluate tangible non-monetary incentive systems and found that work performance increased, on average, with 22%. Tangible non-monetary incentives were found to increase intrinsic interest in the tasks to perform. Additionally, they noted that the intrinsic value, or motivation, for work tasks did not decrease with the tangible incentives. This last finding is in line with the findings of Amabile (1998). Stolovitch, Clark, & Condly also found that the quota-based incentive programmes maximized the effects of motivational variables on worker performance and other programmes performed significantly worse.

Although the tangible non-monetary incentives have a considerable amount of advantages over monetary incentives, there is an important disadvantage. Workers state a clear preference for monetary incentives over tangible non-monetary incentives and seem to have an

aversion to this kind of incentives. Waldfogel (1996) showed in his empirical research that between 1/10 and 2/3 of the value of tangible non-monetary gifts are ‘destroyed’ which is in line with the expectations of the conventional economic theory. The aversion to tangible non-monetary incentives is also present in the study of Hein & Alonzo (1998). They surveyed 555 salespeople active in various dimensions of the business field and found that 79% of them prefer monetary over non-monetary incentives of equivalent value. More interestingly, the preference for monetary incentives decreased with the yearly earnings. The preference reversal is in line with the theory of diminishing marginal returns and mental accounting (Thaler, 1999). Firms trying to motivate the top earners can mitigate the problem of diminishing marginal returns by offering non-monetary incentives.

4.4 IMPLEMENTATION OF TANGIBLE NON-MONETARY INCENTIVES

As already mentioned monetary and tangible non-monetary incentive pay schemes generate different outcomes originating from a complex mix of psychological influences. To make it even more complex, the literature suggests that success of incentive pay is highly dependent on the industry type and the organizational design of the firm. A clear distinction can be made between the public and private sector. Individuals working in the public sector are more likely to enter the sector in the hope to do interesting work and not because they want to maximize their earnings (Perry, 1997). Since pay for performance highly depends on the assumption that the workers try to maximize their earnings, this could impose contrary results in the public sector. The success of pay for performance is more proved to be more modest than in the private sector (Weibel, Rost, & Osterloh, 2009). Firms active in the public service offset the difference in compensation between the public and private sector by offering nonpecuniary benefits to keep the motivation high (Francois, 2000). Public agencies seem to attract more intrinsically motivated and, therefore, be more sensitive for the possible motivational crowding out effect (Gailmard & Patty, 2007). Consequently, public agencies may demand the implementation of an incentive pay scheme with higher attention for the intrinsically motivational consequences.

Tangible non-monetary rewards come in many forms, all with unique traits. Firms have incentives to provide the tangible non-monetary rewards that result in the greatest benefits for the firm. The firm should take into account which tangible non-monetary goods will benefit the worker the most. Tangible non-monetary rewards possibly can lower the costs of exerting effort. Aguinis, Joo, & Gottfredson (2013) illustrate the importance of the nature of the tangible non-monetary incentive. Vacations and gym memberships are likely to positively influence the well-being of the worker and, consequently, the utility a worker would derive from working originating from lower the costs of exerting effort. Jeffrey (2004) also mentioned the importance of the nature on tangible non-monetary rewards when implementing the incentive pay structure. By offering products related to or produced by the specific firm, the worker gets more familiar with the product and this increases the abilities of the worker to work with the product. The consumption of the good by the worker makes him, especially, in future periods

better off. A salesmen driving the car it has to sell, received as bonus, makes him more capable of advising potential buyers.

Firms considering implementing tangible non-monetary incentive programmes should take into account that the firm can have advantages in acquiring tangible non-monetary rewards over individuals (Jeffrey, 2004). Firms have more negotiation power and can make agreements with suppliers of the tangible non-monetary good. In consequence, firms can offer more rewards with the same budget or internalize the cost advantage. Bulk purchases could, theoretically, be available for individuals, however, this is not attractive since the individuals cannot consume all the items on their own or costless distribute the items between others. Bulk purchases are, therefore, more accessible and interesting for firms.

5. THE MODEL

5.1 MODEL DESCRIPTION

This game theoretic interaction model is constructed to give insights in the possibility for a firm to implement an incentive pay scheme with tangible non-monetary rewards. In order to derive the optimal contract design, two imaginary firms will interact with a single worker. The worker chooses to work for one of the two firms, depending on the utility the worker derives from working at that particular firm. By designing the model in this particular way it is also possible to apply the model in the case of a single firm which is considering whether to offer contracts with monetary or tangible non-monetary incentives. The hypothetical firms in this model compensate their workers with a fixed wage and, possibly, with a quota-based bonus. The bonus the worker receives can be monetary, an additional cash payment, or non-monetary, a product or service, besides the fixed wage in this model. The quota-based bonus can easily be converted into another bonus pay method, which makes the model applicable for different industries.

Workers can exert either low or high effort. In case the workers exerts high effort, they will meet the quota. The quota set by the firm can, for example, be a productivity or quality standard. Both types of workers will receive a fixed wage regardless of achieving the standard or not. The utility the worker derives depends on the fixed wage the worker receives, the possible bonus based on effort and the cost of exerting effort. The worker will work for the firm that will maximize their expected utility taking into account the obtainable bonus.

The actions of the worker, in this case the level of effort the worker exerts, influence the revenues of the firm. When the worker exerts high effort and meets the quota, the firm will have a high revenue. On the other hand, when the worker exerts low effort, the firm will have a low revenue. The firm has an incentive to offer bonuses if the new wage structure including bonuses will increase profits while taking into account the cost of introducing the bonuses. When the increased revenues do not outweigh the increased costs, the firm will not offer bonuses.

The firms use backward induction in their decision-making process to find the best fitting wage scheme. Firstly, the firm offering non-monetary bonuses observes the utility

functions of the worker and the wage structure of the firm offering monetary bonuses. With this information the participation constraint of the worker can be obtained. Secondly, the firm derives the optimal contract based on the participation constraint of the worker, with the aim to maximize the profits.

The two firms considered in this model differ from each other in the bonus structure. One firm compensates the worker with a monetary bonus when the effort exerted is high. The second firm compensates the worker with a non-monetary bonus in that particular case. In theory, the non-monetary item should represent a value exactly equal to the monetary equivalent if the worker does not prefer monetary rewards over non-monetary ones. A car bought for \$10,000 should be valued at \$10,000, the monetary equivalent, in case the theory holds. Nevertheless, the actual observed value of the non-monetary bonus, and not the monetary equivalent, is crucial in this model. According to the available literature, the utility a worker derives from a non-monetary bonus is likely to be lower than the utility derived from the equivalent monetary bonus. The firm offering the non-monetary bonuses understands that the worker's valuation of non-monetary rewards is lower and, therefore, needs to take advantage of possibility to obtain the items at a lower cost than the worker would be able to and, in consequence, correct for the lower valuation. For example, the firm could have a higher bargaining power to obtain discounts or could reward the worker with the products produced by the firm. The difference between the price the worker and the firm have to pay will be labelled as a discount in this model. The firm offers more non-monetary items, with a monetary value higher than the monetary equivalent, to compensate for the lower preference for non-monetary items. By doing so, the firm can gain an advantage over the firm offering monetary bonuses under some restrictions.

To begin with, a one period model will be constructed to examine the comparative advantage of the firm arising from a possible higher observed value of a non-monetary bonus. Secondly, the lower cost of exerting effort in the future period is added in the two period model, again to study a possible comparative advantage over the firm offering monetary bonuses. The profits of both firms will be compared to obtain the optimal choice for the firm. In the final section the possible advantages of a non-monetary wage structure in the selection process of workers will be determined.

5.2 ONE PERIOD MODEL

Monetary Incentives

Worker

The firm compensates their workers with a fixed wage and a bonus when they exerted high effort. However, exerting high effort is more costly than exerting low effort. The utility the worker derives from working at the firm increases with the fixed wage and the bonus received for high effort. The utility decreases with the cost of effort.

$$U_{Hm} = w_m + b_m - c(e_H)$$

$$U_{Lm} = w_m - c(e_L)$$

Ideally the bonus outweighs the higher costs of effort. In this case the worker will exert high effort and the firm will earn a high revenue.

$$U_{Hm} > U_{Lm}$$

$$w_m + b_m - c(e_H) > w_m - c(e_L)$$

$$b_m > c(e_H) - c(e_L)$$

So the required bonus depends on the absolute difference between the costs of exerting low effort and the costs of exerting high effort. When the costs of high effort are slightly higher than the costs of exerting low effort, a relatively small bonus would be sufficient to make the worker exert more effort.

Firm

The choice of effort of the worker is of great importance for the firm because the generated profits differ with the effort exerted by the worker. The profits increase with the revenues generated by the worker and decrease with the fixed wage and possibly with the bonus paid to the worker.

$$\pi_{Hm} = P_H - w_m - b_m$$

$$\pi_{Lm} = P_L - w_m$$

Offering a wage scheme with a bonus component is only interesting for the firm if the profits increase because of the higher generated revenue by the worker. The revenue is high when the worker exerts high effort. So the wage scheme with the bonus component is only attractive when the increase in revenue is higher than the bonus paid to the worker.

$$\pi_{Hm} > \pi_{Lm}$$

$$P_H - w_m - b_m > P_L - w_m$$

$$P_H - P_L > b_m$$

Non-Monetary Incentives

Worker

The firm can, alternatively, choose to introduce incentives in the wage scheme by a non-monetary bonus besides the fixed wage. However, workers gain less utility from non-monetary bonuses than from monetary bonuses with the same equivalent value. But, the firm has a possibility to obtain the non-monetary items for a lower price than the workers would be able to in their own private situation. Therefore the firm can increase the quantity of non-monetary

items offered to the worker in an attempt to outweigh the lower gain in utility from non-monetary bonuses. The observed value of the non-monetary bonus matters for the worker and, in consequence, for the firm.

$$\alpha z b = \text{observed value bonus}$$

$$U_{Hn} = w_n + \alpha z b_n - c(e_H)$$

$$U_{Ln} = w_n - c(e_L)$$

As also has been showed in the contract design with monetary incentives, the observed value of the bonus should outweigh the increase in costs of effort for the worker to exert high effort and earn the bonus.

$$w_n + \alpha z b_n - c(e_H) > w_n - c(e_L)$$

$$\alpha z b_n > c(e_H) - c(e_L)$$

Besides that the observed non-monetary bonus should outweigh the increased cost of effort, the utility from working at the non-monetary firm should be higher than utility derived from working for the firm offering the monetary bonus wage scheme.

$$U_{Hn} > U_{Hm}$$

$$w_n + \alpha z b_n - c(e_H) > w_m + b_m - c(e_H)$$

$$w_n + \alpha z b_n > w_m + b_m$$

Assuming the amount spent on the fixed wages and the bonuses is equal for both firms, the utility derived from the non-monetary bonus should be higher than the utility derived from the monetary bonus for the worker to choose to work for firm offering non-monetary bonuses. The amount spent on the fixed wages and bonuses is set equal to make a comparison between the two wage structures purely based on the observed value of the non-monetary bonus. The utility derived fully depends on the valuation of non-monetary incentives and the discount the firm faces.

$$b_n = b_m \ \& \ w_n = w_m$$

$$\alpha z > 1$$

$$\frac{\alpha}{1-d} > 1$$

Assume both firms spend the same amount on bonuses, but have the opportunity to offer different fixed wages. The observed value of the non-monetary bonus, however, does not necessarily equal the amount paid by the firm offering non-monetary bonuses. The observed value does depend on the valuation of the non-monetary bonus and the amount of non-monetary

items received. As already mentioned, the number of items received increases with the discount the firm faces. A higher discount results in a higher observed value. However, the observed value does not automatically be higher than the monetary bonus because of to the lower valuation of non-monetary bonuses. Therefore, the participation constraint should be analysed in more detail in order to design the non-monetary contract correctly.

$$b_n = b_m$$

$$w_n > w_m - (\alpha z - 1)b$$

In the participation constraint above the fixed wage offered by the firm implementing non-monetary bonuses should be higher than the fixed wage offered by the firm offering monetary bonuses corrected with the absolute difference in the observed value of the bonuses. The monetary firm functions as an outside option for the worker. Ideally the observed value of the non-monetary bonus is strictly higher than the observed value of the monetary bonus. This results in an opportunity to lower the fixed wage by the firm offering non-monetary incentives, which is beneficial because it increases profits since the amount spent on the bonus is the same for both firms.

Firm

Costless Discount

The firm introduces the non-monetary incentives to increase the effort exerted by the worker and consequently increase revenues. The introduction of the non-monetary incentives is only compelling if the additional revenues created outweighs the additional costs. The additional cost for the firm is the bonus it has to hand over to the worker.

$$\pi_{Hn} = P_H - w_n - b_n$$

$$\pi_{Ln} = P_L - w_n$$

$$\pi_{Hn} > \pi_{Ln}$$

$$P_H - w_n - b_n > P_L - w_n$$

$$P_H - P_L > b_n$$

Besides that the profits with the non-monetary bonus wage scheme should outweigh the profits without the bonus structure, it should also outweigh the profits of the other firm with the monetary bonus structure. When the firm with the monetary bonus structure generates more profits, it would not be inviting to offer non-monetary bonuses. Assuming both structures achieve the same revenues and the amount spend on bonuses is equal, the fixed wage is the decisive factor in the most favoured wage scheme.

$$\pi_{Hn} > \pi_{Hm}$$

$$P_H - w_n - b_n > P_H - w_m - b_m$$

$$w_n < w_m$$

Given the participation constraint of the worker, the most favoured structure entirely depends on the observed value of the bonuses. The observed value of the non-monetary bonus should be higher than the monetary value of the bonus to make the non-monetary wage structure appealing for the firm.

$$\begin{aligned} b_n &= b_m = b \\ w_n &> w_m - (\alpha z - 1)b \\ P_H - (w_m - (\alpha z - 1)b) - b &> P_H - w_m - b \\ (\alpha z - 1)b &> 0 \\ \left(\frac{\alpha}{1-d} - 1\right)b &> 0 \\ d &> 1 - \alpha \end{aligned}$$

The advantage of the non-monetary bonus structure decreases with the aversion to non-monetary incentives. Ideally the discount would make it achievable for the firm to buy more items and cancel out the aversion. The advantage of the non-monetary bonus increases with the amount spent on bonuses.

Increasing discount is costly

Offering a monetary bonus is the simplest and therefore cheapest way for the firm to introduce incentives in the wage scheme. It is not unthinkable that introducing non-monetary incentives comes with a cost. The costs depend for example on the costs of negotiation with the firm producing the non-monetary items.

$$\begin{aligned} \pi_{Hn} &= P_H - w_n - b_n - c(z) \\ \pi_{Hn} &= P_H - w_m + (\alpha z - 1)b_n - b_n - c(z) \end{aligned}$$

Assumingly the cost of this scheme depends on the discount the firm faces and the costs increase exponentially with the discount obtained. For simplicity assume that the parameter for the exponential cost increase is equal to 2.

$$\begin{aligned} c(z) &= \frac{1}{\gamma} \theta z^\gamma \text{ with } \gamma > 1 \\ \gamma &= 2 \\ \pi_{Hn} &= P_H - w_m + (\alpha z - 1)b_n - b_n - \frac{1}{2} \theta z^2 \end{aligned}$$

To make the non-monetary wage structure with the costs of obtaining discounts appealing, the profits should be higher than the profits generated with the monetary wage scheme. If the

increased costs would be higher than the increased profits, the non-monetary wage scheme would not be a credible option. Using the monetary wage scheme structure as second best option, it is possible to find the optimal strategy for the firm to maximize their profits.

$$\begin{aligned}\pi_{Hn} &> \pi_{Hm} \\ P_H - w_m + (\alpha z - 1)b_n - b_n - \frac{1}{2}\theta z^2 &> P_H - w_m - b_m \\ b_n &= b_m = b \\ (\alpha z - 1)b_n &> \frac{1}{2}\theta z^2\end{aligned}$$

Assuming that the non-monetary wage structure is strictly preferred, the firm can adjust the obtainable discount to maximize profits.

$$\begin{aligned}\max_z P_H - w_m + (\alpha z - 1)b_n - b_n - \frac{1}{2}\theta z^2 \\ \frac{\Delta\pi_{Hn}}{\Delta z} &= 0 \\ \alpha b_n - \theta z &= 0 \\ z^* &= \frac{\alpha b_n}{\theta} \\ \frac{1}{1-d} &= \frac{\alpha b_n}{\theta} \\ d^* &= 1 - \frac{\theta}{\alpha b_n}\end{aligned}$$

The optimal level of discount decreases with the cost of obtaining the discount. It could be the case that the cost of discount is large enough to make the non-monetary wage scheme not alluring. However, this depends on the other two factors influencing the optimal level of discount. The less extreme the aversion to tangible non-monetary incentives is, the higher the optimal level of discount is. In case of a less extreme aversion, more of the benefits of the non-monetary wage scheme are transferred to the firm through the lower fixed. The optimal level of discount also increases with the amount of bonuses paid to the worker. The more bonuses paid, the more the firm can lower the fixed wage in consequence and thus increase profits.

$$\begin{aligned}P_H - w_m + \left(\frac{\alpha^2 b_n}{\theta} - 1\right)b_n - b_n - \frac{1}{2}\theta \left(\frac{\alpha b_n}{\theta}\right)^2 &> P_H - w_m - b_m \\ P_H - w_m + \frac{(\alpha b_n)^2}{2\theta} - 2b_n &> P_H - w_m - b_m \\ \frac{(\alpha b_n)^2}{2\theta} - b_n &> 0\end{aligned}$$

5.3 TWO PERIOD MODEL

In the previous section the optimal incentive structure for the worker and firm has been obtained for a hypothetical single period setting. However, the positive effects of non-monetary incentives can be noticeable in future periods if the firm offers rewards which possibly lower the cost of effort in the future periods. A single period model would not capture this advantage and is in consequence not perfectly suitable. A two period model can capture the beneficial effects of the non-monetary incentives and give clearer insights in the genuine advantages over monetary incentives. Furthermore, a two period model can give better understanding of the suitability of the model in the real world principal-agent relationships. The only interest of the firm in the single period were the profits and the firm did not anticipate on future periods. The worker only cared about the utility derived in the current period. However, firms and individuals do care about future outcomes when considering their present actions. For this reason, a two period model can be constructed to take the future outcomes into account and act according utility and profit maximizing intentions. In this two period model, the switching costs, which occur when the worker decides to work for the alternative firm in the second period, are assumed to be zero.

5.3.1 WORKER ANTICIPATES LOWER COST OF EFFORT IN FUTURE

The worker's decision-making depends on the current and future discounted utility. The non-monetary bonus in the current period can lower the costs of effort in the future period. A lower cost of effort is obviously preferred by the worker and consequently by the firm. If the worker can anticipate the lower cost of effort in the future, this should be updated in the model. First, a two period model for monetary incentives will be constructed to function as a benchmark. Secondly, the two period non-monetary incentives model will be constructed and compared to the monetary one. Both will be used to determine the participation constraint for the worker. The constraint will be substituted in the profit function of the non-monetary firm in order to derive the profit maximizing actions of the firm.

Monetary incentives

Worker

The total utility with the monetary incentives of the two periods should be higher than the utility of the fixed wage contract without the monetary bonus to make the worker willing to exert high effort in both periods.

$$\begin{aligned}
 U_{Hm} &= w_{m1} + b_m - c(e_H) + \delta(w_{m2} + b_m - c(e_H)) \\
 U_{Lm} &= w_{m1} - c(e_L) + \delta(w_{m2} - c(e_L)) \\
 U_{Hm} &> U_{Lm} \\
 b_m &> c(e_H) - c(e_L)
 \end{aligned}$$

The bonus the worker requires to exert high effort does not differ from the single period model because the discount factor for both periods is equal and the monetary bonus does not induce a reduction in the future costs of effort.

Firm

The increase in profits in both periods of the firm offering a monetary bonus should be higher than the monetary bonus to make the bonus offer appealing for the firm.

$$\begin{aligned}\pi_{Hm1+2} &= P_H - w_{m1} - b_m + \delta(P_H - w_{m2} - b_m) \\ \pi_{Lm} &= P_L - w_{m1} + \delta(P_L - w_{m2}) \\ \pi_{Hm} &> \pi_{Lm} \\ P_H - P_L &> b_m\end{aligned}$$

The conditions for the firm offering the monetary bonus do not differ from the single period model.

Non-monetary incentives

Worker

As already has been proven in the single period model, the firm can benefit from non-monetary incentives under some reasonable conditions. Whether the wage scheme is interesting for the firm in a single period setting depends on the utility the worker derives from non-monetary incentives and the costs of discount. However, the influence on the costs of effort of the worker were not taken into account in the single period model. An additional parameter for the lower costs of effort (β) will be added to include the advantages of the non-monetary into the utility function.

$$\begin{aligned}U_{Hn} &= w_{n1} + \alpha z b_n - c(e_H) + \delta(w_{n2} + \alpha z b_n - \beta c(e_H)) \\ U_{Ln} &= w_{n1} - c(e_L) + \delta(w_{n1} - c(e_L)) \\ U_{Hn} &> U_{Ln} \\ w_{n1} + \alpha z b_n - c(e_H) + \delta(w_{n2} + \alpha z b_n - \beta c(e_H)) &> w_{n1} - c(e_L) + \delta(w_{n1} - c(e_L)) \\ (1 + \delta)\alpha z b_n &> (1 + \beta\delta)c(e_H) - (1 + \delta)c(e_L) \\ \delta &= 1 \\ 2\alpha z b_n &> (1 + \beta)c(e_H) - 2c(e_L)\end{aligned}$$

The two period contract is only appealing for the worker when exerting high effort in both periods yields more utility than exerting low effort. The lower cost in the future period make it more appealing for the worker to exert high effort compared to the situation where the introduction of non-monetary does not yield a lower cost of effort. The non-monetary utility of two single periods is lower than the utility derived from the utility of the two period model with lower cost of effort in the future. Hence, when the worker acts accordingly the two period model

and therefore anticipates the lower cost of effort in the future, the worker is even more willing to work for the firm offering the non-monetary wage scheme.

$$\begin{aligned} 2\alpha z b_n - (1 + \beta)c(e_H) + 2(c(e_L)) &> 2(\alpha z b_n - c(e_H) + c(e_L)) \\ \beta c(e_H) &< c(e_H) \\ \beta &< 1 \end{aligned}$$

The non-monetary utility of two single periods is lower than the utility derived from the utility of the two period model with lower cost of effort in the future. Hence, when the worker acts accordingly the two period model and therefore anticipates the lower cost of effort in the future, the worker is even more willing to work for the firm offering the non-monetary wage scheme.

Aside from the fact that the worker demands that the bonus should outweigh the increased cost of effort, the worker also requires that the utility derived from working at the non-monetary firm in both periods exceeds the utility derived from working at the monetary firm for both periods.

$$\begin{aligned} U_{Hn1+2} &> U_{Hm1+2} \\ w_{n1} + \alpha z b_n - c(e_H) + \delta(w_{n2} + \alpha z b_n - \beta c(e_H)) &> w_{m1} + b_m - c(e_H) + \delta(w_{m2} + b_m - c(e_H)) \\ w_{nj} &= w_{mj} \\ (1 + \delta)\alpha z b_n - \delta\beta c(e_H) &> (1 + \delta)b_m - \delta c(e_H) \\ b_n &= b_m = b \\ (1 + \delta)(\alpha z - 1)b + \delta(1 - \beta)c(e_H) &> 0 \\ \alpha z &= 1 \\ \delta(1 - \beta)c(e_H) &> 0 \text{ if } \beta < 1 \end{aligned}$$

When both firms pay the same fixed wages and the amount spent on bonuses are equal for both firms, the non-monetary contract is preferred for the two periods if the observed value of the non-monetary bonus is high enough and the cost reduction in the future is sufficient. The observed value of the non-monetary bonus depends on the aversion for non-monetary bonuses and the increased amount of non-monetary items received which follows from the discount the firm can obtain. If the observed value of the non-monetary bonus is equal to the monetary equivalent, the worker still has an incentive to choose for the firm offering the non-monetary bonus because of the lower cost of effort in the future period.

$$\begin{aligned} (1 + \delta)(\alpha z - 1)b &> \delta(\beta - 1)c(e_H) \\ \delta &= 1 \\ 2(\alpha z - 1)b &> (\beta - 1)c(e_H) \end{aligned}$$

$$\alpha z > 1 - \frac{(1 - \beta)c(e_H)}{2b}$$

Interestingly, when the costs of effort in the future period decrease, the observed value of the non-monetary bonus can also decrease. The lower cost of effort in the future could, partly, cancel out the non-monetary bonus aversion. The utility of working at the firm offering the non-monetary bonus can be higher than the monetary alternative even though the observed value of the non-monetary bonus is lower than the monetary equivalent. Even if workers discount the future utility, the observed value, nevertheless, can be strictly lower than the observed value of the monetary equivalent.

Obviously the firm is interested in the participation constraint of the worker for both periods. Especially the observed value of the non-monetary bonus and the cost reduction in the second period are interesting factors influencing the minimal fixed wage required by the worker in both periods. By comparing the utility derived from exerting high effort in the monetary and non-monetary wage scheme, the participation constraint can be obtained. The wages paid in both periods are assumed to be equal since the worker is perfectly informed about the future.

$$\begin{aligned} w_n + \alpha z b_n - c(e_H) + \delta(w_n + \alpha z b_n - \beta c(e_H)) \\ &> w_m + b_m - c(e_H) + \delta(w_m + b_m - c(e_H)) \\ & \quad b_m = b_n = b \\ w_n &> w_m - (\alpha z - 1)b - \frac{\delta}{1 + \delta}(1 - \beta)c(e_H) \end{aligned}$$

The required fixed wage for the worker active in the non-monetary firm decreases with the observed value of the non-monetary bonus. The fixed wage can also be lowered with the reduction in costs of effort in the future period. However, the decrease in the demanded fixed wage does not correspond perfectly with the cost reduction in the future if the worker discounts future utility.

Firm

Since the fixed wage can be lowered with the higher observed value and the cost reduction of effort, the firm's profits can increase by implementing a non-monetary incentive pay scheme. The importance of the increased observed value of the non-monetary incentive is already discussed in the single period model. The decrease in costs of effort is more interesting to focus on in this two period model. By taking the participation constraint of the worker, the total profits can be derived for the firm.

$$\begin{aligned} w_n &> w_m - (\alpha z - 1)b - \frac{\delta}{1 + \delta}(1 - \beta)c(e_H) \\ \pi_{n1+2} &= P_{H1} - w_{n1} - b_{n1} - c(z) + \delta(P_{H2} - w_{n2} - b_{n2} - c(z)) \end{aligned}$$

$$\begin{aligned} \pi_{n1+2} = & P_{H1} - w_m + (\alpha z - 1)b + \frac{\delta}{1 + \delta}(1 - \beta)c(e_H) - b - c(z) \\ & + \delta \left(P_{H2} - w_m + (\alpha z - 1)b + \frac{\delta}{1 + \delta}(1 - \beta)c(e_H) - b - c(z) \right) \end{aligned}$$

The effects of the observed value are of less importance in the two period analysis, since this has already been discussed in the single period model. More importantly are the effects of the cost of effort reduction on the profits. By isolating the lower cost of effort parts in the profit function, it can be obtained that the benefits arising from the lower costs of effort in the future are captured in both periods. The total benefits for the firm increase with magnitude of the cost of effort reduction.

$$\begin{aligned} & \frac{\delta}{1 + \delta}(1 - \beta)c(e_H) + \delta \left(\frac{\delta}{1 + \delta}(1 - \beta)c(e_H) \right) \\ & \frac{(1 + \delta)\delta}{1 + \delta}(1 - \beta)c(e_H) \\ & \delta(1 - \beta)c(e_H) \end{aligned}$$

5.3.2 WORKER DOES NOT ANTICIPATE LOWER COST OF EFFORT IN FUTURE

In the previous section the assumption was made that the worker anticipated the lower costs of high effort in the future period as a result of the non-monetary bonus obtained. The ability to correctly anticipate the future costs of effort is debatable. When the worker's decision-making process only depends on the current and future discounted utility without noticing the reduction of the costs of high effort in the future, this has consequences for the firm. As already mentioned, the firm could lower the fixed wage if the observed value of the non-monetary bonus is higher than the monetary equivalent and the cost of effort decreases in the following period. Since the worker has different expectations about the future utility, this impacts the decision-making process of the firm. In the following section the adjusted participation constraint will be constructed and using the new constraint the optimal actions for the firm can be determined. The same benchmark, the monetary wage scheme which functions as the outside option, will be used in this two period approach.

Non-Monetary Incentives

Worker

The expected utility of the worker matters for the decision-making process, therefore the expected utilities of both periods need to be derived. The worker expects to derive the same utility in both periods. The expected utility of the first period and the discounted expected utility of period 2 should exceed the utility derived from the monetary wage scheme in the two periods assuming that the bonus paid by both firm is equal.

$$\begin{aligned}
U_{Hn1} + \delta U_{Hn2} &= w_{n1} + \alpha z b_n - c(e_H) + \delta(w_{n2} + \alpha z b_n - c(e_H)) \\
U_{Hm1} + \delta U_{Hm2} &= w_{m1} + b_m - c(e_H) + \delta(w_{m2} + b_m - c(e_H)) \\
U_{Hn1} + \delta U_{Hn2} &> U_{Hm1} + \delta U_{Hm2} \\
w_{n1} &> w_{m1} + \delta w_{m2} - \delta w_{n2} - (1 + \delta)(\alpha z - 1)b
\end{aligned}$$

The combination of the fixed wages in the first and second period depends on the fixed wages of the monetary firm and the observed value of the non-monetary bonus. The firm has the ability to offer distinctive fixed wages in period 1 and period 2. The fixed wage in period 1 can be lowered, though, the fixed wage should increase in the second period to compensate for reduced fixed wage in the first period. The combination of both fixed wages should be high enough to make sure the worker derives sufficient utility from both periods combined.

The fixed wage the worker demands is lower in the first period in case of the correct anticipation. If the firm offers the wages as computed in the case of the correct anticipation, the worker may think he is better off with the firm offering the monetary bonus even though the actual utility the worker would derive is lower in case of the imperfect anticipation. In this case the firm would compute the minimum fixed wage based on the actual utility and would make sure that the worker is just slightly better off when choosing the firm with the non-monetary bonus. However, to make the worker indifferent the firm should increase the fixed wage with the difference between the anticipated cost of effort and the actual cost of effort.

$$\begin{aligned}
EU_{Hn1} + \delta EU_{Hn2} &= w_{n1} + \alpha z b_n - c(e_H) + \delta(w_{n2} + \alpha z b_n - c(e_H)) \\
U_{Hn1} + U_{Hn2} &= w_{n1} + \alpha z b_n - c(e_H) + \delta(w_{n2} + \alpha z b_n - \beta c(e_H)) \\
U_{Hn1} + U_{Hn2} - EU_{Hn1} - EU_{Hn2} &= (1 - \beta)c(e_H)
\end{aligned}$$

Given that the worker lacks the ability to anticipate the lower future costs of high effort, both periods should be approached separately to derive the true utility for the worker which the firm will take into account in the decision-making process. Assuming that the observed value of the non-monetary is sufficient to compensate for the higher cost of effort, the utility the worker derives from working at the firm offering the non-monetary bonus depends on the wage, consisting of the fixed wage and the observed value of the non-monetary bonus, and the cost of exerting high effort. Suppose that the amount spent on non-monetary bonus and the monetary bonus is equal, the firm can derive the minimum fixed wage payable as already has been proven in the first section. The minimum fixed wage the firm has to offer in the first period needs to increase with the fixed wage offer of the monetary firm and can be lowered with the higher observed value of the non-monetary bonus if the firm succeeds to obtain appropriate discount.

$$\begin{aligned}
U_{Hn1} &> U_{Hm1} \\
w_{n1} &> w_{m1} - (\alpha z - 1)b
\end{aligned}$$

The true utility the worker derives from working in the second period for the firm offering non-monetary bonuses is interesting for the firm. The firm realizes that offering a non-monetary bonus in the first period lowers the cost of effort in the second period. The worker notices the reduction in the cost of effort at the start of the second period and takes this into account when reconsidering the company to work for in the second period. Suppose that switching firms is possible and costless. This makes the outside option, working for the monetary firm, achievable.

$$\begin{aligned}
 U_{Hn2} &> U_{Hm2} \\
 w_{n2} + \alpha z b_{n2} - \beta c(e_H) &> w_{m2} + b_{m2} - c(e_H) \\
 w_{n2} &> w_{m2} - (\alpha z - 1)b - (1 - \beta)c(e_H)
 \end{aligned}$$

When comparing the minimum fixed wages the worker requires to work for the firm offering the non-monetary bonuses in the first and second period, it is noticeable that the fixed wage the worker demands in the second period is lower than the fixed wage in the first period. The fixed wage decreases with the lower costs of effort as a result of the non-monetary bonus received in the first period.

Firm

The worker could lack the ability to anticipate the lower cost of exerting high effort in the second period. To totally benefit from the advantages of a non-monetary bonus structure, the firm should adjust the wage offers compared to the situation where the worker does anticipate the lower cost of effort in the second period. The adjusted wage offers have some consequences for the firm's profits.

$$\begin{aligned}
 w_{n1} &> w_{m1} - (\alpha z - 1)b \\
 w_{n2} &> w_{m2} - (\alpha z - 1)b - (1 - \beta)c(e_H) \\
 \pi_{n1+2} &= P_{H1} - w_{n1} - b_{n1} - c(z) + \delta(P_{H2} - w_{n2} - b_{n2} - c(z)) \\
 b_{n1} &= b_{n2} = b_{m1} = b_{m2} \\
 \pi_{n1+2} &= P_{H1} - w_{m1} + (\alpha z - 1)b - b - c(z) \\
 &\quad + \delta(P_{H2} - w_{m2} + (\alpha z - 1)b + (1 - \beta)c(e_H) - b - c(z))
 \end{aligned}$$

The profits generated in the first period are lower compared to the profits in the second period. The different profits in the first and second period arise from the lack of anticipation of the worker at the beginning of the first period. Again by isolating the lower cost of effort part in the profit function, it can be obtained that the benefits arising from the lower costs of effort in the future are equal to the total benefits for the firm in case of a correct anticipation of the worker. The important difference is that the benefits are spread over both periods in case the worker anticipates the lower costs of effort and the benefits are fully taken in the second period in case the worker does not anticipate the lower costs of effort.

$$\delta(1 - \beta)c(e_H)$$

5.4 SELECTION

Firms try to select the best workers during the selection process. However, firms need to deal with information asymmetry. The job applicant could have an incentive to withhold crucial information in an attempt to acquire the job. Firms offer wage schemes with a bonus component to make sure that only workers high with qualifications will apply since the workers of lower quality will not obtain enough utility from exerting high effort. Within the group of best job applicants who want to work for the firm with the bonus structure, the firm would like to select the ones most fitting the company. Tangible non-monetary incentives can come to hand in some specific situations to select the right type of workers for the firm.

Assume that in the group of applicants, who are willing to work for a firm offering bonuses, two types can be distinguished. One group has true affinity with the specific type of firm, the other group has no or little affinity with the firm. The difference expresses in different valuation of the non-monetary bonus. Think for example of a firm producing cars. As a firm you would like to select the workers with true affinity for cars since they are likely to be more motivated to work in the car industry. The workers with a true affinity for cars are likely to have a higher valuation for a car compared to the worker with no or little affinity. The utilities the two types of workers should be compared to the first best outside option.

$$\begin{aligned} \text{Affinity: } U_{Hn} &= w_n + \alpha_h z b_n - c(e_H) \\ \text{No affinity: } U_{Hn} &= w_n + \alpha_l z b_n - c(e_H) \\ \text{Outside option: } U_{Hm} &= w_m + b_m - c(e_H) \end{aligned}$$

The firm wants to attract the workers with the high affinity. The firm can succeed in attracting this specific group of job applicants by offering a wage scheme which is only appealing for the workers with high affinity. The utility for the worker with high affinity should be higher than the outside option, the firm offering a monetary wage structure. On the other hand, the utility the worker with no affinity derives from working at the firm offering a non-monetary wage structure should be lower than the outside option.

$$\begin{aligned} w_n + \alpha_h z b_n - c(e_H) &> w_m + b_m - c(e_H) \\ w_n + \alpha_l z b_n - c(e_H) &< w_m + b_m - c(e_H) \end{aligned}$$

Assuming that the fixed wages and the amount spent on bonuses are equal for non-monetary and monetary firms, the participation constraint for the worker with high affinity can be constructed. Besides the participation constraint of the worker with high affinity, the nonparticipation condition can be derived.

$$w_n = w_m \text{ \& } b_n = b_m = b$$

$$(\alpha_h z - 1)b > 0$$

$$(\alpha_l z - 1)b < 0$$

$$\frac{\alpha_h}{1 - d_h} > 1 \rightarrow d_a > 1 - \alpha_h$$

$$\frac{\alpha_l}{1 - d_l} < 1 \rightarrow d_0 < 1 - \alpha_0$$

The firm can take advantage of the fact that it can adjust the observed value of the non-monetary bonus by increasing the level of discount obtained. The optimal discount decreases with the utility a worker with high affinity derives from a specific non-monetary bonus. This is quite straightforward since the observed value of the non-monetary bonus is more likely to be high. The discount obtained by the firm should just be high enough to make the worker with high affinity just better off by working for the firm offering the non-monetary bonuses. In that particular case the utility the worker with no affinity derives from the non-monetary bonus is likely to be lower since the observed value is strictly lower than the bonus of the monetary equivalent.

6. CONCLUSION

In this thesis a game-theoretic interaction analysis is constructed where tangible non-monetary incentives are introduced to overcome the classical problems of moral hazard and adverse selection arising in a principal-agent relationship. This analysis is based on a hypothetical two firm situation competing for the same workers. However, the results of this analysis are also valuable in a single firm situation where the firm is wondering whether to use tangible non-monetary incentives or monetary incentives in their contract design to optimally motivate workers and maximize their profits.

In the analysis workers are rewarded with a fixed pay and additionally with tangible non-monetary bonus. The use of monetary bonuses is mostly used and broadly accepted as a valuable tool in the design of contracts. This analysis gives clear indication how to introduce tangible non-monetary incentives instead of monetary incentives. The tangible non-monetary incentives can have great advantages over the monetary incentives in specific situations if the firm recognizes the opportunities to inflate the observed value of the tangible non-monetary incentive while taking the important fact of the aversion to tangible non-monetary rewards in consideration. By increasing the observed value of the tangible non-monetary rewards, by either acquiring the tangible rewards with a discount or rewarding workers with items produced by the company itself, the aversion of the worker can be cancelled out and give the firm a comparative advantage over firms offering monetary rewards.

The comparative advantage arises from the fact that the firm offering tangible non-monetary incentives is able to lower the fixed wage offered to the worker while spending the same amount on bonuses as the firm offering monetary incentives. The discount the firm can obtain is of great importance in this model since the firm can alter the discount in the right direction to increase the observed value of the tangible non-monetary incentive. From the analysis follows that the optimal discount decreases with the cost of acquiring the discount, which is assumed to increase exponentially in this model. If the cost of obtaining the discount is considerable, offering tangible non-monetary incentives could become unattractive since the increased costs would not outweigh the benefits of a lower fixed wage. Besides the cost of obtaining the discount, the aversion of the workers for tangible non-monetary rewards is an important factor to take into account in the design of the optimal contract. In case the aversion to tangible non-monetary incentives is less extreme, so the worker values the non-monetary incentives relatively equal to the monetary equivalent, the optimal discount increases. In that case more of the benefits of the increased observed value are transferred to the firm. Additionally, the optimal discount increases with the amount spent on bonuses. A firm spending a relatively great amount on bonuses can internalize more benefits compared to a firm offering relatively few bonuses.

When a firm considers to offer tangible non-monetary incentives it has to take into account that the effects of these incentives can be present in current and, more importantly, future periods. The selection of the type of tangible non-monetary incentives to use is important

since the firm can increase profits by internalizing the effect on the cost of effort of the workers. Furthermore, the firm could, even if the observed value of the tangible non-monetary reward is lower than the monetary equivalent, have a comparative advantage over firms offering monetary incentives. The benefits for the firm increase with the magnitude of the reduction of the cost of effort in the future period.

When designing the incentive pay contract it is important that the firm accounts for the possibility that the worker could lack the ability to correctly anticipate the cost reduction in the future periods. When the firm offers a contract to a worker assuming that the worker anticipates the cost reduction, could lower the expected utility the worker derives from working for the firm offering tangible non-monetary incentives if actually does not anticipate the cost reduction. If the expected utility derived is lower than the utility the worker derives from working for the firm offering monetary rewards, it could be the case that the worker chooses to work for the firm offering monetary incentives while the worker actually would derive more utility from working at the firm offering tangible non-monetary rewards. If the firm correctly offers the right contracts to the two types of workers, the firm obtains the same profits, irrespective of the correct or incorrect anticipation of the worker. The increased profits are internalized in different periods. In case the worker anticipates the cost of effort reduction correctly and the firm acts accordingly, the increased profits are spread over the current and future period. On the other hand, if the worker does not anticipate the cost reduction and the firm offers a contract were this is taken in to account, the cost reduction is fully internalized in the second period where the cost reduction has occurred.

Finally, if the firm wants to use the selective properties of incentive pay contracts, it should take into consideration that the observed value of the tangible non-monetary incentive should not be increased too much. The firm should increase the observed value of the tangible non-monetary incentive such that the workers with high affinity are strictly better off by working for the firm with tangible non-monetary incentives. Additionally the value the workers with low affinity observe should be strictly lower than the value of a monetary bonus offered by the other firm. So it is optimal for the firm to increase the observed value of the tangible non-monetary incentives by obtaining discounts, however, the contract should maintain unattractive for workers with low affinity.

6.1 RECOMMENDATIONS AND IMPLICATIONS

The results of the one period model suggest that non-monetary incentives can be of high value for firms in some specific situations. Offering non-monetary incentives can result in lower fixed wages and, in consequence, increase the profits of the firm. The applicability of the non-monetary incentive pay plan is dependent on the outside option, the costs of effort, the aversion to non-monetary rewards, the amount of bonuses paid, the obtainable discount and the possible costs originating from obtaining the discount. Some of these factors can be altered by the firm and, therefore, should be evaluated in more detail.

The observed value of the non-monetary incentive is of high importance and is likely to be dependent on several factors. The lower preference for non-monetary rewards is crucial to take into account. The lower preference for the non-monetary can differ among certain types of workers. The research by Hein & Alonzo (1998) showed that the aversion to non-monetary rewards decreases with the wage the workers earn. The reversal in preferences is likely to arise from the diminishing marginal returns of money. The benefits of offering non-monetary incentives are, therefore, likely to increase with the wages of the workers. The firm should take this in consideration when offering a contract. Firms with workers with high wages benefit relatively more since the observed value of the non-monetary incentives is relatively higher. When selecting the kind of non-monetary rewards to offer, the theory of diminishing marginal utility and mental accounting (Thaler, 1999) should also be taken into account. Monetary bonuses are likely to be aggregated in one mental account with the fixed wages. However, first of all, non-monetary rewards are likely to be placed in a other mental account and secondly, to manufacture non-monetary rewards can consists of different objects. The different objects are more likely to be placed, partly, in different mental accounts and therefore the problem of diminishing marginal utility is countered. In consequence, the firm can internalize more benefits if it is able to increase the observed value by offering distinctive non-monetary items.

As pointed out, the firm can increase the observed value of the non-monetary bonus by offering more items. Offering more items is only interesting for the firm if it would be able to obtain the items at a lower price than the workers would be able to on their own. However, offering non-monetary rewards is likely to be more costly than offering monetary rewards. Monetary rewards can be transferred more easily and no additional effort is required for the firm to obtain the money. Therefore it is interesting to study the influences of the unique characteristics of the firm and the non-monetary rewards on the costs of implementation.

Firms actually producing products could consider offering their own products as an incentive. If the produced items are supplied to an another company who sells is to individuals, it is likely that the price to be paid by the consumers is higher than the price paid by the reseller. In that case the firm could give the items to the worker and the only costs the firm have to bear are the production costs and the opportunity costs of suppling it to the reseller. The observed value of the worker could be equal to the market price, but the costs for the firm are considerably lower. In consequence, the firm can increase utility the worker derives from the bonus by giving more items and lower the fixed wage. An important condition is that the products produced by the firm should be consumable by the worker. Additionally, the lower preference for non-monetary goods may be less evident when the non-monetary goods belong to the basic needs of individuals. The workers would bought the products in any case, in consequence the workers can spent their earnings on other, more luxury goods.

A firm manufacturing for example semi-finished products or services are less capable of offering their own products to the worker. If the firm is interested in offering non-monetary incentives, it should purchase the items from other firms. These firms still can have an advantage in acquiring items at a lower price. Firms are likely to have more negotiation power

and, hence, obtain the products with a discount. In the model the cost of obtaining the discount is included and assumed to increase exponentially with the amount of discount obtained. The optimal discount obtained depends, partly, on the amount of bonuses transferred to the workers. Some firms rely more heavily on incentives in the contracts than others. As already mentioned, public agencies derive less benefits from the incentive pay and may, for this reason, offer less bonuses. As derived in the model, the benefits the firm can collect from a non-monetary incentive pay scheme increase with the amount spent on bonuses. If the firm offers a low fixed wage and high bonuses to the worker, the higher observed value has a bigger impact on the possibility to lower the fixed wage. The introduction of a non-monetary incentive pay plan gives the firm reason to increase the focus on incentive pay in the contract design.

The outside option is not adjustable by the firm offering the non-monetary bonus and, thus, should be considered as a given. However, as stated above, the firm can alter the diverse factors in the incentive pay structure in the desired direction which make the non-monetary incentive pay plan attractive for various firms in diverse settings.

From the two period model several challenges and opportunities in designing a multi-period incentive pay contract can be derived for the firm. The introduction of the possible lower costs of effort in the future periods makes the model distinctive from the one period model and results in interesting insights. The implications of the one period model are still applicable for the two period model. The consequences of the lower costs of effort are of great importance and will be analysed to find the optimal implementation strategy and derive which kind firms could benefit the most.

The tangible non-monetary rewards, related to the firm's activities, are proven to increase the interest of the workers in the firm (Stolovitch, Clark, & Condly, 2002). Jeffrey (2004) added that the workers can become more familiar with the products they are working with their job if they consume it by themselves. An increased interest in the firm's activities can, logically, be converted in a lower cost of effort. The lower costs of effort are likely to decline in the future period since the consumption of the non-monetary goods takes place after receiving the bonus in the first period. This indicates that firms which are able to offer their own produced products are more likely to derive additional benefits from a tangible non-monetary incentive plan in future periods than other firms would. A salesman who sells finished products to reseller could become more efficient if he has more knowledge about, and experiences with the product sold. The reseller sells the products with a mark-up and therefore the amount the salesman has to pay is likely to be higher than the producing firm receives. The difference between the price received by the producing firm and the price the consumers have to pay for the product can be observed as a discount. The firm can, as stated earlier, increase the amount of items the worker receives.

The increased interests and efficiency derived from the non-monetary incentive could be firm specific. The benefits could be firm specific if the firm is the only producer of certain products in a given geographical or monopoly market. In case of firm specific benefits for the

worker, the incentives to switch to other firms is lower because this decline in cost of effort is not expected to be present in the other firm. Therefore the firm can introduce non-monetary incentives to lower the turnover of personnel and the benefits for the firm are anticipated to be even higher than implicated in the two period model.

The switching costs for the worker were assumed to be zero in the two period model. However, if the switching costs are positive, the firm could offer more non-monetary goods that are able to lower the costs of effort of the worker. Think for example of the argumentation of Aguinis, Joo, & Gottfredson (2013). They indicated that the nature of the tangible non-monetary incentive can be decisive since there exist tangible non-monetary incentives that are likely to increase the overall well-being and health of workers. Workers with a higher overall well-being and health are likely to have lower costs of effort. If switching to an alternative firm would be costless, the worker can choose the firm offering the highest wages. The lower cost of effort is also present in the other firm and, thus, does not influence the choice for the firm to work for in the second period. However, if the switching costs are positive the workers have less incentives to switch to another firm and the firm offering the non-monetary incentives is able to internalize the benefits.

The ability to correctly anticipate the consequences in future periods is important for the contract design, however, it does not impact the firm's total profits. When workers know that the non-monetary incentives offered lower their cost of effort in the future, they are more willing to work for the firm in both periods. However, if the workers do not recognize this phenomenon, the firm must lower the fixed wage in the second period to benefit from the non-monetary incentive pay structure. Since lowering the fixed wages of workers is unusual and might engender resistance of the workers, the firm could have incentives to undertake actions to make the workers aware of the benefits or to select workers who are already aware of the positive effects.

Finally, tangible non-monetary incentive pay can be very useful in the attraction of new workers. Firms are presumably most interested in workers with true affinity with the activities of the firm. As obtained from the model where the selective features of the incentive pay scheme analysed, the firm can select workers with true affinity by offering non-monetary incentives. The observed value of the non-monetary bonus is crucial and could, fortunately, be influenced by the firm. To make optimal use of the selective properties of the non-monetary incentives, the amount of discount obtainable should be analysed critically.

The firm should make sure that the discount obtained and passed through to the worker is not too high. If the observed value of the non-monetary bonus is too high, because of the high discount, the contract could become interesting for the worker with no affinity which would take away the selecting properties of the non-monetary bonuses. The firm has to make a trade-off between internalizing more of benefits from the cost of effort by increasing the observed value of the tangible non-monetary incentive and attracting more workers with low affinity.

6.2 LIMITATIONS AND RECOMMENDATIONS FOR FURTHER RESEARCH

Lastly, the limitations of the analysis need to be clarified and, additionally, helpful recommendations are given for further research which could be of great valuable for further research on the topic of tangible non-monetary incentives.

In the analysis the principal-agent relationship is simplified to find the possible drivers for firms to choose for tangible non-monetary incentives. First, diminishing marginal utilities is an important factor influencing the decision-making process of agents. However, the diminishing marginal utilities are not included in the analysis. Diminishing marginal returns could work in favour of tangible non-monetary incentives, nevertheless, the analysis does not give an unambiguous conclusion. Secondly, the cost of obtaining discounts is assumed to increase exponentially. The cost of obtaining the discount could, however, consist of many components and would not necessarily increase exponentially. Thirdly, in the construction of the second period model, the switching costs were assumed to be zero. But, a worker changing firms is often prone to switching costs and this could change the exact implications of the analysis. Fourthly, the cost of effort reduction in the future period is an absolute decline. Important to note here is that the cost of effort reduction could be dependent on the amount of tangible non-monetary incentives received. Additionally, the cost reduction could be subjected to diminishing marginal reduction. Finally, the suggestion that all firms introduce tangible non-monetary incentives purely to maximize profits is not likely to be correct. Firms could have many more reasons to introduce tangible non-monetary rewards. Nevertheless, increasing profits could be one of the drivers for firms and is proved to be achievable with tangible non-monetary incentives in this analysis.

The limitations illustrated above indicate that the analysis needs to get expanded in future research to give firms more clear insights in how to introduce tangible non-monetary incentives in the incentive pay contracts. For example, future research could focus on the effects of mixture of tangible non-monetary and monetary incentives in the principal-agent relationship. Furthermore, the nature of the tangible non-monetary incentives is shortly evaluated and as Jeffrey (2007) suggested, workers could actually value some types of tangible non-monetary incentives more than monetary incentives. Thus, future research could focus on the exact types of tangible non-monetary incentives which would fit this analysis the most. Additionally, the benefits of the tangible non-monetary incentives are internalized by lowering the fixed wage by the firm. To expand the options for the firm it would be interesting to take a deeper look at lowering the amount spent on the bonus instead of the fixed wage. This may fit the mindset of the firms and workers in the labour market better. Finally, empirical research on the topic of discounts, tangible non-monetary incentives and the aversion could give more insights in the actual applicability of the model in real world principal-agent relationships.

7. REFERENCES

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