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Contracting with employees with preferences for ESG

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Abstract

This thesis examines the impact of incentive contracting on employees who prefer tasks that are not directly related to profit-seeking activities, such as Corporate Social Responsibility (CSR) and Environmental, Social, and Governance (ESG) tasks. The work is based on a model by Smith (2022), which distinguishes between two types of employees, one profit-seeking employee (Standard Agent) and one virtue-seeking employee (Green Agent). The Green Agent is assigned three additional parameters for the distinction, which are examined separately in this paper. The results show that employees with preferences for CSR activities can significantly influence the company's profitability under certain conditions. In addition to that, the thesis examines important implications for controlling and contracting employees. Integrating CSR objectives into incentive systems can reduce costs and thus make the company more profitable, as well as increase employee motivation. It can be stated that moving towards more sustainable business practices and integrating more non-financial indicators can lead to more profitability for a company from the contracting perspective.

Zusammenfassung

Diese Arbeit untersucht die Auswirkungen von Anreizverträgen auf Mitarbeiter, die Präferenzen für Tätigkeiten haben, die nicht direkt auf Gewinnorientierung abzielen, wie zum Beispiel Aufgaben im Bereich der Corporate Social Responsibility (CSR) und Environmental, Social, and Governance (ESG). Die Arbeit basiert auf einem Modell von Smith (2022), das zwischen zwei Arten von Mitarbeitern unterscheidet: einem gewinnorientierten Mitarbeiter (Standard Agent) und einem tugendorientierten Mitarbeiter (Green Agent). Der Green Agent wird mit drei zusätzlichen Parametern versehen, die in dieser Arbeit separat untersucht werden. Die Ergebnisse zeigen, dass Mitarbeiter mit Präferenzen für CSR-Aktivitäten unter bestimmten Bedingungen, die Rentabilität des Unternehmens erheblich beeinflussen können. Darüber hinaus untersucht die Arbeit wichtige Implikationen für das Controlling und die Vertragsgestaltung mit Mitarbeitern. Die Integration von CSR-Zielen in Anreizsystemen kann Kosten senken und somit das Unternehmen profitabler machen, sowie die Mitarbeitermotivation steigern. Die Arbeit zeigt auf, dass der Übergang zu nachhaltigeren Geschäftspraktiken und die Integration von mehr nicht-finanziellen Kennzahlen zu einer höheren Rentabilität für ein Unternehmen führen können.

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1. Introduction

The classical view that businesses should only maximize their profits and thereby shareholders values has long been challenged. Concepts of social engagement by entrepreneurs have been around as long as Industrialization, while concepts of environmental responsibility by firms have been introduced latest by the end of the 20th century. In the last decades these concepts have become increasingly important and research as well as businesses have started to pay more attention to them, as well as finding out more about their workings. The concept of CSR, which has been around for a while, addresses the social responsibility by firms, stating that the firm's responsibility should include all stakeholders of the firm. This implies that it is the firm's duty to also care about the interests and well-being of their employees, suppliers, consumers and so on (Dathe *et al.*, 2022). The social ideas of CSR were combined with ecological and environmental aspects in the ESG concept. Here three pillars of sustainability – ecological, social, and economic – are defined to measure a firm's level of sustainability (Erchinger, 2022). Since these topics play an ever-increasing role in society and public life these concepts are not mere ideas of responsibility or ethical business anymore but have become important economic factors for firms. This is visible by the trend that more and more firms engage in using these concepts as well as they have become competitive advantages (Aydoğmuş, Gülay and Ergun, 2022). Furthermore, product and brand distinction and differentiation play an important role in highly developed markets, where consumer's and investor's decisions reach far beyond basic needs and goods.

As the ideas of CSR and ESG cannot longer be ignored by companies, since they have become an essential part of doing business, it is highly interesting to learn more about the channels through which they work. Social and environmental engagement can directly profit firms through a higher level of reputation, which has been the case after Russia's attack on Ukraine where stock values rose for those firms who withdrew from Russian markets (Rodionova, Skhvediani and Kudryavtseva, 2022). Here the preferences of investors paid-off for those firms taking social responsibility. This can also work through brand reputation and the identification with such brands in a longer time period, working through consumer preferences. Moreover, these engagements can simply be cost saving, such as reducing one's energy-intensity as well as reducing waste. These savings not only contribute directly to profitability, but also strengthen the company's position in an increasingly environmentally conscious market. This idea extends to the creation of new markets and ideas for new trends which might result in highly profitable enterprises for companies or entrepreneurs.

Another channel through which social and environmental engagement can increase a firm's profitability is through their employees. This has been a highly researched topic in many ways, most often in the context of enhancing a worker's motivation and well-being, which again drives up revenues therefore increasing the company's profitability. Additionally, higher employee motivation and health increases the stability of a firm, thereby improving its long-term economic stability as well as calculability. Furthermore, there is the idea that the competitive advantage can extend to the hiring side, where the most skilled and efficient employees might choose the CSR firms over classical strictly profit-seeking firms, depending on the employee's preferences, therefore benefitting the company through better human capital.

Another channel of improving a firm's economic situation through the engagement of social and ecological topics was developed by Smith (2022) showing how hiring employees with preferences for these topics can be a cost saving factor for companies, since workers with a strong preference for doing something meaningful in their job might discount their reservation utility and therefore request a lower wage. This idea opens up a whole other channel of profitability which can be achieved through these engagements. Smith argues that these virtue-effort oriented employees even have a distaste for pure profit effort which can be mitigated by engaging in tasks which relate to virtues topics. For these purposes he sets up a model with two different types of employees. One is strictly profit-seeking the other employee assumes a distaste for profit effort. To show this, Smith introduces two variables through which this effect can be mitigated as well as through which he shows that engaging in virtue tasks can reduce the wage required by this employee.

In the following thesis I will examine Smith's approach more closely and evaluate his findings critically. I will also discuss the question whether incentive contracting for employees who prefer work that is not directly related to profit-seeking activities can increase a firm's profitability. Furthermore, there will be a deeper analysis of each of the three assumed parameters, which distinguish both employees from each other. This thesis unfolds as follows. Section 2 lays the foundation by embedding the model in the broader research environment. Section 3 presents and analyses Smith's model. Section 4 presents my own calculation and findings when adjusting the assumptions. Section 5 discusses the results and concludes.

2. Theoretical background

The following sections serve as an empirical and theoretical foundation for the model introduced later. To this end, the first part of the model will emphasize the importance of purposeful working regarding sustainable and impactful tasks and identify the characteristics of employees who have these preferences.

In the modern business world, there is an increasing focus on corporate responsibility and its impact Environmental, Social, and Governance (ESG) matters. Corporate Social Responsibility (CSR) has become an integral part of business operations as companies realize that their long-term success depends not only on financial indicators, and thereby on their financial stability, but also on their ability to have a positive impact on their environment as stakeholders seem to increasingly value such efforts. This has also become more important in a sense of a firm's flexibility, since they have to adjust to ecological, social, and economic changes in order to be profitable in the long run.

As part of this development, non-financial Key Performance Indicators (KPIs) have also become an important tool for measuring a company's contribution to sustainability, social justice, and good corporate governance. These KPIs offer a more comprehensive insight into the performance of a company compared to purely financial indicators and help investors and stakeholders to assess the long-term sustainability and social value of a company. Another important aspect of CSR is the promotion of a corporate culture in which employees can find a purpose in their work, who are therefore increasingly becoming the focus of closer research.

The following sections outline the empirical findings in the literature on CSR and ESG (section 2.1), employees with purpose (section 2.2) and the non-financial indicators (section 2.3). In the last part of the section, the theoretical foundation is laid by an introduction to the principal-agent theory (section 2.4), which provides the framework for the subsequent model.

2.1. Corporate Social Responsibility (CSR) and Environment, Social and Governance (ESG)

Sustainability and social agreements are becoming increasingly important in business practices. In the literature, there are two concepts that are often in use: ESG (Environmental, Social, Governance) and CSR (Corporate Social Responsibility). In the following, both concepts are described to differentiate between them.

According to Dathe *et al.* (2022), CSR provides a framework of rules on how companies should behave ethically, whereas ESG presents a concept of how best to measure the ethical practices and behaviors of companies. A definition of CSR was thus drawn up by the European Commission in 2001 and 2002, which states that CSR is a concept intended to provide companies with a basis for voluntarily integrating social and environmental activities in dialogue with stakeholders (European Commission, 2001). CSR appeals above all to the integration of social, ecological, and ethical standards that include human rights, labor rights and environmental protection. In addition to these issues, the interests of stakeholders, such as consumers, employees and suppliers, are also central (Dathe *et al.*, 2022). Another aspect of CSR is that it goes beyond legal obligations to act and is intended to close legal regulatory gaps and thus improve the welfare of all. Corresponding to (Gogoll and Wenke, 2017), companies are seen as quasi-public institutions that should assume responsibility with regard to the three pillars of social, ecological and economic concerns.

One part of CSR is the ESG concept, which stands for Environmental, Social and (Corporate) Governance, and is a method of measuring a company's sustainable strategies which were established as part of CSR (Dathe *et al.*, 2022).

It primarily uses non-financial indicators, defined in more detail below, to compare the social, environmental, and corporate actions of companies. The ecological actions could include factors such as the reduction of waste or carbon emissions. The social actions include aspects like the observance of human and labor rights. And thirdly, corporate governance, is aimed at ethical leadership and the assumption of responsibility by management and leadership (Erchinger, 2022). It is therefore a possibility to analyze insights of a company's sustainability, ethical practices and long-term viability, making it an important tool for investors and other stakeholders to assess the performance of companies on a broader sense than just financial and economic well-being of a firm (Paluka, 2022).

To summarize, CSR is the overarching term that represents the maintenance of social and sustainable standards within companies. In order to make this comparable, the ESG concept was developed, on the basis of which companies must now provide non-financial indicators.

For the sake of simplicity, the term CSR, which includes both CSR and ESG, will be used in the following.

2.2. Employees with purpose for CSR

Employees who are committed to advancing their company's goals in sustainability, social responsibility, and ethical business practices are those who have a purpose for CSR. Having these preferences also means that employees of that type seek a sense of fulfilment in their work. Conversely, there is the classic profit-orientated employee, who tends to have character attributes similar to the homo economicus, such as rationality, i.e., weighing up costs and benefits in order to achieve the greatest possible utility. This goes hand in hand with maximizing one's own interests rather than those of the society. The focus of the work is less on meaningfulness and more on optimizing the financial key indicators and thus also optimizing the own outcome (Nehring, 2011; Rela, 2021).

Bromley, Taylor and Schaninger (2021) found out it trend towards employees who no longer prioritize monetary maximization, but rather the purposefulness of their job. They established that employee performance increases by 33% when they see meaning in their work. In addition, employees feel 75% more a part of the organization, which reduces the chance of leaving by almost 50% when this is the case. Based on these important findings, there is a growing interest in researching what kind of person an employee with purpose for CSR is. In the literature, there is no standardized definition of what exactly an employee with purpose in terms of CSR is. But there are different characteristics that can be assigned to this type of employee, nevertheless, there are many interesting studies in the field which come close to describing an employee with purpose.

To start with, the commitment of a company for CSR increases the intrinsic motivation of employees. This can be the case above all because employees then see their daily work as part of a larger goal, which can make their working hours feel worthwhile and significant (Kunz, 2020; Tang, Loi and Lai, 2023). Furthermore, an employee with purpose for CSR is concerned about social problems and sustainability, and it is important for him to improve them. The well-being of society is at the center of this. The social entrepreneur, analyzed by (Sastre-Castillo, Peris-Ortiz and Danvila-Del Valle, 2015), aims to create social well-being and to maintain this in the long term.

The concept of Green Hiring, which means hiring people on the basis of their environmental friendliness or ability to implement environmental protection, has an impact on the ecological, economic and social performance of a company (Martins *et al.*, 2021). The development of new innovations in terms of increasing resource conservation, which is enhanced by hiring people who are concerned with ecological and environmental topics, improves environmental

performance. At the same time, this has a motivating influence on employees, as they know that their working environment pursues similar interests, which addresses social performance. The ecological and social pillars then favor the cost savings and thus the economic performance of a company. Saving energy, conserving resources or other environmentally friendly practices can help to minimize operating costs in the long term (Molina-Azorín *et al.*, 2009).

A study by Peterson (2004) states that the relationship between corporate citizenship and business commitment is higher among those employees for whom it is important that the company has a high level of corporate social responsibility. This is why it is important that the company assumes social and environmental responsibility and is therefore in line with values, missions, and declarations of consent regarding CSR. It is supported by the findings of Greening and Turban (2000), which say that Corporate Social Performance (CSP) is a strategic advantage for companies to attract more qualified employees. In addition, the study by Flammer and Luo (2017) shows whether CSR can be used to increase employee commitment and, conversely, to minimize negative employee behavior. This is reinforced by Koh and Boo (2001) and Viswesvaran, Deshpande and Joseph (1998) who worked out that ethical behavior of the company correlates positively with job satisfaction. This manifests itself in productive commitment to virtue tasks or the ability to develop innovative and solution-orientated skills. The study by Narayanan (2022) has discovered that employees naturally favor tasks that generate value, which has a positive effect on motivation on the one hand and a sense of belonging to the company on the other. The innovative purpose underlies the study by Milliman, Gonzalez-Padron and Ferguson (2012) which found that sustainability-driven product innovation creates higher value for companies by addressing consumers and other important stakeholders.

Different aspects can be included when it comes to approximating a definition of employees with an interest in CSR. The next section will now look at how CSR is presented in companies, which is usually done using non-financial indicators.

2.3. Non-Financial KPIs as an instrument to measure CSR performance of companies

Non-financial key indicators, that contain non-monetary information about the company, have become increasingly important in recent years, since environmental challenges have become more significant. This is visible when it comes to the annual reports, where companies have to publish their achievement with regard to non-financial KPIs, which can be social indicators like employee satisfaction or engagement as well as the reduction of carbon emission or of waste (Dorestani, 2009). Moreover, key performance indicators targeting CSR are increasingly being

used to measure the performance of executives. This is reflected in the study by Cohen *et al.* (2023), which demonstrates that in 2010 only 3% of the examined companies used this as a performance metric, whereas in 2021, it had already surpassed 30%. KPIs regarding CSR can be a competitive advantage for companies, which is shown by Del Brío, Fernandez and Junquera (2007) and can be achieved through environmental measures such as waste- or emission reduction and can have therefore a positive effect on employee motivation and performance. In the following it will be discussed what non-financial key indicators are, to measure CSR practices of a company.

One key indicator is employee satisfaction, which is the level of fulfilment that employees experience in their work environment and can be measured in the form of various metrics. A higher employee satisfaction reduces the turnover rate, which is another non-financial KPI and represents the proportion of employees who leave an organization over a certain period of time relative to the total number of employees and has a positive impact on productivity (Myskova, 2011). Beyond this, a higher satisfaction can lead to long-term stability and competition (Sawang, 2011).

Another non-financial KPI can be employee engagement, which is the degree to which employees are emotionally invested and committed to the organization’s goals and values. This is outlined in the study by Kumar and Pansari (2015) which investigates in whether high employee commitment leads to higher profits. It was confirmed that a higher level of commitment has a major impact on the success of a company and has a positive impact on all customers. In addition, the study by Widén, Olander and Atkin (2014) found out that engagement should be an intrinsic part of an innovation process.

In addition to employee satisfaction and employee engagement, another important non-financial indicator with regard to CSR preferences is diversity. As in El-Amin's (2022) research, this is generally analyzed in terms of the influence of diversity and inclusion on the company's success. On the other hand, this can also be derived from indicators such as the quota for women or the quota for people with disabilities. This supports the study of Abrams (2013), which discovered that gender heterogeneity can lead to an increase in performance.

Besides the social pillar, which is also depicted in non-financial indicators as shown above, ecological indicators can also address CSR practices of a company. This can include the reduction of waste and carbon emissions or the increase in efficiency such as in the energy use or the use of resources and inputs. These ecological indicators can also set the basis for long-term sustainable targets being achieved.

Furthermore, these different kind of non-financial KPIs can have a positive impact on variable compensation (Lemaire and Limbourg, 2019; Fatimah *et al.*, 2020), to reach long-term sustainability goals of the company. This is one of the reasons why the variable part of the compensation at the management level can be linked to sustainability targets, to set long-term instead of short-term incentives, and has therefore a positive impact on the CSR performance of a company in general (Velte, 2016). With this, the harmonization of employee incentives with the company's sustainability goals and ethical practices create an interplay of incentives and rewards for the integration of CSR practices into the company. Moreover, the integration of non-financial indicators into the variable compensation-schemes of a company, which should reflect their respective CSR ambitions, leads to companies not only increasing their CSR performance but also their overall economic score (Baraibar-Diez, Odriozola and Fernandez Sanchez, 2019). The study by Gebhardt *et al.* (2023) supports this by investigating German listed companies with regard to CSR components in compensation structures.

To sum up, non-financial KPIs, economical as well as social, are used increasingly by firms in their compensation structures and are thereby more and more introduced. This enhances firm's performances regarding their CSR practices and scores but also improve economic long-term well-being. This is why a growing share of research is committed to these processes as well as this thesis.

2.4. Principal-Agent Theory and Incentive structures

The Principal-Agent framework is an economic model which explains and analyzes the relationship between a so-called principal and an agent, whereby their relationship is shaped hierarchically in an organization under asymmetric information. Moral hazard, as a kind of asymmetric information, exists, when the agent can influence his own behavior, namely hidden action, and the principal cannot even observe it directly ex post. With this condition, shirking can occur, which appears as a special form of moral hazard and describes that employees act less responsibly because they cannot be made completely liable for their performance or work ethic after signing a contract (Gaynor, 1990).

For example, the agent can decide for himself whether he chooses a high or low level of effort to complete a task. The principal only has the opportunity to set incentives in such a way that the output, which is directly influenced by the chosen level of effort by the agent, is maximized. Incentives are often used as an instrument to overcome this information asymmetry (Spremann, 1990).

The principal in the Principal-Agency Model is either the owner of the company or a shareholder who has an own special interest for the company. The agent on the other hand stands for an individual or an institution which acts on behalf of the principal and can be a manager or employee. The aim of the model is to design an optimal contract under the assumption that the principal does not have the necessary information about the behavior and preferences of the agent to design and enforce a contract in the first place. This leads to an asymmetric information problematic, in this case moral hazard, which puts the principal in a worse position than the agent. To overcome this, the principal sets incentives that guide the agent in the direction he wants (Jost, 2001). The goal of the principal on the one hand is to maximize his outcome, typically representing the profit, and, of the agent on the other hand, is to maximize his expected utility (Widén, Olander and Atkin, 2014). The solution of the model consists of two stages, the first-best- and the second-best scenario, which will now be analyzed in more detail.

In the case of perfect information, it is easy for the principal to design a perfect incentive system because he can observe the agent's effort. It is assumed that the principal does not have to motivate the agent to behave in a way that is cost-effective for him and can therefore ensure the optimal effort. In this scenario, the first-best case is used (Dierkes and Schäfer, 2008). The situation is different if there is moral hazard and therefore asymmetric information. The linear compensation then consists of a fixed wage and a variable component. The fixed part of the compensation is independent of the agent's efforts, whereas the variable part is now dependent on the incentives set by the principal and can be for example the bonus coefficient or bonus parameter. As a result, the variable compensation increases with the agent's effort. Variable compensation can be a mechanism by which predetermined targets, such as sustainable targets, are linked and can therefore be used to measure performance. If the defined targets are achieved, the agent is rewarded accordingly, which can take the form of a bonus (Jost, 2001). In this way, the principal can counteract the moral hazard problem and still achieve the desired optimal profit.

This Principal-Agent scheme will now be applied to investigate the costs and benefits of hiring different types of employees. Since incentivizing sustainable and social efforts is becoming increasingly important, this thesis examines the differences of a virtue employee compared to a classical employee in the principal-agent set-up. In addition, it investigates at what point it becomes more profitable from the perspective of the company to hire the former.

3. The Model

The aim of this thesis is to analyze the impact of differences in assumptions concerning various types of employees and their implications for the profitability of a firm when employing such employees. Furthermore, it will be investigated how these different types of employees react to certain forms of incentives, and which mix of employee-type and incentives are most profitable for firms.

The following arguments as well as mathematical analyses and derivations are based on Smith's model (2022). In addition, assumptions are modified to the model to establish an even clearer picture of how differences in employee-types and their respective utility functions affect a firm's hiring decision and the corresponding profitability resulting from hiring different kinds of employees. First however, for simplicity reasons, the distinct assumptions are presented in a reduced form, in order to clearly work out their workings before combining the findings in such a way that they are added to Smith's complete model.

In the following work, I will present Smith's model which consists of a risk-neutral principal which will be presented and analyzed in section 3.1. Furthermore, key to Smith's model are the two different types of risk-averse agents, namely the Mercenary which will be in my case the Standard Agent, who will be introduced in section 3.2, and the Saint, which will be in my case the Green Agent and covered in section 3.3.

Moreover, Smith incorporates the Principal-Agent theory, which is explained above, in his model, which consists of a first- and second-best solution. Keeping this framework, I will also show the first- and second-best scenario for each of the assumptions and the implications for the different participants.

3.1. Principal – Objective Function

First, the principal's objective function will be presented. The principal represents the firm in the model, meaning his objective function also represents the firm's profit function which can also be seen as its long-term cashflow function. In addition to that, the principal's objective function is the same in the first- and second-best scenario, both will be looked at in more detail later. The principal objective function is

$$\Pi = f_p p + f_v v - W \qquad [1]$$

which consists of p, standing for the effort behind profitable tasks, and v, which represents the effort behind the virtue tasks and the two parameters f_p and f_v. $f_p > 0$ is a parameter that measures the effectiveness of profit effort. In contrast to that, f_v is a parameter as a multiplier linked with virtue effort. The main assumption behind the company's long-term cash flow function is that the company generates profit from either profit- or virtue effort. But since $f_p > 0$ profit effort will always generate profit as long as $p > 0$ while f_v can be both positive and negative. Because of this possibility the company does not necessarily generate profit from virtue effort directly, which leads to the assumption that virtue practices will only be profitable when financed through contracts, consisting of employees which generate utility from virtue effort and therefore work for a lower wage. In addition, the function also consists of the fixed salary W, which is paid to the employee and represents the costs of the firm.

To summarize, the above basic assumptions provide the foundation for the model. This makes it possible to understand how long-term company profit is influenced: Investing in profit and virtue effort. The differentiation between the two types of effort allows a detailed analysis of the company's long-term performance.

3.2. Standard Agent

Now, that the principal and its objective function (OF) have been described above, the following section takes a closer look at the Standard Agent. This represents an employee who acts solely in a profit-oriented manner. This serves as a benchmark for all following calculations.

His cost function is

$$C = \frac{1}{2}(p^2 + v^2) \qquad [2]$$

and represents a standard quadratic cost function that shows no dependence between profit and virtue effort.

The participation condition is made up of the fixed salary and the cost function just mentioned, which is set equal to at least his minimum utility

$$W - \frac{1}{2}(p^2 + v^2) \geq U_0 \qquad [3]$$

which leads to the fact that the compensation received should therefore correspond to the Standard Agent's minimum utility plus the costs of his efforts. The participation condition thus ensures that the Standard Agent is adequately compensated and that the contract is acceptable for him. If the participation condition is combined with the principal's objective function and transformed, unconstrained maximization is obtained as

$$max_{W,p,v}\ f_p p + f_v v - U_0 - \frac{1}{2}(p^2 + v^2) \qquad [4]$$

which shows the profit resulting for the firm from hiring the Standard Agent. The cost part of the function now corresponds to the participation condition of the Standard Agent.

So far, the functions of the Standard Agent's first-best scenario have been examined in more detail. This changes slightly when it comes to the second-best case. In the second-best case, the principal can no longer observe the agent's effort and is therefore required to set incentives regarding the best output for the company. This changes the expected utility of the Standard Agent as follows

$$E[U] = \mathrm{w} + \beta_p Y_p + \beta_v Y_v - \frac{1}{2}(p^2 + v^2) - \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 - U_0 \qquad [5]$$

and is composed of the fixed wage and the bonus coefficient, which consists of the incentive weights β_i and the incentive signals $Y_i = i + \varepsilon_i, with\ i \in \{p, v\}\ and\ \varepsilon_i \sim N(0, \sigma^2)$, since the parameter for risk aversion is normalized to 1, it applies $Y_i = i$, minus the costs that the employee has to work and the risk premium. Since the Standard Agent is also subject to the uncertainty about the realization of the signals of effort, namely Y_p and Y_v, the risk premium illustrates the costs of utility he experiences as a risk-averse agent. This risk premium increases in the level of uncertainty, namely σ^2 and the incentive weights, which represent the uncertain part of his compensation.

If this expression is rearranged to w it leads to the participation condition. When differentiated with respect to p and v, optimal efforts are obtained and combined with the participation condition and then inserted into the principal's objective function, which contains p^* and v^*, so that the following maximization problem arises

$$max_{\beta_p,\beta_v}\ f_p p^* + f_v v^* - C(p^* + v^*) - \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 - U_0 \qquad [6]$$

where the principal maximizes with respect to the incentive strengths, again to optimize his expected profits.

3.3. Green Agent

Furthermore, there are different functions for the employee-type of the Green Agent, representing his particularities which are assumed in order to generate a model for an employee, who does not only seek profit but also gains utility from engaging in virtue efforts.

The Green Agent's cost of effort function is:

$$\mathrm{C} = \frac{1}{2}(kp^2 + v^2 - gpv) \qquad [7]$$

which differs in two key variables from the Standard Agent's:

Firstly, the parameter k, which is assumed to be $k > 1$, represents that profit effort is more costly for the Green Agent than for the Standard Agent, which indicates that the Green Agent has a disutility from profit-related tasks. This means, profit seeking tasks intrinsically generate less utility for the Green Agent when compared to the Standard Agent. To sum it up, k reflects that both employees react differently to profit tasks and by how much. Even if the Green Agent continues to perform profit-seeking tasks, he still generates a disutility from it, compared to the Standard Agent, which would lead to a higher wage requested by the Green Agent for profit seeking tasks.

Second, $g > 0$, implies that investing in virtue effort mitigates the disutility from profit effort. The parameter g is positive to show that there is a mitigation effect of virtue effort on profit effort. As a result, a higher g implies a higher mitigation factor, which can result in a lower wage. The parameter g, unlike k, does not represent how strong the disutility from profit effort is, but mitigates the disutility of profit effort by engaging in virtue efforts.

Since the Standard Agent's cost function does not have an interaction between the two types of effort, the Green Agent's last part of the cost function $gp_s v_s$ represents a correlation and thereby the mutual effects of virtue and profit effort. It also has a linear relationship which is a simplification of the model and the proportional mitigating effect of virtue effort by the Green Agent. The assumption behind g is that employees who prefer virtue tasks will develop a lower aversion to profit-seeking tasks if these are related to virtue tasks.

In addition to the two differences, between both employee types, of the cost function in the variables g and k, there is a third difference in the reservation utility. The reservation utility is

the threshold at which the employee still benefits from the work. If the reservation utility level is below, which may be reflected in inadequate compensation or missing well-being at work, the employee will look for other work options. The Standard Agent's reservation utility, which is the minimum expected utility, is defined as U_0. As visible, it is not influenced by virtue effort or other information. This is different for the reservation utility of the Green Agent, which is

$$U_0 - \mathrm{b}v \qquad [8]$$

containing also bv. This function of the Green Agent consists of the minimum utility U_0, less the product of b and v. Here, b represents a discount factor which determines by how much the Green Agent discounts his utility when engaging in virtue effort. In other words, the Green Agent values if more effort is invested in virtue tasks and thus works for a lower wage, since his utility function is discounted by bv as long as virtue effort is positive.

The participation condition

$$w - \frac{1}{2}(kp^2 + v^2 - gpv) \geq U_0 - bv \qquad [9]$$

which consists of the fixed wage minus the costs of the Green Agent's work, is set equal to the reservation utility of the Green Agent. If the condition for participation is rearranged to W and then put into the principal's objective function, the following maximization problem arises:

$$max_{W,p,v} = f_p p + f_v v - \frac{1}{2}(kp^2 + 2U_0 - 2bv - gpv + v^2) \qquad [10]$$

As with the Standard Agent, the maximization problem is similar, where the cost part of the function corresponds to the participation condition of the Green Agent.

The utility function changes when it comes to the second-best case. However, the reservation utility remains the same. Here again, the principal cannot observe the effort and is therefore dependent on setting incentives in the contract so that his best level of profit is achieved. The incentive constraint is therefore

$$w + \beta_p p + \beta_v v - \frac{1}{2}(kp^2 + v^2 - gpv) - \frac{1}{2}(\beta_p^2 + \beta_v^2)\sigma^2 \geq U_0 - bv \qquad [11]$$

and also consists of the fixed wage, the incentive signals, the cost to work and the variance of the incentive weights. Which leads to the principal's objective function for the Green Agent's case, which is

$$max_{\beta_p,\beta_v}\ f_p p^* + (f_v + b)v^* - C(p^* + v^*) - \frac{1}{2}(\beta_p^2 + \beta_v^2)\sigma^2 - U_0 \qquad [12]$$

including the optimal efforts p^* and v^* as well as the Green Agent's participation condition.

In the case of the Green Agent, there are three main conditions that distinguish the Green Agent from the classic employee:

Firstly, the parameter k, which has to be assumed to be $k > 1$, in order to show that profit effort is more costly for the Green Agent, which is one of the main assumptions concerning the employee type of the Green Agent. This is also why k illustrates the analytical side of the necessary condition for the model.

Secondly, the parameter g, which is assumed to be $g > 0$, as to represent a mitigation of disutility from profit effort, when investing in virtue effort. This means, that the Green Agent can reduce his utility-costs of profit effort by devoting effort in virtue tasks.

Thirdly, the variable b, which constitutes a discount parameter by how much the Green Agent values if more virtue effort is made. With that he discounts his reservation utility which leads to the fact that he accepts a lower wage compared to the Standard Agent when engaging in virtue tasks.

Since k represents a necessary condition, it will appear in all following calculations, representing the key assumption for distinguishing the Green Agent from the Standard Agent.

This is different for the parameters g and b. Since k represents an extra cost of working, namely through the engagement in profit effort, this has to be counterbalanced in order to make the Green Agent an economic choice for the principal in the first place. Here g and b come into play, although their influence is different from one another. While g is a cross-effort cost mitigation parameter, meaning it has an effect on both efforts, b is a discount parameter resulting from the participation condition for the Green Agent, its function is mainly through the engagement of the Green Agent in virtue effort and therefore through a different channel. These different effects are to be explored and analyzed in the following parts. Finding out more about these differences will be a key finding of this thesis.

3.4. Timing of the model and structure

The model aims to solve a profit optimization problem from the perspective of the principal who contracts an agent in order to generate revenue. This is done for two different types of agents, the Standard Agent and Green Agent, which are introduced above, who choose the optimal level of profit and virtue efforts to maximize their expected utility subject to their restricting constraints. Where the case of the Standard Agent serves as a benchmark and the case of the Green Agent is used to analyze the impact of a worker's attitude towards virtue tasks on the profit of the firm. To solve this, Smith uses the LEN-model as a simplification of the basic model of Principal-Agency Theory, consisting of a Linear contract, Exponential utility functions and normally distributed result (LEN-model).

His model therefore includes the objective function of the principal, the participation constraint, and the incentive constraint of each agent. The following basic model results from these components:

$$max_{W,\beta_p,\beta_v}\ f_p p + f_v v - \mathrm{E}[w]$$

$$s.t. \qquad E[w] \geq U_0 \qquad (PC_{SA,GA})$$

$$p, v \in argmax EU_{SA,GA} \qquad (IC_{SA,GA}) \beta_p, \beta_v \geq 0$$

The participation condition ($PC_{SA,GA}$) is the necessary condition for the employee to accept the contract. This in turn is a guarantee of participation, i.e. that the agent is willing to work for the company. At the same time, the condition of participation represents a basis for the negotiations. Since the agent's reservation utility must be fulfilled, he will negotiate until it is fulfilled. This leads to the fact that the participation condition must be positive (i.e. $PC_{SA,GA} \geq 0$).

The incentive constraint ($IC_{SA,GA}$), which only applies for the second-best case due to the uncertainty, ensures that the incentives in the contract are designed in such a way that they align the interests of the principal and the agent. But the agent decides which level he chooses for the kind and quantity of each effort. For the principal, every effort is positive and increases his payoff. The incentive constraint for the agent therefore results from the first derivation of the participation condition according to either virtue effort or profit effort.

To solve the optimization problem, the process is analogue to any classical LEN-model. The principal sets up his objective function, which is dependent on the virtue- and profit effort. The

agent also formulates his participation condition, to which he accepts the contract, which is therefore fulfilled. After the employee has accepted the contract, he optimizes his utility level by performing his effort. This is carried out by the first derivation of the participation commitment after the respective effort. The two optimal efforts are then inserted into the principal's objective function, which contains the participation condition, in order to calculate the profit. The agent is then compensated based on it. Whereby in the first-best scenario the principal can observe all efforts invested by the agent, so he does not need to set incentives. On the other side in the second-best scenario the efforts are unobservable which is why the principal uses incentives in the contract to direct the employee’s effort in the direction which maximizes his profit.

4. Results/ Calculations

4.1. Standard Agent

The following section takes a closer look at the solutions for a purely profit-seeking and a risk-averse employee, namely the Standard Agent. This serves as a benchmark case in order to be able to interpret and compare the results which will be found for the Green Agent. The mathematical derivation and detailed calculation can be found in Appendix 1.1.

4.1.1. First-best Standard Agent

In the first-best scenario the principal can completely observe the agent's efforts. As a result, the profit and virtue effort are

$$p^{\mathrm{FB1}*} = f_p \text{ and } v^{\mathrm{FB1}*} = f_v \qquad [13]$$

and the employee is compensated accordingly when the respective effort level is reached. The optimal profit effort level here corresponds to the productivity of profit effort and, analogously, optimal virtue effort corresponds to the productivity of virtue effort. Since all effort is still observable in the first-best case, the Standard Agent's compensation is

$$\mathrm{w} - \frac{1}{2}(f_p^2 + f_v^2) \geq U_o \qquad [14]$$

which is therefore depended on the constant fixed wage and the costs depending on the optimal efforts.

The main goal of the principal in the model is to maximize his profits, which he does by finding the best possible effort level for both types of tasks. This leads to

$$\pi^{\mathrm{FB1}*} = \frac{1}{2}(f_p^2 + f_v^2 - 2U_0)$$

as the optimal profit for the principal, which depends on the productivity of profit- and virtue effort less the reservation utility of the agent. This shows the higher the productivity of profit- or virtue effort, the higher the profit.

4.1.2. Second-best Standard Agent

The next passage focuses on the second-best scenario. In this case, the principal can no longer observe the agent's respective effort attitude, which leads to the moral hazard problem. In order to still generate the best possible output, the principal sets incentives in the contract in such a way that his returns are still maximized. For the mathematical derivations and proofs see the Appendix 1.2.

The compensation of the agent now has two parts: the fixed wage part and a bonus coefficient, which is influenced by the incentive weights and the signals for both kind of efforts. The incentives themselves serve as a motivational factor for the agent on the one side, which is used by the principal to allocate effort due to the preferences of the company. On the other side the incentive weights are used as a performance measure and give information about the evaluation of performance by the principal. The optimal incentive weights in the second-best scenario are

$$\beta_p^{SB1*} = \frac{f_p}{1+\sigma^2} \text{ and } \beta_v^{SB1*} = \frac{f_v}{1+\sigma^2} \quad [15]$$

and show how much compensation the Standard Agent receives based on his performance in each type of task. The optimal incentives increase due to $f_p$or f_v. This has a positive effect: the higher the productivity for the respective task, the higher the benefit for the Standard Agent.

Looking at the uncertainty of the performance measurement, which is reflected by the variance σ^2 and influences the risk premium, it decreases each incentive weight when becoming bigger. A higher σ^2 means that the information about the performance by the agent is more unsecure which can depend on external influences. Through the influence on the incentive weights, this leads to a higher risk premium indirectly and directly through σ^2, which is

$$RP = \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 \quad [16]$$

which in turn would decrease the wage for the agent, through the negative interdependence. On the one hand, a high-risk premium can represent an incentive instrument for the principal for the agent, as well as preserving the flexibility of the cost structure. For the agent, this represents increased uncertainty for the amount of his income, which can lead to higher fluctuation and dissatisfaction. At the same time, a low variance can lead to a higher salary for the agent, which in turn represents an incentive.

The incentives are also relevant for the Standard Agent's efforts in the second-best scenario. These are

$$p^{\mathrm{SB1}*} = f_p \text{ and } v^{\mathrm{SB1}*} = f_v \qquad [17]$$

it shows that both efforts are dependent on each respective incentive weight and productivity. This emphasizes the statement that the greater the incentive weight for the Standard Agent, the greater the respective effort. Plugging the optimal efforts and incentive weights back into the principal's objective function results in the optimal profit for the company which is now given by

$$\pi^{SB1*} = \frac{f_p^2 + f_v^2}{2(1+\sigma^2)} - U_0$$

increasing in each productivity parameter, f_p and f_v, which corresponds to higher productivity leading to higher profits. The principal can exploit this fact and direct the Standard Agent's effort in the direction which is most productive and therefore most profitable. The optimal profit is decreasing with the level of uncertainty, namely σ^2, which can be explained by the fact that the Standard Agent's performance is harder to capture and therefore it is more difficult to direct him into the optimal efforts, decreasing profits.

4.2. Green Agent with mitigation parameter g

The next section takes a closer look at the Green Agent, who is a risk averse employee with purpose for CSR. As can be seen from the literature, there is an increasing trend for employees to place more value on meaningful work rather than purely pursuing profits.

In the following parts, compared to the Standard Agent, the Green Agent has three further assumptions in his participation condition that distinguish him from the profit-oriented employee.

The first assumption, which will be kept constant for the following calculations, is that k, which serves as the multiplier for the cost of profit effort for the Green Agent, is present, meaning $k > 0$. This assumption is a necessary condition for the model in order to differentiate between both types of employees. This main assumption defines the Green Agent and shows that investing in profit effort is associated with higher costs for the Green Agent when he only carries out profit-orientated tasks. Conversely, this means that his compensation has to be higher than that of the Standard Agent if only profit tasks are performed, due to the Green Agent's loss in utility

through k. This in turn would lead to a situation where it would always be more profitable for the principal to hire an employee of the Standard Agent type, which is why there are two more assumptions assigned to the Green Agent. One is the parameter g and the other is parameter b which both act as discount factors balancing out the costs incurring through k.

In this scenario however, the disutility from profit effort can be discounted by the variable g, which represents the cross-effort cost mitigation parameter for the Green Agent, while b is assumed to be zero. Since the two parameters g and b are similar in their working, the next two sections investigate whether the model and its assumptions and outcomes still hold when dropping one of those variables. In the first step g is taken into consideration and therefore assumed to be $g > 0$ which serves as the second assumption.

Following the standard LEN-model, the sections are again structured in a first-best case and then a second-best case in order to generate reliable findings which are comparable to the Standard Agent's benchmark case.

4.2.1. First-best Green Agent with mitigation parameter g and discount factor $b = 0$

The first-best case with the above assumptions is presented below. Mathematical derivations and explanations can be found in Appendix 1.3.

As before, the principal wants to maximize his profits and can observe the efforts in the first-best case, resulting in

$$p^{FB2*} = \frac{2(2f_p + gf_v)}{4k - g^2} \text{ and } v^{FB2*} = \frac{2(2kf_v + gf_p)}{4k - g^2} \qquad [18]$$

which are the optimal efforts. Both efforts are dependent on f_p and f_v, effort- and virtue productivity, k the multiplier for profit effort and g the cross-effort cost mitigation parameter. If k increases, both the profit and the virtue effort decrease, which follows the logic that when the cost of working increases the effort to work decreases when holding utility constant or the Green Agent would demand a higher wage with rising k. The opposite applies if g, the mitigation from profit effort by virtue effort, increases. This works through two different ways: on the one side the effect of the respective productivity, f_p and f_v, are increased, on the other side the negative influence of g in the denominator increases the whole term. This supports the same logic as before, since g discounts the costs incurred through profit tasks when engaging in virtue tasks and therefore increases the Green Agent's efforts when rising.

In each case of effort, both productivities influence the optimal effort. This is due to the Green Agent's cost function which depends on both kind of efforts equally. Intuitionally this means that when optimizing, the Green Agent will choose not only one of the efforts but a mix between them. This reflects the fact that the Green Agent will only make a certain amount of profit effort so that he does not become dissatisfied. Contrary to the Standard Agent, the Green Agent experiences an interdependence between the two types of effort.

In the next step, after finding the optimal efforts, the Green Agent is compensated accordingly for his work. Since both efforts are observable in the first-best scenario, the Green Agent's compensation is

$$W = \frac{1}{2}(kp^2 + 2U_0 + v^2 - gpv) \qquad [19]$$

and depends positively on his reservation utility and the costs through work as well as negatively on the cross-parameter mitigation.

After incorporating the Green Agent's salary and the two optimal efforts, one obtains the profit

$$\pi^{FB2*} = \frac{U_0(g^2 - 4k) + 2(f_v^2 + gf_vf_p + kf_p^2)}{4k - g^2}$$

for the principal. This again has similar effects as above in the case of the optimal efforts. As k increases, profit goes down, while when g increases, profit goes up. The intuition behind this mechanism is the same as before: higher costs of working for the Green Agent through k increase the principals cost of hiring the Green Agent and therefore decreases the profitability of the company, while a higher impact of the mitigation parameter g makes the Green Agent comparatively cheaper to hire, since his costs decrease. Through g, the Green Agent increases the effort of both types of tasks, which leads to a more efficient distribution of both and thus increases the overall profitability of the company. Furthermore, profit depends on the productivity parameters which affect it positively but are not further investigated here, they are also affected by g and k respectively.

4.2.2. Second-best Green Agent with mitigation parameter g and discount factor $b = 0$

The following will discuss the second-best scenario for the Green Agent, based on the assumptions made above. Due to the higher costs incurred by the multiplier k for profit effort, and the discounting effect of the parameter g, the principal will now set incentives to motivate

the Green Agent in the second-best case to maximize his profit despite the disadvantage posed by uncertainty. The scenario will be modeled and analyzed below. Mathematical derivations and explanations can be found in Appendix 1.4.

As in the second-best case for the Standard Agent, the agent's payment now consists of the bonus coefficient in addition to the fixed salary. The bonus coefficient depends on the two optimal incentives which are

$$\beta_p^{SB2*} = \frac{2gf_v\sigma^2+4f_p(1+\sigma^2)}{4+4(1+k)\sigma^2-(g^2-4k)\sigma^4} \text{ and } \beta_v^{SB2*} = \frac{4f_v+2(gf_p+2kf_v)\sigma^2}{4+4(1+k)\sigma^2-(g^2-4k)\sigma^4} \quad [21]$$

and are established in order to direct the Green Agent's efforts towards the optimal profit for the principal. These incentives increase when the virtue effort contributes more effectively, namely higher g, to reducing the agent's disutility from making profit effort, namely k. In addition, it can be stated that with an increase in k, the incentive strengths decrease. It can therefore be seen that the parameter g represents a link between the two efforts by having a positive influence on both. At the same time, the incentives increase when the variance, σ^2, decreases. This is mainly due to the fact that if the Green Agent provides the principal with information that contains more errors, which means is more uncertain due to external influences, the principal reduces the weighting in order to minimize the risk.

The impacts of g on the respective incentives is modelled in the following four figures. As one can see an increase in g increases the respective incentive, while the level on how strong the influence of g is, depends on k, which is illustrated by the two different graphs for low and high k. The Standard Agent, who does not have the parameters g and k in his cost function and therefore they do also not appear in his incentive strength, has a constant level of incentive weight for profit effort. But as one can also see, comparing the Green Agent with the Standard Agent, that it is not only the level of g which influences the difference between the two employees but also the level of k, which contributes to the weight of incentive of profit effort. Intuitionally this makes sense, since the lower k the less costly for the Green Agent to engage in profit effort so the incentives put on the effort have a stronger influence on his preferred level of profit effort. This also explains the higher increase through g in the case with low k.

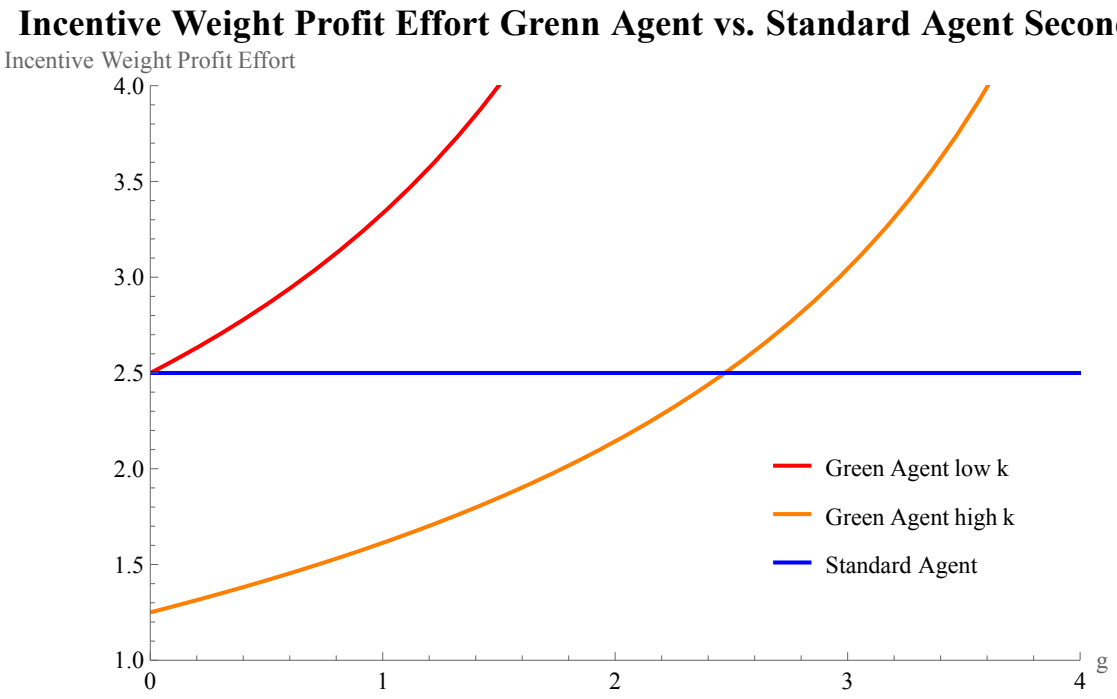

Figure 1: Incentive Weights Profit Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g.

Values used: $f_p = 5, f_v = 5, k^L = 1.1, k^H = 3, \sigma^2 = 1.$

Comparing this with the case, visible in Figure 2, where the variance within the incentive weight for profit effort is higher, g must assume a certain value so that the Green Agent has a higher incentive for profit effort than the Standard Agent. Thus, with higher uncertainty, the principal must compensate the agent even more through g, which is reflected by more virtue tasks. Under higher uncertainty, the level of the incentive weight for profit effort is lower for both, the Standard Agent and the Green Agent. This means that under higher uncertainty, both agents have less incentive to invest in profit tasks in general, for which reasons such as financial uncertainty, fluctuating salary and pressure or stress may be responsible. Conversely, this means that both agents are reacting more sensible under safe circumstances.

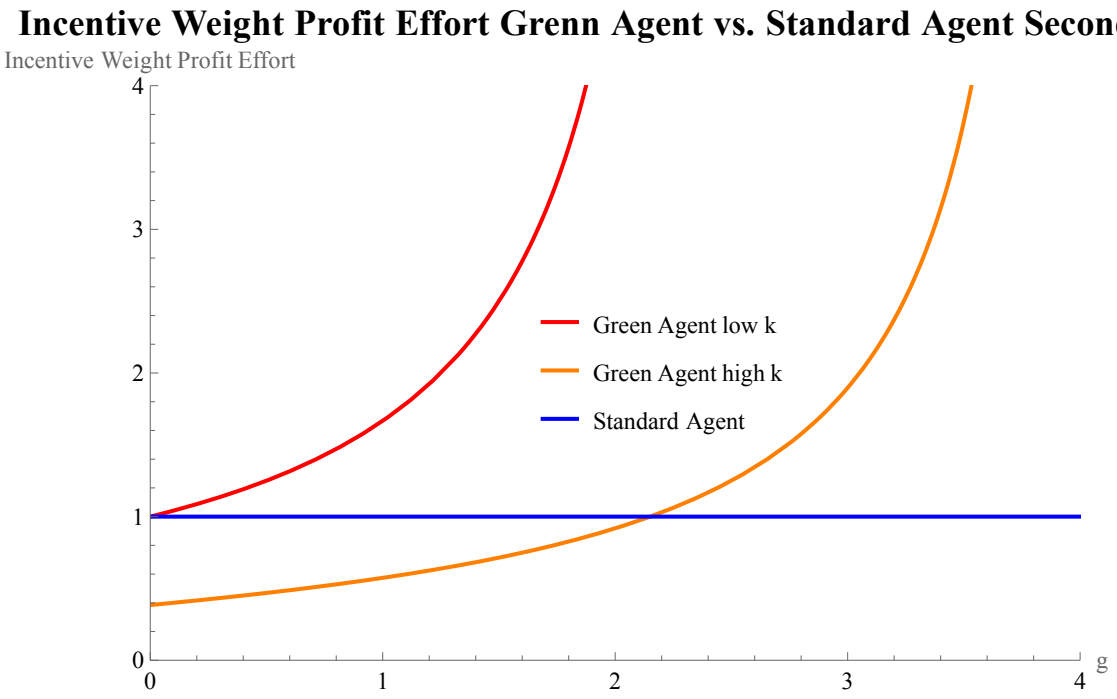

Figure 2: Incentive Weights Profit Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g with higher uncertainty.

Values used: $f_p = 5, f_v = 5, k^L = 1.1, k^H = 3, \sigma^2 = 2.$

Similar results hold for the case of the incentive strength put on virtue effort. While the incentive weight for the Standard Agent continues to be constant, it is also visible that for a low k the incentive weight on virtue effort for the Green Agent has a very similar impact on the Green Agent as the one for profit effort in the low k scenario. The underlying intuition would be that for a low k the Green Agent does not mind engaging in profit effort as much and therefore would react to the incentives in a similar way. This changes with a higher k. As it is shown in Figure 2, when k is high, the incentive weight and its impact on the Green Agent are diminished but still on a higher level than the one for profit effort in the low k scenario. This illustrates the fact that, with a high k, the Green Agent reacts stronger on the incentive for virtue effort since it is more costly for him to engage in profit effort, while engaging in virtue effort would mitigate some of these costs.

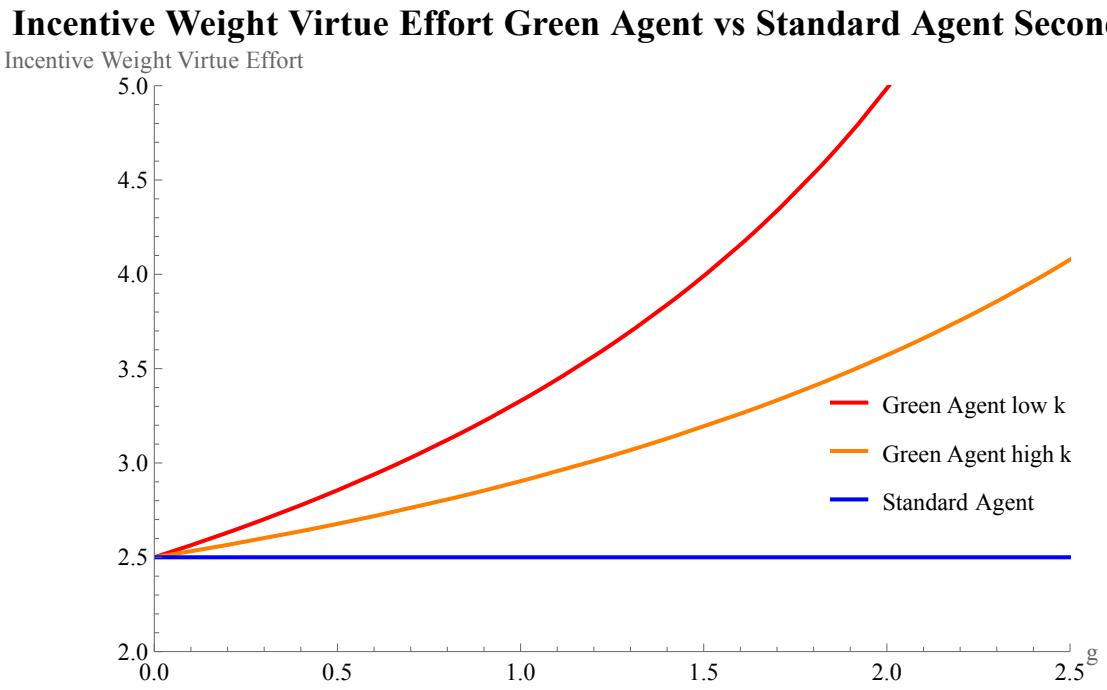

Figure 3: Incentive Weight Virtue Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g.

Values used: $f_p = 5, f_v = 5, k^L = 1.1, k^H = 3, \sigma^2 = 1.$

Furthermore, in the case of virtue effort, it can also be seen that under higher uncertainty σ^2, the general level of the incentive weight for virtue effort is lower, showing in Figure 4 above. Nevertheless, the Green Agent has a higher level of incentive weight for virtue effort under both, low and high uncertainty, for the values used. However, when g reaches a certain threshold, both curves, with high and low k, are steeper for the Green Agent. The Standard Agent has the same level for both, the incentive weight for profit effort and the incentive weight for virtue effort, at higher uncertainty using the same values for the parameters.

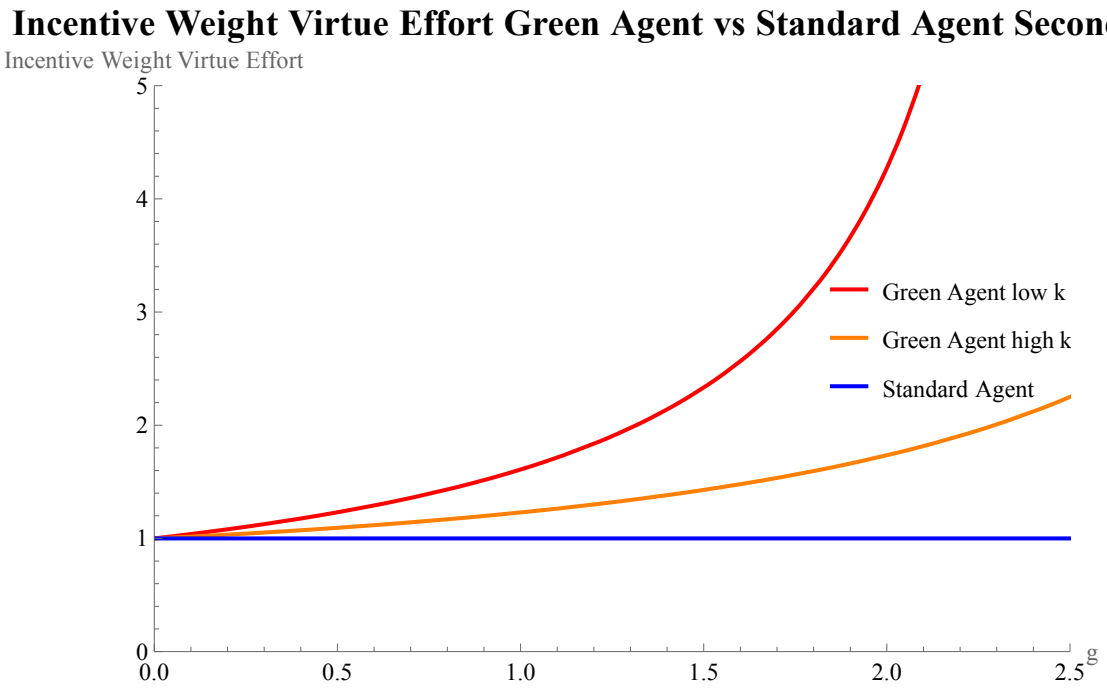

Figure 4: Incentive Weight Virtue Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g with higher uncertainty.

Values used: $f_p = 5, f_v = 5, k^L = 1.1, k^H = 3, \sigma^2 = 2.$

In turn, the incentives also have an important influence on the two efforts, which are initially a function of the incentives

$$p^{SB2*} = \frac{4f_p(4 + (4 + g^2)\sigma^2) + 8gf_v(1 + (1 + k)\sigma^2)}{(g^2 - 4k)(-4 - 4(1 + k)\sigma^2 + (g^2 - 4k)\sigma^4)} \qquad [22]$$

$$v^{SB2*} = \frac{4(2gf_p + 4kf_v + (2g(1 + k)f_p + g^2 f_v + 4k^2 f_p)\sigma^2)}{(g^2 - 4k)(-4 - 4(1 + k)\sigma^2 + (g^2 - 4k)\sigma^4)}$$

which shows that again the higher any of the incentives, the greater the respective effort. Another important aspect is the increase in g again leads to higher efforts. Figures 5 and 7 illustrate this effect for the respective effort in comparison to the Standard Agent. Since the incentive weights mainly drive the level of the respective effort, it is intuitionally, that the behavior of the graphs is quite similar as for the incentive strengths. Again with low k the Green Agent puts in a lot of profit effort and reacts quite strongly on the incentives set for it. But even in the scenario with high k it is observable that when g is high enough to counteract the costs incurred through k, the Green Agent still puts in more profit effort than the Standard Agent, which is shown in Figure 5.

Figure 5: Profit Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g.

Values used: $f_p = 5, f_v = 5, k^L = 1.1\,, k^H = 3, \sigma^2 = 1.$

In addition, another important effect is the changes that become visible in comparing Figure 5 with Figure 6 when lower or higher variance, namely σ^2, is present. In the case of a higher variance, it becomes apparent that g must assume a significantly higher value for the Green Agent to have a higher level of profit effort than the Standard Agent. This again means that g must compensate for the uncertainty with tasks that the Green Agent favours, such as meaningful tasks. The Standard Agent, on the other hand, has no variance in its profit effort function and therefore has a constant and equal level of profit effort compared to the Green Agent.

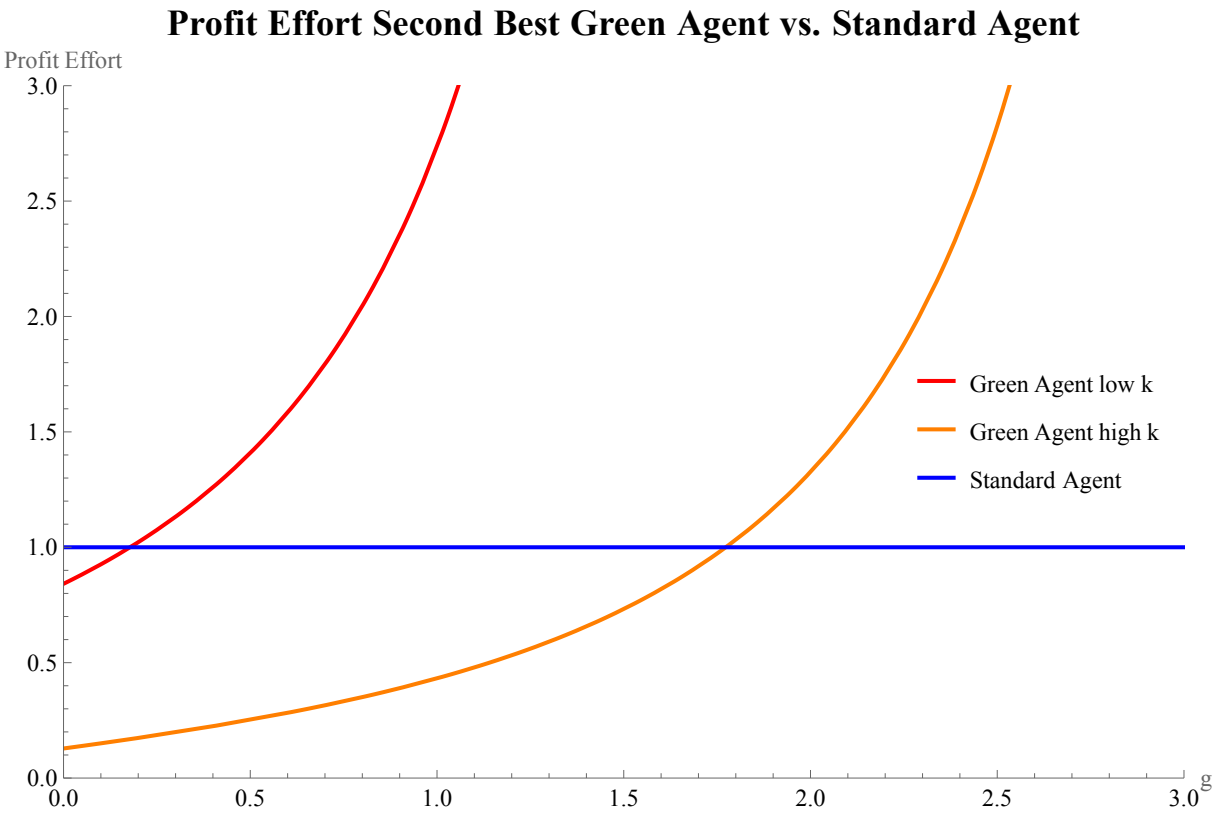

Figure 5: Profit Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g with higher uncertainty.

Values used: $f_p = 5, f_v = 5, k^L = 1.1\,, k^H = 3, \sigma^2 = 2.$

As discussed above, the effects on virtue effort are quite straight forward. With both, low k and high k, effort levels are very similar for low values of g. While in the case of a lower k the Green Agent reacts stronger to an increase in g and on the incentives put on more virtue effort. He therefore also puts in more virtue effort than the Standard Agent since he has an incentive to do so through g per se.

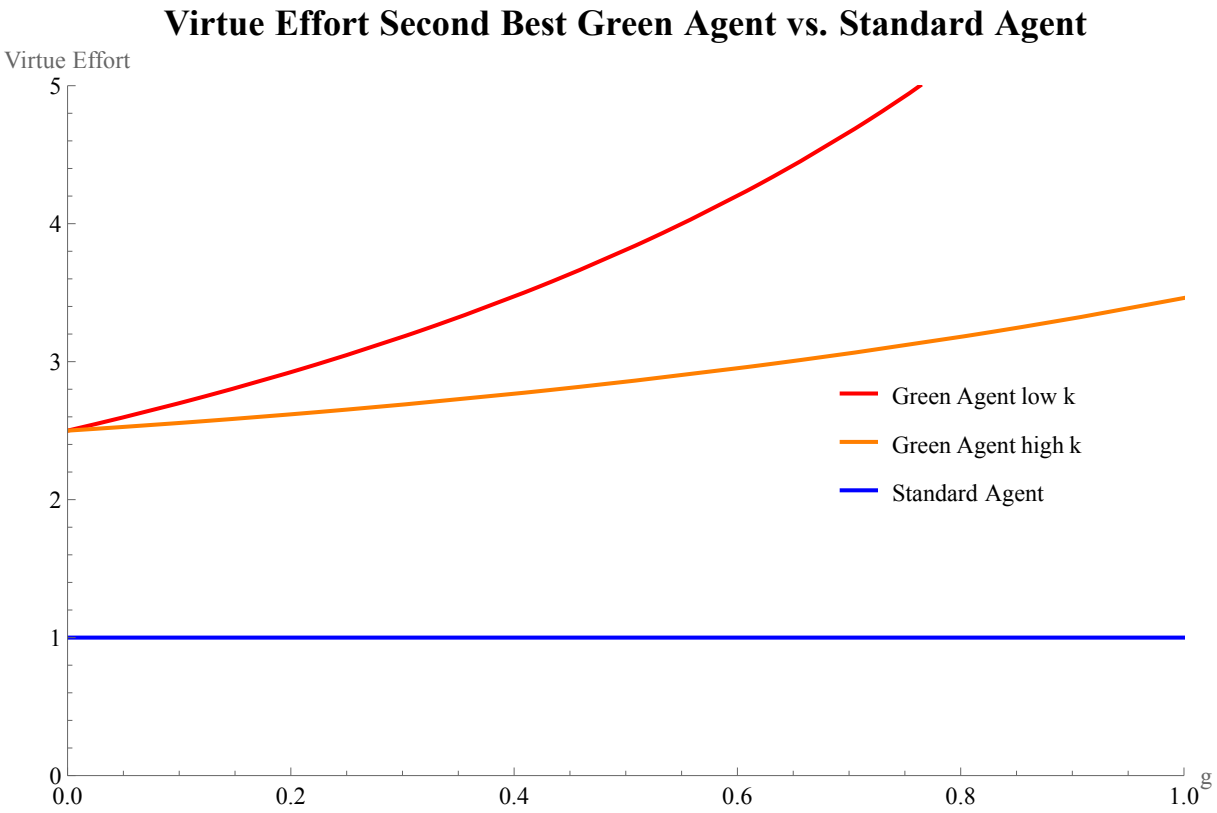

Figure 6: Virtue Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g.

Values used: $f_p = 5, f_v = 5, k^L = 1.1\,, k^H = 3, \sigma^2 = 1.$

The level of virtue efforts is generally lower under a higher variance. This is mainly due to the fact that higher variance is accompanied by higher uncertainty for the employees. The parameter g for the Green Agent must assume a higher value under higher uncertainty in order to reach the same level as under a lower variance. This becomes clear when comparing the two Figures 6 and 7 with each other.

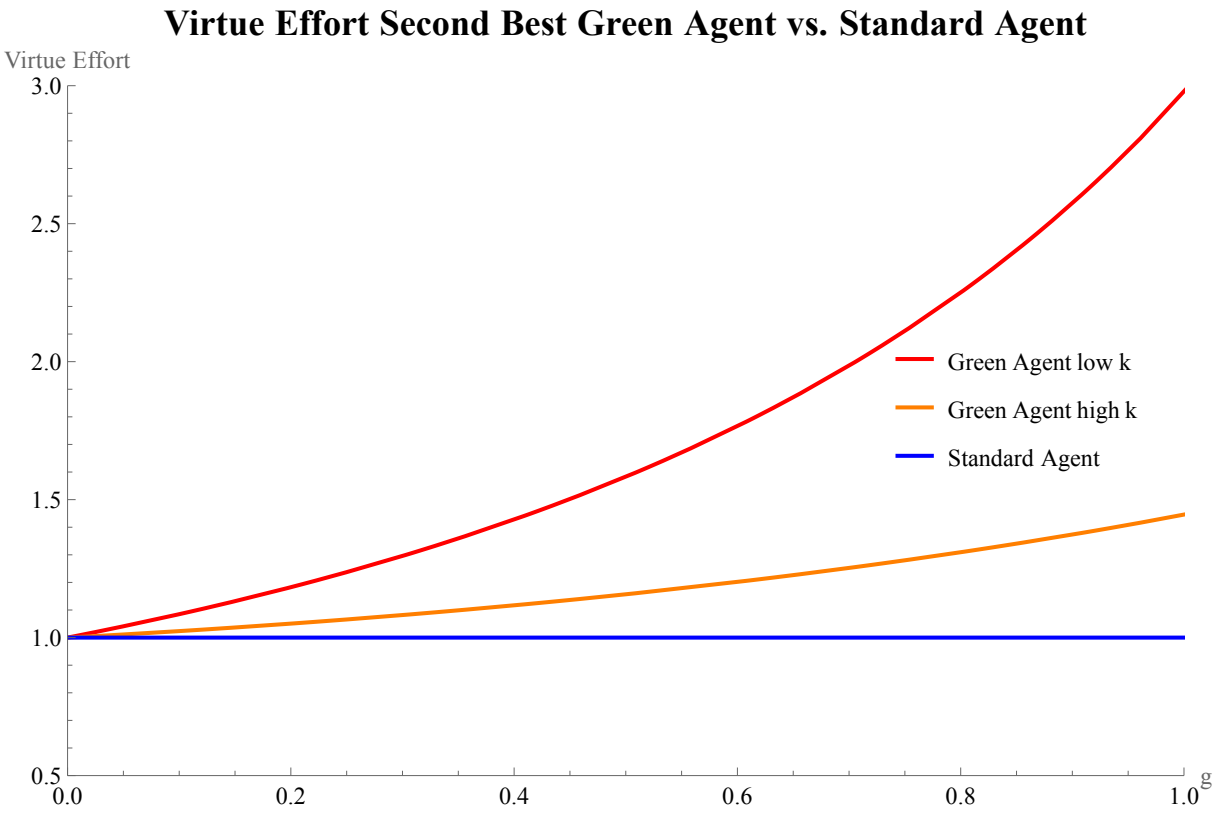

Figure 7: Virtue Effort Second-best Green Agent vs. Standard Agent with mitigation parameter g with higher unvertainty.

Values used: $f_p = 5, f_v = 5, k^L = 1.1\,, k^H = 3, \sigma^2 = 2.$

To obtain the optimal profit for the principal, both incentives and efforts are used in the objective function which is

$$\pi^{SB2*} = \frac{8\left(f_p^2 + g f_p f_v + k f_v^2\right) + 2((4+g^2)f_p^2 + 4g(1+k)f_p f_v + (g^2+4k^2)f_v^2)\sigma^2}{(g^2-4k)(-4-4(1+k)\sigma^2 + (g^2-4k)\sigma^4)} - U_0$$

and depends now on the reservation utility U, which has to be smaller than the first part for the profit to be positive. As before, profit also depends positively on both productivities by the Green Agent which contribute directly to the profit. The parameters g and k as well as the uncertainty measure σ^2 are twofold in their mechanisms since they enter the profit function in an increasing way through the numerator, as well as they influence the profit in a decreasing manner through the denominator. To summarize, the mechanisms described above show how important it is to create the right incentives.

As Figure 8 demonstrates, the profit is strictly increasing in g. This is intuitional in a sense that the higher g the higher the mitigation of costs of working for the Green Agent so he will put in more effort and thereby raise the principal's profit.

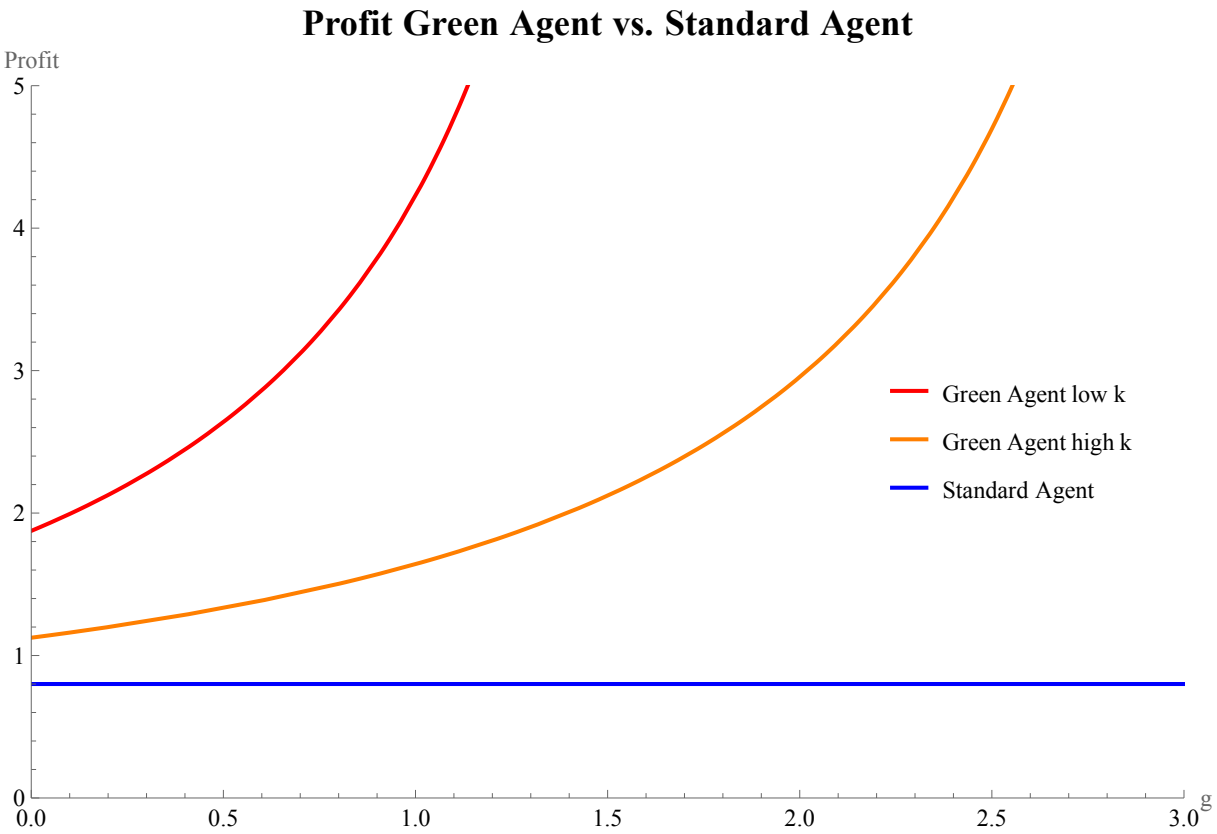

Figure 8: Profit Second-best Green Agent vs. Standard Agent with mitigation parameter g.

Values and function used: $U = 1, f_p = 1.5, f_v = 1.5, k^L = 1.1, k^H = 3, \sigma^2 = 0.5.$

Figure 8 also shows that with a lower k, profit is increasing even stronger in g, since the lower k reduces the costs of engaging in profit effort for Green Agent and therefore increase his productivity with respect to profit. As before the profit made through hiring a Standard Agent does not depend on g which makes the respective profit function constant. Still, with the assumed parameters the Green Agent performs a better profit for the principal even in the high k and low g case. This even holds when it comes to a higher variance, which indicates a higher uncertainty for the Green Agent even with a high or low k. In Figure 9 it is visible that the general level in all three scenarios is lower under a higher σ^2. Comparing both graphs, higher variance leads to lower profit levels for the company. For employees, greater uncertainty means that there may be fluctuations in the amount of their income, which may lead to higher turnover rates, but also to more stress and pressure at work. At the same time, a variable compensation structure, which represents the risk premium, of which the variance is a part, entails higher administrative burdens and thus higher costs for the company. On the other hand, even if the company does not perform well, there is better control of the cost structure and the payment of low incomes to employees.

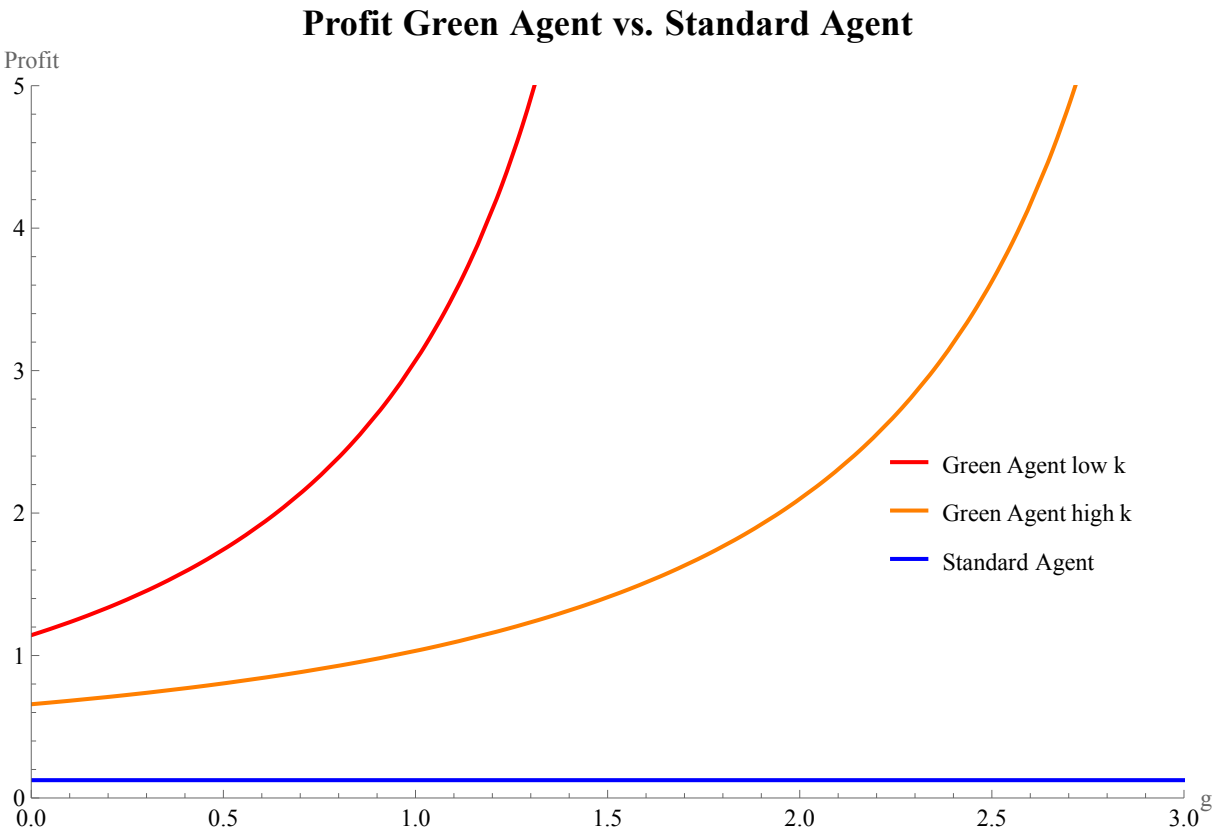

Figure 9: Profit Second-best Green Agent vs. Standard Agent with mitigation parameter g with higher uncertainty.

Values used: $U = 1, f_p = 1.5, f_v = 1.5, k^L = 1.1, k^H = 3, \sigma^2 = 1.$

As both Figures for profit effort show, with the given level of the parameters, the Green Agent is strictly more profitable than the Standard Agent, which will be discussed in more detail in the discussion section. It becomes clear that employee preferences should be taken into account when designing incentive systems. If companies find the right interplay between profit and virtue tasks, as illustrated here, and minimize uncertainty, overall performance and profitability can be maximized with an employee who has preferences for CSR.

4.3. Green Agent with discount factor b and mitigation parameter $g = 0$

The next section takes a closer look at the third assumption: the discount factor b. This parameter enters the Green Agent's utility function and therefore primarily affects his utility which is now discounted by bv. This means that if the Green Agent engages in virtue effort his reservation utility is reduced proportionally to b, which leads to the fact that the principal can reduce the Green Agent's wage and safe costs. To analyze this in more detail, the second assumption is not considered, which means g is assumed to be zero.

As before, the first-best case is analyzed and then the second-best, to make it comparable with the Standard Agent benchmark.

4.3.1. First-best Green Agent with discount factor b and mitigation parameter $g = 0$

The first-best case with the above assumptions is presented below. Mathematical derivations and explanations can be found in Appendix 1.5.

Due to perfect information, the principal can precisely observe the optimal efforts levels

$$p^{FB3*} = \frac{f_p}{k} \text{ and } v^{FB3*} = b + f_v \qquad [23]$$

of the Green Agent. It is recognizable here that the profit effort depends both on the profit productivity f_p, but also on k, which acts as the multiplier for the cost of profit effort for the Green Agent. The higher the productivity for profit and the lower the costs due to profit tasks, the greater the effort.

Virtue effort, on the other hand, depends on the productivity for virtue f_v and the discount factor b. It increases when productivity and the discount factor increase and vice versa. If the Green Agent invests more in virtue tasks, this doubles the positive effect through the productivity and the discount factor. It should be emphasized that b only has an influence on the virtue effort. This is because b only depends on virtue effort in the utility function and therefore has no influence on his profit effort. When applied, this means that the Green Agent can only reduce his reservation utility through virtue effort, and it thus becomes more economically for the company to give the Green Agent more tasks in this area in order to reduce the Green Agent's wage. A first notable difference to the Green Agent's results before is, that in this case there is no interdependence between the two efforts.

Once the two effort levels have been determined, the Green Agent is compensated according to the following wage function

$$W = \frac{1}{2}(kp^2 + 2U_0 - 2bv + v^2) \qquad [24]$$

which depends positively on his reservation utility, his costs of work for both efforts and negatively on the discounting factor by b.

Taking both efforts and the wage function into account, the profit in the case of perfect information is obtained as

$$\pi^{FB3*} = \frac{f_p^2 + k(-2U_0 + (b + f_v)^2)}{2k}$$

for the company. The function shows that the smaller the cost parameter for profit is, namely k, the greater the profit for the principal. This is due to two mechanisms: Firstly, k has a twofold influence on the numerator, on the one side it lowers profit through the negative reservation utility which will increase if k increases, on the other side it raises the profit through the connection with b and f_v. Secondly, k is the only variable in the denominator, which means the higher k, the lower the profit in general.

Intuitionally this again means that the Green Agent's profit effort is costly but is now counteracted by the fact that through more virtue effort these costs can be discounted through his utility discount b. Apart from that, the profit increases when both productivities increase. But the productivity of virtue is still positively influenced by b, and thus has a stronger influence on profit compared to the profit productivity.

It can be stated that in the first-best case, the Green Agent delivers better results for the company if the principal gives him fewer profit tasks. This is particularly the case as the discount factor b, unlike g, only depends on the virtue effort.

4.3.2. Second-best Green Agent with discount factor b and mitigation parameter $g = 0$

Keeping the assumptions made above, where b is the discount factor to be dealt with, and now going into the scenario with asymmetric information, the principle can no longer recognize what level of effort the agent is pursuing. Nevertheless, the principle still wants to maximize his profit and now uses incentives to encourage the agent to make the profit maximizing effort. For the mathematical derivations and proofs see the Appendix 1.6.

Due to the fact that there is asymmetric information between the principal and the agent, the salary of the Green Agent, as typically for the imperfect information case, consists of two parts: Firstly, the base salary, and secondly, a bonus coefficient.

The latter arises from the incentive weights set by the principal as a motivational factor, and the signals provided by the agent to the principal regarding their performance. The incentive weights are therefore

$$\beta_p^{SB3*} = \frac{f_p}{1+k\sigma^2} \text{ and } \beta_v^{SB3*} = \frac{f_v+b}{1+\sigma^2} \qquad [25]$$

and reflect how much additional compensation an employee receives for achieving higher levels in each type of effort. The incentive weight for profit effort increases when the productivity for profit also rises. In the case of the incentive weight for virtue effort, this also applies to the productivity for virtue. Since the incentive weight for profit effort is dependent on k and independent of the discount factor b, the incentive functions, whether with a higher or lower k are now constant, like the incentive function of the Standard Agent. Therefore it holds, if k increases, the incentive for profit effort decreases. It can therefore be seen that in this scenario the discount factor b has no influence on the incentive weight of profit effort for the Green Agent, and therefore the Green Agent only has strictly lower incentives than the Standard Agent, even at the lowest k, because $k > 1$ applies.

This is different for the incentive of virtue effort. This incentive is positively dependent on b and independent of k. As visible in Figure 10 the mechanism is, if the discount factor increases, the incentive level for virtue effort increases as well. Since the assumption, that b has to be positive, applies, the Green Agent always has a higher level of the incentive of virtue effort compared to the Standard Agent. The incentive for virtue effort for the Green Agent is linearly increasing in b and is always strictly higher than the Standard Agent's. The parameter b increases the incentive weights for virtue effort, which makes the Green Agent more motivated to engage in virtue-oriented tasks. This has a positive impact on the overall profitability of the company.

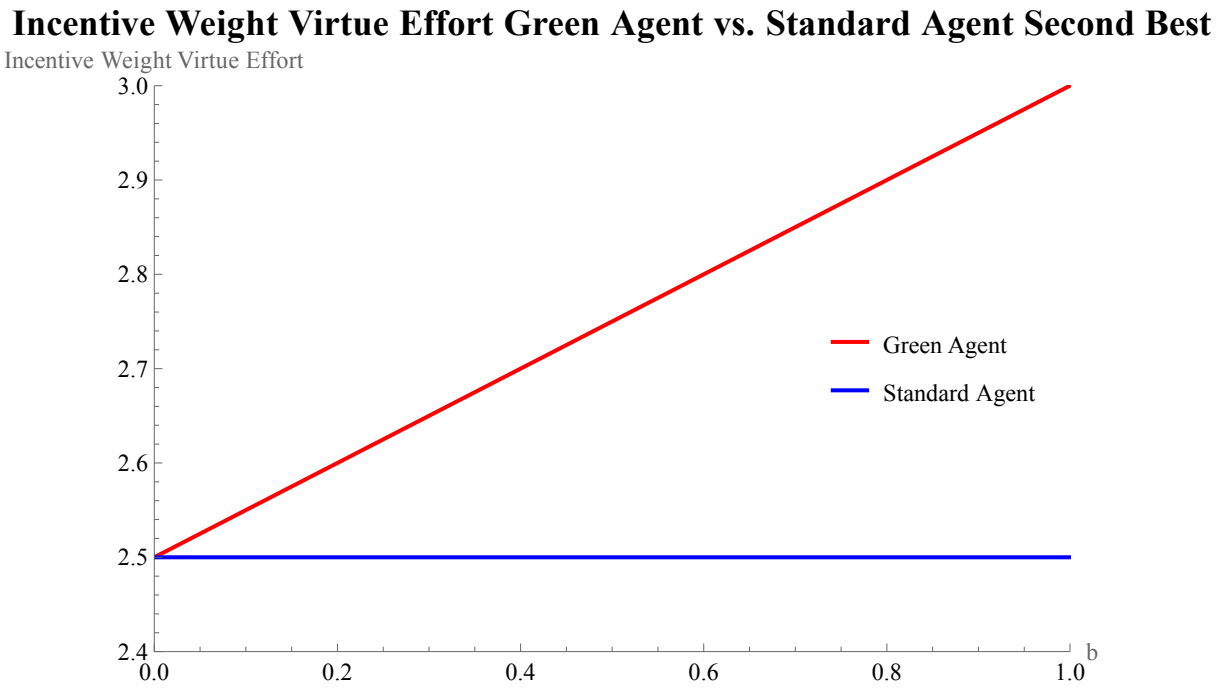

Figure 10: Incentive Weight Virtue Effort Green Agent vs. Standard Agent Second-best.

Values and function used: $f_v = 5, \sigma^2 = 1$.

Both denominators consist of the uncertainty of the performance measurement which is shown by the parameter σ^2. If the uncertainty increases, both incentive weights decrease. This means, if the agent gives incomplete information about the completion of his tasks, either profit or virtue, the uncertainty for the principal increases and therefore the incentive weights decrease. This is again visible in Figure 11 below.

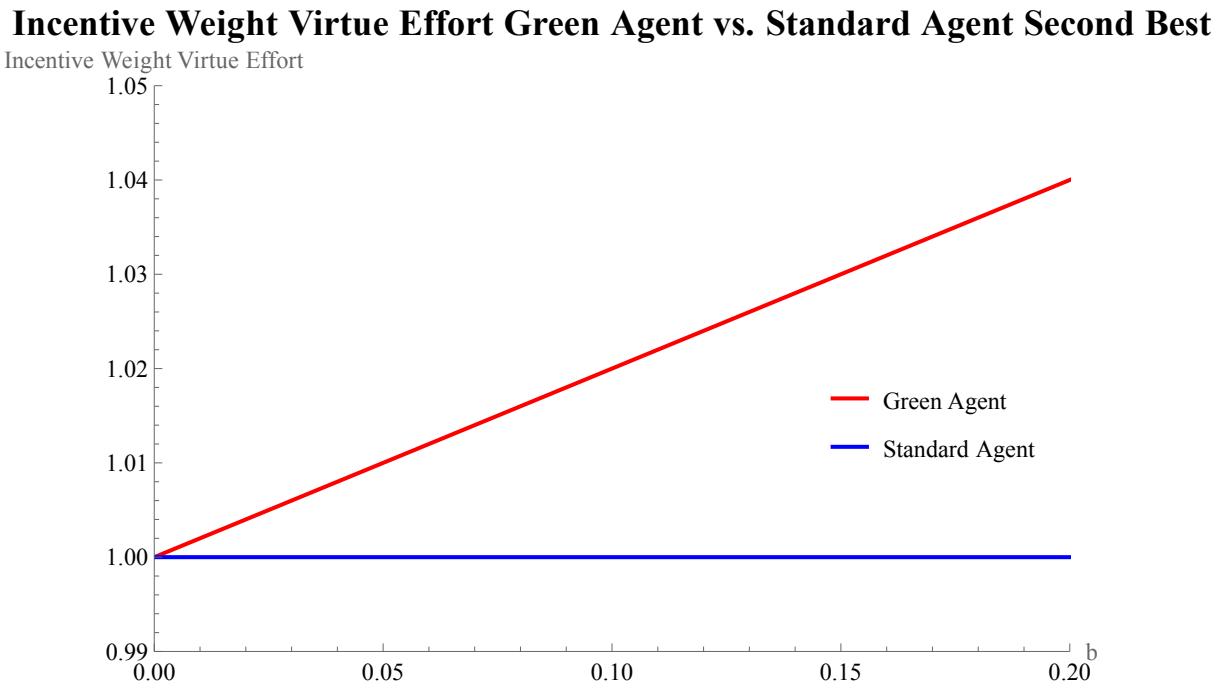

Figure 11: Incentive Weight Virtue Effort Green Agent vs. Standard Agent Second-best with higher uncertainty.

Values and function used: $f_v = 5, \sigma^2 = 2$.

The incentives are set by the principal in a way to guide the Green Agent in the direction of effort levels which maximize the principal's profits. The optimal effort levels are then defined as

$$p^{SB3*} = \frac{f_p}{k+k^2\sigma^2} \text{ and } v^{SB3*} = \frac{f_p+b}{1+\sigma^2} \qquad [26]$$

and consisting of each productivity, cost for profit effort or the discount factor. The profit effort of the Green Agent is the respective incentive weight divided by k. Which means, if the costs for profit effort increases for the Green Agent, the profit effort decreases. Since both functions, the Green Agent's, and the Standard Agent's, for profit effort are independent of b, the profit effort levels are constant. This shows that, k is the only parameter which has a direct effect on profit effort. With a lower level of k the Green Agent has a higher level of profit effort compared to the Standard Agent, which results from his lower levels of incentive for profit effort. The opposite is the case when k is high. If k increases, the Standard Agent becomes relatively stronger in profit effort.

When it comes to the virtue effort for the Green Agent, it is visible that it is equal to his incentive weight function and therefore independent of k and only indirectly dependent on b, through the incentive weight. Comparing this with the Standard Agent, it is seen that his virtue effort is as

well equal to his incentive weight for virtue effort. The effort in virtue for the Standard Agent remains constant since it is independent of b but the Green Agents virtue effort increases as b increases, which is shown in Figure 12 below. In order to generate a different outcome for the Green Agent compared to the Standard Agent, the incentive weight for virtue is now not assumed to be constant, but the function itself is used to show the indirect effect of b on the effort levels, namely through its working in the function for virtue effort.

Figure 12: Virtue Effort Second-best Green Agent vs. Standard Agent with b.
Values used: $f_v = 5, \sigma^2 = 1$.

Using these results, namely the two optimal incentive weights and effort levels, the optimal profit is now defined as

$$\pi^{SB3*} = \frac{f_v^2}{2 + 2\sigma^2} + \frac{f_p^2}{2k + 2k^2\sigma^2} + \frac{b(2f_v + b)}{2(1 + \sigma^2)} - U_0$$

and therefore, again positively depended on both productivities as well as b. The profit in turn decreases due to the negative interdependence with the reservation utility as well as through higher insecurity, that is higher σ^2, and higher k. Through the third term in the profit function, the effect of the discount factor b on the productivity in virtue is highlighted. When the productivity in virtue effort increases, this has a double effect compared to the profit

productivity, due to the influence on the two parts of the function. Here, the main working of b as a discount factor is highlighted. Since it only influences the virtue effort part of the Green Agent, this enters the principals profit twofold, and therefore has a high influence on the profit. This should lead to the fact that the Green Agent should engage in higher levels of virtue effort in order to become more profitable for the firm, which is to be discussed in greater detail in the following discussion section.

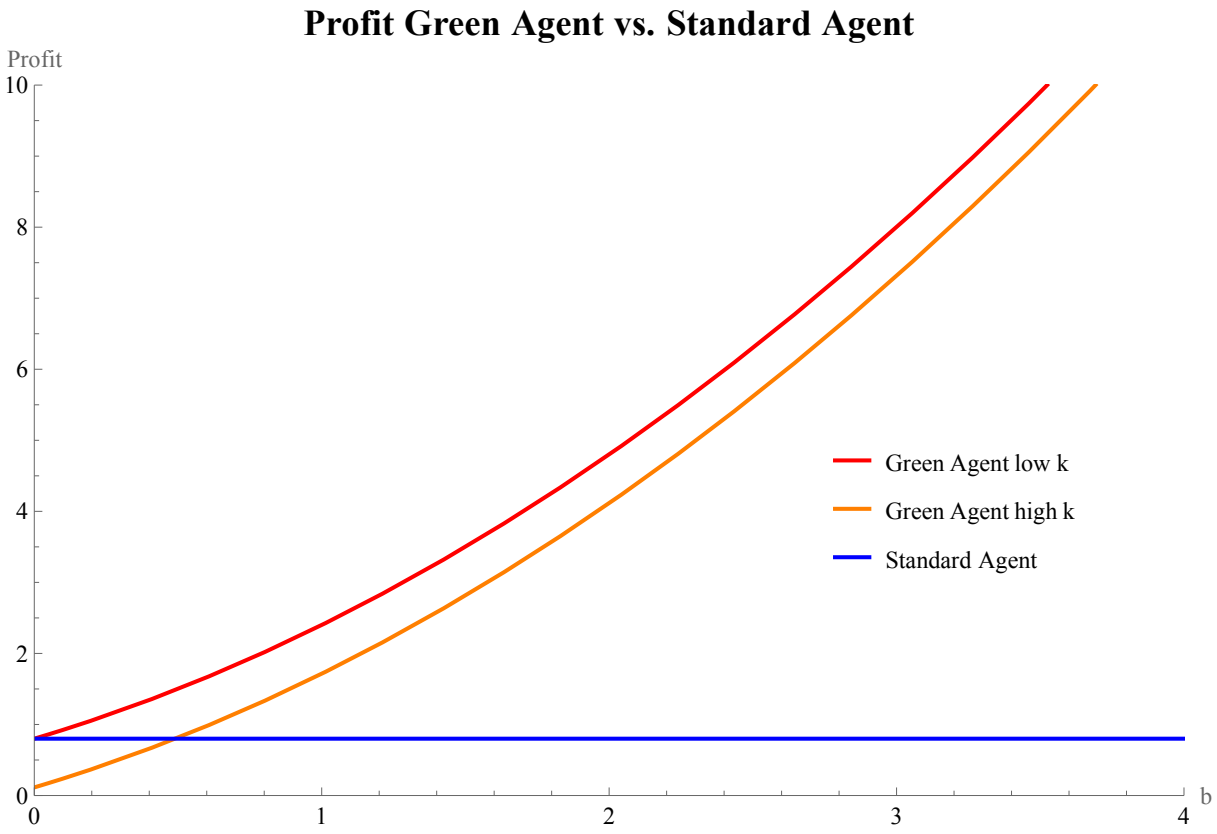

Figure 13: Profit Second-best Green Agent vs. Standard Agent with b.

Values used: $U = 1, f_p = 1.5, f_v = 1.5, k^L = 1.1, k^H = 3, \sigma = 0.5.$

Figure 13 illustrates that with an increase in b, the profit for the company rises. In the case of a lower k, the profit is always higher for the assumed parameters than for the Standard Agent. Comparing this with the case of a higher k, whereby the curve is not as steep as in the lower k scenario, the profit is only greater from a certain threshold value of b. Since the Standard Agent's profit is not dependent on b, the level of his profit with the assumed parameters is constant.

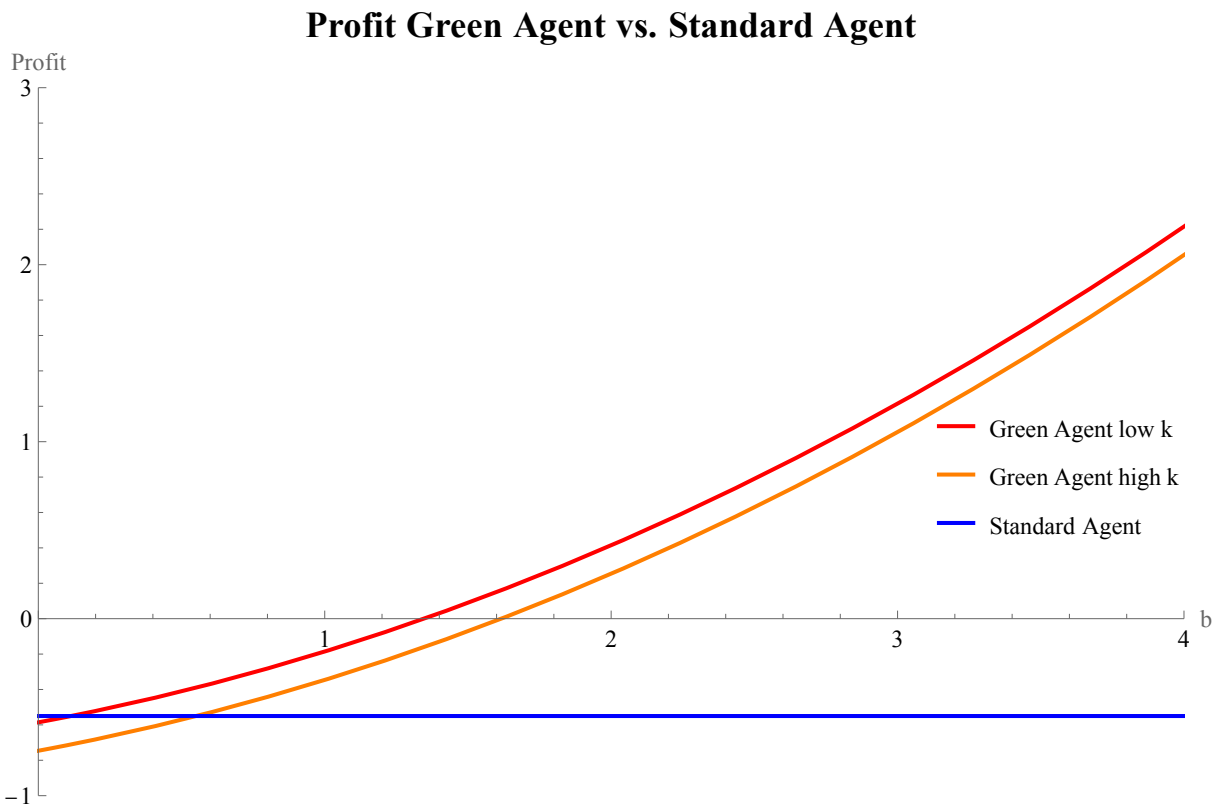

Figure 14: Profit Second-best Green Agent vs. Standard Agent with discount factor b and higher uncertainty.

Values used: $U = 1, f_p = 1.5, f_v = 1.5, k^L = 1.01, k^H = 3, \sigma = 2.$

Figure 14 again clearly shows that with a high variance, i.e., a high uncertainty of income for the agent, which can lead to high fluctuations in income flows, the Standard Agent as a financially driven employee would only bring costs for the company. The Green Agent, on the other hand, becomes profitable for the company above a certain threshold value of b. For the company, this means that with a high variance, employees can only be recruited if this can be offset by meaningful tasks.

It can be concluded that upon closer examination of the discount factor b, it is therefore significantly more profitable for the company to assign more virtue tasks to the Green Agent to make more efficient use of the efforts of the Green Agent. The principal can therefore set the right incentives to optimize the profit through increased motivation of the Green Agent due to virtue tasks. In addition to that, b can help to reduce the compensation for the Green Agent, since virtue tasks reduce the overall reservation utility, which can also lead to a higher profit. These results may motivate the principal to integrate CSR incentive structures in order to increase the attractiveness of the company as an employer and to implement more sustainable and profitable strategies.

5. Model summary and discussion

In this section the model is summarized and there will be a discussion on the model's analysis and calculations in Chapter 4. First the respective results from Chapter 4 will be summarized to compare them with the results of Smith (2022) later, and to outline the main differences. This is followed by a discussion of the results.

5.1. Model summary

Focusing on the results from Chapter 4.2 with the mitigation parameter g, it becomes clear that for profit and virtue effort different mechanisms are in place. In the case of a high k, which means the costs for the Green Agent are high for profit effort, g has to be high enough for both, the incentive weight for profit effort and for the profit effort itself, so that the Green Agent is more profitable than the Standard Agent. With regard to the incentive for virtue effort and for the virtue effort itself, the Green Agent is always higher than the Standard Agent, whether k is low or high. It can therefore be concluded that g has a direct influence on profit and virtue effort and the respective incentive weight of these.

Regarding the results from Chapter 4.3 with the discount factor b, it is visible that b as a discount factor only has a direct influence on the incentive weight of virtue effort and on the virtue effort itself. The Green Agent reaches a higher level for both factors compared to the Standard Agent. The situation is different in the case of the incentive weighting for profit effort and the profit effort itself. Due to the direct influence of k on both variables for the Green Agent, the Standard Agent has a higher level for the respective variable than the Green Agent when k is high. As a result, the Green Agent is always more profitable for the principal when the cost of profit effort is low, and under high costs for profit effort, only becomes more profitable for the principal, if the value for b reaches a certain threshold, compared to the Standard Agent.

When comparing the results for the two examined parameters, b and g, it becomes obvious that their workings are quite different from one another. Although they serve a very similar purpose in their assumption, namely counteracting the costs arising from the assumption of k, their mechanisms differ fundamentally. While g, as was shown above, has not only a direct influence on both types of incentive weights, but it additionally enters the function for both efforts again. This is why g also appears in multiple different ways in the principal's objective function and therefore influences the profit in multiple ways, namely through both incentives and efforts. In the case of b, this is different, since it only influences the incentive weight for virtue effort, while not affecting the one for profit effort. This in turn leads to the fact that it only indirectly

influences the level of virtue effort through its mechanism in the incentive weight but does not have an additional impact like in the case with g. It also applies due to the fact that in the scenario with b the optimal virtue effort is equal to the incentive weight. Furthermore, it leaves the effort for profit untouched. This is also reflected in the principal's objective function where b only enters through the third part of the function, that it only influences the productivity for virtue and its incentive weight.

It has to be stated, that it is not possible to infer a general conclusion on whether the mechanism of b or the one of g is stronger, or rather which of these two parameters counterbalances the costs from k in a more effective manner. It is important to keep in mind, that this is strongly influenced by the assumptions taken on the value of the parameters. What is, the assumptions concerning the Green Agent might differ between employees, as the parameters are trying to capture preferences, which may vary for different employees and situations.

5.2. Model discussion

The results of this thesis add to the findings of Smith and can therefore have further implications for the conclusion of contracts between employer and employee, as well as the motivation of employees.

The outcome of the analysis with the mitigation parameter g indicates that the provision of CSR tasks is important twice, before and after the conclusion of the contract in order to motivate the employee through meaningfulness. This leads to the fact that he becomes more cost-effective for the company compared to the profit-seeking employee. If the costs of profit effort are low for the Green Agent, he is always more profitable than the Standard Agent. This is reflected in increased motivation when employees are given tasks in which they recognize purpose (Narayanan, 2022). At the same time, employees also tend to invest more in their work if the working environment, especially colleagues, benefits and support by the employer are existent, and the corporate commitment to CSR is in place (Koh and Boo, 2001). The results, the model delivers when the employee with purpose for CSR is only modelled with the variable g, can therefore be classified well in line with previous research findings, and underline the duality of g in choosing an employer as well as being motivated to work more productively.

On the other hand, there are the results of the analysis with the discount factor b, which causes the employee with purpose to accept a lower salary due to him valuing the engagement in virtue tasks. The findings also show that b primarily plays an essential role before the contracting process, as it influences his compensation level, but only has an indirect influence on motivation

afterwards through the incentive weighting of virtue effort. The key point here is, that if the costs of profit effort for the Green Agent are high, from a certain threshold for b onwards, the Green Agent maximizes the profit more than the Standard Agent. In the case of a low k, the profit for the company is always higher with the Green Agent. These results show that the concept of Green Hiring should play an even greater and more important role in the recruitment process to improve the sustainable performance of companies (Martins *et al.*, 2021). It is therefore important for the employee that the company appears to act sustainably in the first instance so that the employee decides in favor of the company. At the same time, it only makes sense for the company to hire an employee with an interest in CSR if the company has truly sustainable tasks for them, otherwise the profit is always higher with a classic profit-oriented employee. Conversely, however, this also means that companies can only engage in greenwashing practices if they have no interest in employees with a purpose for CSR. If only profit-orientated tasks are to be carried out, it is always better to hire the profit-orientated employee.

In both cases, the effects of hiring a Green Agent and the firm's engagement in virtue tasks might have a self-enforcing effect. This means that it becomes economically even more attractive to engage in virtue tasks when a Green Agent is hired, since this has now also a cost-lowering effect for the company on the wage level. When then in turn the firm already engages in more CSR activities due to cost-saving efforts, it becomes even more attractive to hire another Green Agent as there will be spillover effects of the CSR engagement on all employees of the type of the Green Agent. This also holds for the reverse case.

A part of the results of the work is the requirement that both g and b must reach a certain level in order to reflect the preferences for the Green Agent that are intended to be highlighted. However, this leads to the limitation that it is difficult to measure these two variables, g and b, accurately among employees. Furthermore, it should also be questioned how well these two variables can be distinguished from each other in real terms, as measurability in terms of utility functions can face different challenges. For this purpose, a measurability would have to be designed so that the model can make even more informed statements about the difference between virtue employees and profit-seeking employees.

Comparing this with the results of Smith (2022), who works with both variables, namely. g and b, it can be seen that even with both variables the values must reach a certain threshold value for the principal to adjust the Green Agent in order to be more profitable. Nevertheless, there is

a larger range, which can be seen in Smith's (2022) Figure 1, where he hires the Green Agent compared to the range of the Standard Agent

6. Conclusion

In this thesis the model of Smith (2022) was analyzed in more detail. The main goal is to examine two different employee types, namely the Green Agent and Standard Agent, regarding different incentive structures on the profitability of the company. Unlike the Standard Agent, the Green Agent has preferences for CSR- and ESG tasks, while the Standard Agent does not, and represents therefore a classic profit-orientated employee.

The results show that the Green Agent can be more profitable for the company under certain assumptions. These assumptions are the two parameters g and b, which influence the costs and incentives for profit- and virtue-orientated tasks. The parameter g influences the incentives and efforts in both types of tasks. The parameter b, on the other hand, only has a direct influence on virtue-orientated tasks. However, the analysis and calculations make it clear that the Green Agent is more profitable under low costs for profit-orientated tasks, which is illustrated by the parameter k. At higher costs, which means a higher k, a certain threshold value for b can be reached, so that the Green Agent is then also more profitable than the Standard Agent.

The results are of significance for contracting and in particular for incentive systems in companies, which demonstrates the importance for controlling. Controlling supports corporate management and can therefore integrate CSR objectives into the corporate strategy and promote long-term profitable business models. In addition to the financial key indicators, controlling can therefore also strengthen the non-financial key indicators and further expand this area. Through the impact of these non-financial indicators on corporate profitability, recommendations for optimization can be made and incorporated into the planning and budgeting process.

The research questions, *how preferences for non-profit activities affect contracting* and *if firms should hire workers with preferences for non-profit activities*, raised in the introduction can be answered in the sense that incentive contracts that take into account CSR activities can have a significant positive impact on corporate profitability. Employees, like the Green Agent, with preferences for virtue tasks, can be motivated by targeted incentives that increase their productivity and satisfaction while lowering their compensation. CSR incentive structures thus also consider the social and ecological responsibility of companies to act more sustainable in many ways in the long term.

Future research can extend this model and develop other forms of incentive schemes with respect to CSR preferences. For example, cultural and demographic differences among

employees could shift preferences with regard to CSR. Although the thesis shows that virtue employees can be more profitable for the company in this model, it should be noted that it is based on a theoretical model and therefore the application and effects may be different in practice. Future work can use this model to potentially test and extend it empirically.

In conclusion, it can be stated that the thesis contributes to the fact that companies can not only act in a more socially responsible manner by employing virtue employees but can also work more profitably. For controlling, this means that non-financial indicators and employees with preferences for CSR must be increasingly integrated into the corporate management in order to develop successful long-term strategies on the one hand, and to increase the employees' performance and therefore the profit of the company on the other hand.

Appendix 1. Mathematical derivations

Appendix 1.1. First-best Standard Agent

Objective function (OF): The objective function of the principal, and therefore the profit function of the company, in the first-best scenario is

$$OF = E[x] - \mathrm{E[w]}. \qquad \text{[A1]}$$

with $E[x] = f_p p + f_v v$ and $E[w]$ as the expected compensation of the agent.

Participation constraint (PC_M): To get the Standard Agent's participation constraint PC_M, the condition for Standard Agent's participation is

$$W - \beta_p p + \beta_v v - \frac{1}{2}(p^2 + v^2) - \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 \geq U_0 \qquad \text{[A2]}$$

In the following, the participation condition can always be set to zero, as the fixed wage is always independent of the effort and is therefore set to a minimum. Since in the first-best case, the principal has perfect information about the behavior of the agent, the incentive weights are defined as $\beta_{p,v} = 0$. If this is then rearranged to the Standard Agent's expected compensation $E[w]$, this leads to

$$\mathrm{E[w]} = U_0 + \tfrac{1}{2}(p^2 + v^2).$$

Optimization problem: The optimization problem in the first-best scenario, consisting of the outcome for the principal and the participation constraint as the only binding condition, is

$$max_{p,v} \qquad \{\mathrm{E[x]} - \mathrm{E[w]}\} \qquad \text{[A1]}$$

$$s.t. \qquad \mathrm{W} - \frac{1}{2}(p^2 + v^2) \geq U_0 \qquad \text{[A3]}$$

whereby the efforts are optimally determined regarding the principal's outcome. There is no need for the incentive constraint since the principal can observe the behavior of the Standard Agent and has perfect information.

Solution of the optimization problem: To solve the optimization problem, the [A3] is inserted in [A1], which results in

$$OF = f_p p + f_v v - \frac{1}{2}(p^2 + v^2) - U_0 \quad [A4]$$

and which will be derived and rearranged according to each effort

$$p^{\mathrm{FB1}*} = f_p \text{ and } v^{\mathrm{FB1}*} = f_v \quad [A5]$$

as the optimal profit and virtue effort. If the two optimal efforts are inserted into the objective function, which contains the participation condition, the following optimal profit is achieved

$$\pi^{\mathrm{FB1}*} = \frac{1}{2}(f_p^2 + f_v^2 - 2U_0) \quad [A6]$$

Appendix 1.2. Second-best Standard Agent

Objective function (OF): The objective function of the principal in the second-best case is the same as in the first-best case [A1].

Participation constraint PC_M: The participation constraint is the same as in the first-best scenario [A2].

Incentive constraint (IC_M): For the incentive constraint IC_M, the expected utility $E[U]$ is needed, which is

$$E[U] = W + \beta_p p + \beta_v v - \frac{1}{2}(p^2 + v^2) - \frac{1}{2}(\beta_p^2 + \beta_v^2)\sigma^2 \quad [A7]$$

From the first derivative of [A2] for both efforts and rearrangement to p, v, the following incentive constraint for the Standard Agent is achieved:

$$p^{\mathrm{SB1}} = \beta_p \text{ and } v^{\mathrm{SB1}} = \beta_v \quad [A8]$$

The Optimization problem: Combining the objective function [A1] and the two constraints, [A2] and [A6], the optimization problem results in

$$max_{p,v} \qquad OF = \mathrm{E[x]} - \mathrm{E[w]} \quad [A1]$$

$$s.t. \qquad W + \beta_p p + \beta_v v - \frac{1}{2}(p^2 + v^2) - \frac{1}{2}(\beta_p^2 + \beta_v^2)\sigma^2 \geq U_0 \quad [A2]$$

$$p^{\mathrm{SB1}} = \beta_p \text{ and } v^{\mathrm{SB1}} = \beta_v \qquad \text{[A8]}$$

Solution of the optimization problem: Inserting [A2] and [A6] in [A1] yields

$$OF = \beta_p f_p + \beta_v f_v - \frac{1}{2}\beta_p^2(1+\sigma^2) - \frac{1}{2}\beta_v^2(1+\sigma^2) \qquad \text{[A9]}$$

the first derivation of [A9] with respect to $\beta_p$and β_v, as well as rearranging to the respective incentive weight leads to the two optimal bonus coefficients

$$\beta_p^{SB1*} = \frac{f_p}{1+\sigma^2} \text{ and } \beta_v^{SB1*} = \frac{f_v}{1+\sigma^2}.$$

which are dependent from the productivity of each effort and the variance of the performance information of the Standard Agent. Inserting both bonus coefficients into [A8] gives the two optimal effort levels for the Standard Agent

$$p^{\mathrm{SB1}*} = \frac{f_p}{1+\sigma^2} \text{ and } v^{\mathrm{SB1}*} = \frac{f_v}{1+\sigma^2}.$$

Inserting the two optimal effort levels and the two optimal bonus coefficients, into [A1] the optimal profit for the principal results as

$$\pi^{SB1*} = \frac{{f_p}^2+{f_v}^2}{2(1+\sigma^2)} - U_0.$$

Proofs of the solutions: Proof that profit- and virtue effort are equal to the respective incentive weight. For that, the first order condition of the expected compensation according to each effort is made as

$$\frac{\partial E[w]}{\partial p} = \beta_p - p = 0, p^{SB1*} = \beta_p$$

$$\frac{\partial E[w]}{\partial v} = \beta_v - v = 0, v^{SB1*} = \beta_v$$

therefore, the sufficient conditions then are

$$\frac{\partial^2 E[w]}{\partial p^2} = -1 < 0$$

$$\frac{\partial^2 E[w]}{\partial v^2} = -1 < 0$$

showing that the expected compensation function has a local minimum in each effort.

Proof of the objective function (OF). For this, the first derivation of the objective function with respect to the incentive weights is made

$$\frac{\partial OF}{\partial \beta_p} = f_p - \beta_p(1+\sigma^2) = 0, \beta_p^{SB1*} = \frac{f_p}{1+\sigma^2}$$

$$\frac{\partial OF}{\partial \beta_v} = f_v - \beta_v(1+\sigma^2) = 0, \beta_v^{SB1*} = \frac{f_v}{1+\sigma^2}$$

the sufficient conditions are therefore

$$\frac{\partial^2 E[w]}{\partial \beta_p^2} = -1 - \sigma^2 < 0$$

$$\frac{\partial^2 E[w]}{\partial \beta_v^2} = -1 - \sigma^2 < 0$$

since the necessary condition holds and the sufficient condition is negative, this means that the objective function has a local maximum regarding the incentive weights. It is also visible that both incentive weights increase in the respective productivity f_p and f_v.

Appendix 1.3. First-best Green Agent with mitigation parameter $g > 0$ and $b = 0$

Objective Function (OF): Is the same as in the Appendix 1.1 and 1.2.

Participation constraint (PC_S): To get the Green Agent's participation constraint (PC_S), the condition for the Green Agent's participation is

$$W + \beta_p p + \beta_v v - \frac{1}{2}(kp^2 + v^2 - gpv) - \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 \geq U_0 - bv. \qquad [A10]$$

In this case, the Green Agent is analyzed more closely under the second condition, namely with the mitigation parameter g, so that b, the discounting parameter, is set to $b = 0$. Since in the first-best case the principal has perfect information about the behavior of the agent the incentive weights are again set to $\beta_{p,v} = 0$. For this, the expected compensation $E[w]$ gives the following Green Agent's participation constraint (PC_S):

$$\mathrm{E[w]} = U_0 + \frac{1}{2}(kp^2 + v^2 - gpv). \qquad \text{[A11]}$$

Optimization problem: The optimization problem in the first-best scenario, consisting of the outcome for the principal [A1] and the participation constraint [A11] as the only binding condition, is

$$max_{p,v} \qquad \{\mathrm{E[x]} - \mathrm{E[w]}\} \qquad \text{[A1]}$$

$$s.t. \qquad \mathrm{W} - \frac{1}{2}(kp^2 + v^2 - gpv) \geq U_0 \qquad \text{[A12]}$$

In this case, no incentive condition is necessary.

Solution of the optimization problem: To solve the optimization problem, the PC_S will be derived and rearranged according to each effort

$$p^{FB2*} = \frac{2(2f_p + gf_v)}{4k - g^2} \text{ and } v^{FB2*} = \frac{2(gf_p + 2kf_v)}{4k - g^2}$$

to then insert the two optimal effort levels into the objective function yields

$$\pi^{FB2*} = \frac{g^2U_0 - 4kU_0 + 2f_p^2 + 2gf_vf_p + 2kf_v^2}{4k - g^2}$$

as the optimal profit function

Appendix 1.4. Second-best Green Agent with mitigation parameter g and $b = 0$

Objective function: The objective function of the principal in the second-best case is the same as in the first-best case [A1].

Participation constraint (PC_S): The participation constraint is as well the same as in the first-best scenario [A12].

Incentive constraint (IC_S): For the incentive constraint (IC_S), the expected utility $E[U]$ is needed, which is the [A12] rearranged according to the expected utility which is

$$E[U] = W + \beta_p p + \beta_v v - \frac{1}{2}(kp^2 + v^2 - gpv) - \frac{1}{2}(\beta_p^2 + \beta_v^2)\sigma^2 \qquad [A13]$$

the first derivative of [A13] according to both efforts and rearranged to p, v, the following incentive constraint for the Green Agent is achieved:

$$p^{SB2} = \frac{2(2\beta_p + \beta_v g)}{4k - g^2} \text{ and } v^{SB2} = \frac{2(\beta_p g + 2\beta_v k)}{4k - g^2} \qquad [A14]$$

Optimization problem: The following optimization problem is now achieved, with the objective function (OF) of the principal and the two constraints, namely participation [A10] and incentive constraint [A13], as

$$max_{p,v} \qquad OF = \mathrm{E[x]} - \mathrm{E[w]} \qquad [A1]$$

$$s.t. \qquad W + \beta_p p + \beta_v v - \frac{1}{2}(kp^2 + v^2 - gpv) - \frac{1}{2}(\beta_p^2 + \beta_v^2)\sigma^2 \geq U_0 \qquad [A15]$$

$$p^{SB2} = \frac{2(2\beta_p + \beta_v g)}{4k - g^2} \text{ and } v^{SB2} = \frac{2(\beta_p g + 2\beta_v k)}{4k - g^2} \qquad [A13]$$

Solution of the optimization problem: Inserting [A15] and [A13] in the [A1] yields the Objective function

$$OF = \frac{4\beta_p^2 + \beta_v^2 k - 2g^2 U_0 - 4\beta_v g f_p - 8\beta_v k f_v + 4\beta_p(\beta_v g - 2f_p - g f_v) - (\beta_p^2 + \beta_v^2)(g^2 - 4k)\sigma^2}{2(g^2 - 4k)} \qquad [A16]$$

The first derivation of [A16] according and rearranging to β_p^{SB2} and β_v^{SB2} leads to the two optimal incentive weights

$$\beta_p^{SB2*} = \frac{2g f_v \sigma^2 + 4f_p(1 + \sigma^2)}{4 + 4(1 + k)\sigma^2 - (g^2 - 4k)\sigma^4}$$

$$\beta_v^{SB2*} = \frac{4f_v + 2(g f_p + 2k f_v)\sigma^2}{4 + 4(1 + k)\sigma^2 - (g^2 - 4k)\sigma^4}$$

which are dependent from the productivity of each effort, the variance as well as of the parameter for cost for profit effort, namely k, and the cross-cost mitigation parameter, namely g.

Inserting both incentive weights into [A13] gives the two optimal effort levels for the Green Agent

$$p^{SB2*} = \frac{4f_p(4 + (4 + g^2)\sigma^2) + 8gf_v(1 + (1 + k)\sigma^2)}{(g^2 - 4k)(-4 - 4(1 + k)\sigma^2 + (g^2 - 4k)\sigma^4)}$$

$$v^{SB2*} = \frac{4(2gf_p + 4kf_v + \big(2g(1 + k)f_p + g^2f_v + 4k^2f_p\big)\sigma^2)}{(g^2 - 4k)(-4 - 4(1 + k)\sigma^2 + (g^2 - 4k)\sigma^4)}$$

Subsequently, the two optimal effort levels and the two optimal incentive weights can be inserted into [A14] to get the optimal profit for the principal

$$\pi^{SB2*} = \frac{8\big(f_p^2 + gf_pf_v + kf_v^2\big) + 2((4 + g^2)f_p^2 + 4g(1 + k)f_pf_v + (g^2 + 4k^2)f_v^2)\sigma^2}{(g^2 - 4k)(-4 - 4(1 + k)\sigma^2 + (g^2 - 4k)\sigma^4)} - U_0$$

Proofs of the solutions: Proof of profit effort and virtue effort, that they are dependent on the respective incentive weight, the costs for profit effort k, and the cross-effort cost mitigation parameter g. For this the expected utility is derived according to each effort and gives the following necessary conditions as

$$\frac{\partial E[U]}{\partial p} = \beta_p + \frac{1}{2}(-2kp + gv) = 0, p^{SB1} = \frac{2(2\beta_p + \beta_v g)}{4k - g^2}$$

$$\frac{\partial E[U]}{\partial v} = \beta_v + \frac{1}{2}(gp - 2v) = 0, v^{SB1} = \frac{2(\beta_p g + 2\beta_v k)}{4k - g^2}$$

and the sufficient conditions are

$$\frac{\partial^2 E[U]}{\partial p^2} = -\mathrm{k} < 0$$

$$\frac{\partial^2 E[U]}{\partial v^2} = -1 \ < 0$$

it is visible that the expected utility of the Green Agent has a local maximum and therefore a concave curve regarding the respective efforts.

Proof of the influence of k and g on the respective effort. For this both efforts are derived with respect to k and g.

$$\frac{\partial p^{SB2*}}{\partial k} > 0, \frac{\partial v^{SB2*}}{\partial k} > 0$$

$$\frac{\partial p^{SB2*}}{\partial g} > 0, \frac{\partial v^{SB2*}}{\partial g} > 0$$

this shows that both efforts, profit, and virtue, are increasing in k and g.

Proof of the objective function (OF). For this, the first derivation of the objective function including the participation- and incentive constraint is made

$$\frac{\partial OF}{\partial \beta_p} = \frac{8\beta_p + 4\left(\beta_v g - 2f_p - g f_v\right) - 2\beta_p(g^2 - 4k)\sigma^2}{2(g^2 - 4k)} = 0$$

$$\beta_p^{SB2*} = \frac{2g f_v \sigma^2 + 4f_p(1 + \sigma^2)}{4 + 4(1 + k)\sigma^2 - (g^2 - 4k)\sigma^4}$$

$$\frac{\partial OF}{\partial \beta_v} = \frac{4\beta_p g + 8\beta_v k - 4g f_p - 8k f_v - 2\beta_v(g^2 - 4k)\sigma^2}{2(g^2 - 4k)} = 0$$

$$\beta_v^{SB2*} = \frac{4f_v + 2(g f_p + 2k f_v)\sigma^2}{4 + 4(1 + k)\sigma^2 - (g^2 - 4k)\sigma^4}$$

and the sufficient condition is therefore

$$\frac{\partial^2 OF}{\partial \beta_p^2} = -\frac{8 - 2\,(g^2 - 4k)\sigma^2}{2(4k - g^2)} < 0$$

$$\frac{\partial^2 OF}{\partial \beta_v^2} = -\frac{8k - 2\,(g^2 - 4k)\sigma^2}{2(4k - g^2)} < 0$$

and implies that the (OF) has therefore a local maximum regarding both incentive weights, since k has to be $k > 1$ and $g > 0$.

Appendix 1.5. First-best Green Agent with discount factor b and $g = 0$

Objective function (OF): The objective function [A1] is the same as in the previous Appendix parts (Appendix 1.1-1.4).

Participation constraint (PC_S): The same holds for the participation constraint of the Green Agent, which is [A10].

In this part, the Green Agent will be analyzed more closely under the third assumption, namely with the discount factor b, so that g is set equal zero ($g = 0$). Since in the first-best case the principal has perfect information about the behavior of the agent it must be that $\beta_{p,v} = 0$. Because of that the Green Agent's expected compensation $E[w]$ leads to the employee's participation constraint (PC_S)

$$\mathrm{E[w]} = \frac{1}{2}(kp^2 + 2U_0 - 2bv + v^2). \qquad \text{[A10]}$$

Optimization problem: The optimization problem of the first-best scenario, consisting of the outcome for the principal and the participation constraint (PC_S) which is the only binding condition, is

$$max_{p,v} \qquad \{\mathrm{E[x]} - \mathrm{E[w]}\} \qquad \text{[A1]}$$

$$s.t. \qquad W - \frac{1}{2}(kp^2 + v^2) \geq U_0 - bv \qquad \text{[A10]}$$

whereby the efforts are optimally determined regarding the principal's outcome. There is no need for the incentive constraint since the principal can observe the behavior of the Green Agent and has perfect information.

Solution of the optimization problem: Solving the first-best optimization problem, the [A10] are inserted into [A1], which results in

$$OF = f_p p + f_v v - \frac{1}{2}(kp^2 + 2U_0 - 2bv + v^2) \qquad \text{[A15]}$$

and which will be derived and rearranged according to each effort

$$p^{FB3*} = \frac{f_p}{k} \text{ and } v^{FB3*} = b + f_v$$

which are then the optimal profit and virtue efforts. If the two optimal efforts are inserted into the objective function [A1c], which contains the participation condition, the following optimal profit in the first-best scenario is realized as

$$\pi^{FB3*} = \frac{f_p^2 + k(-2U_0 + (b + f_v)^2)}{2k}$$

Appendix 1.6. Second-best Green Agent with discount factor b and $g = 0$

Objective function: The objective function [A1] of the principal in the second-best case is the same as in the first-best case.

Participation constraint (PC_S): The same holds for the participation constraint [A10] which is as well the same as in the first-best scenario.

Incentive constraint: For the incentive constraint IC_S, the expected utility $E[U]$ is needed, which is

$$E[U] = W + \beta_p p + \beta_v v - \frac{1}{2}(kp^2 + v^2) - \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 + bv. \qquad [A16]$$

From the first derivative of [A16] for both efforts and rearranging to p, v, the following incentive constraint for the Green Agent is achieved as

$$p^{SB3} = \frac{\beta_p}{k} \text{ and } v^{SB3} = \beta_v \qquad [A17]$$

as a function of the respective incentive weights.

Optimization problem: With the objective function [A1] and the two constraints, [A10] and [A17], the following optimization problem is obtained:

$$max_{p,v} \qquad OF = \mathrm{E[x]} - \mathrm{E[w]} \qquad [A1]$$

$$s.t. \qquad W + \beta_p p + \beta_v v - \frac{1}{2}(kp^2 + v^2) - \frac{1}{2}\left(\beta_p^2 + \beta_v^2\right)\sigma^2 \geq U_0 + bv \qquad [A10]$$

$$p^{SB3} = \frac{\beta_p}{k} \text{ and } v^{SB3} = \beta_v \qquad \text{[A17]}$$

Solution of the optimization problem: Inserting [A10] and also the IC_S [A17] in the objective function [A1] yields

$$OF = \frac{2kU_0 - 2\beta_p f_p + \beta_v k(\beta_v - 2f_v + \beta_v\sigma^2) + \beta_p^2(1 + k\sigma^2)}{2k} - \beta_v b \qquad \text{[A18]}$$

the first derivation of [A18] according and rearranging to β_p^{SB2} and β_v^{SB2} leads to the two optimal incentive weights

$$\beta_p^{SB3*} = \frac{f_p}{1+k\sigma^2} \text{ and } \beta_v^{SB3*} = \frac{f_v+b}{1+\sigma^2}$$

which are positively dependent form each productivity. The incentive weight on the one hand for profit effort is increasing if k or σ decreases since both parameters are part of the denominator. And on the other hand, the incentive weight for virtue effort increases if the uncertainty, namely σ, decreases. The discount parameter b has only a positive influence on the incentive weight for virtue effort and none on the incentive weight for profit effort.

Inserting both incentive weights into IC_S [A17] gives the two optimal effort levels for the Green Agent

$$p^{SB3*} = \frac{f_p}{k+k^2\sigma^2} \text{ and } v^{SB3*} = \beta_v^{SB3*} = \frac{f_v+b}{1+\sigma^2}$$

Inserting the two optimal effort levels and the two optimal bonus coefficients, into [A18] the optimal profit for the principal is obtained as

$$\pi^{SB3*} = \frac{f_v^2}{2 + 2\sigma^2} + \frac{f_p^2}{2k + 2k^2\sigma^2} + \frac{b(2f_v + b)}{2(1 + \sigma^2)} - U_0 \qquad \text{[A22]}$$

Proofs of the solutions: Proof of profit and virtue effort that they are dependent from the respective incentive weight. Therefore, the necessary condition is

$$\frac{\partial E[w]}{\partial p} = \beta_p - kp = 0, p^{SB3} = \frac{\beta_p}{k}$$

$$\frac{\partial E[w]}{\partial v} = \beta_v - v = 0, v^{SB3} = \beta_v$$

and the sufficient conditions are

$$\frac{\partial^2 E[w]}{\partial p^2} = -\mathrm{k} < 0$$

$$\frac{\partial^2 E[w]}{\partial v^2} = -1 \ < 0$$

which shows that the function has a local maximum regarding the respective efforts. In addition to that, only the profit effort is dependent from the cost of profit effort of the Green Agent, namely k.

Proof of the profit- and virtue effort that they are dependent on k and b. For this the first order condition is derived regarding to the parameters for the respective effort

$$\frac{\partial p^{SB3*}}{\partial k} < 0, \frac{\partial v^{SB3*}}{\partial k} = 0$$

$$\frac{\partial p^{SB3*}}{\partial b} = 0, \frac{\partial v^{SB3*}}{\partial b} > 0$$

The derivations show that k has a negative correlation with profit effort and therefore profit effort decreases when k increases. The parameter b has no effect on profit effort. Virtue effort, on the other hand, increases when b increases, as there is a positive correlation, and the curve increases positively. The parameter k has no influence on virtue effort.

Proof that the objective function [A1]. For this, the first derivation of [A1] including the participation- and incentive constraint is made according to the two optimal incentive weights. The necessary condition for each incentive weight is therefore

$$\frac{\partial OF}{\partial \beta_p} = \frac{2f_p + 2\beta_p(1 + k\sigma^2)}{2k} = 0, \beta_p^{SB2*} = \frac{f_p}{1 + k\sigma^2}$$

$$\frac{\partial OF}{\partial \beta_v} = \frac{\beta_v k(1+\sigma^2) + k(\beta_v - 2f_v + \beta_v \sigma^2)}{2k} - b = 0,$$

$$\beta_v^{SB2*} = \frac{f_v + b}{1+\sigma^2}$$

And the sufficient conditions are

$$\frac{\partial^2 OF}{\partial \beta_p^2} = -\frac{1+k\sigma^2}{k} < 0$$

$$\frac{\partial^2 OF}{\partial \beta_v^2} = -1 - \sigma^2 < 0$$

this shows that the objective function [A1] has a local maximum for each incentive weight and therefore a concave curve.

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