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# Framing: The Holy Grail of Compensation Contracts?

An experimental analysis of the psychological processes that  
underlie the effect of contract frame on work effort

by

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# Abstract

- Title:** **Framing: The Holy Grail of Compensation Contracts?**  
An experimental analysis of the psychological processes that underlie the effect of contract frame on work effort
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- Purpose:** The purpose of this study is to analyse the psychological processes that underlie the effect of framed compensation contracts on work effort.
- Methodology:** The study is based on an online survey experiment (N=113) and applies quantitative research methods. In a between-subjects design, participants are randomly assigned to two economically equivalent compensation contracts (bonus contract or penalty contract). Mediation analysis is performed using multiple linear regression.
- Theory:** Prospect theory and self-determination theory are combined to develop a comprehensive model for empirical testing. The study thereby draws upon elements of cognitive, motivation, and social psychology. Focus is set on three potential mediators: loss aversion (prospect theory), the prospect of basic psychological need satisfaction, and the prospect of basic psychological need frustration (self-determination theory).
- Results:** In opposition to previous research, penalty contracts are found to have an insignificant negative effect on intended work effort. This relationship is mediated by the prospect of basic psychological need satisfaction but not by the prospect of basic psychological need frustration. Profound loss aversion is measured, yet, it is unrelated to intended work effort.
- Conclusion:** The survey experiment produces no evidence in favour of penalty contracts over bonus contracts. Contrary to the intuition of loss aversion, findings suggest that realising basic psychological need satisfaction is a bigger motivation for high work effort than preventing basic psychological need frustration.
- Keywords:** Bonus contract; Penalty contract; Framing; Loss aversion; Basic psychological needs.

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# List of Abbreviations and Acronyms

<b>ANOVA</b>	Analysis of variance
<b>BLUE</b>	Best linear unbiased estimator
<b>BPNF</b>	Basic psychological need frustration
<b>BPNS</b>	Basic psychological need satisfaction
<b>BPNSFS</b>	Basic psychological need satisfaction and frustration scale
<b>CET</b>	Cognitive evaluation theory
<b>CFA</b>	Confirmatory factor analysis
<b>CFI</b>	Comparative fit index
<b>MANOVA</b>	Multiple analysis of variance
<b>MCS</b>	Management control system
<b>OCCSEFF</b>	Occupational self-efficacy (measurement scale)
<b>OIT</b>	Organismic integration theory
<b>OLS</b>	Ordinary least squares
<b>OSE</b>	Occupational self-efficacy
<b>RMSEA</b>	Root mean squared error of approximation
<b>SDT</b>	Self-determination theory
<b>SEM</b>	Structural equation modelling
<b>SRMR</b>	Standardised root mean residual
<b>WESC</b>	Work effort scale

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# 1 Introduction

## 1.1 Research problem

To provide incentives that motivate employees to exhibit high effort levels is a primary function of management control systems (MCS) (Merchant & Van der Stede, 2017). Closely linked to this function is the overarching question which type of incentive most effectively stipulates employee effort and therefore satisfies this corporate objective. Traditionally, the focus has been on financial incentives that are contingent on performance targets (Locke & Latham, 1990; Merchant & Van der Stede, 2017). However, in recent years, the field of behavioural economics which approaches economic decision-making from a psychological perspective has generated new insights that facilitate an interesting shift of focus for management control research on financial incentives. More specifically, prospect theory (Kahneman & Tversky, 1979), as an important account in behavioural economics, can be connected to the idea that companies might benefit from a more proactive approach towards the design of their incentive-based compensation contracts. This leads to the introduction of two terms that are critical for this study: (1) framing and (2) economic equivalence. (1) Framed communication refers to information that is presented in ways that guide the receiver's focus towards a reference point (Tversky & Kahneman, 1981). (2) Economic equivalence refers to alternatives that have the same economic value irrespective of the label that is put on them. The presumption is that economically equivalent contract options can induce different behavioural responses depending on the format (frame) in which they are presented (Tversky & Kahneman, 1981). As for MCSs, this entails the enticing prospect that framed compensation contracts might allow to induce desired behavioural responses of employees. Thus, the following research question has attracted increased attention in management control research: How does the framing of compensation contracts affect employee work effort?

To investigate the relationship between framing and work effort, literature predominantly relies on two contrasting archetypes of compensation contracts. Those are: a 'bonus contract' which involves a lower base salary and a variable bonus component and a 'penalty contract' that contains a higher base salary and a variable penalty component (e.g. Church et al., 2008; Frederickson & Waller, 2005; Hannan et al., 2005; Luft, 1994). Critically, the two contracts are designed to be economically equivalent

since they specify the same pay-out amounts at the same pay-out probabilities. Several studies have found that penalty contracts motivate individuals to exert higher effort levels as compared to bonus contracts (e.g. Church et al., 2008; Fryer et al., 2012; Hannan et al., 2005; Hong et al., 2015; Hossain & List, 2012). This phenomenon is usually attributed to the widespread cognitive bias called ‘loss aversion’ which presumes that ‘losses loom larger than corresponding gains’ (Kahneman & Tversky, 1979; Kahneman et al., 1991). These findings imply that companies can increase employee effort levels at no additional cost by implementing the penalty frame. If that is accurate, it begs the following question: Why are penalty contracts only rarely implemented in practice? One argument is that employees can be expected to demand a premium for accepting the allegedly unpopular penalty contract (Frederickson & Waller, 2005) which would lead to increased remuneration costs. Even though this argument is intuitive, it does not receive conclusive empirical support. De Quidt (2018) ran a series of recruitment experiments in which bonus and penalty contracts were contrasted. Offering the same pay-out amounts, the penalty contract performs no worse than the bonus contract in recruiting workers and therefore does not involve higher remuneration costs. This raises the question of whether there is more for management to be sceptical about when penalty contracts are concerned.

A possible explanation for management’s hesitance could be the meagre understanding of additional psychological processes that are set off by different contract frames and eventually materialise in work effort. Past research has mostly focused on the observation of outcomes when studying the effects associated with framed compensation contracts (e.g. Church et al., 2008; Hong et al., 2015; Hossain & List, 2012). Whenever results were in line with predictions of prospect theory, researchers typically attributed them exclusively to the cognitive bias of loss aversion without considering competing explanations. Therefore, there is a clear research gap in the studies of the relationship between contract frame and work effort: the underlying psychological processes that complement the relevance of loss aversion. Recognising this lack of sufficient coverage, practitioners’ hesitation towards the implementation of penalty contracts becomes understandable. Without a comprehensive knowledge of the psychological processes that go along with a contract frame, there is a reasonable fear that penalty frames may trigger unwanted negative psychological side-effects. Those would not be immediately

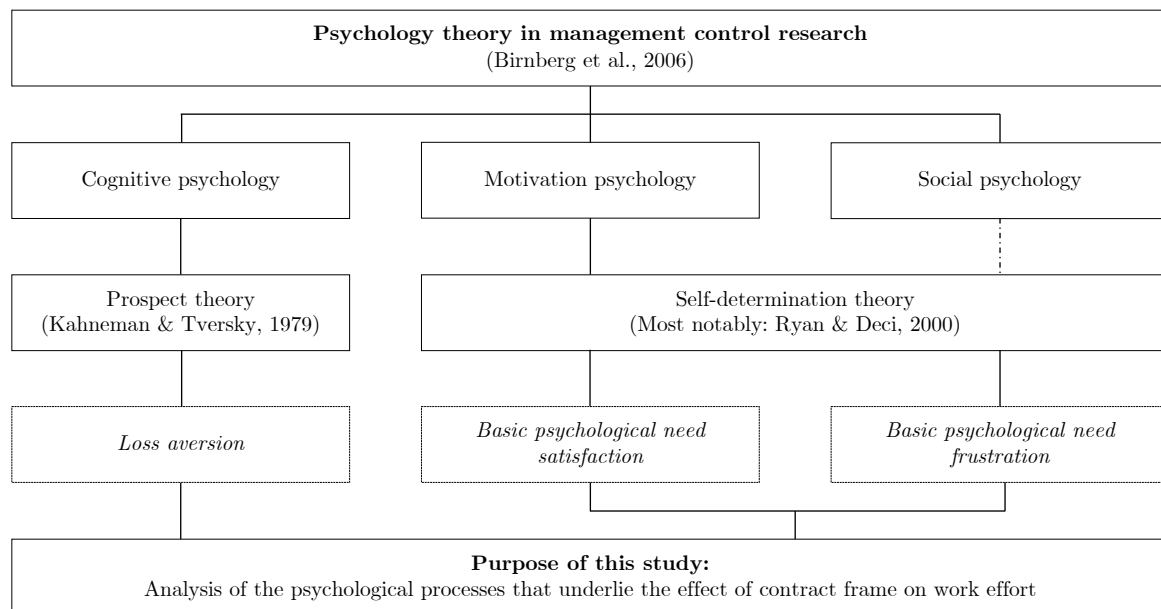
captured by the currently applied outcome-based measures but could harm an organisation in the long-run. It follows that as of today the effective use of contract frames, as a part of the MCS, may be impeded by insufficient information. Providing insight on the complementary psychological processes promises to reinforce an MCS' capacity to fulfil one of its primary functions: provide incentives that efficiently motivate employees to exhibit high effort levels.

## **1.2 Research purpose**

The purpose of this study is to analyse the psychological processes that underlie the effect of contract frame on work effort and, thus, move beyond the mere observation of outcomes. To create a deepened understanding of the mechanics of the effect the study aims to identify mediators that provide causal explanations about how contract frames affect work effort. What follows from this purpose is the aspiration to develop and test an empirical model that incorporates multiple aspects from psychological-based research. Here, Birnberg et al. (2006) provide a popular typology which distinguishes three broader fields of psychological research that are applied in management control. Those are: cognitive psychology, motivation psychology, and social psychology. As pointed out earlier, previous research on framed compensation contracts predominantly relied on loss aversion as a sole explanation for the impact of contract frame on work effort. Since loss aversion is derived from prospect theory, which is a theory of cognitive psychology (Birnberg et al., 2006), only one of the three psychological fields is well-represented in prior research. To account for this shortcoming, this study also draws upon self-determination theory (SDT) which, as a broad framework, is concerned with investigating individuals' inherent growth tendencies (Ryan & Deci, 2000b). As an overarching theme, SDT relies on three basic psychological needs which are the basis for self-motivation and social development: autonomy, relatedness, and competence (Ryan & Deci, 2000b). Set in relation to the classification of psychological research after Birnberg et al. (2006), SDT is primarily a theory of motivation psychology. However, SDT also comprises elements of social psychology as exemplified by its concerns for peoples' need for relatedness. The incorporation of SDT, in conjunction with prospect theory, allows this study to simultaneously account for aspects of cognitive, motivation, and social psychology which is believed to foster a more comprehensive understanding of the effect of contract frame on work effort.

The joint consideration of prospect theory and SDT for the purpose of this study leads to an empirical analysis of three potential mediators. In line with prior research, loss aversion is examined as a first potential mediator for the relationship between contract frame and work effort. In addition, SDT is incorporated by investigating if the prospects of basic psychological need satisfaction (BPNS) and basic psychological need frustration (BPNF) mediate the relationship between contract frame and work effort. Even though BPNS and BPNF entail the same three needs (autonomy, relatedness, and competence), recent research on SDT has found the conceptual distinction between the satisfaction and frustration dimensions to be theoretically meaningful (Chen et al., 2015; Schultz et al., 2015). The reasons why this is the case are further explained in the corresponding theory Section 3.2. For a deeper understanding of the positioning of this study in the field of psychological-based management control research Figure 1 is provided. It also illustrates the connections between the applied theories and empirically tested mediators.

*Figure 1: Linkage between psychology theory in management control literature and the study's purpose*



This study intends to address a practical question – why penalty contracts are rarely used – by generating theoretical knowledge. The findings produced by this study are therefore hoped to be of theoretical interest and of practical use. With regards to theoretical contributions, three aspects are emphasised in the following.

First, this study draws upon insights from cognitive, motivation, and social psychology to advance the knowledge on the psychological processes that underlie the effect of contract frame on work effort. This is achieved by developing and testing an empirical model that links prospect theory and SDT.

Second, this study incorporates a recent trend within research on basic psychological needs: the distinction between BPNS and BPNF. By deploying the newly developed basic psychological need satisfaction and frustration scale (BPNSFS) (Chen et al., 2015; Schultz et al., 2015), the relevance of this conceptual distinction is tested in the context of framed compensation contracts. Incorporating the frustration dimensions for autonomy, relatedness, and competence promises to unveil insights that might have been obscured by the continuity assumption underlying the sole measurement of basic psychological fulfilment.

Third, by testing if the relationship between contract frame and work effort is mediated by the prospects of BPNS and BPNF, two distinct contributions are made: First, previous research on the effects of rewards and punishments on basic psychological needs (Deci, 1972; Deci 1975) is extended by testing if the established effects also apply when economically equivalent incentives are compared. Second, apart from rare exceptions (e.g. Sheldon & Gunz, 2009), previous SDT research has been content with the repercussions arising from present or non-present basic psychological need fulfilment. In contrast, this study investigates if prospective BPNS and BPNF is a motivation for work effort. More specifically, is it tested if the intuition of loss aversion also applies to basic psychological needs in relation to work effort. Thereby, the following question is answered: Is preventing BPNF a bigger motivation for high work effort than realising BPNS?

Besides the above-mentioned theoretical additions, also practical contributions are made. First, this study addresses the hesitance of organisations towards the use of penalty framed contracts. Exploring the complementary psychological processes creates knowledge that might help companies to better understand the risks associated with the implementation of penalty contracts. Additionally, unveiling negative side-effects triggered by penalty contracts allows companies to understand the trade-offs they might face when evaluating the benefits of different contract frames. Ultimately, this reduced uncertainty may contribute to more effective incentivisation.

Additionally, this study draws a sample from a target population of 20 to 35 years old academics. A group that is said to have different expectations about the workplace compared to previous generations (Suleman & Nelson, 2011). An alleged distaste for cybernetic forms of control that signal distrust (Suleman & Nelson, 2011) might conflict with the use of negative frames. Against this background, it is critical for companies to understand how the target population of young employees reacts to different contract frames.

This study is structured into eight sections. Section 1 was concerned with introducing the interest around framed compensation contracts. Furthermore, the relevant research gap was presented which, in turn, led to the establishment of the research purpose: to analyse the psychological processes that underlie the effect of contract frame on work effort. Lastly, the focus was on expected contributions. Hereinafter, two theoretical sections follow. Section 2 is concerned with reviewing findings from previous research on framed compensation contracts. Section 3 focuses on the characteristics of prospect theory and SDT. Consequently, Section 4 synthesises insights from the two theoretical sections to develop relevant hypotheses to investigate the given research purpose. As a final step in the hypothesis development, the model for empirical testing is presented. Section 5 provides information on the methodological considerations of the study. The subsequent Section 6 comprises the empirical results which are structured in three parts: (1) Descriptive statistics, (2) discussion of the Gauss-Markow assumptions, and (3) presentation of regression results. In Section 7 the empirical findings are discussed and set in relation to relevant literature. Lastly, Section 8 provides a conclusion for the study.

## **2 Review of previous research on framed compensation contracts**

While incentivisation and contracting have been researched for decades, management control has been rather late in developing an interest in researching framing effects explicitly. Besides Luft (1994), there is no management control research covering this topic originating from the past millennium. Though, starting in 2005 the body of available research slowly started to expand. The following section provides a brief overview of the most relevant studies that researched framed incentives from a management control perspective. The section consists of two parts which represent two ‘waves’ of



research. The first wave consists of lab-experiments that established a groundwork for research on framing effects in management control. A groundwork that is applied and tested in the field by the second wave of experiments.

Starting the first wave, Luft (1994) conducted a lab-experiment in which participants were asked to choose between two different contract options that were presented to them. Even though both contracts were economically equivalent, their form of presentation differed: One involved a bonus, hence, carrying a positive connotation and the other involved a penalty, hence, carrying a negative connotation. As hypothesised by Luft (1994) and predicted by prospect theory's phenomenon of loss aversion, participants preferred the positively framed bonus contract. This finding was later supported by Hannan et al. (2005), who conducted a lab-experiment that yielded similar results: If economically equivalent, participants prefer bonus contracts over penalty contracts. Critically, the study conducted by Hannan et al. (2005) extended the scope of research by showing that participants were willing to exert greater effort under a penalty contract than under a bonus contract (also see Church et al., 2008). In line with prospect theory, this behaviour was attributed to the fact that the participant's fear of paying a penalty superseded their desire of receiving a bonus.

Luft (1994) and Hannan et al. (2005) both acknowledge that subjecting employees to penalty contracts likely comes at a cost: since employees generally dislike this contract mode, they are expected to demand additional compensation for the disutility they experience under a penalty contract. Hence, total remuneration costs are estimated to be higher for penalty contracts than for bonus contracts. This vague conjecture was then captured and quantified, respectively, by Frederickson and Waller (2005) as a by-product of a lab-experiment primarily concerned with exploring dissimilar negotiation paths between employers and employees using either bonus or penalty contracts. In this study, participants were presented with three options: a guaranteed salary or a base salary plus (minus) a bonus (penalty). Participants were then asked to indicate their point of indifference which was found to be higher for penalty contracts than for bonus contracts. In the study's dynamic setting, employers would respond by increasing the expected pay associated with the penalty contract. With regards to compensation policies, the abovementioned studies suggest the following: loss aversion can be exploited to increase work effort, yet, at the price of higher remuneration costs.

Besides the lab-experiments presented in the previous paragraph, as of late similar research questions have been increasingly explored in field research. De Quidt (2018) runs a series of online recruitment experiments on Amazon Mechanical Turk under the use of differently framed incentive contracts. In the online setting, he finds no evidence for peoples' predicted distaste for penalty framed contracts. In some experiments, the acceptance rate for the penalty contract even exceeds the corresponding rate for the bonus option. Hence, in contrast to prior literature, the study concludes that loss aversion only plays a surprisingly little role.

Besides this online experiment, also studies drawing upon the framing of full-time employment contracts exist. Hong et al. (2015) cooperated with a Chinese manufacturing facility that allowed the researches to temporarily manipulate its employee compensation agreements, using bonus and penalty frames, and letting the teams compete against each other. The team receiving the penalty treatment was found to achieve greater productivity and was thus more likely to be victorious. A comparable experiment performed by Hossain and List (2012), cooperating with the same Chinese manufacturing facility, also finds that a potential loss motivated teams to exert more effort compared to the same incentive framed as a gain. Moreover, this study emphasises that incentive framing is more effective when rewards or punishments apply to whole teams and not merely to individuals.

Furthermore, Armantier and Boly (2015) conducted a field experiment in Burkina Faso where they would recruit individuals to perform grading tasks for exams in higher education under differently framed incentives. The penalty frame was found to lead to higher grading quality than the bonus frame. However, the best grading quality was attributed to a third group who received a mixed treatment, involving a bonus as well as a penalty component. Armantier and Boly (2015) argue that the combination allows to simultaneously utilise loss aversion associated with the penalty and the more favourable 'moral' stimulus associated with the bonus (also see Fehr & Schmidt, 2007).

Another vivid example of how to incorporate loss aversion into compensation schemes is provided by Fryer et al. (2012) who conducted a field experiment on teachers in nine schools of the district of Chicago. Here, it was discovered that students' test scores were higher when teachers were threatened to pay back a bonus in case their students performed poorly on tests. In comparison to prior studies, the distinguishing element is that the bonus was paid upfront. Contrary, students' test scores were lower in classes

whose teachers were to potentially earn a bonus after their students performed well. For this reason, Fryer et al. (2012, p.18) conclude that there “may be significant potential for exploiting loss aversion in the pursuit of both optimal public policy and the pursuit of profit”.

However, this conclusion might be misguided by narrowly zeroing in on the observed outcome, while disregarding the multidimensional process that leads to it. Typically, the outcome is neatly explained with arguments connected to loss aversion. Yet, the related psychological processes and their implications extend beyond the field of cognitive psychology and comprise various elements from motivational and social psychology. Merely relying on prospect theory for policy recommendations to stimulate the desired behaviour in organisations is therefore likely insufficient.

## **3 Theory**

To further explore the relationship between contract frame and work effort, it is necessary to fully grasp the characteristics of prospect theory and SDT which have been touched upon in the introduction. While the first part concerns prospect theory, the second part sheds light on SDT and its overarching theme of the three basic psychological needs.

### **3.1 Prospect theory**

Previous research on framed compensation contracts centres around the rationale of ‘loss aversion’ as the most prominent cognitive bias derived from the wider ‘prospect theory’ (e.g. Armantier & Boly, 2015; Hong et al., 2015; Hannan et al., 2005). Since framing, as a bias in itself, is inevitably connected to prospect theory, a theoretical perspective on it appears needed. First, focus is on the three heuristics which are central to the theory’s development. Thereinafter, the key characteristics of the value function in prospect theory are explained and linked to the field of framed compensation contracts.

In economics, the past few decades have been marked by an emerging movement that challenges the dominant view of neoclassical utility theory. At the centre of this movement is the field of behavioural economics which focuses on cognitive psychological aspects of human economic decision-making (List, 2004). While neoclassical theory

builds on the assumption of the ‘homo economicus’ to exercise perfectly rational decisions, behavioural economics recognises humans’ cognitive limitations and, therefore, emphasises the view of a ‘bounded rationality’ (Sent, 2004). Limitations that prevent perfectly rational decision-making are manifold and potentially relate to time, access to relevant information, or cognitive computational capacities (Simon, 1955). Departing from the goal to systematically capture the irrational in human decision-making, Daniel Kahneman and Amos Tversky’s *Prospect Theory – An Analysis of Decision under Risk (1979)* is one of the most well-established models to incorporate cognitive psychological knowledge into economic theory (Wakker, 2010).

### **3.1.1 Heuristics: availability, representativeness, and anchoring**

Before expanding on the attributes of prospect theory itself, it is important to first put emphasise on the rationales which lead to its establishment. Economic research had already identified individuals’ probabilistic judgment in some contexts to deviate from rational behaviour. Here, it were Kahneman and Tversky (1973; 1974) again who first categorised systematic biases in cognitive human processes, which they called heuristics. They found that individuals turned to those heuristics as a response to conditions that limit them from exercising perfectly rational decisions. In their initial research, three types of heuristics that are commonly used to either develop or revise subjective probabilities are outlined. Those are: availability (Kahneman & Tversky, 1973), representativeness, and anchoring (Kahneman & Tversky, 1974).

With availability, an individual’s subjective judgement on the probability of an event based on how accessible it is to him/her is described (Kahneman & Tversky, 1973). Events become more accessible when they are either familiar or have recently occurred. As a direct inference from familiarity or recent occurrence, individuals tend to overestimate the probability of occurrence for those events. Transferred to research on framed compensation contracts, a potential source of availability is an individual’s past experiences with variable compensation components. If an individual has previously received a bonus it is more likely that he/she assumes that the same event will recur. The identical logic applies to the penalty setting.

The second heuristic is representativeness which is directed towards an individual’s subjective estimation on whether a sample (A) belongs to or originates from a population (B) (Kahneman & Tversky, 1974). Individuals tend to not consider the actual

probabilistic relationship between a sample and a population but rather establish a judgement based on the similarity between the two (Kahneman & Tversky, 1974). Similarity is commonly acknowledged as a dominant feature of cognition (Medin et al., 1993) and, therefore, judgements based on similarity can be exercised with relative ease compared to exploring the actual likelihoods of a probabilistic relationship. A potential source of representativeness bias in the context of framed compensation contracts might be an individual's limited number of personal contacts within an organisation. If an individual has knowledge that all of its personal contacts received a bonus (penalty), an overestimated likelihood of receiving a bonus (penalty) is likely the case. This false assessment is induced by the individual's assumption that its personal contacts represent all members of the organisation.

Lastly, the third heuristic is anchoring which describes the human assessment of uncertainties to depart from a point of reference – or in other words: an anchor. An anchor typically is an initial piece of information that is not necessarily (un)true but available to an individual (Kahneman & Tversky, 1974). The flaw with human decision-making arises when an individual adjusts an anchor to arrive at the believed probability of an uncertainty: whilst the direction of that adjustment is usually correct, its magnitude is typically insufficient and remains too close to the initial anchor (Kahneman & Tversky, 1974). Translated to the context of this research, varying levels of base salary that are accompanied by a variable component (bonus or penalty) likely establish a cognitive anchor.

### **3.1.2 Value function**

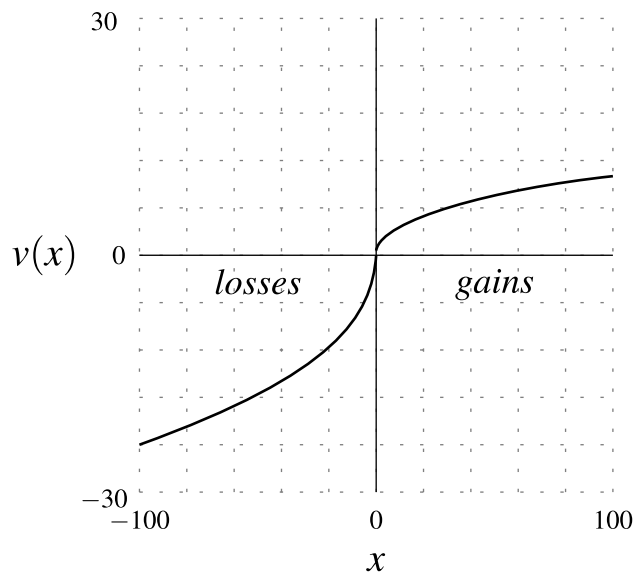
Departing from the recognition of the three common cognitive heuristics, Kahneman and Tversky (1979) established prospect theory which views economic decision-making as an individual's choice between gambles or prospects under risk. In that sense, a prospect is a contract that yields an outcome  $x_1$  with a probability  $p_1$ , where the sum of all probabilities ( $p_n$ ) equals one (Wakker, 2010). The distinct characteristics of the theory's value function evolve around three odds in human economic decision-making which are outlined in the following paragraphs.

The first odd is 'dependency on a reference point' which describes prospect theory to view an individual to subjectively value each prospect as a gain or loss relative to a reference point (Kahneman & Tversky, 1979). This perception contrasts the view of

classical utility theory which assumes an individual to relate a utility relative to its absolute level of welfare (Wakker, 2010). The conjecture for the conceptualisation around a reference point is that human minds are primed to detect changes in sensory stimuli rather than to store and compare their accumulated values (Wakker, 2010). A reference point may reflect one’s current state of wealth, an aspired goal, or, when translated to the specific context of this research, the amount for base salary in a compensation contract.

In Figure 2 the value function of prospect theory is depicted. Here, one can observe an S-shaped function around the zero-valued reference point. Gains and losses are shown as  $x$  while the subjective value associated with it is incorporated as  $v(x)$ . Also, for the value function, one might wonder why a change of signs in the reference point occurs and why the level of steepness differs between the gain and the loss side of the reference point. These distinct characteristics are explained by the following two odds.

*Figure 2: Value function of prospect theory*



The second odd describes human economic decision-making to involve a decreased sensitivity the further a change in value moves away from the previously described reference point (Kahneman & Tversky, 1979). Through the approximation of the perceived change in value to zero on both extremes of the function, the S-shaped form is established. It follows, that the function is concave for gains and convex for losses. Translated into the context of this research, decreased sensitivity implies a change in bonus

(penalty) from 100 Euros to 200 Euros can be expected to revoke a more intense reaction of individuals than a change in bonus (penalty) from 1,100 Euros to 1,200 Euros. Even though the absolute change in value is the same for both scenarios, the relative perceived impact is lower in the second one.

Thirdly, the focus is on the dissimilar perception of gains and losses. A wide range of experiments have shown that individuals are more sensitive to losses than to gains of the same magnitude (Abdellaoui et al., 2007; Kahneman et al., 1991). To avoid the increased pain associated with a loss, an individual prefers an option that does not incur a loss to an alternative that yields an equivalent gain (Kahneman & Tversky, 1979; Kahneman et al., 1991). This phenomenon is described as loss aversion and is commonly referred to as ‘losses loom larger than corresponding gains’. In the value function, loss aversion is expressed by the steeper change in value on the loss side of the reference point. As pointed out earlier, loss aversion is one of the most well-established biases in behavioural economics and is also the most referred to source of explanation for a positive association of penalty frame and work effort (e.g. Armantier & Boly, 2015; Hong et al., 2015; Hannan et al., 2005). In order to avoid a penalty (loss), an individual is expected to show a higher level of effort as compared to when striving for a bonus (gain).

When focusing on loss aversion, one should also point out its association with the so-called ‘endowment effect’ which was first recognised by Thaler (1980). The endowment effect is described as an individual’s tendency to assign a higher value to the items it possesses. Logically, a higher assigned value corresponds with an increased potential loss which resembles the rationale of loss aversion. The endowment effect was touched upon in previous research when Fryer et al. (2012) introduced a contract frame that comprised a bonus pay-back for teachers (see Section 2).

## **3.2 Self-determination theory**

Like prospect theory, and typical for most psychology-based theories of the individual, SDT refuses the neoclassical concept of the value maximising, self-interested economic man (Hosseini, 1990). Instead, SDT is centred around the “investigation of people’s inherent growth tendencies and innate psychological needs that are the basis for self-motivation” (Ryan & Deci, 2000b, p. 68). SDT serves as a meta-theory comprising six

sub-theories with a shared core, the three basic psychological needs: autonomy, relatedness, and competence (Ryan & Deci, 2000b). The fulfilment of these needs is associated with intrinsic motivation and well-being (Ryan & Deci, 2000b).

### **3.2.1 Basic psychological needs: autonomy, relatedness, and competence**

#### ***Autonomy***

*“Autonomy concerns the self-organisation and endorsement of one’s behaviour” (Ryan & Deci, 2008, p. 658).*

Put differently, feelings of autonomy occur when behaviour is perceived as originating from within the individual (DeCharms, 1968). Experiencing autonomy does not necessitate that a person is free of any dependencies (Ryan & Deci, 2008). Autonomy is undermined when individuals feel subjected to heteronomy (Ryan & Deci, 2008) which means “producing a behaviour by notably abiding by norms that are to a large extent independent of the agent” (Steiner & Stewart, 2009, p. 529). The differentiation between dependencies and heteronomy is critical: acknowledging that life is full of dependencies, individuals could never experience autonomy if being freed from all dependencies was the key criterium (Ryan & Solky, 1996). Similarly, autonomy is not to be confused with individualism. For instance, members of East Asian societies assimilating the cultural ideals they are subjected to without experiencing heteronomy would be considered “autonomously collectivistic” in SDT (Ryan & La Guardia, 2000, p. 150). Probably, the essence of autonomy in SDT is a locus of causality that is internal to the individual (Ryan & Deci, 2000a). With regards to MCSs, it cannot be reliably predicted how specific components affect an individual’s perceived autonomy. If controls represent values that are congruent with the values internal to an individual, then imposing these controls will not considerably affect the individual’s autonomy perceptions (Ryan & La Guardia, 2000). Conversely, if intended controls and the individual’s values constitute an area of tension, then, imposing these controls will deprive the individual of perceived autonomy (Ryan & La Guardia, 2000).

#### ***Relatedness***

*“Relatedness refers to feeling connected with others and having a sense of belonging within one’s community” (Ryan & Deci, 2008, p. 658).*



Relatedness rests on the inherent desire of an individual to matter to other individuals and groups of people and thus involves a twofold relationship: “caring for others and being cared for” (Ryan & Deci, 2008, p. 658). A caring relationship involves parties that are responsive and sensitive towards the other party’s experiences and emotional needs (Ryan & La Guardia, 2000). Here, importance is attached to the stability of these relationships. An environment in which relatedness is experienced inconsistently is likely to harm an individual’s feeling of self-worth (Deci & Ryan, 1995). In the organisational context, being a valued member of the group (the person identifies with) is a particularly important element of experiencing relatedness (Broeck et al., 2010). Notably, relatedness does not have to conflict with autonomy or competence (Ryan, 1991). Individuals typically feel most inclined towards those people who signal acceptance and appreciation for the autonomous behaviour the individual exhibits (Ryan & Powelson, 1991).

### ***Competence***

*“Competence refers to feeling effective in one’s actions – that is, experiencing opportunities to exercise, expand and express one’s capacities.” (Ryan & Deci, 2008, p. 658).*

Expressed in a reduced form, competence relates to “individuals’ inherent desire to feel effective in interacting with the environment” (Broeck et al., 2010, p. 982). From a management control perspective, it must be noted that feelings of competence do not remain constant over time but vary depending on the types of stimuli the individual receives (Vallerand & Reid, 1984). Feelings of competence generally increase when individuals perform tasks which are difficult enough to raise curiosity but not that difficult that individuals feel overburdened (Ryan & Deci, 2008). Similarly, receiving positive feedback is found to facilitate increased feelings of competence (Ryan & Deci, 2008). Conversely, negative feedback, tasks lacking difficulty, and feeling incapable of performing an assigned task are found to diminish feelings of competence (Ryan & Deci, 2008).

Furthermore, one terminology differentiation is critical for this study: the difference between feelings of competence and self-efficacy. Unfortunately, some scholars view the two terms as interchangeable and ignore the distinct theoretical affiliation of both terms. Bandura's (1977) self-efficacy theory and Deci and Ryan's SDT have dissimilar

understandings of competence with regards to construct properties. In self-efficacy theory, competence relates to an individual's expectations of attaining success (Ryan & La Guardia, 2000). Therefore, self-efficacy reflects an individual's confidence in achieving outcome-oriented goals (Schyns & Von Collani, 2002). Correspondingly, occupational self-efficacy (OSE) relates to an individual's confidence in achieving work-related goals (Schyns & Von Collani, 2002). In SDT however, feelings of competence entail facets that exceed mere outcome expectations. Ryan & La Guardia (2000, p. 150) state that "according to SDT, the feeling of competence attends behaviours that are both self-endorsed and effectively pursued. Thus, efficacy at heteronomous tasks does not typically enhance feelings of competence".

### *The relevance of basic psychological need frustration*

In the three preceding sections, the conditions for basic psychological need fulfilment were described. In research practise, basic psychological need fulfilment is typically operationalised as BPNS and measured by the wide-spread BPNS (at work) scale (Deci et al., 2001; Ilardi et al., 1993; Kasser et al., 1992). Recent studies, however, call for a conceptual distinction between BPNS and BPNF because they find that basic psychological needs can be actively foiled (Chen et al., 2015; Bartholomew et al., 2011; Vansteenkiste & Ryan, 2013). If BPNS is low, then there is insufficient support for personal growth (Chen et al., 2015). BPNF, however, uniquely causes ill-being, exemplified by conditions such as defensiveness or psychopathology (Stebbins et al., 2012; Ryan et al., 2015; Vansteenkiste & Ryan, 2013; Verstuyf et al., 2013). A study conducted by Chen et al. (2015) investigates how BPNS and BPNF, respectively, relate to life satisfaction, vitality, and depressive symptoms. They find that BPNS is positively associated with vitality and life satisfaction while BPNF is positively associated with depressive symptoms and negatively associated with life satisfaction. On the need level, frustration occurs in the following forms: 'autonomy frustration' resembles a state of feeling controlled by external forces (Deci & Ryan, 1985b; Chen et al., 2015), 'relatedness frustration' entails feelings of loneliness and experiences of social isolation, and 'competence frustration' refers to doubts in one's abilities that is provoked by feelings of failure (Ryan, 1995; Chen et al., 2015).

### **3.2.2 Intrinsic and extrinsic motivation, and their relationship to work effort**

Each of the three basic psychological needs matter individually. However, in connection they provide a comprehensive explanation for the occurrence of different types of human motivation. Therefore, the following section is dedicated to the question how autonomy, relatedness, and competence are related to intrinsic and extrinsic motivation. Lastly, the relationship between motivation and work effort is highlighted.

#### ***Intrinsic motivation***

Intrinsic motivation can be defined as:

*“doing of an activity for its inherent satisfactions rather than for some separable consequence” Ryan & Deci (2000a, p. 56).*

Ryan and Deci (2000a) emphasise that intrinsic motivation contrasts operant theory which assumes all behaviours to be motivated by some form of separable incentive (Skinner, 1963). Importantly, intrinsic motivation is associated with humans acting in their healthiest states and thus provides ideal conditions for the acquisition of skills and knowledge (Ryan & Deci, 2000a). Closely tied to intrinsic motivation is cognitive evaluation theory (CET), a sub-theory of SDT, which identifies perceived autonomy and competence as the main facilitators of intrinsic motivation (Deci & Ryan, 1985a). Though not the focus of CET initially, subsequent studies found that the facilitation of intrinsic motivation also requires sufficient levels of relatedness (e.g. Grolnick & Ryan, 1989). Within CET, several factors are identified that either threaten or support need fulfilment and, therefore, intrinsic motivation. For instance, while positive performance feedback is found to facilitate intrinsic motivation, negative performance feedback achieves the opposite (Deci, 1975). A subsequent study found that the aforesaid relationship between positive performance feedback and intrinsic motivation is moderated by perceived competence (Vallerand & Reid, 1984).

#### ***Extrinsic motivation***

Extrinsic motivation, the complement to intrinsic motivation, is defined as:

*“a construct that pertains whenever an activity is done in order to attain some separable outcome.” (Ryan & Deci, 2000a, p. 60).*

Importantly, human motivation should not be envisioned in binary terms, distinguishing only between intrinsic and extrinsic motivation. Rather, extrinsic motivation exists in different forms, depending on the level of perceived autonomy (Ryan & Connell, 1989; Vallerand, 1997). Organismic integration theory (OIT), a second SDT sub-theory (Deci & Ryan, 1985c), contains a ‘taxonomy of human motivation’ that recognizes different types of extrinsic motivation. Its four subtypes (external regulation, introjection, identification, and integration) are characterised by different internal processes and vary with respect to the perceived locus of causality (Ryan & Deci, 2000a; see Figure 3).

Figure 3: Extract from taxonomy of human motivation after Ryan and Deci (2000a)

External motivation				
Types of external motivation (Regulatory styles)	External regulation	Introjection	Identification	Integration
Associated processes	<ul style="list-style-type: none"> <li>• Salience of extrinsic rewards or punishments</li> <li>• Focus on compliance/reactance</li> </ul>	<ul style="list-style-type: none"> <li>• Ego involvement</li> <li>• Focus on approval from self and others</li> </ul>	<ul style="list-style-type: none"> <li>• Conscious valuing of activity</li> <li>• Self-endorsement of goals</li> </ul>	<ul style="list-style-type: none"> <li>• Hierarchical synthesis of goals</li> <li>• Congruence</li> </ul>
Perceived locus of causality	External	Somewhat external	Somewhat internal	Internal

-----> Process of internalisation

Critically, external values or motivation can become internalised over time (Ryan & Deci, 2000a). If individuals begin to embrace an external stimulus, then their perceived locus of causality will shift from being external to being more internal and behaviours will become more self-determined (Ryan & Deci, 2000a). However, certain means of management control are likely to obstruct internalisation. Ryan and Deci (2000a) argue that extrinsic incentives (e.g. praise) might support feelings of competence and relatedness, but not perceived autonomy. In the context of MCSs, it is therefore believed that extrinsic motivation stimulated by direct incentives becomes, at best, introjected but not integrated. Therefore, the distinction between external regulation and introjection is particularly relevant for this study. External regulation occurs in connection to external rewards and demands and is associated with processes such as compliance and

reactance. Introjection, in contrast, takes a perspective that is internal to the individual and emphasises processes such as ego involvement and the desire for approval. Most likely, bonuses and penalties matter beyond the external sphere. Baumeister et al. (1993) conducted several experiments showing that monetary rewards resemble ego threats that seduce individuals with high self-esteem to engage in dysfunctional decision-making behaviour. Their findings suggest that bonuses and penalties play a role not only for external regulation but also for introjection. In conclusion, the process of internalisation is facilitated by feelings of relatedness (Ryan et al., 1994) competence and, critically, perceived autonomy (Ryan & Deci, 2000a).

### ***Work Effort***

The third construct presented in this section is work effort which might be seen as the outcome of intrinsic or extrinsic motivation. According to Kanfer (1990), persistence, direction, and intensity resemble the most commonly used dimensions to measure effort deployed in motivation research. Taken together, those dimensions constitute the “three critical components of motivational outcomes” (Kanfer, 1990, p. 79). Following this assumption, De Cooman et al. (2009) conceptualise work effort as a three-dimensional construct comprising persistence, direction, and intensity. Again, referring to De Cooman et al. (2009), the essence of the three dimensions is best described as follows: First, persistence refers to an individual’s will to keep on trying irrespective of experienced difficulties. Second, direction means that the actions an individual performs are in accordance with the goals and expectations set by the organisation. Lastly, intensity refers to the amount of energy an individual mobilises when working ‘hard’.

## 4 Hypotheses development

### *The main effect of contract frame on intended work effort*

Having established the theoretical framework for this study in the previous sections, focus is now set on the development of hypotheses for empirical testing. First, the relationship between contract frame and intended work effort is addressed<sup>1</sup>.

Central to prospect theory is the discovery that ‘losses loom larger than corresponding gains’ (Kahneman & Tversky, 1979; Kahneman et al., 1991). More precisely, prospect theory suggests that the decrease in perceived value when losing  $x_1$  is larger than the increase in perceived value when gaining  $x_1$  as expressed by the differing levels of steepness on the two sides of the value function introduced in Section 3.1 (Kahneman & Tversky, 1979). In the context of this study, this means that the decrease in perceived value when receiving a penalty (loss) likely exceeds the foregone increase in perceived value when not receiving a bonus (no gain). To maximise perceived value, individuals are therefore expected to be more concerned with avoiding the penalty than with receiving the bonus. Acknowledging that avoiding the penalty or receiving the bonus, respectively, is strongly related to work effort, individuals ought to increase work effort to enhance the probability of receiving the full pay-out (e.g. Church et al., 2008; Hannan et al., 2005).

This effect is believed to be complemented by a second aspect that has, hitherto, not been linked to research on framed compensation contracts: basic psychological needs fulfilment. Individuals are expected to not only respond to monetary stimuli but also to emotional ones (Ryan & Deci, 2000b). Penalty contracts are hypothesised to have a positive effect on intended work effort that is mediated by lower prospects of BPNS and higher prospects of BPNF (the full reasoning is presented subsequently in reference to H3 and H4). In short, it is predicted that loss aversion, the intuition of prospect theory, also applies to BPNS and BPNF in conjunction with framed compensation contracts and work effort intentions. Individuals are expected to place more importance

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<sup>1</sup> Please note that ‘intended work effort’ refers to the effort measure used in the subsequently presented survey experiment. When other studies or general considerations are concerned the terms ‘work effort’ or ‘effort’ (for agency theory-based experiments) are used.

on preventing BPNF than on realising BPNS. Put differently, the negative prospect inherent to BPNF is predicted to exceed the positive prospect inherent to BNPS. A circumstance that is hypothesised to be reflected by increased intended work effort for high prospects of BPNF.

Additionally, these two effects are believed to be intensified by the widespread reliance on the availability heuristic (Kahneman & Tversky, 1973). While the negative framing of the penalty contract likely directs individuals' attention to previous failures, the positive framing of the bonus contract likely directs their attention towards previous successes. The respective focus of attention is expected to influence the assessment of the probability of meeting the performance target and, thus, receiving the full pay-out. Those individuals focussing on previous failures are more likely to consider higher levels of effort warranted to achieve the performance target than those focusing on previous successes. Therefore, and in line with large parts of previous research, the following hypothesis for the main effect of contract frame on intended work effort is formulated (e.g. Church et al., 2008; Fryer et al., 2012; Hannan et al., 2005; Hong et al., 2015; Hossain & List, 2012):

*H1 Penalty contracts lead to higher intended work effort than bonus contracts.*

### ***The moderating role of occupational self-efficacy***

An individual's assessment of the probability to achieve a performance target and, thus, receive a performance-based incentive is expected to depend on its confidence in achieving work-related goals, which is known as OSE (see Section 3.2). In general, individuals are preoccupied with achieving or maintaining high self-efficacy (Bandura, 1977). Furthermore, research also suggests that high self-efficacy is promoted when success is achieved with low levels of effort (Bandura, 1981; Schunk, 1983). What follows from those two objectives is that individuals, to increase self-efficacy, are expected to strive for the minimum effort level that still allows them to succeed in achieving performance targets. Therefore, OSE is hypothesised to be negatively related to intended work effort:

*H2a Occupational self-efficacy is negatively related to intended work effort.*

Moreover, OSE is also expected to have a moderating effect on the relationship between contract frame and intended work effort (see H1). This is because the degree of susceptibility to compensation-related framing manipulation likely varies across the level of OSE. Here, the following is assumed: If OSE is high, individuals are likely to zero in on the maximum pay-out amount of a contract, irrespective of the label that is put on it. Also, failure, a scenario that is considered highly improbable when OSE is high, is unlikely to receive much consideration. Consequently, it is expected that contract frame only has a marginal impact on individuals with high OSE. Contrary, if OSE is low, individuals are more likely to zero in on the minimum pay-out of a contract because failure is considered a more realistic scenario. With regard to the event of failure, ‘not receiving a bonus’ (bonus contract) or ‘receiving a penalty’ (penalty contract) is argued to convey very different messages which enhances the relevance of framing. While a penalty is associated with a severe failure, not receiving a bonus is an event more ordinary (Luft, 1994; and see H3.2). Taken together, individuals with a low OSE are expected to focus more on the event of failure which is why they are predicted to be more vulnerable to framing. Therefore, the following hypothesis is formulated:

*H2b The effect of contract frame on intended work effort is negatively related to occupational self-efficacy.*

### ***The mediating role of loss aversion***

Prospect theory emphasises the importance of anchors in economic decision-making processes (Kahneman & Tversky, 1974). Even though economically equivalent, the penalty and the bonus contract set dissimilar anchors. In the penalty case, the high base salary sets the initial anchor. In contrast, in the bonus case, the low base salary sets a lower initial anchor. Critically, these anchors are assumed to resemble reference points from which an individual assesses prospective changes in wealth (Kahneman & Tversky, 1979). Due to this logic, the two contracts are assumed to have dissimilar perceived properties:

*A. Penalty contract: Penalty = Decrease in wealth, No penalty = No change in wealth*

*B. Bonus contract: Bonus = Increase in wealth, No bonus = No change in wealth*

This perception, caused by anchoring, reflects what is called an endowment effect: Individuals’ fear of losing what is ‘theirs’ (high base salary) is more pronounced than



their desire to gain what is not yet ‘theirs’ (bonus) (Thaler, 1980). The difference in perceptions establishes loss aversion. Also, the altered perception might be intensified by focussing on previous failures, as suggested by the argument concerning the availability heuristic that was presented in connection with the main effect.

Loss aversion reflects the difference in perceived value between a loss and the corresponding gain (Kahneman & Tversky, 1979). A precise hypothesis, therefore, must account for the methodological means chosen to quantify loss aversion. In this study, loss aversion is quantified through a common reference point that is applied to both contract frames (Contract B). This reference point is an alternative contract option (Contract A) which contains an unspecified guaranteed salary. The indifference amount is the guaranteed salary in Contract A that would make participants feel indifferent in comparison to Contract B (see Section 5.2). Loss aversion is hypothesised to be reflected by indifference amounts that are lower under penalty contracts than under bonus contracts which leads to the following hypothesis:

*H3.1 Penalty contracts lead to lower indifference amounts than bonus contracts (which reflects loss aversion)*

Referring to the value function of prospect theory, loss aversion reflects the disproportionately large decrease in perceived value associated with losses as compared to gains. Responding to loss aversion, individuals who state lower indifference amounts are expected to choose higher levels of intended work effort to prevent the suffering associated with experiencing a loss (e.g. Church et al., 2008; Fryer et al., 2012; Hannan et al., 2005; Hong et al., 2015; Hossain & List, 2012). Accordingly, the next hypothesis is established:

*H3.2 The indifference amount is negatively related to intended work effort.*

### ***The mediating role of basic psychological need satisfaction and frustration***

Regardless of the frame, performance-based incentives resemble means of control which have been found to conflict with perceived autonomy and self-determination in an individual’s behaviour at work (Ryan & Deci, 2000a). Although the bonus and the penalty contract share the same economic properties, they might induce very different emotional responses. For example, as Luft (1994) argues, bonuses are associated with

reward and approval, properties that would not be attributed to the absence of penalties. Closely related to approval is positive feedback, which is found to facilitate the development of competence satisfaction (Ryan & Deci, 2008). In contrast, penalties involve a form of stigmatisation many people disapprove (Luft, 1994). As a form of negative performance feedback, penalties are likely to initiate competence frustration (Ryan & Deci, 2008). Furthermore, while bonuses are commonly used as means of incentivisation, penalties resemble something ‘out-of-the-ordinary’. Therefore, bonuses and penalties might not be perceived equally with regards to their inherent salience. Direct salience of incentives, in turn, is associated with the obstruction of perceived autonomy (Cerasoli et al., 2014). Also, employees might react to penalty contracts by assuming a ‘compliance-attitude’ to avoid being sanctioned, which would further obstruct their autonomy (Ryan & Deci, 2000a).

Taking the social psychology perspective, either receiving no bonus or getting penalised, because performance targets were not achieved, likely triggers different feelings with respect to an individual’s social environment at work. While it is not inconceivable that receiving no bonus is met with a rather nonchalant attitude by some individuals, such a reaction is less likely if the same individual gets penalised. Getting penalised for poor performance likely causes fear of social isolation at the workplace (Weeks et al., 2010). Individuals might be afraid that co-workers become hostile towards them because the co-workers must exert increased effort and work longer hours themselves to offset the shortfall of performance that is underlying a missed performance target. Conversely, getting rewarded for good job performance indicates that an individual made a substantial contribution towards achieving team or organisational goals. As a consequence, one is likely to feel connected with the social environment at work (Ryan, 1995). When applying these assumptions to BPNS and BPNF, the following hypotheses arise:

*H4.1a Penalty contracts are associated with lower prospects of basic psychological need satisfaction than bonus contracts.*

*H4.1b Penalty contracts are associated with higher prospects of basic psychological need frustration than bonus contracts.*

As established in Section 3.2, BPNS is associated with an individual’s well-being (Ryan & Deci, 2000b). Therefore, it can be suspected that people naturally strive for BPNS. It follows that individuals are likely to commit to work effort levels that increase their

probability of receiving a bonus (avoiding a penalty) to attain the desired state of well-being. On the other hand, BPNF has been found harmful to emotional well-being (e.g. Ryan et al., 2015; Vansteenkiste & Ryan, 2013), and therefore individuals might strive for preventing BPNF just as much as they strive for attaining BNPS. For this reason, the prospect of BPNS and the prospect of BPNF are both hypothesised to facilitate increases in intended work effort as reflected in both hypotheses:

*H4.2a The prospect of basic psychological need satisfaction is positively related to work effort.*

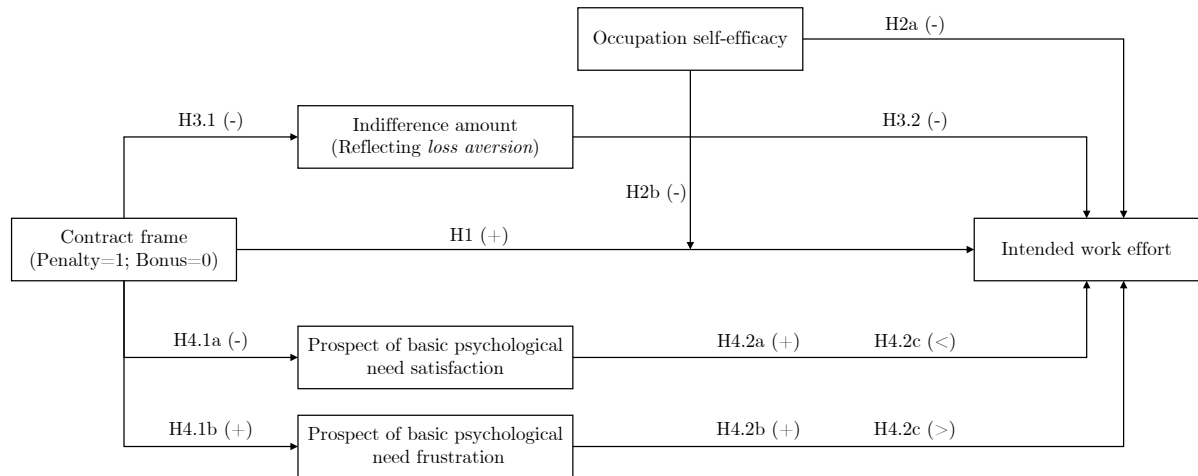
*H4.2b The prospect of basic psychological need frustration is positively related to work effort.*

Here, the critical question is which of the two hypothesised effects (H4.2a or H4.2b) is larger in magnitude and therefore dominant? The magnitudes of the relationships between prospects of BPNS or BPNF, respectively, and intended work effort might be predicted by the intuition of prospect theory. When neutral basic psychological need fulfilment is assumed as a reference point, BPNS can be considered the equivalent of a gain while BPNF resembles the equivalent of a loss. Therefore, individuals are predicted to place more importance on preventing BPNF than on realising BPNS. Put differently, the negative prospect of BPNF is hypothesised to exceed the positive prospect of BNPS in relevance what is predicted to be reflected in a larger effect on intended work effort:

*H4.2c The prospect of basic psychological need frustration has a larger effect on intended work effort than the prospect of basic psychological need satisfaction.*

In summary, the described relationships and their hypothesised directions establish this study’s empirical model<sup>2</sup> which is depicted in Figure 4. However, before being able to test if the relationships apply, the following section will focus on the methodological considerations that relate to this research.

Figure 4: Empirical model pre-testing



- (+) Hypothesised **positive** relationship    (<) Hypothesised **weaker** relationship  
 (-) Hypothesised **negative** relationship    (>) Hypothesised **stronger** relationship

## 5 Methodology

To analyse the effects that originate from different compensation contract frames, a quantitative study based on a survey experiment is conducted. The survey experiment is performed through an online survey tool. Using a between-subjects design, the treatment (bonus or penalty contract) is randomly assigned to the participants. Both contracts contain a variable compensation component which is based on relative performance evaluations. The survey experiment’s 113 participants (N=113), 20 to 35- year-

<sup>2</sup> Separate analyses of parts of the empirical model are required due to the chosen estimation method. Hence, there is no single equation that would represent the empirical model. Moreover, for most parts, it cannot be drawn upon functional relationships established in previous research, wherefore the correct model specifications are systematically developed in Section 6.3. Hypothesis testing is conducted based on the specification stated in parenthesis: H1, H2a (1e); H2b (1c); H3.1 (2a); H4.1a (2b); H4.1b (2c); H3.2, H4.2a, H4.2b, H4.2c (4). The formal model for each estimated specification is stated in Section 6.3 as well as in Appendix 9.

old academics, were recruited from the authors' personal contacts. Multiple linear regression based on ordinary least squares (OLS) estimations is used for statistical analysis. For the mediation analysis, the procedure established by Baron and Kenny (1986) is followed. Furthermore, two-sided t- respectively F-tests are used for hypothesis testing.

## 5.1 Research methods

### *Study type*

Previous research on framed compensation contracts primarily uses laboratory experiments to collect data for empirical analysis (e.g. Frederickson & Waller, 2005; Hannan et al., 2005; Luft, 1994). Classical experiments have the advantage of improved control over participants' actions since they are well-observable within the contained setting (Zikmund, 2003). For this reason, experiments, which are praised for their high internal validity, are the preferred methodological means to establish causal relationships (Zikmund, 2003). Though, experiments also involve a significant downside: since all participants need to be present for a classical experiment, they typically involve high costs which, in turn, leads to small sample sizes (Zikmund, 2003). Small sample sizes are troublesome for two reasons. First, they obstruct internal validity if the collected data does not satisfy the minimum requirements for credible inferential statistics (Brazzale & Davison, 2008). Second, small samples also undermine external validity since findings are hardly generalisable for a whole population (Mitchell, 2012).

In contrast, classical surveys are associated with high degrees of external validity and limited internal validity (Bryman & Bell, 2011). A quality that relates to the less demanding and less expensive data collection process as compared to experiments. Therefore, the use of surveys favours larger sample sizes (Bryman & Bell, 2011). Due to technical advancements in the field of survey research, so-called 'experimental surveys' have become an increasingly popular research method in social science research (Mutz, 2011). Survey experiments are typically integrated into online solutions that combine elements from classical experiments and surveys (Mutz, 2011). More specifically, they support means such as the application of complex designs, use of treatments, and random sampling. For these reasons, it was determined that a survey experiment would best suit the study's purpose, considering the obvious constraints in time and resources.

Admittedly, the field could be considered the ideal environment for a study of this type. Unfortunately, from the researchers' perspective, compensation contracts are a delicate affair employers treat with high caution. Therefore, no company can be expected to risk alienating its employees (e.g. by imposing penalty contracts) to support a nine-week degree project. Hence, conducting a field experiment was no viable option for this project.

### ***Target population and sampling***

The target population is defined as 20 to 35-year-old individuals that have received at least one year of higher education (in the following referred to as 'academic background'). For the survey experiment, a convenience sample is drawn from the authors' personal contacts. In total, 121 out of the 182 contacted acquaintances chose to participate in the survey experiment which equates to a response rate of 66.5%. Eight responses contained either wildly illogical values or clearly inconsistent answers. To contain distortions, these eight observations were removed, arriving at a final sample size of  $N=113$ .

Abstracting from the obvious limitations arising from this sampling method (see Section 8.2), recruiting participants from personal contacts has several advantages. The first advantage is a more predictable and less time-consuming data collection process which is particularly valuable considering the project's tight timeline (nine weeks). Also, the convenience sampling helps to obtain a large enough sample that meets the prerequisites for meaningful statistical analysis. This exemplifies how sampling methods often involve a trade-off between internal and external validity (Bryman & Bell, 2011). For this study, the sampling method reflects the decision to sacrifice external validity for increased internal validity. The second critical advantage relates to the level of commitment that can be expected from personal contacts. What is more, any individual that understands the presented compensation contracts is a suitable participant for the purpose of this study. That is because the survey experiment does not require participants to possess specific knowledge or skills.

Apart from its convenience, the sample holds properties that are interesting for practical reasons. Insights from young adults are of utmost interest for employers since they either head towards the job market or, as young professionals, are likely to change their positions more frequently than other employee groups.

### *Statistical estimation method*

This study uses analysis of variance (ANOVA) which is a widely-used statistical estimation technique for smaller scaled studies and between-subjects designs. It is a convention to refer to ANOVA when predictor variables are categorical and to refer to ‘linear regression’ when predictor variables are continuous (Muller & Fetterman, 2002). In either case, the same general linear model is estimated (Muller & Fetterman, 2002). Since the empirical model contains continuous predictor variables, the linear regression terminology is applied henceforth. Each specification is estimated using multiple linear OLS regression which produces the best linear unbiased estimator (BLUE) when the Gauss-Markow assumptions are satisfied (see Section 6.2). Heteroskedasticity, which is tested for using the Breusch-Pagan and the White test, is addressed by using robust standard errors. Furthermore, normality is tested using the Shapiro-Wilk test.

For the hypothesis testing, two-sided t- respectively F-tests are used even though all hypotheses entail directional predictions. Recognising that the direction of an effect is always known post-testing, directional hypothesis testing is believed to obstruct the credibility of results.

Due to the choice of multiple linear regression, separate analyses of parts of the empirical model are required to perform a mediation analysis. For this reason, is it drawn upon the traditional methodology for mediation analysis established by Baron and Kenny (1986) which includes two critical steps: (1) Regressing the mediator on the causal variable (contracts frame) to confirm that their relationship is significant, and (2) regressing the main outcome variable (intended work effort) on both the causal variable and the respective mediator to confirm that the relationship between the mediator and the outcome variable is significant. In the subsequent results section, it is therefore referred to ‘stage one’ and ‘stage two’ of the mediation analysis. For multiple mediators, the second stage can either be performed separately for each mediator (‘restricted model’) or simultaneously for all mediators (‘full model’) (Baron & Kenny, 1986). To provide an indication of the robustness of the mediated relationships, both models are estimated. The hypothesis testing is based on the full model which is the more conservative approach (Baron & Kenny, 1986).

Furthermore, the existence of alternative estimation methods that are often considered more powerful than OLS regression should be acknowledged. In particular, for complex

models that contain latent constructs as well as for mediation analysis in general, structural equation modelling (SEM) is considered a more powerful technique in contemporary literature (Brown, 1997; Hayes, 2009; Iacobucci et al., 2007). However, the use of SEM is only appropriate when the underlying data fulfils a set of assumptions, most importantly a large sample size ( $N > 200$ ) and multivariate normality (Kline, 2011). These conditions also apply for a warranted use of multiple analysis of variance (MANOVA), another multivariate estimation technique which accounts for interrelations among multiple dependent variables (Johnson & Wichern, 2007). However, neither of these conditions is satisfied by the data that is produced by the conducted survey experiment. Hence, it is believed that the use of either SEM or MANOVA would not produce more valid or more credible results, respectively, as compared to OLS regression.

## 5.2 Study design

### *Between-subjects design*

The survey experiment uses a between-subjects design which is considered the preferred methodological means for research on framing effects (Charness et al., 2012). The preference for between-subjects designs over within-subjects designs in this research field relates to the researchers' cautiousness about the avoidance of spill-over effects (Charness et al., 2012). Whilst a between-subjects design means that a participant is only given one treatment within an experiment, a within-subjects design implies that a participant is subject to more than one treatment consecutively (Erlebacher, 1977). Therefore, using a between-subjects design sacrifices at least one-half of the observations which typically leads to lower statistical power (Charness et al., 2012). Critically though, the use of a within-subjects design is only warranted if substantial distortions caused by potential spill-over effects can be ruled out (Greenwald, 1976). Spill-over effects apply if having been exposed to a first treatment significantly affects an individual's subsequent reaction to the following treatment(s) (Greenwald, 1976). In this specific study, a within-subjects design would contain the risk that the successive presentation of economically equivalent bonus and penalty contracts draws attention to the lack of economic difference between the two contracts. If this realisation occurs while being exposed to the second treatment, individuals might want to show that they



are rational decision-makers by indicating preferences according to expected value consideration rather than according to their true feelings. Therefore, a within-subjects design would likely suffer from substantial distortions which makes it unsuitable for this study type. In contrast, the chosen between-subjects design is protected from this type of distortions, since it only contains one treatment per group.

### *Treatment design*

The participants of the survey experiment are randomly assigned to one of two treatment groups: the ‘bonus group’ or the ‘penalty group’. The two treatments are depicted in Figure 5 below. Participants in the bonus group are subjected to a contract with a low base salary and a performance dependent bonus component. Contrary, participants in the penalty group are subjected to a contract with a high base salary and a performance dependent penalty component<sup>3</sup>.

*Figure 5: Depiction of treatments*

<b>Bonus contract:</b>	<b>Penalty contract:</b>
Base salary: 2,000€ Bonus: 1,000€	Base salary: 3,000€ Penalty: 1,000€
The bonus is paid if your performance puts you in the top-half of the peer-group.	The penalty applies if your performance puts you in the bottom-half of the peer-group.

Both contracts are economically equivalent. The 2:1 proportion of guaranteed compensation to variable compensation equals the one used by Hannan et al. (2005). Participants are given the information that the stated amounts resemble net monthly amounts. Critically, the full pay-out is contingent on a relative performance evaluation which is explained in detail in following.

Previous laboratory experiments on framed compensation contracts often compared framed contracts that included variable compensation components with fixed pay-out probabilities for linear combinations of effort levels and effort costs. Hannan et al.

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<sup>3</sup> The two complete surveys that were designed based on the initial treatment and given to the participants of the survey experiment are provided in the Appendix. Appendix 1 is the survey given to the bonus group and Appendix 2 is the copy given to the penalty group.

(2005), for instance, deploys a modelling in which the expected net pay-off for participants remains constant irrespective of effort level. Opposed to that, this study chooses a less static approach by introducing a scenario in which pay-outs are contingent on relative performance evaluations. This approach allows pay-out probabilities to implicitly vary across effort levels. More precisely, the bonus is paid (penalty is avoided) if an individual outperforms the bottom-half of its peer-group which is constituted by co-workers who perform similar tasks. Recognising that this study draws upon a heterogeneous sample, this rather vague formulation is chosen deliberately to allow participants to imagine a work setting in accordance with their domain specifics. For the same reason, performance is not further specified since it is assumed to have different characteristics across occupational domains (Motowidlo & Kell, 2012). If half of a peer group receives the full pay-out than one critical piece of information can be deducted: across all individuals, the average probability of receiving the full pay-out equals 50 percent. Thus, a pay-out probability of 50 percent is implied, yet, it varies depending on the work effort an individual chooses to exert.

In general, relative performance evaluations are found to motivate individuals to exert high effort levels in various settings (Frederickson, 1992; Hannan et al., 2013). For this reason, modelling incentive pay-outs as a function of relative performance evaluations is considered a particularly interesting design to test the strength of framing effects.

### ***Operationalisation of loss aversion***

One common way to capture loss aversion is to introduce two economically equivalent contract frames and then ask participants to rate the contracts in accordance with their preferences towards them (e.g. Luft, 1994). This approach involves several issues. Some participants will likely realise that two economically equivalent contracts are compared. This realisation might motivate them to show that they are rational decision-makers by stating alleged indifference between the contracts even though that might not reflect their ‘true feelings’. If the researcher responds to this issue by denying participants a neutral option, another issue arises. In this case, respondents that are truly indifferent between both contract modes are forced to deviate from their actual perception. These issues can be evaded by not comparing both contracts directly. Therefore, a technique similar in intuition to Frederickson and Waller (2005), yet implemented slightly different, is used. Participants are to compare ‘their contract’ (Contract B = bonus or penalty), to an alternative contract option (Contract A) which states an unspecified base

salary and contains no variable component. Then, participants are asked to indicate what base salary in Contract A would make them feel indifferent between the two contracts.

*Figure 6: Operationalisation of loss aversion (indifference amount)*

**Bonus group:**

<p><b>Contract A:</b>          Base salary: _____€          Bonus: 0€          The base salary is guaranteed.</p>	<p><b>Contract B:</b>          Base salary: 2,000€          Bonus: 1,000€          The bonus is paid if your performance puts you in the top-half of your peer-group.</p>
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**Penalty group:**

<p><b>Contract A:</b>          Base salary: _____€          Penalty: 0€          The base salary is guaranteed.</p>	<p><b>Contract B:</b>          Base salary: 3,000€          Penalty: 1,000€          The penalty applies if your performance puts you in the bottom-half of the peer-group.</p>
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### 5.3 Measurement scales

For the data analysis, each scale used in this study is treated as an interval scale. The appropriateness of treating Likert-data as interval scales is one of the research community’s most ancient discussions (Wu & Leung, 2017). Here, the following stance is taken: Once the average of two or more items is taken interval properties are implicitly assumed because this arithmetic step would not be allowed otherwise. Recognising that single-item measurement is no satisfying alternative with respect to reliability (Loo, 2002), making the interval assumption is considered reasonable. Against this background, end-point labelling is used for each scale to avoid creating explicit non-interval response categories. Additionally, a visual depicting a linear slope is placed above the response categories throughout the survey. All scales are seven-point Likert-scales and, thus, allow for a neutral option.

### ***Work effort scale (WESC)***

First, it must be recalled that this study draws upon a heterogeneous sample with respect to academic disciplines and occupations. Therefore, a measurement of effort must not be too specific but should emphasise higher-level capacities which are expected to produce desirable outcomes across most disciplines. The ten-item Work Effort Scale (WESC) developed and validated by De Cooman et al. (2009) satisfies this requirement. WESC measures work effort as a three-dimensional construct that comprises: persistence, direction, and intensity. Hence, it corresponds to Kanfer's (1990) definition of work effort as stated in Section 3.2. In this study, receiving the full payout requires participants to receive the bonus (avoid the penalty). Therefore, participants were asked to reflect on the following statement: *“To receive the bonus (avoid the penalty), I would...”*. The complementing set of items represents various expressions of the effort an individual is willing to put into work, one of which was dropped because it did not fit the above-mentioned context. Based on pre-test feedback, the end-point labels were changed from “fully disagree” to “very untrue for me” (1) respectively from “fully agree” to “very true for me” (7). Appendix 3 provides an overview of the items used to measure work effort in this study.

### ***Occupational self-efficacy scale (OCCSEFF)***

To measure OSE, the short version of the occupational self-efficacy scale (OCCSEFF), compiled and validated by Schyns and Von Collani (2002) was chosen. The scale involves eight items and therefore satisfied the need to keep the survey at an acceptable length. Due to the use of the relative performance evaluation, OSE in relation to co-workers is considered more relevant than independent OSE. Therefore, instead of asking participants if statements were “completely true” or “not at all true” for them, participants were asked to compare themselves against their average co-worker and indicate if a statement was “much less true for me” (1) or “much more true for me” (7). The original OCCSEFF scale does not provide a neutral option. Since the participants in the survey experiment were asked to use their average co-worker as a reference point, forcing them into a non-neutral answer was deemed inadequate. Therefore, a neutral point was added. Appendix 4 provides an overview of the items used to measure OSE in this study.

### ***Basic psychological need satisfaction and frustration scale (BPNSFS)***

In the theory section, attention was drawn to the recently emphasised conceptual distinctness of BPNS and BPNF. To account for this, the newly developed basic psychological need satisfaction and frustration scale (BPNSFS) in the work domain (Chen et al., 2015; Schultz et al., 2015) is used instead of the more established BPNS-only scale (Deci & Ryan, 2000; Deci et al., 2001; Ilardi et al., 1993; Kasser et al., 1992). Due to the inclusion of BPNF, the scale involves six dimensions: autonomy satisfaction, autonomy frustration, relatedness satisfaction, relatedness frustration, competence satisfaction, and competence frustration.

For compensation contracts, it is presumed that feelings of competence and relatedness occur in conjunction with (not) receiving the incentive while autonomy perceptions emerge independently of (not) receiving the incentives. For the autonomy related items, participants were therefore asked how they “*would likely feel*” if they had to work under the contract they were assigned to in the experiment. With regards to feelings of competence and relatedness, two scenarios were established that involved:

- 1) *Success: Receiving the bonus (avoiding the penalty).*
- 2) *Failure: Receiving no bonus (receiving the penalty).*

Participants were then asked to envision the occurrence of each respective scenario and indicate how they would react to it. Here, the softer wording “*I could imagine*” was chosen over “*I would likely*” to make it easier for participants to admit self-doubt, insecurities, and ego related feelings. The scale ranges from “*strongly disagree*” (1) to “*strongly agree*” (7). To increase fit for the specific context of this study and also to shorten the survey’s overall length, six out the 24 initial items were dropped. Appendix 5 provides an overview of the items used to measure PBNS and BPNF in this study.

## 5.4 Reliability and validity

### 5.4.1 Reliability

One critical challenge for (experimental) survey researchers is to ensure that directions and questions are understood correctly by the participants (Mutz, 2011). Naturally, survey experiments are self-administered, hence, they involve limited means to detect and clear out misunderstandings once the experimental survey is sent out (Mutz, 2011). To ensure reliability, several measures were taken to anticipate and eliminate as many potential ambiguities as possible in advance.

First, and most importantly, two small-scale pre-tests were conducted to ensure that the instructions and survey items were clearly formulated and therefore understandable. The key adjustments performed based on the pre-testers feedback were mentioned in the proceeding section which introduced the three deployed measurement scales.

Second, reliability is typically enhanced when the recruited participants are motivated to take part in a study (Gosling et al., 2004). For an experiment that requires participants to imagine a hypothetical situation and reflect on how they would respond to it, participants need to be considerably involved. The personal relationship between the researchers and the recruited participants is believed to support this condition.

Third, in 2019, many participants are expected to complete the survey on their mobile devices. Against this background, the survey was modified (e.g. the number of questions per page and font sizes) so that the mobile and desktop version would provide similar experiences.

Furthermore, to provide an objective measure of the scales' reliability, Cronbach's alpha ( $\alpha$ ) is reported (Cronbach, 1951). Cronbach's  $\alpha$  calculates a measure for a scale's internal consistency that is based on inter-item correlation. Good internal consistency might also be promoted by the previously pointed out precautions.

Table 1: Cronbach's alpha

Scale	Number of items in the scale	Average inter- item covariance	Cronbach's $\alpha$
OSE	8	0.524	0.830
Intended work effort	9	0.523	0.897
Persistence	3	0.400	0.622
Direction	3	0.641	0.802
Intensity	3	0.612	0.844
BPNS	9	1.076	0.894
AutS	3	1.414	0.850
RelS	3	2.713	0.952
ComS	3	0.885	0.847
BPNF	9	0.834	0.834
AutF	3	0.946	0.791
RelF	3	2.427	0.889
ComF	3	1.201	0.827

The table provides statistics on the number of items per measurement scale (see Section 5.3), their covariances, and Cronbach's  $\alpha$ . For intended work effort, BPNS, and BPNF also statistics on the subdimensions are provided.

**OSE**: Occupational self-efficacy, **BPNS**: Basic psychological need satisfaction, **AutS**: Autonomy satisfaction, **RelS**: Relatedness satisfaction, **ComS**: Competence satisfaction, **BPNF**: Basic psychological need frustration, **AutF**: Autonomy frustration, **RelF**: Relatedness frustration, **ComF**: Competence frustration.

An  $\alpha$  exceeding the threshold of 0.7 is generally believed to indicate satisfying levels of internal consistency (Peterson, 1994). For the four main construct,  $\alpha$  exceeds 0.8 in all cases: OSE ( $\alpha = 0.830$ ); Intended work effort ( $\alpha = 0.897$ ); BPNS ( $\alpha = 0.894$ ); and BPNF ( $\alpha = 0.834$ ) (see Table 1). For the six need dimensions,  $\alpha$  ranges between 0.791 (for autonomy frustration) and 0.952 (for relatedness satisfaction). Only the persistence dimension of intended work effort ( $\alpha = 0.622$ ) fails to exceed the 0.7 threshold. All in all, Cronbach's  $\alpha$  suggest that each deployed scale is reliable to a satisfying degree.

## 5.4.2 Validity

### *Construct validity*

To ensure construct validity, this study exclusively rests on measurement scales that were developed and validated in previous studies (see Section 5.3). The source(s) for each scale is depicted in Table 2 below.

Table 2: Sources of measurement scales

Variable	Source	Scale
Intended work effort	De Cooman et al., 2009	WESC
OSE	Schyns & Von Collani, 2002	OCCSEFF
BPNS	Chen et al., 2015; Schultz et al., 2015	BPNSFS
BPNF		

The table provides the sources of each measurement scale deployed in this study (see Section 5.3).

**OSE:** Occupational self-efficacy, **BPNS:** Basic psychological need satisfaction, **BPNF:** Basic psychological need frustration.

However, adjustments were necessary to increase their fit to the scope of this study which is why a repeated validation is desirable. For construct validation, most contemporary studies draw upon confirmatory factor analysis (CFA). CFA, in turn, is based on SEM for which the sufficiency of the data was questioned. However, data insufficiency is more troublesome for the structural model than for isolated measurement models (Kline, 2011). Therefore, estimating four separate measurement models for each construct is considered a reasonable approach to test for construct validity. Table 3 reports the incremental and absolute goodness-of-fit statistics that are commonly referred to in contemporary research, accompanied by the corresponding thresholds for model fit as established by (Hair et al., 2010). The estimated measurement models which depict standardised factor loadings, covariances, and intercepts are provided in Appendix 6. Additionally, more comprehensive output statistics for goodness-of-fit are shown in Appendix 7.

Table 3: Goodness-of-fit statistics for intended work effort, OSE, BPNS, and BPNF

Variable	df	Incremental fit statistics	Absolute fit statistics	
		CFI (>0.9)	SRMR (< or close to 0.05)	RMSEA (<0.08)
Intended work effort	24	0.962	0.049	0.084
OSE	20	0.944	0.058	0.079
BPNS	24	0.971	0.059	0.089
BPNF	24	0.944	0.061	0.103

The table provides a summary of the comprehensive goodness-of-fit statistics provided in Appendix 7. Model fit in relation to three key statistics is shown: CFI (incremental fit statistic), SRMR, and RMSEA (absolute fit statistics).

**OSE:** Occupational self-efficacy, **BPNS:** Basic psychological need satisfaction, **BPNF:** Basic psychological need frustration.



With regards to incremental fit, the proposed threshold for the comparative fit index (CFI), 0.9, is surpassed in all cases which indicates a good model fit. Concerning absolute fit, values ranging between 0.049 and 0.061 for the standardised root mean residual (SRMR) suggest acceptable fit, although the recommended threshold is slightly exceeded for each construct, except for intended work effort. For the second absolute fit statistic, the root mean squared error of approximation (RMSEA), the threshold of 0.08 is exceeded in three cases. Only OSE (0.79) complies with the threshold recommended by Hair et al. (2010). However, the literature on model fit indices is inconclusive and other cut-off points exist that are less restrictive. For example, MacCallum et al. (1996) view a RMSEA between 0.08 and 0.10 as a mediocre fit. In conclusion, construct validity is not great but given at acceptable levels. In conjunction with the validation of each construct through previous research, construct validity is considered sufficient to carry out a meaningful empirical analysis.

Considering that each dimension of OSE, BPNS, and BPNF is measured by only three items (see Table 1), deleting items to improve the goodness-of-fit statistics was no viable option. Construct validity could have been boosted by adding more items to the survey and thereby leaving room to later eliminate items with poor fit. That, however, would have conflicted with the overall length of the already comprehensive survey.

### ***Causality***

The pursuit to establish causality is primarily addressed by choosing a between-subjects design which is based on the random assignment of contract frames. The random assignment assures that there is no systematic bias between the bonus group and the penalty group (given perfect randomisation, which is tested for using Welch's t-test, see Section 6.1) (Bailey, 2017). Therefore, the experiment is expected to produce estimates with little bias for the effect of contract frame on intended work effort, BPNS, BPNF, and the indifference amounts. For the second stage of the mediation, in which intended work effort is regressed on the hypothesised mediators, the same cannot be guaranteed.

### ***Gauss-Markow assumptions***

The validity of empirical results depends on the precision of the applied estimation method. OLS regressions produce BLUE parameter estimates when the five Gauss-

Markow assumptions are satisfied (Wooldridge, 2013). These include: linearity in parameters (MLR1), random sampling (MLR2), no perfect collinearity (MLR3), zero conditional mean (MLR4), and constant variance (MLR5) (Wooldridge, 2013). Additionally, normally distributed residuals (normality) (MLR6) are required to ensure reliable confidence and prediction intervals when sample sizes are small, two propositions that are critical for valid hypothesis testing (Wooldridge, 2013). Therefore, before presenting the regression results, it is tested and discussed if the six assumptions are satisfied (see Section 6.2).

### ***External validity***

Lastly, the focus is on external validity which is commonly distinguished into population validity and ecological validity. First, it is inherent to convenience samples that findings cannot be generalised to a wider population (Bryman & Bell, 2011). Second, the survey experiment requires participants to anticipate how they would feel and behave in a hypothetical scenario. This requirement raises several conflicts related to ecological validity that are discussed in the concluding limitations section of this study (see Section 8.2).

## **5.5 Variable description**

### ***Causal variable***

**Contract Frame ( $Frame_i$ ):** The contract frame is what distinguishes the two treatment groups in the survey experiment. Participants are randomly assigned to either the bonus contract or the penalty contract. Hence, contract frame is a binary variable (Penalty=1; Bonus=0).

### ***Dependent variable***

**Intended Work Effort ( $Effort_i, rIEffort_i$ ):** Intended work effort is not segregated into its three dimensions (persistence, intensity, and direction) but treated as a single variable. The reason being that, adopting the perspective of the organisation, aspired performance outcomes are believed to rest on the combination of all three dimensions. Therefore, intended work effort is calculated as the mean of all nine items that constitute the modified WESC scale. Importantly,  $rIEffort_i$  denotes the reflected and logged

form of  $Effort_i$ . The reasons for the transformation are discussed in detail in Section 6.2.

### *Independent variable*

**Occupational self-efficacy ( $OSE_i$ ):** OSE is measured prior to the treatment which makes it independent of the contract frame. Similar to the other latent variables, OSE is calculated as the mean of the eight items constituting the modified OCCSEFF scale.

### *Mediating variables*

**Indifference amount<sup>4</sup> ( $IndAmount_i$ ):** As described in Section 5.2, participants are to compare ‘their contract’ (Contract B = bonus or penalty) to an alternative contract option (Contract A) which states an unspecified base salary and contains no variable component. The indifference amount is the base salary (in Euros) in (Contract A) that would make them feel indifferent between the two contracts.

**Basic psychological need satisfaction ( $BPNS_i$ ):** Autonomy satisfaction ( $AutS_i$ ), relatedness satisfaction ( $RelS_i$ ), and competence satisfaction ( $ComS_i$ ) each are calculated as the mean of their three respective measurement items derived from the modified BPNSFS. BPNS is calculated as the mean of  $RelS_i$ ,  $AutS_i$ , and  $ComS_i$ .

**Basic psychological need frustration ( $BPNF_i$ ):** Autonomy frustration ( $AutF_i$ ), relatedness frustration ( $RelF_i$ ), and competence frustration ( $ComF_i$ ) each are calculated as the mean of their three respective measurement items derived from the modified BPNSFS. BPNF is calculated as the mean of  $RelF_i$ ,  $AutF_i$ , and  $ComF_i$ .

### *Control variables*

**Gender ( $Gender_i$ ):** Female=1; Male=0.

**Age ( $Age_i$ ):** Age in years.

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<sup>4</sup> The relationship between the indifference amount and loss aversion might not be fully intuitive at first. Wherefore, it is briefly outlined: Loss aversion is the alleged reason for the hypothesised gap in average indifference amounts between the two treatment groups. Put differently, a lower mean indifference amount for the penalty group would reflect loss aversion. Therefore, a statement such as ‘loss aversion is lower for bonus contracts’ would be inaccurate. Loss aversion always relates to the comparison between gains and the corresponding losses (Kahneman & Tversky, 1979). That is why no individual indifference amount can measure loss aversion but corresponding group means do.

**Higher education ( $HighEdu_i$ ):** Higher education denotes the years of education a participant has received at a university or a similar institution. Prolonged academic exposure is assumed to facilitate critical thinking (Lehmann, 1963). An aptitude that might encourage participants to rephrase the contracts and free themselves from the initially set anchor.

**Professional work experience ( $ProfExp_i$ ):** Professional work experience denotes the years of professional work a participant has accumulated. Possibly, work experience shapes participants' attitudes towards the level of work effort they generally endorse and, therefore, are willing to exert. If that is the case, participants with more work experience might be less responsive to different contract frames.

**Business school education ( $BSE_i$ ):** Business school education is used as a binary variable (Yes=1; No=0) that denotes if a participant has received at least one year of higher education at a business school. Business school socialisation might produce distinct perceptions of performance-based incentives with uncertain implications.

Due to the random assignment of the contract frames, the estimated regression coefficients of contract frame are expected to be unbiased even when control variables were dispensed. Reasons for including control variables nonetheless are discussed in Section 6.3.

A comprehensive list of all variables used in this study is provided in Appendix 8.

## 6 Empirical results

The following results section is subdivided into three parts. First, key descriptive statistics are presented. Second, the Gauss-Markow assumption for OLS estimations to be BLUE are discussed. Lastly, regression results are reported.

### 6.1 Descriptive statistics

The following part presents key descriptive statistics and is organised as follows: First, summary statistics for the independent variables are presented. For smaller sample sizes, random assignment is unlikely to assure that all unit characteristics are distributed perfectly even between treatment groups. Therefore, the summary statistics are accompanied by Welch's t-test to ascertain acceptable distributions between the two groups (Ruxton, 2006). Next, summary statistics for the model's main dependent and

mediating variables are presented. Subsequently, several scatterplots are presented to shed light on the relationship between contract frame, the hypothesised mediators, and intended work effort. Lastly, a Pearson correlation matrix is provided.

The left-hand side of Table 4 presents summary statistics for all independent variables.

*Table 4: Summary statistics and randomisation check for independent variables*

Variable	Group	Obs	Mean	Std. Err.	Std. Dev.	t-value	df	p-value
OSE	Bonus	56	4.911	0.114	0.854			
	Penalty	57	5.015	0.098	0.737	-0.697	109.976	0.487
	Combined	113	4.963	0.075	0.795			
Gender	Bonus	56	0.482	0.067	0.504			
	Penalty	57	0.596	0.066	0.495	-1.216	112.851	0.226
	Combined	113	0.540	0.047	0.501			
Age	Bonus	56	25.589	0.397	2.971			
	Penalty	57	25.526	0.440	3.323	0.106	111.996	0.916
	Combined	113	25.558	0.295	3.139			
HighEdu	Bonus	56	5.071	0.200	1.500			
	Penalty	57	4.456	0.196	1.477	2.197	112.875	0.030**
	Combined	113	4.761	0.142	1.513			
ProfExp	Bonus	56	4.000	0.381	2.848			
	Penalty	57	3.737	0.410	3.097	0.470	112.498	0.639
	Combined	113	3.867	0.279	2.966			
BSE	Bonus	56	0.679	0.063	0.471			
	Penalty	57	0.684	0.062	0.469	-0.064	112.942	0.949
	Combined	113	0.681	0.044	0.468			

The table provides key summary statistics (number of observations, mean, standard error, and standard deviation) and a randomisation check through Welch's t-test (t-statistics, degrees of freedom, and p-values) for OSE and the control variables. The summary statistics are grouped by contract frame.

**OSE:** Occupational self-efficacy, **Gender** (Female=1; Male=0), **Age:** Age in years, **HighEdu:** Years of higher education, **ProfExp:** Years of professional experience, **BSE:** Business school education (Yes =1, No = 0)

The 113 observations comprise the bonus group which contains 56 observations and the penalty group which contains 57 observations. For the full sample, the following properties are observed: The female share is 54.0 percent and the average age is 25.5 years. On average, participants received 4.7 years of higher education and have accumulated 3.8 years of professional work experience. Furthermore, 68.1 percent did receive business school education as part of their higher education. Lastly, average OSE, measured in relation to peers, is 4.963, which exceeds the scale's neutral point, 4, by almost one point. For psychological research, it is typically recommended not to rely

on the equal variance assumption when assessing group means (Delacre et al., 2017). Therefore, Welch’s t-test, which works for unequal variances is used (Ruxton, 2006). As indicated by high p-values, four out of the six independent variables (OSE, age, higher education, and professional work experience) show minimal differences in means between the two treatment groups. Even though the difference is not statistically significant ( $t = -1.216$ ,  $p = 0.226$ ), gender is not distributed evenly between the two groups. More alarming though, is the unequal distribution of higher education ( $t = 2.197$ ,  $p = 0.030$ ) between the groups. On average, participants receiving the bonus treatment had accumulated about half a year more higher education than the participants receiving the penalty treatment. If either gender or higher education were powerful predictors of intended work effort, not controlling for them could cause systematic bias. In this case, valid conclusions concerning the effect of contract frame on intended work effort must rest on statistical inference that allows to account for dissimilar predictor levels by including the respective variable.

Next, summary statistics for the main dependent variable (intended work effort) and the hypothesised mediators (indifference amount, BPNS, and BPNF) are presented.

*Table 5: Summary statistics for dependent variable and mediators*

Variable	Group	Obs	Mean	Difference in %	Std. Dev	Min.	Max.
Effort	Bonus	56	5.927		0.833	4.111	7.000
	Penalty	57	5.815	-1.9%	0.691	3.778	6.889
IndAmount	Bonus	56	2,625.000		277.489	2,000.000	3,000.000
	Penalty	57	2,334.228	-12.5%	402.229	1,700.000	3,000.000
BPNS	Bonus	56	4.466		0.972	2.333	6.889
	Penalty	57	3.943	-13.3%	1.158	1.556	6.556
BPNF	Bonus	56	4.560		1.025	2.333	6.778
	Penalty	57	5.070	10.1%	0.915	3.333	7.000

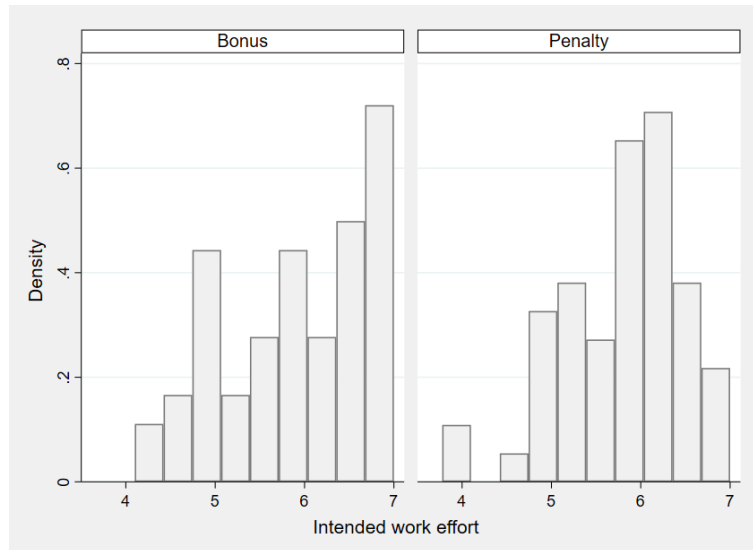
The table provides key summary statistics (number of observations, mean, standard deviation, minimum, and maximum) for intended work effort, the indifference amount, BPNS, and BPNF, grouped by contract frame. Additionally, the difference in means between the bonus and the penalty group is depicted in percentages for each variable.

**Effort:** Intended work effort, **IndAmount:** Indifference amount in Euros, **BPNS:** Basic psychological need satisfaction, **BPNF:** Basic psychological need frustration.

As shown in Table 5, the mean values of intended work effort only differ marginally between the two groups. Yet, it should be noted that both means, 5.927 (bonus) and 5.815 (penalty), reflect surprisingly high values for intended work effort. Values that

certainly make a case for extrinsic compensation incentives, irrespective of framing. A case that is further underscored by the notable absence of low values of intended work effort which might indicate protest against such incentivisation practices. Separated by treatment group, Figure 7 depicts the respective distribution of intended work effort in the form of a histogram.

*Figure 7: Histogram of intended work effort scores*



In contrast, the hypothesised mediators all differ considerably between the groups. The indifference amount is 290.72 Euros lower for the penalty group compared to the bonus group, which resembles a gap of 12.5 percent. Similarly, BPNS and BPNF values differ by roughly half a point each between both groups. Precisely, it is the bonus group that exhibits a higher mean value for BPNS and a lower mean value for BPNF. Another interesting observation is the difference between mean BPNS and BPNF scores for each group. While satisfaction and frustration scores are practically equal for the bonus group, there is an unfavourable gap of over one point for the penalty group (BPNS=3.943 vs. BPNF=5.070).

Table 6 provides a concise break-down that depicts autonomy, relatedness, and competence.

Table 6: Summary statistics for autonomy, relatedness, and competence

Dimension	Need	Group	Obs.	Mean	Difference in %	Std. Dev
BPNS	AutS	Bonus	56	3.643		1.201
		Penalty	57	3.152	-15.6%	1.341
	RelS	Bonus	56	3.929		1.608
		Penalty	57	3.409	-15.2%	1.739
	ComS	Bonus	56	5.827		0.722
		Penalty	57	5.269	-10.6%	1.193
BPNF	AutF	Bonus	56	5.000		1.060
		Penalty	57	5.556	10.0%	1.064
	RelF	Bonus	56	3.548		1.621
		Penalty	57	4.164	14.8%	1.639
	ComF	Bonus	56	5.131		1.322
		Penalty	57	5.491	6.6%	1.060

The table provides key summary statistics (number of observations, mean, and standard deviation), grouped by contract frame. Additionally, the difference in means between the bonus and the penalty group is depicted in percentages for each basic psychological need dimension.

**BPNS**: Basic psychological need satisfaction, **BPNF**: Basic psychological need frustration, **AutS**: Autonomy satisfaction, **RelS**: Relatedness satisfaction, **ComS**: Competence satisfaction, **AutF**: Autonomy frustration, **RelF**: Relatedness frustration, **ComF**: Competence frustration.

The mean values for need satisfaction and need frustration follow a consistent pattern. With regard to the satisfaction dimension, mean values are higher for the bonus group for all three needs. The opposite is true for the frustration dimension. Here, higher mean values are reported for the penalty group for each of the three needs. Irrespective of the framing, particularly high scores are observed for competence satisfaction, autonomy frustration, and competence frustration. Notably, the mean for competence satisfaction (5.827) exceeds the means for competence frustration (5.131) for the bonus group. For the penalty group, in contrast, the competence satisfaction mean (5.269) falls short of the competence frustration mean (5.491). The same relationship exists for relatedness, yet, on a weaker absolute level. Lastly, the high mean values for both groups (Bonus: 5.000; Penalty: 5.556) with regards to autonomy frustration indicate that the incentive scheme imposed on the participants considerably conflicts with perceived autonomy, irrespective of the contract frame.

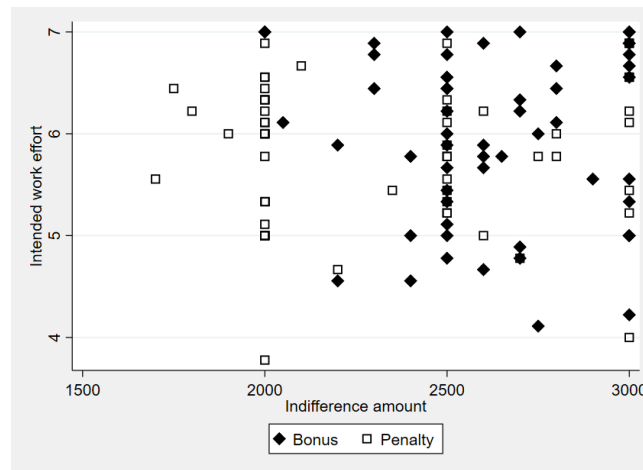
Referring back to Table 5, the indifference amount represents a particularly interesting case that deserves special emphasise. With 3,000 Euros, the maximal value is the same irrespective of the assigned contract frame. If an individual is free of any doubt to



outperform half of his peer-group, then it is rational to demand the full 3,000 Euros. Interestingly, the minimum guaranteed salary is falling short of 2,000 Euros for the penalty case. Considering that 2,000 Euros is the minimum pay-out specified in each contract, any value below suggests an extreme refusal of the incentive scheme. Put differently, a participant stating 1,700 Euros is willing to sacrifice a guaranteed amount of 300 Euros for not being subjected to the penalty scheme.

Next, three scatterplots are presented to give a first indication of the nature of the relationship between contract frame, intended work effort, and each hypothesised mediator. Figure 8, which is concerned with the indifference amount, highlights the presence of three popular indifference amounts: 2,000 Euros, 2,500 Euros, and 3,000 Euros.

*Figure 8: Scatterplot of intended work effort and indifference amount<sup>5</sup>*



These values represent the minimum, the implied average, and the maximum pay-out of the contracts. 3,000 Euros reflects full confidence in outperforming the bottom half, while 2,000 Euros reflects a full lack of confidence or general refusal of the introduced incentive scheme. On the one hand, all but one indifference amounts of 2,000 Euros and below are reported for participants of the penalty group. On the other hand, most indifference amounts between 2,500 Euros and 3,000 Euros are reported for participants of the bonus group. Though, the scatterplot does not reveal any obvious relationship

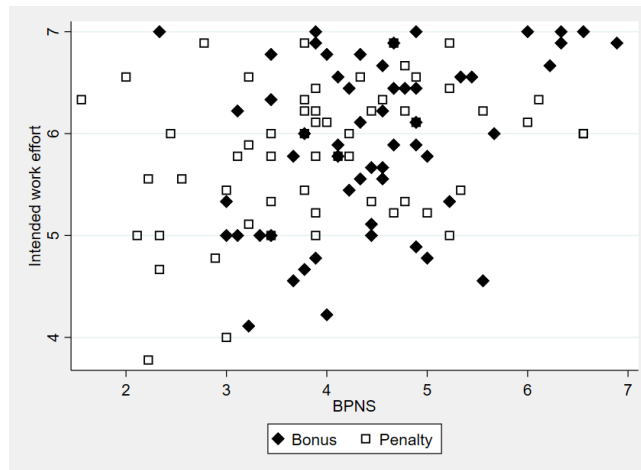
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<sup>5</sup> Please note that here and in the following Figures 9-10 the ‘black stars’ are overlapping data points from both groups.

between indifference amounts and intended work effort. In fact, intended work effort is showing similar levels of variance across low and high indifference amounts alike.

Next, Figure 9 shows a scatterplot in which BPNS is plotted against intended work effort.

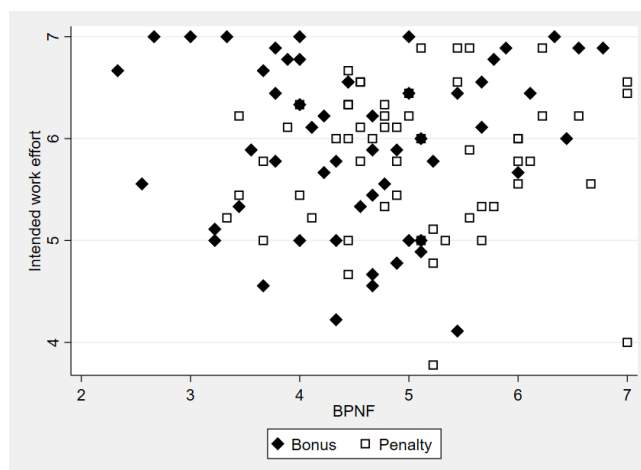
*Figure 9: Scatterplot of intended work effort and BPNS*



The distribution of intended work effort appears to describe a triangular shape for both treatment groups. For low values of BPNS, intended work effort varies widely. The variance decreases with increasing values of BPNS. On the top end, BPNS scores above six are associated with intended work effort scores exceeding six as well. Notably, the set of data points constituting the penalty group lies to the left of the set constituting the bonus group, which reflects lower overall levels of BPNS.

Furthermore, Figure 10 depicts a scatterplot in which BPNF is plotted against intended work effort.

*Figure 10: Scatterplot of intended work effort and BPNF*



The point cloud resembles a heart-shape, which implies a quadratic rather than a linear relationship between BPNF and intended work effort. A closer look reveals that the heart-shape is primarily constituted by data points belonging to the bonus group. For this group, high intended work effort is observed on both ends, for low BPNF and high BPNF, while low intended work effort is associated with mediate levels BPNF. Conversely, the data points belonging to the penalty group imply a positive relationship between BPNF and intended work effort across all levels of BPNF.

Lastly, Table 7 contains a Pearson correlation matrix comprising all variables that constitute the empirical model (see end of Section 4) complemented by the control variables.

*Table 7: Pearson correlation matrix*

	Effort	Frame	IndA- mount	BPNS	BPNF	OSE	Gender	Age	HighEd u	ProfExp p	BSE
Effort	1.000										
Frame	-0.074	1.000									
IndA- mount	0.009	-0.390	1.000								
BPNS	0.341	-0.239	-0.027	1.000							
BPNF	0.018	0.256	-0.160	-0.056	1.000						
OSE	0.308	0.066	0.127	0.182	-0.014	1.000					
Gender	-0.103	0.115	0.046	0.038	-0.132	0.075	1.000				
Age	0.021	-0.010	0.121	0.072	-0.015	0.094	0.114	1.000			
HighEdu	-0.094	-0.198	0.144	-0.075	0.053	-0.065	0.152	0.414	1.000		
ProfExp	0.120	-0.045	0.236	0.014	-0.044	0.185	0.097	0.689	0.194	1.000	
BSE	0.100	0.006	0.014	0.245	-0.024	-0.029	0.169	-0.170	-0.104	-0.224	1.000

The table depicts the Pearson correlation table for each variable included in the empirical model and the control variables.

**Effort:** Intended work effort, **Frame:** Contract Frame (Penalty = 1; Bonus = 0), **IndAmount:** Indifference amount in Euros, **BPNS:** Basic psychological need satisfaction, **BPNF:** Basic psychological need frustration, **OSE:** Occupational self-efficacy, **Gender** (Female = 1; Male = 0), **Age:** Age in years, **HighEdu:** Years of higher education, **ProfExp:** Years of professional experience, **BSE:** Business school education (Yes = 1; No = 0).

The highest correlation ( $r = 0.689$ ) is observed between age and professional work experience, which is not surprising. Contract frame ( $r = -0.074$ ) and the indifference amount ( $r = 0.009$ ) are reported to have very little correlation with intended work effort, which is surprising considering the findings presented in previous research (e.g. Frederickson & Waller, 2005). The suspicion that both variables resemble poor predictors of intended work effort is to be assessed in the subsequent regression analysis. On

the other hand, contract frame (penalty=1; bonus=0) shows moderately strong (negative) correlations with all three hypothesised mediators: The indifference amount ( $r = -0.390$ ), BPNS ( $r = -0.239$ ), and BPNF ( $r = 0.256$ ). According to the correlation matrix, BPNS ( $r = 0.341$ ) and OSE ( $r = 0.308$ ) are expected to be good predictors of intended work effort. Several of the control variables, in particular age ( $r = 0.021$ ), also lack significant correlation with intended work effort. Related implications are discussed in the part on regression results.

## 6.2 Gauss-Markow assumptions

As stated in the methodology section, OLS regressions are BLUE when the five Gauss-Markow assumptions are satisfied (Wooldridge, 2013). For small samples, normality is also required for OLS to produce precise confidence and prediction intervals, two propositions that are critical for valid hypothesis testing (Wooldridge, 2013). Before presenting the regression results, each assumption is briefly discussed, the focus being on heteroskedasticity and normality.

**MLR1: Linearity in parameters.** Linearity refers to the coefficients, not the regressors (Bailey, 2017). Thus, linearity in parameters applies for all estimated regression specifications irrespective of the regressors' functional forms.

**MLR2: Random sampling.** Due to the convenience sample, OLS does not produce unbiased parameter for the population of 20- to 35-old academics. The estimated parameters are only accurate for the subset of this population that is the author's personal contacts.

**MLR3: No perfect collinearity.** As shown by the correlation table, none of the variables are perfectly correlated. The highest correlation ( $\text{corr.} = 0.689$ ) is observed between age and professional work experience. Considering that the next highest correlation is below  $(-)0.4$ , the precision of the OLS estimates is not expected to be affected by multicollinearity issues (Wooldridge, 2013).

**MLR4: Zero conditional mean (exogeneity).** Concerning the effect of contract frame on intended work effort, the indifference amount, BPNS, and BPNF, endogeneity is addressed by randomly assigning participants into treatment groups (Bailey, 2017). Due to random assignment, issues such as omitted variables or measurement error

apply to both treatment groups likewise and, hence, do not systematically bias the parameter estimates for contract frame.

**MLR5: Constant variance.** The between-subjects research design carried out produces data for which autocorrelation does not apply. For each estimated regression, the distribution of the error variance is tested by conducting two heteroskedasticity tests. The Breusch-Pagan-test which detects linear forms of heteroskedasticity is accompanied by the White-test which also detects non-linear forms of heteroskedasticity (Wooldridge, 2013). Both are testing the null hypothesis of homoskedasticity. In contrast to t-testing, the conservative approach for homoskedasticity testing is to reject the null hypothesis also at lower significance levels (Wooldridge, 2013). Applying a ten percent significance level, heteroskedasticity, therefore, is assumed whenever p-values fall below 0.1. In each regression model for which one of the two tests rejects homoscedasticity, robust standard errors are used (Wooldridge, 2013). If both tests fail to reject the null hypothesis of homoscedasticity, standard errors are used. Appendix 10 reports the results for the heteroscedasticity tests.

**MLR6: Normality.** To assess normality, the Shapiro-Wilk test is conducted (see Appendix 11) (Wooldridge, 2013). Using the non-transformed *Effort*<sup>6</sup> variable, the Null-hypothesis of normality is rejected at the five percent significance level ( $z = 1.754$ ,  $p = 0.040$ ). This is hardly surprising since the distribution of intended work effort scores was shown to be substantially skewed to the left in the previous section. To obtain normally distributed residuals, *Effort* is transformed following a standard recommendation on how to address negative skewness: first reflecting and then logging the outcome variable (Howell, 2010). The reflection is performed by subtracting intended work effort scores from a constant. In the given case: eight (the scale's maximum plus one) minus the scores. When the transformed intended work effort variable (*rlEffort*) is inserted into Specification (1e)<sup>7</sup>, the Shapiro-Wilk test fails to reject the Null-hypothesis of normality ( $z = -0.380$ ,  $p = 0.648$ ). Additionally, the effectiveness of the transformation is visually depicted in Figure 11 in which the quantiles of the respective

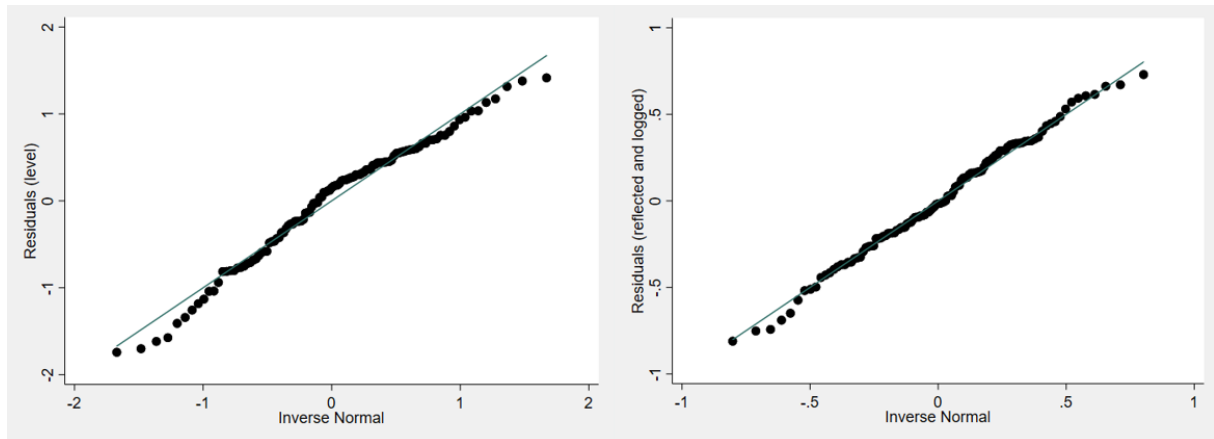
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<sup>6</sup> To test for normality ((1n), see Appendix 11), *Effort* (in its level form) is inserted into Specification (1e), the eventual estimation for the main effect.

<sup>7</sup> See Section 6.3.1

residuals are plotted against the quantiles of the normal distribution. Perfect normal distribution requires all residuals to lie on the inverse (Aldor-Noiman et al., 2013). Dispersion between the inverse and the residuals indicate divergence from normality (Aldor-Noiman et al., 2013). The right-hand graph shows that the dispersion considerably decreases if intended work effort is transformed.

Figure 11: Quantile-quantile plot: before (1n) and after (1e) transformation



### 6.3 Regression results

The reporting of the regression results is structured in four parts. First, results for the main effect of contract frame on intended work effort, which includes OSE as a potential moderator, are reported. Second, the first stage of the mediation analysis is performed in which the indifference amount, BPNS, and BPNF are regressed on contract frame. Third, the second stage of the mediation analysis is performed in which intended work effort is regressed on the three potential mediators and contract frame. Fourth, and last, both stages of the mediation analysis are repeated on the level of autonomy, relatedness, and competence.

Due to the choice of multiple linear regression as the estimation method (see Section 5.1), a partial analysis of the mediation stages is required (Baron & Kenny, 1986). This, together with the subsequent segregation of BPNS and BPNF into autonomy, relatedness, and competence, in conjunction with the comparison of restricted and full models for robustness, produces a rather lengthy results section with many regressions. Therefore, Figure 12 (see end of Section 6.3.3) and Figure 13 (see end of Section 6.3.4) are provided to visually summarise the key results.

### 6.3.1 Main effect (H1/H2a/H2b)

First, in Table 8 the regression results for the main effect of contract frame on intended work effort are presented.

Table 8: Regression results for the main effect

VARIABLES	(1a) rIEffort	(1b) rIEffort	(1c) rIEffort	(1d) rIEffort	(1e) rIEffort
Frame	-0.087 (0.070) [0.216]	-0.102 (0.067) [0.130]	0.483 (0.484) [0.321]	-0.096 (0.067) [0.155]	-0.098 (0.067) [0.145]
OSE		0.149*** (0.047) [0.002]	0.200*** (0.060) [0.001]	0.137*** -0.046 [0.004]	0.137*** (0.046) [0.003]
FrameOSE			-0.118 (0.094) [0.212]		
Gender				-0.104 (0.069) [0.134]	-0.104 (0.069) [0.134]
Age				-0.003 (0.018) [0.888]	
HighEdu				0.021 (0.026) [0.439]	-0.022 (0.021) [0.294]
ProfExp				0.023 (0.018) [0.201]	0.022* (0.013) [0.096]
BSE				0.093 (0.075) [0.220]	0.093 (0.075) [0.219]
Constant	0.646*** (0.056)	1.377*** (0.240)	1.626*** (0.304)	1.257*** (0.436)	1.307*** (0.275)
Observations	113	113	113	113	113
R-squared	0.014	0.115	0.131	0.168	0.168
Adjusted R-squared	0.005	0.100	0.107	0.112	0.120

Robust standard errors in parentheses

P-values from two-sided t-test in squared brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: To revoke the reflection of intended work effort, all coefficients are shown with reverse signs to allow for a more intuitive read.

**rIEffort**: Reflected and logged intended work effort, **Frame**: Contract Frame (Penalty=1; Bonus=0), **OSE**: Occupational self-efficacy, **FrameOSE**: Product of Frame and OSE, **Gender**: (Female=1; Male=0), **Age**: Age in years, **HighEdu**: Years of higher education, **ProfExp**: Years of professional experience **BSE**: Business school education (Yes=1; No=0).

To begin with, the following baseline model, Specification (1a), is formulated to obtain a first estimate for the effect of contract frame on intended work effort:

$$(1a) \text{rlEffort}_i = \beta_0 + \beta_1 \text{Frame}_i + \varepsilon_i^8$$

In Specification (1a), the negative coefficient for frame (-0.087) indicates a negative effect of penalty contract on intended work effort, which is not statistically significant<sup>9</sup> though ( $t = -1.25$ ,  $p = 0.216$ ).

Thereinafter, OSE is added in Specification (1b):

$$(1b) \text{rlEffort}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \varepsilon_i$$

Now, the coefficient of contract frame increases slightly from -0.087 to -0.102, yet, it remains statistically insignificant ( $t = -1.53$ ,  $p = 0.130$ ). OSE, on the other hand, has a significant positive effect on intended work effort ( $t = 3.16$ ,  $p = 0.002$ ).

For Specification (1c), an interaction term, the product of contract frame and OSE, is added to test if OSE moderates the relationship between contract frame and intended work effort:

$$(1c) \text{rlEffort}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_3 (\text{Frame}_i \times \text{OSE}_i) + \varepsilon_i$$

The change in magnitude and sign observed for  $\beta_1$  (0.483) is explained by the fact that  $\beta_1$  (and  $\beta_2$ ) no longer resemble(s) the main effect after an interaction term is added. In the presence of the interaction term,  $\beta_1$  is contingent on  $\beta_2$  which means that  $\beta_1$  only measures the effect of framing on intended work effort if  $\beta_2$  equals zero (Wooldridge, 2013). The interaction term's coefficient is -0.118. As predicted by hypothesis H2b, the negative sign indicates that the effect of framing on intended work effort decreases with increasing levels of OSE. The t-statistic reported for the product's coefficient ( $t = -1.25$ ,  $p = 0.212$ ) is unsuitable to assess statistical significance when interaction effects are concerned (Wooldridge, 2013). Instead, F-statistics for overall significance between (1c) which resembles the full model including the interaction term and (1b) which

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<sup>8</sup> An overview of all used regression specifications is provided in Appendix 9.

<sup>9</sup> This section is exclusively concerned with the statistical significance of the regression coefficients. The 'economic' significance of contract frame is best shown in Tables 5-6. As for the effect of BPNS and BPNS on intended work effort, the nature of the data (Likert-type) obstructs a sensible interpretation in terms 'economic' magnitudes.



resembles the restricted model that isolates the effect of contract frame by zero-setting the interaction term's coefficient are compared (Bedeian & Mossholder, 1994). Including the interaction terms appears warranted based on a lower p-value for the full model ( $F = 4.91$ ,  $p = 0.003$ ) as compared to the restricted model ( $F = 5.40$ ,  $p = 0.003$ ). However, a second restricted model, in which  $\beta_1$  and  $\beta_3$  are both set to zero, should be taken into account as an additional reference point. Regressing intended work effort on OSE alone produces the best F-statistic for overall significance ( $F = 9.93$ ,  $p = 0.002$ ) of any of the three models. Put differently, a model based on OSE as the sole predictor exceeds the model containing contract frame, OSE, and their interaction term in overall significance. The dispensability of the interaction term is further exemplified by the marginal improvement in adjusted R-squared when moving from Specification (1b) (0.100) to Specification (1c) (0.107). While adjusted R-squared is not a measure of statistical significance, it indicates that including the interaction between contract frame and OSE resembles no meaningful contribution to model fit. Considering the inconclusive findings, evidence confirming the interaction term's relevance is regarded too weak to justify its inclusion in the model. It follows that H2b is not supported.

In Specification (1d), the control variables gender, age, higher education, professional work experience, and business school education are added:

$$(1d) \text{rlEffort}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_3 \text{Age}_i + \beta_4 \text{Gender}_i \\ + \beta_5 \text{HighEdu}_i + \beta_6 \text{ProfExp}_i + \beta_7 \text{BSE}_i + \varepsilon_i$$

None of the controls show significance. Yet, there are several reasons to include them nevertheless. Including control variables can increase the precision of linear estimation models because the error variance typically decreases (Kirk, 2012). Though, in the case of small samples, adding control variables involves a trade-off. The nominal gain in model fit, as measured by R-squared, might be offset by the incurring loss of degrees of freedom, ultimately leading to lower adjusted R-squared and often lower statistical power in hypothesis testing (Kirk, 2012). Therefore, it is reviewed how adjusted R-squared behaves when control variables are removed. If it increases, removing the control variable is warranted. If it decreases, keeping the control variable seems advisable. Exploratory testing revealed that adjusted R-squared improves when age is removed. Similarly, removing higher education is found to yield a marginal increase in adjusted R-squared. Yet, considering the variable's uneven distribution between the treatment

groups (see Section 6.1), sacrificing marginal improvements in statistical power for the good of eliminating a potential source of bias seems justified.

That is why higher education is kept in the model and only age is dropped in Specification (1e) which is the final estimation model for the main effect of contract frame on intended work effort:

$$(1e) \text{rlEffort}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_3 \text{Gender}_i \\ + \beta_4 \text{HighEdu}_i + \beta_5 \text{ProfExp}_i + \beta_6 \text{BSE}_i + \varepsilon_i$$

Here, the effect of contract frame on intended work effort remains insignificant ( $t = -1.47$ ,  $p = 0.145$ ), which means H1 is not supported. In fact, the coefficient indicates a weak negative relationship between contract frame and intended work effort which is the opposite of the hypothesised positive association. As in all previous specifications, the positive effect of OSE on intended work-effort remains highly significant ( $t = 3.00$ ,  $p = 0.003$ ) which means that H2a is supported. The model fit measures, R-squared and adjusted R-squared, display rather low values of 0.168 and 0.120, respectively, which is assumed to relate to the insignificance of the main effect. In Specification (1e), professional experience is the only control variable that is significant ( $t = 1.68$ ,  $p = 0.096$ ). The positive sign of the coefficient indicates that intended work effort increases with years of professional work experience. Recalling that age and professional work experiences are highly correlated ( $\text{corr.} = 0.689$ ), the significance of professional experience in Specification (1e) is likely caused by the omission of age. Furthermore, the highest present correlation between variables in the model is dropping to 0.227 when age is removed, which further fortifies the assumption that multicollinearity concerns would be unfounded. Though not statistically significant, the direction of the remaining controls should not be dismissed. For this study's sample, there is a negative relationship between intended work effort and years of higher education as well as being female. Conversely, business school education and years of professional work experience show positive relationships with intended work effort.

### 6.3.2 First stage mediation: loss aversion, BPNS, and BPNF (H3.1/H4.1a/H4.1b)

In the following, the first stage of the mediation analysis is performed. For this purpose, each hypothesised mediator is regressed on the same set of independent variables<sup>10</sup> as specified in Specification (1e). The results of those regressions are reported in Table 9.

Table 9: Regressions results for the first stage mediation of loss aversion (indifference amount), BPNS, and BPNF

VARIABLES	(2a) IndAmount	(2b) BPNS	(2c) BPNF
Frame	-289.451*** (69.880) [0.000]	-0.605*** (0.200) [0.003]	0.603*** (0.198) [0.003]
OSE	54.484 (47.466) [0.254]	0.263** (0.125) [0.039]	-0.006 (0.128) [0.963]
Gender	35.833 (71.813) [0.692]	0.059 (0.204) [0.773]	-0.370* (0.194) [0.059]
HighEdu	7.690 (19.344) [0.692]	-0.079 (0.068) [0.251]	0.085 (0.065) [0.197]
ProfExp	25.281* (13.369) [0.061]	0.014 (0.035) [0.687]	-0.011 (0.036) [0.768]
BSE	46.953 (77.543) [0.546]	0.578*** (0.218) [0.009]	0.019 (0.199) [0.923]
Constant	2,168.186*** (262.943)	3.098*** (0.746)	4.366*** (0.726)
Observations	113	113	113
R-squared	0.221	0.171	0.107
Adjusted r-squared	0.1518	0.1243	0.0568

(2a) & (2b): Robust standard errors in parentheses

(2c): Standard errors in parentheses

P-values from two-sided t-test in squared brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**IndAmount:** Indifference amount in Euros, **BPNS:** Basic psychological need satisfaction, **BPNF:** Basic psychological need frustration, **OSE:** Occupational self-efficacy, **Gender:** (Female = 1; Male = 0), **HighEdu:** Years of higher education, **ProfExp:** Years of professional experience, **BSE:** Business school education (Yes = 1; No = 0).

<sup>10</sup> For the following specifications, the vector  $X_i$  represents the control variables Gender, HighEdu, ProfExp, and BSE.

In Specification (2a), the indifference amount takes the role of the dependent variable:

$$(2a) \text{IndAmount}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_{3-6} X_i + \varepsilon_i$$

The effect of the penalty contract on the indifference amounts is significantly negative ( $t = -4.14$ ,  $p = 0.000$ ), which means H3.1 is supported. As predicted by loss aversion, participants receiving the penalty contract are estimated to settle for guaranteed salaries almost 300 Euros lower compared to their counterparts that are subjected to the bonus contract. Also, professional work experience is the only control to show statistical significance ( $t = 1.89$ ,  $p = 0.061$ ). Its positive coefficient indicates that increased professional work experience is associated with higher indifference amounts and, therefore, lower loss aversion.

In Specification (2b), BPNS is inserted as the dependent variable:

$$(2b) \text{BPNS}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_{3-6} X_i + \varepsilon_i$$

Penalty contracts have a significant negative effect on BPNS ( $t = -3.02$ ,  $p = 0.003$ ) which means that H4.1a is supported. In contrast to that, OSE has a significant positive effect on BPNS ( $t = 2.09$ ,  $p = 0.039$ ). Furthermore, business school education is reported to have a significant positive effect on BPNS ( $t = 2.66$ ,  $p = 0.009$ ). When recalling how BPNS is measured, this finding suggests that current and former business school student expect to experience higher BPNS than their non-business school counterparts when outperforming their peers and therefore receiving the bonus (avoiding the penalty).

Lastly, in Specification (2c), BPNF serves as the outcome variable:

$$(2c) \text{BPNF}_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_{3-6} X_i + \varepsilon_i$$

Similar to the previous two estimated specifications, the coefficient of contract frame is significant ( $t = 3.18$ ,  $p = 0.002$ ) which means penalty contracts are associated with higher BPNF than bonus contracts. It follows that H4.1b is supported. With regards to the set of control variables deployed, only gender is significant ( $t = -1.92$ ,  $p = 0.058$ ). Females expect to experience less BPNF when failing to outperform their peers and, thus, receiving no bonus (a penalty) than males.

Summarising, contract frame is found to have a highly significant relationship ( $p < 0.01$ ) with each of the three hypothesised mediators. Therefore, the first condition to establish a mediating relationship is fulfilled in all three cases.

### 6.3.3 Second stage mediation: loss aversion, BPNS, and BPNF (H3.2/H4.2a/H4.2b/H4.2c)

Next, it is tested how well each hypothesised mediator predicts intended work effort. However, initially the focus is put on their correct functional form as predictor variables. The scatterplots presented in the section on descriptive statistics indicated that BPNF and BPNS form dissimilar functional relationships with intended work effort (see Figures 9-10). They imply that BPNF has a quadratic effect on intended work effort while BPNS has a linear effect on it. This presumption is tested by comparing a pair of restricted regressions in which intended work effort is regressed on the linear forms of BPNS (3a) and BPNF (3b), against a second pair of regressions in which quadratic terms for BPNS (3c) and BPNF (3d) are included (see Appendix 12).

For Specification (3a), the linear form of BPNS is reported as significant ( $t = -0.113$ ,  $p = 0.000$ ). With regards to Specification (3b), both the linear and the quadratic terms are jointly significant according to the F-test ( $F = 8.06$ ,  $p = 0.0005$ ). However, the overall significance of the model is inferior to Specification (3a) ( $F = 14.07$ ,  $p = 0.0003$ ). For this reason, BPNS is considered correctly specified in its linear form. In contrast, Specification (3c) reports no significance for the linear form of BPNF ( $t = 0.23$ ,  $p = 0.819$ ). Though, when the squared term is added in Specification (3d), both coefficients become statistically significant. The joint significance of both terms is confirmed by the F-test ( $F = 2.60$ ,  $p = 0.079$ ) which implies that BPNF is correctly specified in the quadratic form instead.

To ensure consistency throughout the empirical model, the set of controls used in Specification (1e) is also deployed here. As pointed out in the methodology section, multiple mediators can be tested either separately ('restricted model') or simultaneously ('full model') (Baron & Kenny, 1986). Even though the hypotheses testing is performed based on the full model, both options are reported to give an indication of the results' robustness. To capture the isolated effects of the indifference amount (4a), BPNS (4b), and BPNF (4c) on intended work effort, three restricted models are estimated in which the coefficients of the other two hypothesised mediators are set to zero. The simultaneous effect is estimated by the following full model:

$$(4) rLEffort_i = \beta_0 + \beta_1 IndAmount_i + \beta_2 BPNS_i + \beta_3 BPNF_i + \beta_4 BPNF_i^2 + \beta_5 Frame_i + \beta_6 OSE_i + \beta_{7-10} X_i + \varepsilon_i$$

Table 10: Regressions results for the second stage mediation of loss aversion (indifference amount), *BPNS*, and *BPNF*

VARIABLES	(4a) rIEffort	(4b) rIEffort	(4c) rIEffort	(4) rIEffort
IndAmount	0.000 (0.000) [0.450]			0.000 (0.000) [0.715]
BPNS		0.088*** (0.033) [0.009]		0.086** (0.034) [0.013]
BPNF			-0.126 (0.275) [0.647]	-0.173 (0.256) [0.501]
BPNFsqu			0.015 (0.028) [0.591]	0.02 (0.026) [0.453]
Frame	-0.124 (0.082) [0.134]	-0.044 (0.068) [0.520]	-0.106 (0.069) [0.129]	-0.063 (0.086) [0.464]
OSE	0.142*** (0.050) [0.005]	0.114** (0.045) [0.012]	0.130*** (0.049) [0.010]	0.107** (0.052) [0.042]
Gender	-0.101 (0.070) [0.152]	-0.109 (0.068) [0.111]	-0.093 (0.072) [0.197]	-0.097 (0.071) [0.175]
HighEdu	-0.021 (0.021) [0.312]	-0.015 (0.021) [0.469]	-0.023 (0.021) [0.294]	-0.015 (0.021) [0.493]
ProfExp	0.024** (0.012) [0.050]	0.02 (0.013) [0.109]	0.02 (0.013) [0.120]	0.02 (0.012) [0.106]
BSE	-0.097 (0.074) [0.189]	-0.042 (0.071) [0.555]	-0.091 (0.076) [0.232]	-0.043 (0.070) [0.536]
Observations	113	113	113	113
R-squared	0.174	0.224	0.173	0.232
Adjusted R-squared	0.1189	0.1728	0.1097	0.1565

Robust standard errors in parentheses

P-values from two-sided t-test in squared brackets

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: To revoke the reflection of intended work effort, all coefficients are shown with reverse signs to allow for a more intuitive read.

**rIEffort**: Reflected and logged intended work effort, **IndAmount**: Indifference amount in Euros, **BPNS**: Basic psychological need satisfaction, **BPNF**: Basic psychological need frustration, **BPNFsqu**: Squared basic psychological need frustration, **Frame**: Contract frame (Penalty = 1; Bonus = 0), **OSE**: Occupational self-efficacy, **Gender**: (Female = 1; Male = 0), **HighEdu**: Years of higher education, **ProfExp**: Years of professional experience, **BSE**: Business school education (Yes =1; No = 0).

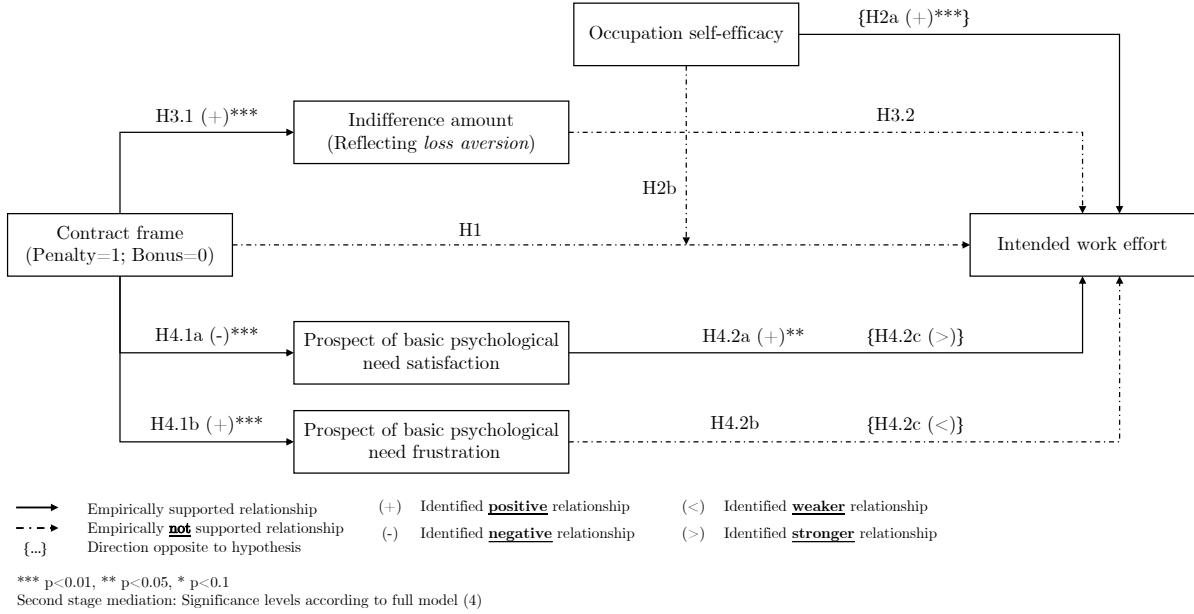
Regression results reported in Table 10 show that the hypothesised mediators' coefficients and significance levels vary only marginally between the full model and the restricted models. Having said that, one notable difference concerns the significance level of BPNS, which decreases from one percent in the restricted model (4b) to five percent in the full model (4). However, a closer look reveals that this change is due to a marginal increase in p-value when moving from the restricted ( $t = 2.66$ ,  $p = 0.009$ ) to the full model ( $t = -2.52$ ,  $p = 0.013$ ). This means that BPNS still has a significant positive effect in intended work effort and that H4.2a is supported. In contrast, the indifference amount (reflecting loss aversion) has no effect on intended work effort at all. The associated coefficient, 0.000 in Specification (4), is statistically insignificant ( $t = 0.37$ ,  $p = 0.715$ ) which means H3.2 is not supported.

Lastly, an F-test for joint significance is conducted to test the effect of BPNF on intended work effort. Test results suggest that the effect is insignificant ( $F = 0.42$ ,  $p = 0.661$ ). Hence, H4.2b is not supported. Nevertheless, the signs of the coefficients of the linear term (-0.173) and squared term (0.02) confirm the assumed U-shaped relationship between BPNF and intended work effort. The function's low point is obtained by partially differentiating equation (4) for BPNF (Wooldridge, 2013). The low point, which equals 4.325, separates two ranges in which BPNF exerts dissimilar effects on intended work effort. For BPNF scores between 1 and 4.325 increasing BPNF has a negative effect on intended work effort. Conversely, for BPNF scores between 4.325 and 7 increasing BPNF has a positive effect on intended work effort. For H4.2c it was assumed that the prospect of BPNF has a larger effect on intended work effort than the prospect of BPNS. Considering the quadratic nature of BPNF, this hypothesis becomes difficult to test, since its effect on intended work effort is not constant. Obtaining one or several point estimates for BPNF and comparing them to the constant effect associated with BPNS is not overly informative. Therefore, the assessment of hypothesis H4.2c is made based on the significance levels reported earlier. Together, the significance of BPNS at five percent ( $t = -2.52$ ,  $p = 0.013$ ) and the insignificance of BPNF ( $F = 0.42$ ,  $p = 0.6611$ ) provide no support for H4.2c.

In summary, out of the three hypothesised mediators, only BPNS is found to have a significant (positive) effect on intended work effort. In contrast, the (quadratic) effect of BPNF on intended work effort is insignificant. Also, the indifference amount (reflecting loss aversion) did not show any effect on intended work effort at all. After

testing all relationships postulated by the empirical model, Figure 12 presents a visual summary of the results and, thus, an updated model whose implications will be discussed further on.

Figure 12: Empirical model post-testing



### 6.3.4 First and second stage mediation: autonomy, relatedness, and competence

#### *First stage mediation of autonomy, relatedness, and competence*

Having detected the highly significant relationships between contract frame and BPNS as well as BPNF, or more granular analysis on the need level appears warranted. For this purpose, BPNS is split up into autonomy satisfaction ( $AutS_i$ ), relatedness satisfaction ( $RelS_i$ ), and competence satisfaction ( $ComS_i$ ). Similarly, BPNF is subdivided into autonomy frustration ( $AutF_i$ ), relatedness frustration ( $AutF_i$ ), and competence frustration ( $ComF_i$ ). Each of the six dimensions is inserted, as the dependent variable, in the same model estimated in Section 6.3.2:

$$(5a) \text{Aut}S_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_{3-6} X_i + \varepsilon_i$$

[...]

$$(5f) \text{Com}F_i = \beta_0 + \beta_1 \text{Frame}_i + \beta_2 \text{OSE}_i + \beta_{3-6} X_i + \varepsilon_i$$



The Shapiro-Wilk test (see Appendix 11) indicates non-normally distributed residuals for four of the six estimated specifications depicted in Table 11. As pointed out before, non-normality can cause prediction and confidence intervals to become imprecise which thwarts hypothesis testing (Wooldridge, 2013). To account for this issue, the non-parametric Mann-Whitney U-test is performed to assure that the significance levels obtained from the OLS estimation are reasonable (Nachar, 2008)<sup>11</sup>. Typically, significance levels will decrease due to the lower statistical power of non-parametric tests, which relates the abandonment of any distributional assumptions (Zimmerman, 1987). Table 11 compares the significance levels obtained from the (parametric) OLS regression against the (non-parametric) Mann-Whitney U-test. Full regression results are reported in Appendix 13.

*Table 11: Summary of regression results for the first stage mediation analysis of autonomy, relatedness, and competence*

Specification		Normality:	Parametric:		Non-parametric:
		Shapiro-Wilk p- value	OLS, Student Coefficient	t-test p-value	Mann-Whitney U-test p-value
(5a)	AutS	0.686	-0.524	0.036**	0.057*
(5b)	RelS	0.042*	-0.643	0.046**	0.103
(5c)	ComS	0.048*	-0.648	0.001***	0.02**
(5d)	AutF	0.014**	0.606	0.007***	0.005***
(5e)	RelF	0.272	0.709	0.029**	0.039**
(5f)	ComF	0.001***	0.493	0.043**	0.168

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**AutS:** Autonomy satisfaction, **RelS:** Relatedness satisfaction, **ComS:** Competence satisfaction, **AutF:** Autonomy frustration, **RelF:** Relatedness frustration, **ComF:** Competence frustration.

First, results from the OLS regression are presented. Table 11 shows that contract frame exerts a significant effect on each of the six dimensions. For competence satisfaction ( $t = 3.57$ ,  $p = 0.001$ ) and autonomy frustration ( $t = -2.73$ ,  $p = 0.007$ ) this relationship is significant at one percent. For the other four dimensions, the relationship is statistically significant at five percent: autonomy satisfaction ( $t = 2.12$ ,  $p = 0.036$ ),

<sup>11</sup> Here, it was decided to provide non-parametric tests instead of transforming the variables (as it was done for intended work effort) because the six constructs would have required different transformations which would have been detrimental for comparability.

relatedness satisfaction ( $t = 2.02$ ,  $p = 0.046$ ), relatedness frustration ( $t = -2.21$ ,  $p = 0.029$ ), and competence frustration ( $t = -2.05$ ,  $p = 0.043$ ). The signs of all coefficients are consistent with the higher-level coefficients of BPNS and BPNF obtained in Specifications (2b) and (2c). This means that penalty contracts are negatively related to each BPNS dimension, with coefficient ranging between -0.524 and -0.648. Conversely, penalty contracts are positively related to each BPNF dimension, with coefficients ranging between 0.493 and 0.709.

When comparing the parametric Student t-test against the non-parametric Mann-Whitney U-test, p-values in most cases do not increase substantially, considering the latter foregoes any distributional assumption. Only competence frustration and autonomy satisfaction become insignificant, the latter only barely ( $p = 0.103$ ). To conclude, the effect of contract frame is most significant on competence satisfaction, autonomy frustration, and relatedness frustration, no matter whether tested parametrically or non-parametrically.

### ***Second stage mediation of autonomy, relatedness, and competence***

Consistent with the procedure in Section 6.3.3, the isolated effect of autonomy, relatedness, and competence on intended work effort is estimated using six restricted models in which all the other hypothesised mediators' coefficients are set to zero:

$$(6a) \text{rlEffort}_i = \beta_0 + \beta_1 \text{AutS}_i + \beta_2 \text{Frame}_i + \beta_3 \text{OSE}_i + \beta_{4-7} X_i + \varepsilon_i$$

[...]

$$(6f) \text{rlEffort}_i = \beta_0 + \beta_1 \text{ComF}_i + \beta_2 \text{ComF}_i^2 + \beta_3 \text{Frame}_i + \beta_4 \text{OSE}_i + \beta_{5-8} X_i + \varepsilon_i$$

To capture the simultaneous effect of all six need dimensions on intended work effort, the following full model is formulated:

$$(6) \text{rlEffort}_i = \beta_0 + \beta_1 \text{AutS}_i + \beta_2 \text{RelS}_i + \beta_3 \text{ComS}_i + \beta_4 \text{AutF}_i + \beta_5 \text{AutF}_i^2 + \beta_6 \text{RelF}_i + \beta_7 \text{RelF}_i^2 + \beta_8 \text{ComF}_i + \beta_9 \text{ComF}_i^2 + \beta_{10} \text{IndAmount}_i + \beta_{11} \text{Frame}_i + \beta_{12} \text{OSE}_i + \beta_{13-16} X_i + \varepsilon_i$$

Table 12 summarises the regression results for the restricted models (6a) – (6f) and the full model (6). The complete regression results are reported in Appendix 14.

Table 12: Summary of regression results for the second stage mediation analysis of autonomy, relatedness, and competence

Predictor	Restricted models (6a) – (6f)			Full model (6)		
	Coefficient	t-test: p-value	F-test: p-value	Coefficient	t-test: p-value	F-test: p-value
(6a) AutS	0.047*	0.077		0.016	0.650	
(6b) RelS	0.033*	0.093		-0.010	0.708	
(6c) ComS	0.137***	0.001		0.123***	0.003	
(6d) AutF	-0.120	[0.523]	0.798	-0.055	[0.767]	0.759
AutFsq	0.011	[0.553]		0.003	[0.873]	
(6e) RelF	-0.095	[0.318]	0.448	-0.023	[0.811]	0.843
RelFsq	0.013	[0.253]		0.004	[0.715]	
(6f) ComF	-0.340*	[0.051]	0.053	-0.284	[0.124]	0.244
ComFsq	0.038**	[0.031]		0.031	[0.103]	

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

rIEffort is the dependent variable in all specifications.

Note: To revoke the reflection of intended work effort, all coefficients are shown with reverse signs to allow for a more intuitive read.

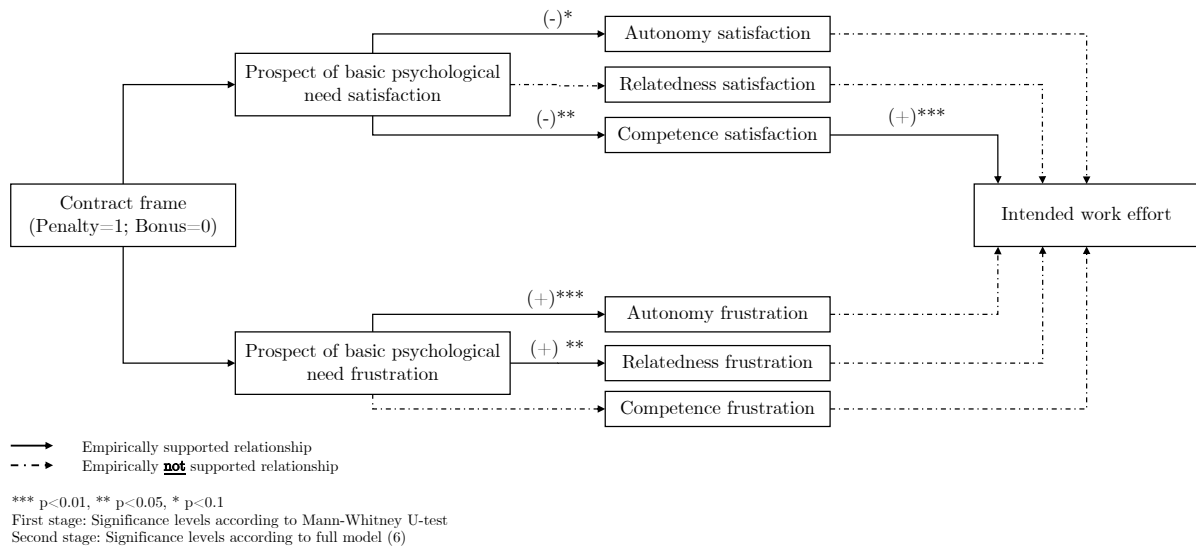
**AutS**: Autonomy satisfaction, **RelS**: Relatedness satisfaction, **ComS**: Competence satisfaction, **AutF**: Autonomy frustration, **AutFsq**: Squared autonomy frustration, **RelF**: Relatedness frustration, **RelFsq**: Squared relatedness frustration, **ComF**: Competence frustration, **ComFsq**: Squared competence frustration.

Referring to the isolated models, the largest effect on intended work effort is attributable to competence satisfaction ( $t = 3.47$ ,  $p = 0.001$ ). Additionally, both autonomy satisfaction ( $t = 1.78$ ,  $p = 0.077$ ) and relatedness satisfaction ( $t = 1.70$ ,  $p = 0.093$ ) also have a significant positive effect on intend work effort. On the frustration side, competence frustration ( $F = 3.03$ ,  $p = 0.053$ ) has a significant effect on intended work effort that follows the same U-shape relationship previously discussed for overall BPNF.

When all six basic psychological need dimensions are inserted into the full model, only the positive effect of competence satisfaction on intended work effort remains significant ( $t = 3.09$ ,  $p = 0.003$ ).

Figure 13 below summarises the findings presented in this section. With regards to the first stage of the mediation, significance levels refer to the more conservative estimates obtained from the non-parametric Mann-Whitney U-test. Significance levels for the second states refer to the full model (6).

Figure 13: Empirical model post-testing, basic psychological needs level



## 7 Discussion of results

### 7.1 Main effect

The regression results reveal that the effect of contract frame on intended work effort is not only insignificant, it is also negative which contrasts the expectations extrapolated from previous research. In particular, these results contrast the studies that find penalty contracts to be positively related to work effort respectively performance (e.g. Church et al., 2008; Fryer et al., 2012; Hannan et al., 2005; Hong et al., 2015; Hossain & List, 2012). In the following, various possible explanation for the unexpected findings are presented which address the main effect's insignificance as well as its direction. At this point, the reader might wonder why the direction of a statistically insignificant effect is discussed. First, it is a well-documented phenomenon that, for small sample sizes, meaningful effects can be reported as statistically insignificant while, for large samples sizes, marginal effects can be found statistically significant (Bailey, 2017). For smaller samples, this means that coefficients with p-values that only narrowly exceed common thresholds for statistical significance should not be automatically dismissed from further discussion. Moreover, this study uses two-sided hypothesis testing. If it instead had followed the dodgy practise of restating hypotheses post-testing and arguing for the adequacy of one-sided testing, the effect of contract frame on intended work effort would have been reported as statistically significant at a ten percent level.

### *Loss aversion*

The main reason for the insignificance of the main effect is assumed to relate to an incomplete mediation process involving loss aversion. The assumption that penalty contracts lead to higher work effort critically rests on a mechanism in which, triggered by loss aversion, individuals respond to the threat of potential losses by increasing work effort (e.g. Church et al., 2008; Hannan et al., 2005). Regarding the first stage of the mediation, the indifference amounts indicate the presence of profound loss aversion which is in line with the formulated hypothesis and the results from Fredrickson and Waller (2005) who capture loss aversion with a similar method. More precisely, indifference amounts are almost 300 Euros lower for the penalty group compared to the bonus group which reflects most peoples' distaste for penalty contracts. The conjecture that the gap in mean indifference amounts is a distaste for penalty contracts is further supported by a complementary question which was included at the end of the survey but not further utilised in the empirical analysis of this study. For this complementary question, participants were asked to state their preference between their initial treatment and the alternative contract frame which was introduced to them for this question. In total, 60 (53,1 %) participants preferred the bonus frame, 31 (27,4 %) were indifferent between the two frames, and only 22 (19,5 %) preferred the penalty frame. These results are in line with Luft (1994) who investigates contract preferences by a direct comparison of economically equivalent bonus and penalty contracts. To eliminate exposure to the unpleasant scenario of receiving a penalty, participants from the penalty group are willing to settle for a considerably lower guaranteed salary than their peers from the bonus group. Critically, the obtained mean indifference amounts support the assumption (Hannan et al., 2005; Luft, 1994) that the use of penalty contracts leads to higher remuneration costs which corresponds to the empirical findings from Fredrickson and Waller (2005). To infer the remuneration costs associated with each contract, the mean indifference amounts must be compared to the maximum pay-out specified in each contract (Bonus group: 3,000 Euros – 2,625 Euros = 375 Euros; Penalty group: 3,000 Euros – 2,334 Euros = 666 Euros). The considerably higher spread for the penalty group implies that employees would demand a premium to accept a penalty contract over a bonus contract. Therefore, the assumption that penalty contracts lead to higher remuneration costs is supported.

For the second stage of the mediation, participants were expected to respond to the threat of a penalty by choosing higher levels of intended work effort to increase the likelihood of avoiding the disappointment associated with getting penalised (Hannan et al., 2005). That, however, is not true for the conducted survey experiment in which chosen levels of intended work effort are not affected by loss aversion. As indicated by the results obtained from the complementary question, most individuals would rather not work under a penalty contract. Yet, when they are forced to do so, loss aversion does not motivate them to alter their work effort intentions.

In previous research, an interesting phenomenon of the relationship between the magnitude of a penalty and task performance is reported. Armantier and Boly (2015), when conducting a field-experiment on the impact of framed incentives on the performance in grading tasks (see Section 2), find that penalty contracts lead to higher task performance when the penalty component is small but also lead to lower task performance when the penalty component is large. The 2:1 ratio between guaranteed and variable compensation (also applied by Hannan et al., 2005) used in the survey experiment certainly resembles a large penalty. Armantier and Boly (2015) argue that their findings relate to the principle of diminishing sensitivity which complements loss aversion in prospect theory (see Section 3.1.2). Recalling that the S-shaped value function of prospect theory is convex for losses and concave for gains (Kahneman & Tversky, 1979), the effect of loss aversion is most pronounced when the penalty is smaller. As the penalty becomes larger, the effect of loss aversion is expected to diminish gradually. However, finding a strong relationship between contract frame and the indifference amounts (reflecting loss aversion), while finding no relationship between the indifference amount and intended work effort casts doubt on the diminishing sensitivity explanation. Diminishing sensitivity would have explained finding weak loss aversion for large penalties but it does not explain why pronounced loss aversion is not reflected in higher intended work effort.

### ***Measurement of work effort***

So, what are possible explanations for the missing link between loss aversion and intended work effort? One plausible reason might lie in the different effort measures used in this study as compared to some previous studies. In laboratory research, operationalisation of effort are often derived from agency theory and rest on two critical assumptions: (1) The probability of achieving targets increases with higher effort, and (2)

individuals experience disutility from higher effort (Baiman, 1982). Various studies model disutility as a monetary cost that increases with chosen effort levels (e.g. Fehr et al., 1993; Fehr & Schmidt, 2007; Hannan et al., 2005; Hannan et al., 2013). What follows is the question of whether this operationalisation accurately reflects an individual's attitude towards work effort. The significant positive relationship this study finds between the prospect of competence satisfaction and intended work effort conveys a different impression. Most importantly, it contradicts the traditional view of the homo economicus that regards work effort as an evil that must be minimised. More specifically, it calls into question the belief that individuals generally experience disutility from higher work effort as postulated by agency theory (Baiman, 1982). Results suggest that many individuals have a positive attitude towards work effort because it also resembles a means to become more proficient at work (White, 1959). Agency theory fails to recognise that, in a workplace, increased effort does not only enhance the likelihood of achieving performance targets but it also increases the probability of realising a much-desired emotional state: competence satisfaction (Deci, 1975; Ryan, 1995). An example of the operationalisation of effort in reference to agency theory that is used to compare framed compensation contract is Hannan et al. (2005). In their study, participants are given a table that depicts effort levels as (linear) combinations of pay-out probabilities and work effort costs. This means that effort is disconnected from the prospect of competence satisfaction because there is no link to any activity which participants could become more proficient at through higher effort.

Therefore, effort, as measured in many previous studies, does not necessarily equate to effort evinced at an individual's actual workplace because it does not entail the same prospects. In contrast to previous research, this study's survey experiment asks participants how they would respond to the assigned contract at their respective workplace. Critically, effort exhibited at someone's workplace has the potential to lead to increased proficiency and thus entails the prospect of competence satisfaction (Deci, 1975; Ryan, 1995). Hence, it is assumed that the effort measure applied in this study, to some degree, reflects an individual's general posture on work effort that might be largely maintained irrespective of contract frame. If this is accurate, results indicate that contract frame cannot be expected to have a long-lasting effect on the effort young academics chose to exert at their respective workplaces.

### *Offsetting effects and competitive focus*

Besides differences in the measurement of effort, two alternative explanations for the insignificance of the main effect are discussed in the following. The first explanation relates to the dissimilar dispersion of intended work effort scores within the two treatment groups. The dispersion is tighter for the penalty contract as compared to the bonus contract. An observation that relates to two distinct effects. On the one hand, apart from two outliers, the lowest intended work effort scores predominantly represent scores of participants who were subject to the bonus contract. An observation which suggests that the threat of receiving a penalty might have a disciplining effect for low levels of intended work effort. On the other hand, the highest intended work effort scores also predominantly represent scores of participants who were subject to the bonus contract. Hence, it appears that a penalty contract also involves a restricting effect for high levels of intended work effort. Previous agency-based experiments suggest that the latter observation might relate to reciprocity. Fehr and List (2004) argue that agents perceive fines as hostile acts they chose to respond to by lowering effort level. Several studies find empirical support for this argument (e.g. Falk & Kosfeld, 2006; Fehr & List, 2004; Fehr & Rockenbach, 2003; Fehr & Schmidt, 2007). Translated to the context of this study, reciprocity implies the refusal of maximum effort intentions under the penalty contract which explains the observed restricting effect.

Taken together, the disciplining effect and the restricting effect that emerge from the use of penalty contracts appear to largely offset each other, which might explain the insignificance of the relationship between contract frame and intended work effort. Having said that, the negative sign of relationship suggests that the restricting effect dominates the disciplining effect. However, the data is hardly sufficient to draw such a conclusion with certainty.

The second possible explanation for the insignificance of the main effect relates to the use of relative performance evaluation as part of the study design. In the survey experiment, incentive pay-outs were specified to depend on relative instead of absolute performance evaluations. This setting introduces a scenario in which participants are competing in a 'tournament' against their peers that contains two ranks: the top-half (success) and the bottom-half (failure). Such a scenario, to some extent, reflects the view of an organisation as it is postulated by Lazear and Rosen's (1981) tournament theory. In this theory, superior relative performance is associated with moving up the corporate



ladder. If the use of the relative performance evaluation primes participants for the mode of action described in tournament theory, then their attention might be drawn towards the competition amongst peers (to strive for promotion) and away from the contract frame. As a result, the relative performance evaluation would be a strong stimulus in itself which would outweigh the effects of the contract frame. If this interpretation is accurate, it would explain why loss aversion is present but not reflected by the intended work effort.

Another consideration in regard to the relative performance evaluation setting relates to the question of whether an evaluation applies to an individual or to teams. Hossain and List (2012) conducted field-experiments in which manufacturing teams, that were subjected to either positively and negatively framed incentives, competed against each other. They find that incentive framing is more effective when punishments apply on the team level than on the individual level. This finding suggests that the insignificance of contract frame on intended work effort might also relate to the fact that participants were subject to an individual and not team-based relative performance evaluation.

### ***Basic psychological need frustration and satisfaction***

Besides the previously discussed restricting effect, the mediating roles of BPNS and BPNF provide another potential explanation for the negative direction of the main effect. As hypothesised, penalty frames are found to be associated with higher prospects of BPNF and lower prospects of BPNS. This finding is consistent with previous research in which negative feedback is found to obstruct intrinsic motivation (e.g. Deci, 1972; Deci, 1975). Moreover, the conjecture that need fulfilment can be actively foiled is supported (e.g. Bartholomew et al., 2011, Chen et al., 2015; Vansteenkiste & Ryan, 2013), an effect that is more pronounced for the penalty contract. It is concluded that the positive connotation inherent to bonuses as rewards and the negative connotation inherent to penalties as punishments, as argued by Luft (1994), indeed leads to significant differences in anticipated BPNS and BPNF.

Similar to loss aversion, the first condition of the hypothesised mediation is fulfilled, yet, the second condition fails to hold true: only the prospect of BPNS but not the prospect of BPNF has a significant (positive) effect on intended work effort. It follows that the prospect of realising BPNS resembles a more powerful motive to increase work

effort than the prospect of preventing BPNF. This means that loss aversion, the intuition of prospect theory, does not apply to the prospects of BPNS and BPNF in relation to work effort, a relationship for which ‘losses do not loom larger than gains’. Or in full terms: ‘satisfaction realisation looms larger than frustration prevention’ as a motive to increase work effort.

Moreover, this finding underlines the importance attached to conceptually distinguish between BPNS and BPNF. If low BPNS was to be equated to high BPNF and vice versa, both constructs would be considered diametrically opposed. Then, the prospect of BPNF would, compulsorily, need to have a negative effect on intended work effort, given that BPNS has a positive effect on it. However, the statistical analysis shows that this is not the case. Summarising, penalty contracts are associated with higher prospects of BPNF and lower prospects of BPNS. Together with the finding that only the prospect of BPNS is (positively) related to intended work effort, a plausible explanation for the negative direction of the effect of penalty contracts on intended work effort is given.

When taking a closer look, the significance of BPNS as a mediator between contract frame and intended work effort is, to large parts, attributable to competence satisfaction. In the first stage, participants associated receiving a bonus with significantly higher prospects of competence satisfaction as compared to avoiding a penalty. In the second stage, the prospect of competence satisfaction has a significantly positive relationship with intended work effort, as already discussed in connection with the effort measurement. It was argued that, when striving for bonuses, individuals are less content about increasing their monetary wealth than they are about realising feelings of competence satisfaction (Srivastava et al., 2001). Therefore, companies may also stimulate their employees’ work effort through means that involve the prospect of competence satisfaction instead of relying on costly financial incentives to do so (Appelbaum & Kamal, 2000).

## **7.2 Role of occupational self-efficacy**

This second part of the discussion is concerned with the role of OSE as a predictor for intended work effort. The regression results show that OSE has a significant direct effect on intended work effort rather than the hypothesised moderating effect. Therefore, since the focus of this study is on contract frame, OSE will only be discussed

briefly. Surprisingly, OSE has a strong positive effect on intended work effort which is the opposite of the hypothesised direction. Since the argument developed in the hypothesis section is refuted, an alternative explanation is provided to address this unexpected finding.

Possibly, the positive relationship between OSE and intended work effort relates to the phenomenon of ‘affective commitment’. In its essence, affective commitment is described as an individual’s positive emotional attachment to an organisation (Meyer & Allen, 1997). When developing the short version of the OSE scale, on which this study relies, Schyns and Von Collani (2002) found a significant positive association between OSE and affective commitment. They interpret this relationship as follows: “employees with high occupational self-efficacy feel obliged to their company because they are convinced they are able to do a good job which they could not do in a different company” (Schyns & Von Collani, 2002, p. 236). This implies that individuals with a high OSE can be expected to show more effort as an expression of their gratitude to their employer. At the same time, this exact behaviour secures their job position which, from their perspective, enables them to maintain their current level of OSE.

### **7.3 Hidden effects of basic psychological need frustration**

The third part of the discussion is concerned with the role of ‘autonomy frustration’ and ‘relatedness frustration’. Critically, penalty contracts are associated with significantly higher prospects of autonomy and relatedness frustration compared to bonus contracts. However, neither of the two prospects is significantly related to intended work effort. By solely focussing on the outcome measure, repercussions that might be critical for long-term organisational objectives are likely dismissed. Therefore, implication for the internalisation of extrinsic motivation, different task environments, and employee well-being are discussed in the following.

#### ***Internalisation of extrinsic motivation***

In Section 3.2, intrinsic motivation was established to provide ideal conditions for the acquisition of skills and knowledge (Ryan & Deci, 2000a). Since the employees’ acquisition of skills and knowledge is fundamental to an organisation’s sustained competitiveness (March, 1991), companies are advised to provide conditions that facilitate

intrinsic motivation. However, presumably only few careers are pursued exclusively for the joy that comes with practising a profession without any concerns for a separable outcome such as income or prestige. Therefore, intrinsic motivation cannot be expected to be present at all workplaces. According to Ryan and Deci (2000a), the next best thing to intrinsic motivation is the gradual internalisation of extrinsic motivation. According to their OIT, extrinsic motivation can become internalised over time if certain conditions are met (Ryan & Deci, 2000a). More specifically, the process of internalisation requires feelings of autonomy (Ryan & Deci, 2000a; Kuhl & Fuhrmann, 1998), relatedness (Ryan & Deci, 2000b; Ryan et al., 1994) and competence (Ryan & Deci, 2000b; Vallerand, 1997) to be present. The regression analysis reveals that, compared to bonus contracts, penalty contracts are associated with higher need frustration and lower need satisfaction for all three needs, the effect being most pronounced for autonomy frustration, relatedness frustration, (and competence satisfaction)<sup>12</sup> (see Figure 13).

To some extent, both effects reflect a presumption raised in the hypothesis development: penalties exceed bonuses in perceived salience. This interpretation is supported by previous research which has established that incentive salience obstructs intrinsic motivation (Cerasoli et. al., 2014), the manifestation of basic psychological need fulfilment. Whilst being denied a bonus is not an uncommon event in a competitive professional environment, a penalty marks an event that is usually connected to obvious wrongdoing (e.g. breaking a law and being fined for this action). Typically, the most salient extrinsic incentives encourage individuals to strive for compliance while less salient incentives raise fewer conflicts with self-endorsed behaviour (Ryan & Deci, 2000a). Therefore, this link might explain why penalty contracts are associated with higher autonomy frustration than bonus contracts.

With regard to the detrimental effect of penalty contracts on relatedness frustration, a plausible explanation relates to the relative performance evaluation participants were subjected to. Relatedness as a need refers to the two-fold relationship of “caring for others and being cared for” (Ryan & Deci, 2008, p. 658). Under relative performance

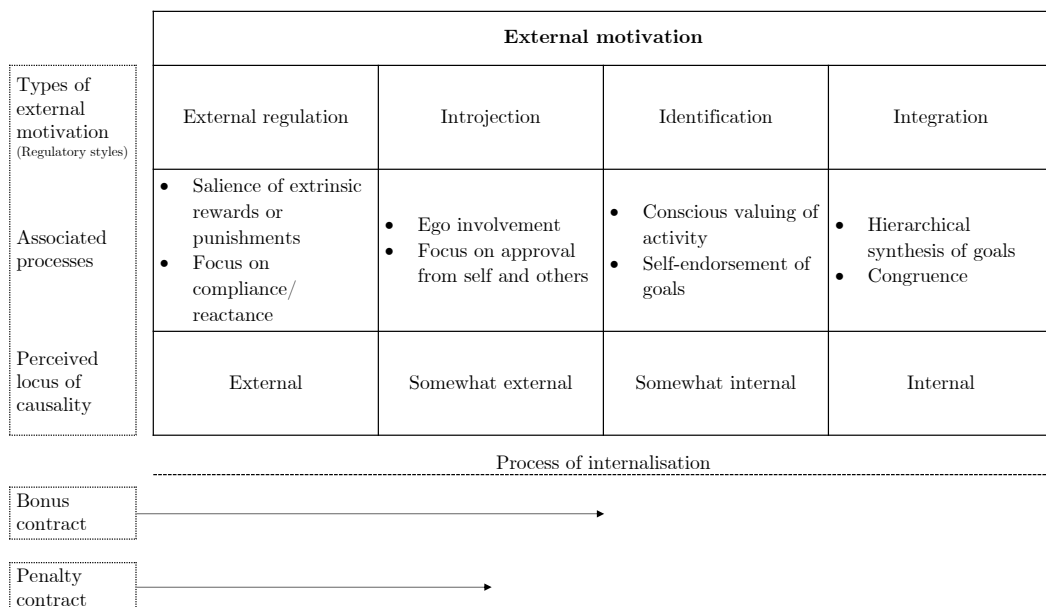
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<sup>12</sup> Competence satisfaction has already been discussed in the preceding part and is therefore excluded from repeated analysis here.

evaluations, individuals are in constant competition with their co-workers and therefore might prefer to focus on their own interest rather than committing themselves to the group. If most co-workers adopt such a mindset, a loose and unstable social environment at work is a likely consequence. A condition that has been found harmful for an individual's feeling of self-worth (Ryan & Deci, 1995). In conclusion, bonus contracts are therefore associated with preferable emotional states for all three basic psychological needs.

However, assuming that bonus contracts provide a straight path for the internalisation of extrinsic motivation would be misguided. As pointed out earlier, it is argued that extrinsic incentives might promote feelings of competence and relatedness but not autonomy and therefore facilitate *introjection* at best (Ryan & Deci, 2000a). This argument is supported by the high absolute autonomy frustration group means (penalty = 5.556; bonus = 5.000) and the low absolute autonomy satisfaction group means (penalty = 3.152; bonus = 3.643) observed for both treatments. Taken together, the findings suggest that bonus contracts conflict less with the internalisation process than penalty contracts. However, even bonus contracts are unlikely to allow for internalisation that goes beyond the state of introjection. In Figure 14, both contract frames are set in relation to the taxonomy of human motivation from OIT based on the empirical findings in conjunction with previous qualitative reasoning.

Figure 14: Extract from taxonomy of human motivation after Ryan and Deci (2000a) set in relation to contract frames



### ***Additional perspectives: task environment and employee well-being***

The preceding paragraph adopted the perspective of the individual in discussing the area of tension between autonomy frustration and the internalisation of extrinsic motivation. Now, the perspective of the organisation is taken to evaluate the importance of basic psychological need fulfilment. That is why the following question arises: Under which circumstances is intrinsic motivation essential for organisational objectives? Here, Cerasoli et al. (2014) provide a meta-analysis comprising 40 years of research linking intrinsic and extrinsic motivation to performance. They find that intrinsic motivation is a better predictor of performance quality while extrinsic motivation is a better predictor of performance quantity. It follows that, quality-type tasks are best performed by intrinsically motivated employees while quantity-type tasks are best performed by extrinsically motivated employees Cerasoli et al. (2014). Quantity-type tasks are typically standardised, repetitive in nature, less complex, and demand less cognitive engagement (Cerasoli et al., 2014; Gilliland & Landis, 1992). In contrast, quality-type tasks are typically associated with complexity, the demand for greater skills, and personal engagement (Cerasoli et al., 2014). Also, they go along with unexpected challenges that require creativity and innovativeness to produce unique solutions (Løwendahl et al., 2001). Modern economies, in which firms are demanded to offer complex and innovative products and services, increasingly require firms to set focus on quality-type tasks (Seltzer & Bentley, 2001). Against this background, despite being preferable to penalty contracts, bonus contracts might still not be the best means of incentivisation for an increasing number of firms that (will) operate in a quality-type task environment.

In the preceding parts, it has been argued that penalty contracts likely obstruct important organisational objectives, as exemplified in connection with the internalisation of extrinsic motivation and the quality-type task environment. This argument is further substantiated by drawing attention to the health-related repercussions that are associated with BPNF. The higher prospects of BPNF associated with penalty contracts were found to be unrelated to intended work effort. However, the latter finding does not mean that increased BPNF is without consequences for long-term corporate objectives. In the theory section, it was established that BPNF can cause states of ill-being, even severe conditions such as depressions or psychopathology (Ryan et al., 2015; Stebbings et al., 2012; Vansteenkiste & Ryan, 2013, Verstuyf et al., 2013). Employees suffering

under these conditions can hardly be expected to act in accordance with the work effort intentions they indicate in healthy states. Moreover, employees are likely to change jobs when they are exposed to prolonged experiences of BPNF with little prospects of improvement. Furthermore, it is also hard to imagine how the prospect of BPNF is a clincher for the acquisition of talent. Taken together, those are two complementary conditions that likely gradually hurts an organisation's human asset base and therefore its sustained competitiveness. These examples illustrate the importance of BPNF for long-term organisational objectives despite the fact that the survey experiment reveals no direct link between the prospect of BPNF and intended work effort.

The preceding discussion of BPNF in relation to employee well-being warrants a concluding ethical remark. The survey experiment produced no evidence in favour of using penalty contract. Yet, even if it had shown that penalty contracts stimulate increased work effort intentions at no higher remuneration costs, organisations ought to refrain from using them. This relates to the finding that penalty contracts are associated with significantly higher BPNF. The authors adopt the position that accepting the employees' ill-being to stimulate work effort is morally reprehensible. Even under pronounced shareholder pressure, MCS must adhere to reasonable ethical standards. Performance optimisation must not be played out at the expenses of employees' health. If shareholder return is below expectations, MCS should respond by becoming smarter, not nastier.

## **8 Conclusion**

The purpose of this study was to investigate the psychological processes that underlie the effect of contract frame on work effort. More specifically, the conjecture was raised that organisations abstain from introducing penalty contracts because of the fear they might trigger unwanted negative psychological side-effects. Therefore, this study aimed to move beyond the mere observations of outcomes to reveal effects that previously were not captured by the common performance-based outcome measures. Against this background, two findings from the survey experiment are particularly meaningful: the presence of pronounced loss aversion (indifference amounts) and the significantly higher BPNF associated with penalty contracts. Neither of the two had a significant relationship with intended work effort, meaning they were not captured by the outcome measure. First, this shows that being loss averse does not necessarily equate to being inclined

to respond to the threat of penalties or losses by increasing effort. Secondly, this shows that typical outcome measures might not be suitable to evaluate the use of framed incentives. In the short-term, organisations might not suffer any repercussion related to BPNF. Yet, in the long-term, prolonged BPNF most likely conflicts with organisational objectives.

Moreover, the study addressed the question if the desire to prevent BPNF is a greater motivation for high work effort than the desire to realise BPNS. Results suggest that the opposite is true. In particular, the prospect of realising competence satisfaction is found to motivate high work effort. A finding that casts doubt on the neoclassical idea of the homo economicus who strives for the minimisation of effort. As for competence satisfaction, it is suggested that the interests of individuals and organisations are naturally aligned because work effort entails a two-fold promise. On the one hand, high work effort likely leads to favourable organisational outcomes while, on the other hand, high work effort allows employees to increase their occupational proficiency and, thus, realise competence satisfaction.

Lastly, the survey experiment produces no evidence in favour of penalty contracts over bonus contracts. For penalty contracts, results comprise insignificantly lower intended work effort, higher implied remuneration costs, significantly lower BPNS, and significantly higher BPNF. It is therefore concluded that penalty contracts are a dead-end rather than the Holy Grail of compensation contracts.

### *Contributions*

With regards to theoretical advances, this study makes contributions to management control literature on framed compensation contracts as well as literature on basic psychological needs research in work environments.

First, this study develops and tests an empirical model that draws upon theory from cognitive, motivation, and social psychology to advance the knowledge on the psychological processes that underlie the effect of contract frame on work effort. Finding that penalty contracts have an insignificant negative effect on intended work effort opposes large parts of the existing literature (e.g. Church et al., 2008; Fryer et al., 2012; Hannan et al., 2005; Hong et al., 2015; Hossain & List, 2012). Moreover, this finding supports Armantier and Boly (2015) who suggest that framed contracts with large penalty components might have a detrimental effect on work effort. Interestingly, pronounced loss



aversion is observed, yet, it does not translate into intended work effort. A missing link that has not been observed in previous research.

Second, this study tests if loss aversion, the central intuition of prospect theory, also applies for basic psychological needs in connection to framed compensation contracts and work effort. The results obtained from the survey experiment suggest the opposite relationship: the prospect of BPNS is found to have a significant positive effect on intended work effort while the prospect of BPNF has an insignificant effect on intended work effort. Phrased in the language of prospect theory, it is shown that ‘the realisation of BPNS looms larger than prevention of BPNF’.

Furthermore, three additional contributions to the literature on basic psychological need research in workplaces are made. First, this study incorporates a recent development within basic psychology needs research: the distinction between BPNS and BPNF (Chen et al., 2015; Schultz et al., 2015), which is shown to be meaningful in the context of this study. Second, it is also shown that the findings from earlier SDT research concerned with the effect of rewards and punishments on basic psychological need fulfilment remain valid (e.g. Deci, 1972; Deci 1975) even when incentives are economically equivalent. Third, apart from rare exceptions (e.g. Sheldon & Gunz, 2009), previous SDT research has been content with the repercussions arising from present or non-present basic psychological need fulfilment. In contrast, this study suggests that the prospect of BPNS is a motivation to increase work effort.

Besides the above-stated theoretical advances, this study contributes to the practice of management control by conducting a survey experiment from which recommendation for the (framed) design of compensation contracts can be derived. As for the comparison between penalty contracts and bonus contracts, three aspects deserve special emphasis. First, contrary to suppositions, the experiment produces no evidence that penalty contracts stimulate higher work effort. Furthermore, the measured indifference amounts imply that remunerations costs are higher for penalty contracts.

A second aspect relates to negative psychological side-effects triggered by penalty contracts that are not immediately reflected in outcome measures. Penalty contracts are shown to be associated with higher autonomy frustration and higher relatedness frustration. Besides the negative consequences for employee well-being, it is discussed how

autonomy frustration obstructs the internalisation of extrinsic motivation which is argued to be particularly troublesome in quality-type task environments. Summarising, the results suggest that penalty contracts are neither supporting short-term objectives, such as higher work effort, nor long-term objectives such as a competitive workforce that is healthy and intrinsically motivated. Therefore, the clear recommendation for organisations not to introduce penalty contracts is derived.

Third, the sample used in this study consists of 20 to 35-year-old academics. A generation of employees that is said to have a different expectation about a workplace compared to previous generations. For the various before-mentioned reasons, results indicate that penalty contracts starkly conflict with young employees' expectations towards their workplace.

### ***Limitations***

In the following, the study's key limitations are recognised. Multiple limitations relate to ecological validity which is the question of how realistically the study design resembles real-world conditions (Bryman & Bell, 2011). In the following, three aspects that conflict with ecological validity are emphasised.

First, a hypothetical penalty unlikely resembles the same threat as a penalty applied in the real world. For the conducted survey experiment, it is therefore doubtful if individuals rightly anticipate the disproportionate suffering that prospect theory assumes in conjunction with losses.

Second, in the survey experiment, work effort is not directly observed but stated in the form of intentions. Therefore, participants do not have to bear the material consequences of their effort choices. For instance, participants can state high work effort intention without experiencing the hassle that typically accompanies it.

Third, the ratio of guaranteed to variable compensation, which is 2:1 for both contracts (also applied by Hannan et al., 2005), might add artificiality to the study design. In practice, few of the 20 to 35-year old participants can be expected to work under compensation contracts in which one third of the total compensation is variable. Also, previous literature finds that effect sizes cannot be assumed to be constant for varying ratios of guaranteed to variable compensation (Armantier & Boly, 2015). Therefore, a different effect for contract frame on intended work effort might have been observed for altered ratios. Lastly, 'plain vanilla' bonus and penalty contracts are not the only

means to frame compensation contracts. In a field experiment, Fryer et al. (2012) identify ‘hybrid-contracts’ that combine variable bonus and penalty components to be most effective in stimulating performance.

Furthermore, several limitations arise from the sample the survey experiment draws upon. First, even though larger than the samples used in many comparable studies (e.g. Hannan et al., 2005; Luft, 1994),  $N=113$  still resembles a relatively small sample size. This is especially true in light of the chosen between-subjects design. While the random assignment contains systematic bias, the small sample is vulnerable to random error caused by outliers (Wooldridge, 2013). While this concern relates to the study’s internal validity, another critical limitation relates to population validity. As it is inherent to convenience samples (Bryman & Bell, 2011), findings cannot be generalised to a population other than the authors’ 20 to 35-year-old personal contacts with an academic background. Even though it could be argued that basic psychological needs are shared among many populations, claiming that the study’s findings are generally applicable would be dubious.

Due to the pioneering nature of parts of this study, only few established relationships could be used to build the empirical model. For this reason, the reported model fit indices are rather weak. This limitation applies to construct validity, as exemplified by the mediocre goodness-of-fit statistics produced by the CFA, as well as for the predictive power of the model estimating the main effect (1e), as exemplified by poor values for (adjusted) R-squared.

Lastly, in the discussion, it was pointed out that competing explanations exist for why penalty contracts are found to have an insignificant negative effect on intended work effort. It cannot be determined with certainty if this effect is caused by the relative performance evaluation, the work effort measure, the prospect of competence satisfaction, reciprocity, or perhaps other unobserved factors. On the positive side, this uncertainty opens up various interesting avenues for future research.

### ***Further research***

Of course, it would be desirable if this study’s findings were to be validated by further research using larger samples and different populations. Besides these two general points, three distinct avenues for future research are outlined in the following.

First, to the best of the authors' knowledge, no studies about the effect of different contract frames on long-term organisational outcomes exist. Presuming that BPNS and BPNF are developing gradually rather than occurring suddenly, long-term studies are needed to capture the full effects associated with BPNS and BPNF that are caused by different contract frames.

Furthermore, it was argued that the effect of contract frame might vary across different ratios of guaranteed to variable (incentive) compensation. Expanding on the work of Armantier and Boly (2015), future research could investigate the question if there are ranges for which the effect remains stable respectively if there are thresholds at which the effect changes direction.

Lastly, as established in the preceding limitations section, it cannot be determined with certainty if the insignificance of the negative main effect is caused by the relative performance evaluation, the effort measure, the prospect of competence satisfaction, reciprocity, or perhaps other uncaptured aspects. Particularly interesting is the question if the effect of contract frame on work effort is different when incentives are based either on absolute or relative performance evaluations. Future research could isolate this effect and test the hypothesis that the presence of relative performance evaluations diminishes the effectiveness of framing.

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# 10 Appendices

## Appendix 1: Survey bonus group (bonus contract)

Galley-proof bonus (compensation-contract-modes) 11.04.2019, 22:33

11.04.19, 22:33



LUND UNIVERSITY  
School of Economics and Management

compensation-contract-modes → bonus

11.04.2019, 22:33

**Page 01**

BLA

**Hello and thank you for following our link,**

LA01

in this questionnaire, we ask you to answer a set of questions related to compensation contracts (employment contracts). Each question or set of questions will be introduced to you with the necessary information. We estimate the time needed to complete the questionnaire to be approximately 10-15 minutes.

We highly appreciate your willingness to spend time answering our questions. Therefore, we have decided to donate 1€ for every complete participation. The donation will go to the **Malala Fund**, an international non-profit organization that fights for girls' education - especially in those places where girls are deprived of equal opportunities. We hope that this little incentive may serve you as a motivation to complete our questionnaire.

When providing answers, please keep in mind that there is no 'right' or 'wrong' answer. We are solely interested in your preferences and motives.

The data collection is designed to be anonymous. After the collection, the data will be exclusively used for the academic purpose of our study. If you are curious about the results of our research, please send us a personal message. We are more than happy to share them with you after our work is finished.

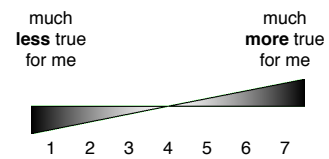
Thank you for your participation.

Marc & Tim

**1. Assessment of work-related perceptions**SE01 

Please imagine an average co-worker of yours who is carrying out similar tasks as you do and thus represents a typical member of your 'peer-group'. Now, we ask you to answer the statements below by comparing yourself to this average co-worker of yours.

On the scale provided, the lower end means that a statement is much less true for you than for your average co-worker. Contrarily, the upper end means that a statement is much more true for you than for your average co-worker.



Thanks to my resourcefulness, I know how to handle unforeseen situations in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If I am in trouble at work, I can usually think of something to do.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I can remain calm when facing difficulties in my job because I can rely on my abilities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am confronted with a problem in my job, I can usually find several solutions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No matter what comes my way in my job, I'm usually able to handle it.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My past experiences in my job have prepared me well for my occupational future.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I meet the goals that I set for myself in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel prepared to meet most of the demands in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



**Indifference between contracts**

IN04

Now, two types of compensation contracts are presented to you. **Contract A** only involves a base salary. **Contract B** involves two components: a base salary and a bonus. Receiving the bonus is dependent on a relative evaluation against your co-workers who perform similar tasks as you do (peer-group).

**Contract A:** The base salary is paid irrespective of your performance.

**Contract B:** The base salary is paid irrespective of your performance. The bonus is paid if your performance puts you in the top-half of your peer-group. Contrarily, if your performance puts you in the bottom-half of your peer-group, you receive no bonus.

(The stated figures reflect net monthly amounts.)

**2. What is the base salary in Contract A that makes you feel indifferent between the two contracts?** (Meaning of 'indifferent' in this context = you do not mind which contract you are given)

IN03

Contract A:	Contract B:
Base salary: _____ €	Base salary: 2000€
Bonus: 0€	Bonus: 1000€
The base salary is guaranteed.	The bonus is paid if your performance puts you in the top-half of your peer-group.

Base salary (Contract A)  in €

Page 04  
BEC

### Implications on your work effort

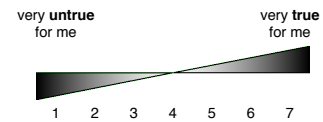
EC02

For this section, we ask you to indicate how you would react if **Contract B** (as introduced in the previous section) was assigned to you. Receiving the bonus remains conditional on your performance relative to your peer-group (top-half = bonus; bottom-half = no bonus).

**Contract B:**  
Base salary: 2000€  
Bonus: 1000€  
  
The bonus is paid if your performance puts you in the top-half of your peer-group.

### 3. To receive the bonus, I would...

EC04



- |   |   |
|---|---|
| not give up quickly when something does not work well.              | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try my best to get work done, regardless of potential difficulties. | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| pursue to complete every task I get assigned.                       | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try my best to do what is expected of me.                           | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| be trustworthy in the execution of the tasks I get assigned.        | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try my best to achieve the objectives of the organisation.          | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| work hard.  | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try to do my best in my job.  | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| put a lot of energy into the tasks that I commence.                 | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |

Page 05  
BPN

### Implications for your life at work

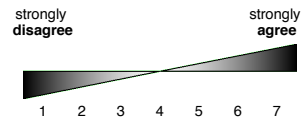
PN02

Now, we want you to reflect on how being subject to **Contract B** might affect various aspects of your life at work. Receiving the bonus remains conditional on your performance relative to your peer-group (top-half = bonus; bottom-half = no bonus).

**Contract B:**  
Base salary: 2000€  
Bonus: 1000€  
  
The bonus is paid if your performance puts you in the top-half of your peer-group.

4. If I was working under Contract B, I would likely...

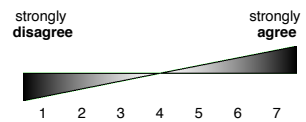
PN05



- feel a sense of choice and freedom in the things I undertake.
- feel that my decisions on my job reflect what I really want.
- feel like I do what really interests me in the job.
- do most of the things I do as my job because I feel like "I have to".
- feel like being pressured at work.
- feel like my daily activities at work are a chain of obligations.

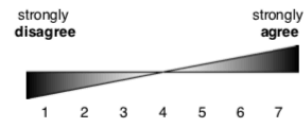
5. If I received the bonus, I could imagine...

PN10



- to feel confident that I can do things well on my job.
- to feel competent to achieve my goals.
- to feel comfortable about handling difficult tasks.
- that the people I care at work about also care about me.
- to feel connected with people who care for me at work, and for whom I care at work
- to experience a warm feeling with the people I spend time with at work.

PN11

6. If I **received no bonus**, I could imagine...

- to develop serious doubts about whether I can do things well.
- to feel disappointed with my performance in my job.
- to feel like a failure because of the mistakes I made.
- to become excluded from the group I want to belong to at work.
- that people who are important to me at work become cold and distant towards me.
- that people I spend time with at work begin disliking me.

Page 06  
BCP

## Preference between contract options

CP03

Now, we would like you to consider the following two contract options. Please note that the relative evaluation against your peer-group also applies to these contracts.

## 7. If you were to choose freely between the two options which one would you prefer?

CP02

Contract B:	Contract C:
Base salary: 2000€	Base salary: 3000€
Bonus: 1000€	Penalty: 1000€
The bonus is paid if your performance puts you in the top-half of the peer-group.	The penalty applies if your performance puts you in the bottom-half of the peer-group.

Contract B

Indifferent

Contract C

Page 07

BPI

**Personal information**

PI08

Lastly, we would like to collect some general information about you.

**8. What gender do you identify with?**

PI01

 Female Male Other**9. What is your age?**

PI02

 years**10. What is your academic discipline / field of work?**

PI03

 Humanities (e.g. Arts, History, Languages, Law, Philosophy, or Theology) Social sciences (e.g. Anthropology, Business, Economics, Political Science, Psychology, or Sociology) STEM and Medicine (e.g. Sciences, Technology, Engineering, Mathematics, or Medicine) Others**11. How many years of higher education did you receive?**

PI04

(e.g. university, university of applied sciences, academy, college)

 years**12. Of your time in higher education, how many years have you studied at a business school or business faculty?**

PI05

 years**13. How many years of professional work experience do you have?**

PI06

(including full-time employment, part-time employment, working student, internship)

 years**14. In your professional career, how many different employers have you been with?**

PI07

 number of employers

## Appendix 2: Survey penalty group (penalty contract)

Galley-proof penalty (compensation-contract-modes) 11.04.2019, 22:33

11.04.19, 22:33



**LUND UNIVERSITY**  
School of Economics and Management

---

compensation-contract-modes → penalty

11.04.2019, 22:33

**Page 01**

PLA

**Hello and thank you for following our link,**

LA01

in this questionnaire, we ask you to answer a set of questions related to compensation contracts (employment contracts). Each question or set of questions will be introduced to you with the necessary information. We estimate the time needed to complete the questionnaire to be approximately 10-15 minutes.

We highly appreciate your willingness to spend time answering our questions. Therefore, we have decided to donate 1€ for every complete participation. The donation will go to the **Malala Fund**, an international non-profit organization that fights for girls' education - especially in those places where girls are deprived of equal opportunities. We hope that this little incentive may serve you as a motivation to complete our questionnaire.

When providing answers, please keep in mind that there is no 'right' or 'wrong' answer. We are solely interested in your preferences and motives.

The data collection is designed to be anonymous. After the collection, the data will be exclusively used for the academic purpose of our study. If you are curious about the results of our research, please send us a personal message. We are more than happy to share them with you after our work is finished.

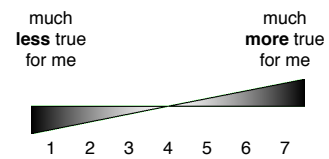
Thank you for your participation.

Marc & Tim

**1. Assessment of work-related perceptions**SE01 

Please imagine an average co-worker of yours who is carrying out similar tasks as you do and thus represents a typical member of your 'peer-group'. Now, we ask you to answer the statements below by comparing yourself to this average co-worker of yours.

On the scale provided, the lower end means that a statement is much less true for you than for your average co-worker. Contrarily, the upper end means that a statement is much more true for you than for your average co-worker.



Thanks to my resourcefulness, I know how to handle unforeseen situations in my job.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
If I am in trouble at work, I can usually think of something to do.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
I can remain calm when facing difficulties in my job because I can rely on my abilities.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
When I am confronted with a problem in my job, I can usually find several solutions.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
No matter what comes my way in my job, I'm usually able to handle it.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
My past experiences in my job have prepared me well for my occupational future.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
I meet the goals that I set for myself in my job.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>
I feel prepared to meet most of the demands in my job.	<input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/>

**Indifference between contracts**

IN02

Now, two types of compensation contracts are presented to you. **Contract A** only involves a base salary. **Contract B** involves two components: a base salary and a penalty. Avoiding the penalty is dependent on a relative evaluation against your co-workers who perform similar tasks as you do (peer-group).

**Contract A:** The base salary is paid irrespective of your performance.

**Contract B:** The base salary is paid in full if your performance puts you in the top-half of your peer-group. Contrarily, if your performance puts you in the bottom-half of your peer-group, the penalty is deducted from your base salary.

(The stated figures reflect net monthly amounts.)

**2. What is the base salary in Contract A that makes you feel indifferent between the two contracts?**  
(Meaning of 'indifferent' in this context = you do not mind which contract you are given)

IN01

Contract A:	Contract B:
Base salary: _____ €	Base salary: 3000€
Penalty: 0€	Penalty: 1000€
The base salary is guaranteed.	The penalty applies if your performance puts you in the bottom-half of the peer-group.

Base salary (Contract A)  in €



Page 04  
PEC

### Implications on your work effort

EC01

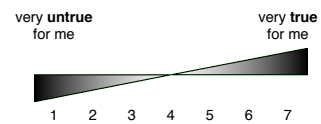
For this section, we ask you to indicate how you would react if **Contract B** (as introduced in the previous section) was assigned to you. Avoiding the penalty remains conditional on your performance relative to your peer-group (top-half = no penalty; bottom-half = penalty).

**Contract B:**  
Base salary: 3000€  
Penalty: 1000€

The penalty applies if your performance puts you in the bottom-half of the peer-group.

### 3. To avoid the penalty, I would...

EC03



- |   |   |
|---|---|
| not give up quickly when something does not work well.              | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try my best to get work done, regardless of potential difficulties. | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| pursue to complete every task I get assigned.                       | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try my best to do what is expected of me.                           | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| be trustworthy in the execution of the tasks I get assigned.        | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try my best to achieve the objectives of the organisation.          | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| work hard.  | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| try to do my best in my job.  | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |
| put a lot of energy into the tasks that I commence.                 | <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> <input type="radio"/> |

Page 05  
PPN

### Implications for your life at work

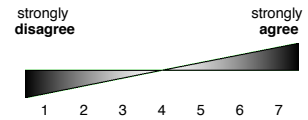
PN01

Now, we want you to reflect on how being subject to **Contract B** might affect various aspects of your life at work. Avoiding the penalty remains conditional on your performance relative to your peer-group (top-half = no penalty; bottom-half = penalty).

**Contract B:**  
 Base salary: 3000€  
 Penalty: 1000€  
 The penalty applies if your performance puts you in the bottom-half of the peer-group.

4. If I was working under Contract B, I would likely...

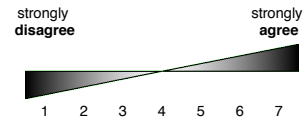
PN04



feel a sense of choice and freedom in the things I undertake.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
feel that my decisions on my job reflect what I really want.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
feel like I do what really interests me in the job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
do most of the things I do as my job because I feel like "I have to".	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
feel like being pressured at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
feel like my daily activities at work are a chain of obligations.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

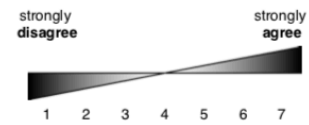
5. If I avoided the penalty, I could imagine...

PN06



to feel confident that I can do things well on my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to feel competent to achieve my goals.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to feel comfortable about handling difficult tasks.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that the people I care at work about also care about me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to feel connected with people who care for me at work, and for whom I care at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to experience a warm feeling with the people I spend time with at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PN07

6. If I **received the penalty**, I could imagine...

to develop serious doubts about whether I can do things well.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to feel disappointed with my performance in my job.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to feel like a failure because of the mistakes I made.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
to become excluded from the group I want to belong to at work.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that people who are important to me at work become cold and distant towards me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that people I spend time with at work begin disliking me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 06  
PCP

## Preference between contract options

CP03

Now, we would like you to consider the following two contract options. Please note that the relative evaluation against your peer-group also applies to these contracts.

## 7. If you were to choose freely between the two options which one would you prefer?

CP01

<b>Contract B:</b> Base salary: 3000€ Penalty: 1000€ The penalty applies if your performance puts you in the bottom-half of the peer-group.	<b>Contract C:</b> Base salary: 2000€ Bonus: 1000€ The bonus is paid if your performance puts you in the top half of the peer-group.
--	---

Contract B
Indifferent
Contract C

Page 07

PPI

**Personal information**

PI08

Lastly, we would like to collect some general information about you.

**8. What gender do you identify with?**

PI01

 Female Male Other**9. What is your age?**

PI02

 years**10. What is your academic discipline / field of work?**

PI03

 Humanities (e.g. Arts, History, Languages, Law, Philosophy, or Theology) Social sciences (e.g. Anthropology, Business, Economics, Political Science, Psychology, or Sociology) STEM and Medicine (e.g. Sciences, Technology, Engineering, Mathematics, or Medicine) Others**11. How many years of higher education did you receive?**

PI04

(e.g. university, university of applied sciences, academy, college)

 years**12. Of your time in higher education, how many years have you studied at a business school or business faculty?**

PI05

 years**13. How many years of professional work experience do you have?**

PI06

(including full-time employment, part-time employment, working student, internship)

 years**14. In your professional career, how many different employers have you been with?**

PI07

 number of employers

*Appendix 3: Measurement items for work effort*

<b>Statement</b>	To avoid a penalty (receive a bonus), I would...	
<b>Scale</b>	Very untrue for me (1) - Very true for me (7)	
<b>Var (Item)</b>	<b>Var2 (Item)</b>	<b>Item</b>
WE1	WEP1	not give up quickly when something does not work well.
WE2	WEP2	try my best to get work done, regardless of potential difficulties.
WE3	WEP3	pursue to complete every task I get assigned.
WE4	WED1	try my best to do what is expected of me.
WE5	WED2	be trustworthy in the execution of the tasks I get assigned.
WE6	WED3	try my best to achieve the objectives of the organisation.
WE7	WEI1	work hard.
WE8	WEI2	try to do my best in my job.
WE9	WEI3	put a lot of energy into the tasks that I commence.
WEP	(Mean of WEP1 - WEP3)	Persistency
WED	(Mean of WED1 - WED3)	Direction
WEI	(Mean of WEI1 - WEI3)	Intensity
WE	(Mean of WEP, WED, WIE)	Work Effort

*Appendix 4: Measurement items for occupational self-efficacy*

<b>Statement</b>	Please imagine an average co-worker of yours who is carrying out similar tasks as you do and thus represents a typical member of your 'peer-group'. Now, we ask you to answer the statements below by comparing yourself to this average co-worker of yours.	
<b>Scale</b>	Much less true for me (1) - Much more true for me (7)	
<b>Var (Item)</b>	<b>Item</b>	
OSE1	Thanks to my resourcefulness, I know how to handle in my job unforeseen situations.	
OSE2	If I am in trouble at work, I can usually think of something to do.	
OSE3	I can remain calm when facing difficulties in my job because I can rely on my abilities.	
OSE4	When I am confronted with a problem in my job, I can usually find several solutions.	
OSE5	No matter what comes my way in my job, I'm usually able to handle it.	
OSE6	My past experiences in my job have prepared me well for my occupational future.	
OSE7	I meet the goals that I set for myself in my job.	
OSE8	I feel prepared to meet most of the demands in my job.	
OSE	Occupational self-efficacy (Mean of OSE1 – OSE8)	

*Appendix 5: Measurement items for basic psychological need satisfaction and frustration*

<b>Dimension</b>	<b>Statements</b>
AUTS, AUTF	If I was working under Contract B (A), I would likely...
RELS, COMS	If I avoided the penalty (received the bonus), I could imagine...
RELF, COMF	If I received the penalty (no bonus), I could imagine...

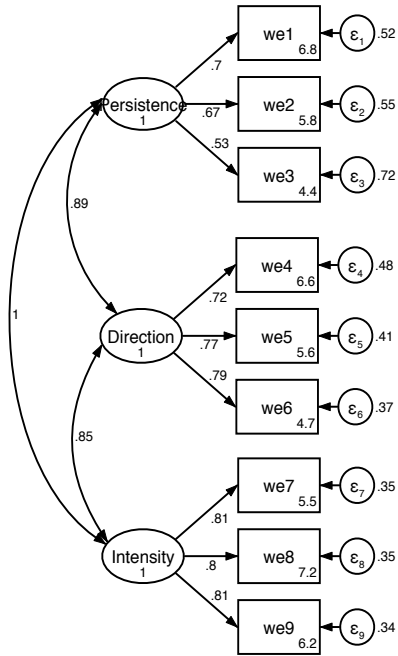
  

<b>Scale</b>	Strongly agree (1) - Strongly disagree (7)
--------------	--

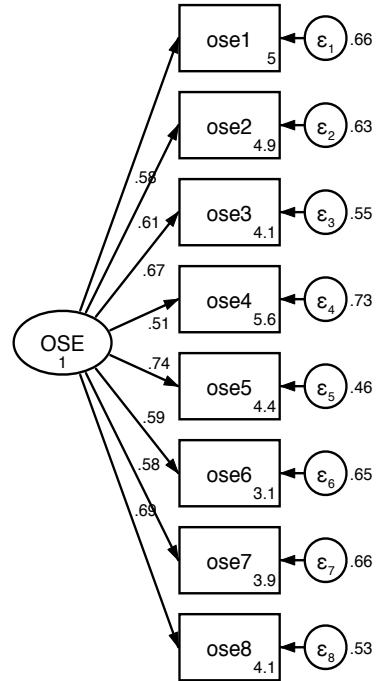
<b>Var (Item)</b>	<b>Var2 (Item)</b>	<b>Item</b>
BPNS1	AUTS1	feel a sense of choice and freedom in the things I undertake.
BPNS2	AUTS2	feel that my decisions on my job reflect what I really want.
BPNS3	AUTS3	feel like I do what really interests me in the job.
BPNS4	RELS1	that the people I care at work about also care about me.
BPNS5	RELS2	to feel connected with people who care for me at work, and for whom I care at work.
BPNS6	RELS3	to experience a warm feeling with the people I spend time with at work.
BPNS7	COMS1	to feel confident that I can do things well on my job.
BPNS8	COMS2	to feel competent to achieve my goals.
BPNS9	COMS3	to feel comfortable about handling difficult tasks.
BPNF1	AUTF1	do most of the things I do as my job because I feel like "I have to".
BPNF2	AUTF2	feel like being pressured at work.
BPNF3	AUTF3	feel like my daily activities at work are a chain of obligations.
BPNF4	RELF1	to become excluded from the group I want to belong to at work.
BPNF5	RELF2	that people who are important to me at work become cold and distant towards me.
BPNF6	RELF3	that people I spend time with at work begin disliking me.
BPNF7	COMF1	to develop serious doubts about whether I can do things well.
BPNF8	COMF2	to feel disappointed with my performance in my job.
BPNF9	COMF3	to feel like a failure because of the mistakes I made.
AUTS	Autonomy satisfaction	(Mean of AUTS1 - AUTS3)
RELS	Relatedness satisfaction	(Mean of RELS1 - RELS3)
COMS	Competence satisfaction	(Mean of COMS1 - COMS3)
AUTF	Autonomy frustration	(Mean of AUTF1 - AUTF3)
RELF	Relatedness frustration	(Mean of RELF1 - RELF3)
COMF	Competence frustration	(Mean of COMF1 - COMF3)
BPNS	Basic psychological need satisfaction	(Mean of AUTS, RELS, COMS)
BPNF	Basic psychological need frustration	(Mean of AUTF, RELF, COMF)

Appendix 6: Measurement models used for confirmatory factor analysis

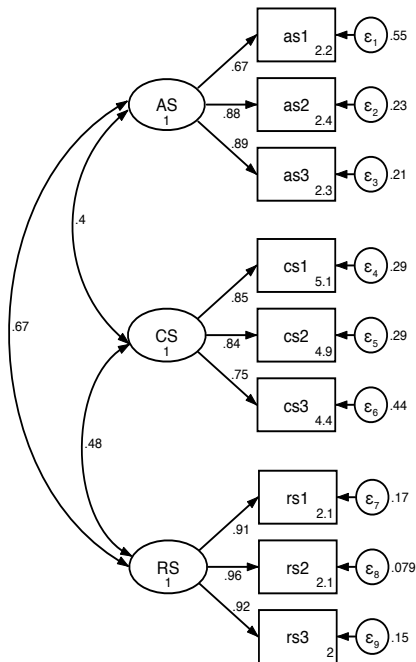
Intended work effort:



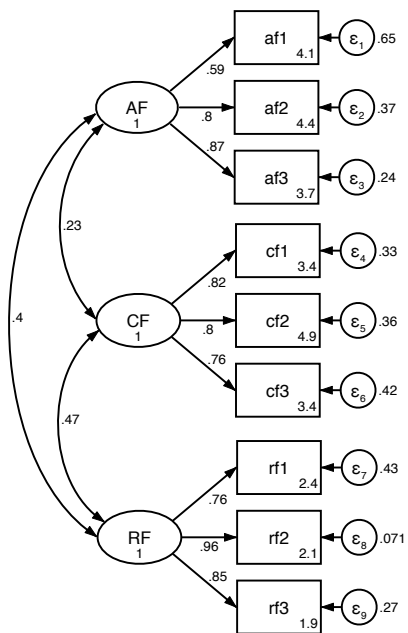
OSE:



BPNS:



BPNF:



*Appendix 7: Comprehensive goodness-of-fit statistics for validation of measurement scales*

Fit statistic	Description	Intended work effort	OSE	BPNS	PBNF
<i>Likelihood ratio</i>					
chi2_ms(24)	model vs. saturated	42.939	34.043	45.570	52.697
p > chi2		0.010	0.026	0.005	0.001
chi2_bs(36)	baseline vs. saturated	533.646	280.997	787.220	550.598
p > chi2		0.000	0.000	0.000	0.000
<i>Population error</i>					
RMSEA	Root mean squared error of approximation	0.084	0.079	0.089	0.103
90% CI, lower bound		0.040	0.027	0.048	0.065
upper bound		0.123	0.123	0.128	0.141
pclose	Probability RMSEA <= 0.05	0.090	0.144	0.057	0.014
<i>Information criteria</i>					
AIC	Akaike's information criterion	2.481.227	2.614.667	2.948.860	3.244.247
BIC	Bayesian information criterion	2.563.048	2.680.124	3.030.682	3.326.069
<i>Baseline comparison</i>					
CFI	Comparative fit index	0.962	0.944	0.971	0.944
TLI	Tucker-Lewis index	0.943	0.922	0.957	0.916
<i>Size of residuals</i>					
SRMR	Standardised root mean squared residual	0.049	0.058	0.059	0.061
CD	Coefficient of determination	0.952	0.844	0.999	0.998

This table reports comprehensive goodness-of-fit statistics for the confirmatory factor analyses performed to re-validate the adapted scales for intended work effort, OSE, BPNS, and PBNF.



*Appendix 8: Variable description*

Variable	Description
$Frame_i$	Contract frame (Penalty = 1; Bonus = 0)
$Effort_i$	Intended work effort
$rfEffort_i$	Reflected and logged intended work effort
$OSE_i$	Occupational self-efficacy
$FrameOSE_i$	Interaction term: Product of contract frame and occupational self-efficacy
$IndAmount_i$	Indifference amount (in Euros)
$BPNS_i$	Basic psychological need satisfaction
$BPNF_i$	Basic psychological need frustration
$AutS_i$	Autonomy satisfaction
$RelS_i$	Relatedness satisfaction
$ComS_i$	Competence satisfaction
$AutF_i$	Autonomy frustration
$RelF_i$	Relatedness frustration
$ComF_i$	Competence frustration
$BPNSsq_i$	Squared basic psychological need satisfaction
$BPNFsq_i$	Squared basic psychological need frustration
$AutFsq_i$	Squared autonomy frustration
$RelFsq_i$	Squared relatedness frustration
$ComFsq_i$	Squared competence frustration
$Age_i$	Age (in years)
$BSE_i$	Business school education, at least one year (Yes = 1; No = 0)
$Gender_i$	Gender (Female = 1; Male = 0)
$HighEdu_i$	Higher education (in years)
$ProfExp_i$	Professional work experience (in years)
$X_i$	Vector for control variables (BSE, Gender, HighEdu, ProfExp)
$\varepsilon_i$	Idiosyncratic error

The table lists the variables used in any of the estimated regression specifications (see Appendix 9).

*Appendix 9: List of estimated regression specifications*

**Main Effect:**

---

$$(1a) rEffort_i = \beta_0 + \beta_1 Frame_i + \varepsilon_i$$

$$(1b) rEffort_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \varepsilon_i$$

$$(1c) rEffort_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_3 (Frame_i \times OSE_i) + \varepsilon_i$$

$$(1d) rEffort_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_3 Age_i + \beta_4 Gender_i + \beta_5 HighEdu_i + \beta_6 ProfExp_i + \beta_7 BSE_i + \varepsilon_i$$

$$(1e) rEffort_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_3 Gender_i + \beta_4 HighEdu_i + \beta_5 ProfExp_i + \beta_6 BSE_i + \varepsilon_i$$

$$(1n) Effort_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_3 Gender_i + \beta_4 HighEdu_i + \beta_5 ProfExp_i + \beta_6 BSE_i + \varepsilon_i$$

**First stage mediation of loss aversion, BPNS, and BPNF:**

---

$$(2a) IndAmount_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-6} X_i + \varepsilon_i$$

$$(2b) BPNS_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-6} X_i + \varepsilon_i$$

$$(2c) BPNF_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-6} X_i + \varepsilon_i$$

**Analysis functional forms for BPNS and BPNF:**

---

$$(3a) rEffort_i = \beta_0 + \beta_1 BPNS_i + \varepsilon_i$$

$$(3b) rEffort_i = \beta_0 + \beta_1 BPNS_i + \beta_2 BPNS_i^2 + \varepsilon_i$$

$$(3c) rEffort_i = \beta_0 + \beta_1 BPNF_i + \varepsilon_i$$

$$(3d) rEffort_i = \beta_0 + \beta_1 BPNF_i + \beta_2 BPNF_i^2 + \varepsilon_i$$

### Second stage mediation of loss aversion, BPNS, and BPNF:

---

$$(4) rlEffort_i = \beta_0 + \beta_1 IndAmount_i + \beta_2 BPNS_i + \beta_3 BPNF_i + \beta_4 BPNF_i^2 + \beta_5 Frame_i + \beta_6 OSE_i + \beta_{7-10} X_i + \varepsilon_i$$

$$(4a) rlEffort_i = \beta_0 + \beta_1 IndAmount_i + \beta_2 Frame_i + \beta_3 OSE_i + \beta_{4-7} X_i + \varepsilon_i$$

$$(4b) rlEffort_i = \beta_0 + \beta_1 BPNS_i + \beta_2 Frame_i + \beta_3 OSE_i + \beta_{4-7} X_i + \varepsilon_i$$

$$(4c) rlEffort_i = \beta_0 + \beta_1 BPNF_i + \beta_2 BPNF_i^2 + \beta_3 Frame_i + \beta_4 OSE_i + \beta_{5-8} X_i + \varepsilon_i$$

### First stage mediation of autonomy, relatedness, and competence

---

$$(5a) AutS_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-7} X_i + \varepsilon_i$$

$$(5b) RelS_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-7} X_i + \varepsilon_i$$

$$(5c) ComS_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-7} X_i + \varepsilon_i$$

$$(5d) AutF_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-7} X_i + \varepsilon_i$$

$$(5e) RelF_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-7} X_i + \varepsilon_i$$

$$(5f) ComF_i = \beta_0 + \beta_1 Frame_i + \beta_2 OSE_i + \beta_{3-7} X_i + \varepsilon_i$$

### First stage mediation of autonomy, relatedness, and competence

---

$$(6) rlEffort_i = \beta_0 + \beta_1 AutS_i + \beta_2 RelS_i + \beta_3 ComS_i + \beta_4 AutF_i + \beta_5 AutF_i^2 + \beta_6 RelF_i + \beta_7 RelF_i^2 + \beta_8 ComF_i + \beta_9 ComF_i^2 + \beta_{10} IndAmount_i + \beta_{11} Frame_i + \beta_{12} OSE_i + \beta_{13-16} X_i + \varepsilon_i$$

$$(6a) rlEffort_i = \beta_0 + \beta_1 AutS_i + \beta_2 Frame_i + \beta_3 OSE_i + \beta_{4-7} X_i + \varepsilon_i$$

$$(6b) rlEffort_i = \beta_0 + \beta_1 RelS_i + \beta_2 Frame_i + \beta_3 OSE_i + \beta_{4-7} X_i + \varepsilon_i$$

$$(6c) rlEffort_i = \beta_0 + \beta_1 ComS_i + \beta_2 Frame_i + \beta_3 OSE_i + \beta_{4-7} X_i + \varepsilon_i$$

$$(6d) rlEffort_i = \beta_0 + \beta_1 AutF_i + \beta_2 AutF_i^2 + \beta_3 Frame_i + \beta_4 OSE_i + \beta_{5-8} X_i + \varepsilon_i$$

$$(6e) rlEffort_i = \beta_0 + \beta_1 RelF_i + \beta_2 RelF_i^2 + \beta_3 Frame_i + \beta_4 OSE_i + \beta_{5-8} X_i + \varepsilon_i$$

$$(6f) rlEffort_i = \beta_0 + \beta_1 ComF_i + \beta_2 ComF_i^2 + \beta_3 Frame_i + \beta_4 OSE_i + \beta_{5-8} X_i + \varepsilon_i$$

*Appendix 10: Breusch-Pagan test and White test for heteroskedasticity*

	Breusch-Pagan Test		White Test	
	Chi2	Prob > Chi2	Chi2	Prob > Chi2
(1e)	0.04	0.844	36.23	0.052
(2a)	3.96	0.047	48.68	0.002
(2b)	1.25	0.264	21.45	0.612
(2c)	2.1	0.147	41.46	0.015
(4a)	0.29	0.589	61.86	0.001
(4b)	0.01	0.934	49.83	0.023
(4c)	0.03	0.868	51.92	0.098
(4)	0.22	0.639	87.35	0.015
(5a)	0.01	0.911	22.99	0.520
(5b)	0.21	0.650	16.51	0.869
(5c)	8.35	0.004	35.01	0.063
(5d)	0.58	0.447	45.39	0.005
(5e)	0.31	0.580	22.07	0.575
(5f)	0.21	0.645	37.61	0.038
(6a)	0.01	0.937	41.79	0.115
(6b)	0.01	0.907	47.93	0.035
(6c)	0.27	0.604	53.84	0.009
(6d)	0.12	0.728	55.44	0.053
(6e)	0.04	0.844	50.85	0.117
(6f)	0.43	0.512	46.85	0.212
(6)	0.08	0.779	113	0.456

The table reports results from two heteroskedasticity tests: the Breusch-Pagan test and the White test. Heteroskedasticity is assumed to be present if one or both tests reject the Null-hypothesis of homoskedasticity ( $p < 0.1$ ).

*Appendix 11: Shapiro-Wilk test for normality*

<b>Regression</b>	<b>Obs</b>	<b>W</b>	<b>V</b>	<b>z</b>	<b>Prob&gt;z</b>
(1n)	113	0.976	2.193	1.754	0.040
(1e)	113	0.991	0.843	-0.38	0.648
(2a)	113	0.985	1.416	0.777	0.218
(2b)	113	0.984	1.473	0.865	0.193
(2c)	113	0.986	1.265	0.526	0.300
(4a)	113	0.989	0.997	-0.006	0.503
(4b)	113	0.993	0.649	-0.965	0.833
(4c)	113	0.992	0.777	-0.564	0.714
(4)	113	0.992	0.778	-0.561	0.713
(5a)	113	0.991	0.805	-0.483	0.686
(5b)	113	0.971	2.684	2.205	0.014
(5c)	113	0.977	2.104	1.661	0.048
(5d)	113	0.955	4.119	3.161	0.001
(5e)	113	0.976	2.171	1.731	0.042
(5f)	113	0.986	1.313	0.608	0.272
(6a)	113	0.991	0.867	-0.319	0.625
(6b)	113	0.992	0.765	-0.6	0.726
(6c)	113	0.992	0.717	-0.743	0.771
(6d)	113	0.993	0.673	-0.883	0.811
(6e)	113	0.992	0.687	-0.84	0.800
(6f)	113	0.991	0.831	-0.413	0.660
(6)	113	0.994	0.517	-1.473	0.930

The table report results from the Shapiro-Wilk test for normality (normally distributed residuals). The Null-hypothesis of normality is rejected at  $p < 0.1$ .

Appendix 12: Testing of functional forms for BPNS and BPNF

	(3a)	(3b)	(3c)	(3d)
F	14.07	8.06	0.05	2.6
Prob > F	0.0003	0.0005	0.8190	0.0785
VARIABLES	rIEffort	rIEffort	rIEffort	rIEffort
BPNS	0.113*** (0.030) [0.000]	-0.126 (0.175) [0.474]		
BPNSsq		0.028 (0.020) [0.168]		
BPNF			0.008 (0.035) [0.819]	-0.571** (0.258) [0.029]
BPNFsq				0.060** (0.026) [0.025]
Constant	1.166*** (0.131)	0.689* (0.367)	0.729*** (0.173)	-0.615 (0.616)
Observations	113	113	113	113
R-squared	0.112	0.128	0.001	0.045
R-squared adjusted	0.105	0.112	-0.009	0.028

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

P-values from two-sided t-test in squared brackets

Note: To revoke the reflection of intended work effort, all coefficients are shown with reverse signs to allow for a more intuitive read

The table show regression results for the testing of functional forms for BPNS and BPNF. Therefore, rIEffort is regressed on the linear and the linear plus the quadratic forms of BPNS respectively BPNF.

**rIEffort**: Reflected and logged intended work effort, **BPNS**: Basic psychological need satisfaction, **BPNSsq**: Squared basic psychological need satisfaction, **BPNF**: Basic psychological need frustration, **BPNFsq**: Squared basic psychological need frustration.

Appendix 13: Full regression results for the first stage mediation of autonomy, relatedness, and competence

VARIABLES	(5a) AutS	(5b) RelS	(5c) ComS	(5d) AutF	(5e) RelF	(5f) ComF
Frame	-0.524** (0.247) [0.036]	-0.643** (0.319) [0.046]	-0.648*** (0.182) [0.001]	0.606*** (0.222) [0.007]	0.709** (0.321) [0.029]	0.493** (0.241) [0.043]
OSE	0.271* (0.155) [0.082]	0.160 (0.200) [0.425]	0.356*** (0.116) [0.003]	0.105 (0.155) [0.500}	-0.054 (0.201) [0.790]	-0.069 (0.151) [0.650]
Gender	0.195 (0.252) [0.442]	0.068 (0.325) [0.835]	-0.085 (0.177) [0.630]	-0.158 (0.223) [0.481]	-0.351 (0.327) [0.286]	-0.602*** (0.225) [0.009]
HighEdu	0.035 (0.084) [0.681]	-0.161 (0.108) [0.139]	-0.109** (0.050) [0.031]	0.067 (0.075) [0.372]	0.100 (0.109) [0.364]	0.088 (0.066) [0.185]
ProfExp	-0.007 (0.043) [0.868]	0.019 (0.056) [0.728]	0.030 (0.030) [0.316]	0.006 (0.036) [0.873]	-0.051 (0.056) [0.368]	0.013 (0.050) [0.802]
BSE	0.343 (0.269) [0.204]	0.867** (0.347) [0.014]	0.525** (0.214) [0.016]	-0.144 (0.210) [0.494]	0.116 (0.349) [0.740]	0.086 (0.286) [0.763]
Constant	1.836** (0.920)	3.263*** (1.188)	4.195*** (0.731)	4.297*** (0.853)	3.600*** (1.196)	5.201*** (0.782)
Observations	113	113	113	113	113	113
R-squared	0.090 0.0382	0.112 0.0613	0.243 0.2005	0.088 0.0365	0.061 0.008	0.087 0.0356

(5a), (5b), and (5e): standard errors in parenthesis

(5c), (5d), and (5f): robust standard errors in parenthesis

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

P-values from two-sided t-test in squared brackets

The table reports full regression results for each of the six basic psychological need dimensions for the first stage of the mediation.

**AutS:** Autonomy satisfaction, **RelS:** Relatedness satisfaction, **ComS:** Competence satisfaction, **AutF:** Autonomy frustration, **RelF:** Relatedness frustration, **ComF:** Competence frustration, **Frame:** Contract Frame (Penalty = 1; Bonus = 0), **OSE:** Occupational self-efficacy, **Gender:** (Female = 1; Male = 0), **HighEdu:** Years of higher education, **ProfExp:** Years of professional experience, **BSE:** Business school education (Yes =1; No = 0).

*Appendix 14: Full regression results for the second stage mediation of autonomy, relatedness, and competence*

VARIABLES	(6a) rIEffort	(6b) rIEffort	(6c) rIEffort	(6d) rIEffort	(6e) rIEffort	(6f) rIEffort	(6) rIEffort
IndAmount							0.000 (0.000) [0.625]
AutS	0.047* (0.026) [0.077]						0.016 (0.034) [0.650]
RelS		0.033* (0.020) [0.093]					-0.010 (0.027) [0.708]
ComS			0.137*** (0.040) [0.001]				0.123*** (0.040) [0.003]
AutF				-0.120 (0.187) [0.523]			-0.055 (0.185) [0.767]
AutFsq				0.011 (0.019) [0.553]			0.003 (0.019) [0.873]
RelF					-0.095 (0.095) [0.318]		-0.023 (0.098) [0.811]
RelFsq					0.013 (0.012) [0.253]		0.004 (0.012) [0.715]
ComF						-0.340* (0.172) [0.051]	-0.284 (0.183) [0.124]
ComFsq						0.038** (0.018) [0.031]	0.031 (0.019) [0.103]
Frame	-0.073 (0.068) [0.228]	-0.095 (0.068) [0.167]	-0.076 (0.067) [0.256]	-0.105 (0.069) [0.134]	-0.009 (0.066) [0.895]	-0.107 (0.068) [0.117]	-0.026 (0.079) [0.740]
OSE	0.124*** (0.043) [0.004]	0.135*** (0.048) [0.006]	0.132*** (0.045) [0.004]	0.127*** (0.044) [0.004]	0.088** (0.044) [0.047]	0.122*** (0.042) [0.005]	0.079* (0.044) [0.077]
Gender	-0.113 (0.069) [0.102]	-0.104 (0.071) [0.147]	-0.106 (0.069) [0.127]	-0.088 (0.070) [0.212]	-0.092 (0.065) [0.160]	-0.046 (0.072) [0.523]	-0.049 (0.071) [0.489]
HighEdu	-0.024 (0.023) [0.301]	-0.02 (0.022) [0.360]	-0.017 (0.021) [0.428]	-0.022 (0.023) [0.334]	-0.007 (0.021) [0.739]	-0.026 (0.023) [0.249]	-0.012 (0.023) [0.609]
ProfExp	0.022* (0.012) [0.063]	0.022* (0.013) [0.093]	0.021 (0.013) [0.107]	0.019 (0.012) [0.118]	0.017 (0.012) [0.158]	0.017 (0.012) [0.154]	0.016 (0.012) [0.197]
BSE	0.077 (0.073) [0.297]	0.09 (0.076) [0.240]	0.064 (0.074) [0.390]	0.083 (0.074) [0.266]	0.021 (0.070) [0.765]	0.107 (0.073) [0.143]	0.038 (0.076) [0.615]



Constant	1.393*** (0.254)	0.999* (0.578)	1.416*** (0.275)	1.110*** (0.335)	1.882*** (0.305)	0.560 (0.507)	0.843 (0.783)
Observations	113	113	113	113	113	113	113
R-squared	0.192	0.171	0.188	0.180	0.276	0.213	0.313
R-square adjusted	0.1382	0.1072	0.1341	0.1173	0.228	0.1529	0.1982

(6a), (6e), and (6f): standard errors in parenthesis

(6b), (6c), and (6d): robust standard errors in parenthesis

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Note: To revoke the reflection of intended work effort, all coefficients are shown with reverse signs to allow for a more intuitive read

The table reports full regression results for each of the six basic psychological need dimensions for the second stage of the mediation.

**AutS:** Autonomy satisfaction, **RelS:** Relatedness satisfaction, **ComS:** Competence satisfaction, **AutF:** Autonomy frustration, **AutFsq:** Squared autonomy frustration, **RelF:** Relatedness frustration, **RelFsq:** Squared relatedness frustration, **ComF:** Competence frustration, **ComFsq:** Squared competence frustration, **Frame:** Contract frame (Penalty = 1; Bonus = 0), **OSE:** Occupational self-efficacy, **Gender** (Female = 1; Male = 0), **HighEdu:** Years of higher education, **ProfExp:** Years of professional experience, **BSE:** Business school education (Yes =1; No = 0).