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DOCTORAL THESIS

THREE ESSAYS ON THE DRIVERS OF
EMPLOYEE MOTIVATION

Author
Costanza Piovanelli

Supervisor
Prof. Marco Faillo

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Supervisor:

Prof. Marco Faillo
University of Trento

Examination Committee:

Prof. Flavio Bazzana
University of Trento

Dr. Fabio Pieri
University of Trento

Prof. Ennio Bilancini
IMT School of Advanced Studies Lucca

ABSTRACT

In the last decade several surveys have suggested that monetary motivation is just one face of the diverse set of motivational drivers of employees' behavior, and sometimes it is not even the most powerful: indeed, they seem to be moved by different psychological motivations, such as peer motivation, the intrinsic desire to do a good job, recognition, and so on. Behavioral and experimental economics incorporate these psychological elements into the standard agency theory, and provide experimental evidence to support their relevance.

The aim of this dissertation is to explore the effects on employees' behavior of two of these psychological forces: intrinsic motivation and solidarity towards peers. Chapter 1 is a review of the effects of the interaction between intrinsic motivation and other motivational forces, both external (such as external interventions, social context, and externally set goals) and internal (such as subject's identity and achievement motives). The laboratory experiment presented in Chapter 2 investigates the relation between intrinsic motivation, wage delegation, and performance, with a twofold aim: 1) testing whether subjects who are delegated their wage choice become more intrinsically motivated 2) exploring the different reactions to wage delegation of differently motivated workers. Chapter 3 reproduces the cash posters framework *à la* Homans (1953, 1954) in the laboratory, and it examines whether employees are moved also by solidarity concerns towards their coworkers.

Keywords: Intrinsic motivation, Employee motivation, Rewards, Compensation, Delegation, Experiment, Solidarity, Gift-exchange, Reciprocity.

JEL Classification: C91; D81; D91; J32; J33; M52; M54.

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INTRODUCTION

The employer-employee relationship has been usually analyzed within an agency framework in which the employer/principal engages the employee/agent to act on her behalf: since the agent's interest usually diverges from the principal's, the principal needs to propose a proper contract in order to induce the agent to act according to her desires (Alchian and Demsetz, 1972; Jensen and Meckling, 1976; Eisenhardt, 1989; Prendergast, 1999). Since the agent's behavior usually can not be monitored nor enforced perfectly, the neoclassical solution to the agency problem is to incentivize the agent's desired actions: as a consequence of this intervention, the agent perceives shirking from the induced behavior to be more costly, and his interests become more aligned to the principal's (Jensen and Meckling, 1976; Kreps, 1990).

Implicit in the standard agency problem and in the proposed solution are several assumptions, among which three are worth highlighting for our purposes: that both subjects are driven only by monetary motivations, they are perfectly selfish, and that agents' effort is positively and monotonically influenced by monetary compensation¹.

Looking at real world scenarios, these assumptions risk to be too simplistic to represent comprehensively an employer-employee relation: subjects' behavior seems to be moved by many other drivers that are disregarded by the standard agency theory, and consequently a reward policy that is based only on monetary compensation

¹For sake of completeness, the other assumptions made by the positive agency theory are: both subjects are perfectly rational and there is common knowledge of rationality, principals are risk neutral while agents are risk averse, their time preferences are calculable with an exponential discount function, agents' utility function depends negatively from the exerted effort (Wright et al., 2001; Pepper and Gore, 2012).

results to be inadequate. Indeed, as long as the employee's effort is remunerated, other needs do arise: for example the need of feeling treated fairly by the employer and coworkers, the need of feeling trusted and motivated, the need of working in an accommodating workplace, the need of feeling cared for by the employer with rewards that can be different from the pure monetary one (such as welfare policies, health care, or housing allowances), and so on. Many consultancies (such as Willis Towers Watson, McKinsey, Mazars) have attempted to investigate the significance of these different drivers through several surveys: for example, in 2014 TINYpulse published a survey about employees' engagement and organizational culture, and it collected over 200.000 anonymous responses from more than 500 organizations. Among several questions, employees were asked "What motivates you to excel and go the extra mile at your organization?", and the answers were far from expected (at least, from a classic agency theory point of view): indeed, monetary compensation resulted to be less powerful than other motivations, such as peer motivation, the intrinsic desire to do a good job, recognition and encouragement, the possibility to have a real impact or to meet clients' needs, the possibility to grow professionally. The relevance of such a plethora of drivers suggests the need to incorporate some psychological elements into the analysis of employees' motivation.

Behavioral economics relaxes some of the hypotheses of the standard agency theory to incorporate the above-mentioned psychological elements, and experimental economics provides much evidence to support the multifaceted motivational forces of employees' behavior: for example, it suggests that subjects can be influenced also by their social preferences (Akerlof, 1982; Fehr et al., 1993; 1997; Fehr and Falk, 2007; Della Vigna et al., 2016), the relation and the comparison with peers (Charness and Khun, 2007; Gächter et al., 2012; Nosenzo, 2013; Charness et al., 2016), the enjoyment/interest in the task (Deci, 1971; Frey, 1997; Gagnè and Deci, 2005; Deci et al., 2017), and so on.

The goal of this research is to explore two motivational forces that are different from pure monetary rewards, but that are likely to drive employees' behavior as well: intrinsic motivation and solidarity. Intrinsic motivation arises when subjects perceive an activity as enjoyable/interesting, and they approach it "as an end in itself" (Kruglanski, 1975); it represents an internal driver of human behavior that has been widely studied because of its power in producing several positive outcomes (in terms of performance, engagement, satisfaction, and so on), but whose interactions with other motivational forces are far from straightforward. Solidarity instead

is usually defined as "a willingness to help people in need who are similar to oneself but victims of outside influences" (Selten and Ockenfels, 1998: 518): despite it represents a less explored topic (at least in a workplace context), we argue that it should not be underestimated when subjects' behavior is studied in relation to their peers.

This doctoral dissertation is composed by three chapters, and its aim is to illustrate, both theoretically and experimentally, the effects of these motivational forces on employees' behavior. Chapter 1 is a review of the effects of the interaction between intrinsic motivation and other sources of motivation, both external (such as outside interventions, social context and externally set goals) and internal (such as subjects' identity and personal goals). Firstly we explore the complex relation between intrinsic motivation and external interventions, by spotlighting the difference in methodologies between the psychological and the economic approach, and we evidence some studies attempting to fill the gap between these two strands of research. Then we investigate how subjects' social context can interact with both intrinsic motivation and external rewards in at least three ways: 1) external rewards are likely to affect both subjects' intrinsic motivation and their personal/social image 2) intrinsic motivation is crowded out by those interventions that are perceived as a signal of distrust 3) some interventions are likely to shift subjects' decision frame from a social one to a monetary one. The third motivational driver that we analyze is subjects' identity, which is suggested to be generally positively linked to intrinsic motivation. Finally, we explore the relation between intrinsic motivation and different achievement goals (either mastery, performance approach, or performance avoidance) and we illustrate our perplexities about a straight link between goal setting and intrinsic motivation.

Chapter 2 is an experimental investigation of the relation between wage delegation, intrinsic motivation and performance. A stream of experimental papers has proved that, when people are delegated the choice of their own wage or payment structure, they tend to perform better; however, there is still no consensus on the psychological determinants of this effect (Charness et al., 2012; Mellizo et al., 2014; Jeworrek and Mertins, 2015). We suggest that delegated people tend to exert higher effort because the possibility to choose their own wage increases their intrinsic motivation; furthermore, we investigate whether differently motivated people react in different ways to wage delegation. We propose a novel experimental design with a creative task, in which each session is divided in two phases: in the first phase

the payment is flat, while in the second phase it depends on the treatment. In the delegation treatment the choice of the wage is delegated to the subjects, in the control treatment subjects are given a random wage in such a way that the wage distributions of the two treatments are equal. Between phase 1 and phase 2 we introduce a free-choice phase, that is a phase in which subjects are told to do whatever they want and they are not paid: the effort exerted during the free-choice phase represents our first measure of intrinsic motivation, while the self-assessed interest in the task (rated after its completion) is our second measure. Our findings confirm that when subjects are given the possibility to select their own wage, they tend to perform better; furthermore, we find that those subjects who are both highly motivated and delegated their wage choice are those who perform better. Nevertheless, the ex-post measure of intrinsic motivation does not seem to be much influenced by the compensation method: we propose two possible reasons for this result, one methodological and one theoretical, that open the way to other possible investigations.

Chapter 3 illustrates a laboratory experiment in which we reproduce the cash posters framework *à la* Homans (1953, 1954) with two main goals: 1) investigating reciprocity within the employer-employee relation, both in terms of wage-effort and in terms of effort-potential leniency 2) exploring whether employees' behavior can be moved also by solidarity concerns towards their peers in need. Our experiment is a gift-exchange with punishment, real effort, and multiple workers: each employer is matched with two employees and she has the possibility to punish each of them if their individual production is lower than that asked. Each employee is asked to exert a real effort, and his production risks to be reduced by a random device with a known probability; in our treatment, each employee has the possibility to help the coworker by renouncing to a part of his production and by giving it to him in order to prevent the coworker from being punished. Our results support the widely proven relation between proposed wage and exerted effort, but not the relation between effort and potential leniency in punishment: indeed, employers do not seem to be willing to forgive employees' noncompliance, neither when employees exerted high effort in the past, nor when their coworkers exert high effort. Furthermore, when employees are given the possibility to show their solidarity with their coworkers in need, they do not only exploit this possibility, but they are even willing to exert higher effort towards their employers. As a consequence, employers are the main beneficiaries of employees' solidarity, and in our treatment the difference in earnings between employers and employees becomes even greater.

This doctoral dissertation attempts to depict some aspects of the multifaceted drivers of human behavior within a workplace context; despite it relies mainly on laboratory evidence, my hope is that it will provide some hints to capture employees' motivations all around, and consequently to help in building a comprehensive total reward strategy.

CHAPTER 1

INTRINSIC MOTIVATION AT WORK: A REVIEW

Intrinsic motivation has been widely recognized as a powerful driver of human behavior, and it has been related to several positive outcomes (Gagnè and Deci, 2005; Ryan and Deci, 2008; Deci et al., 2017). However, most human activities are not merely driven by the interest/enjoyment in the activity itself, but rather they are motivated also by other forces. The aim of this review is to explore the effects of the interaction between intrinsic motivation and other motivational drivers, related to: a) external interventions (such as monetary compensation, controlling devices, and so on), analyzed both from a psychological and an economic perspective, with a focus on the strengths and the weaknesses of these approaches b) social context, such as reputational concerns, perceptions of distrust, and the subject's decision frame (either social or monetary) c) subjects' identity d) goals, explored both as personal and externally set.

Keywords: Intrinsic motivation, Employee motivation, Rewards.

JEL Classification: J32; J33; M52; M54

1.1 Introduction

Intrinsic motivation has been defined as that force that lead a subject to perform an activity that is approached "as an end in itself" (Kruglanski, 1975), because the subject "receives no apparent reward except the activity itself" (Deci, 1971: 105). Most human activities (such as working, following social norms, upholding the law, and so on) are not, or not only, intrinsically motivating; in these contexts, in order to induce the subject to engage in the desired behavior, it is necessary to introduce some external behavioral regulations that make the completion of the activity instrumental to obtaining something else from the mere enjoyment of the activity (Ryan, 1995). When the activity is perceived only "as a means to obtaining something else" (Kruglanski, 1975), the subject is said to be extrinsically motivated.

The self-determination theory (SDT) proposed by Deci and colleagues (Deci and Ryan, 1985; Ryan and Deci, 2000; Gagnè and Deci, 2005; Deci et al., 2017) articulates this basic distinction between intrinsic and extrinsic motivation, and suggests a continuum of motivation according to the degree to which the subject perceives to be autonomous in determining his own behavior (Gagnè and Deci, 2005). On the one extreme of this continuum there is *a-motivation*, that is a synonym of lack of intention and motivation, and implies that the subject is essentially unaware of the reason why he is performing an activity. Between a-motivation and intrinsic motivation, there are four facets of extrinsic motivation that are divided according to the degree to which the external intervention has been internalized. The least-autonomous form of extrinsic motivation is *external regulation*: people perceive their behavior to be out of their control and directly controlled by others (Deci et al., 2017). Next to external regulation there is *introjected regulation*, which implies that the regulation has been taken in by the person, but not yet accepted (Gagnè and Deci, 2005): subjects are pressured by their self-esteem or ego-involvement, and their behaviors are aimed either at avoiding guilt and disapproval, or at achieving pride and approval. More autonomous is perceived the behavior driven by *identified regulation*: people perceive the rationale for acting as their own, and their behavior becomes more congruent with their personal goals and identities. Finally, the most autonomous form of extrinsic motivation is *integrated regulation*, and it represents the full internalization of a regulation: the new regulation is now congruent with the subject's other values and needs.

The problem posited by SDT can be summarized in how to foster the inter-

nalization and the integration of external regulations into one's values and goals: indeed, through these processes, the individual is able to move along the continuum of motivation and to become more autonomously motivated to the point of becoming intrinsically motivated. In order to fully internalize a regulation, SDT proposes that three basic need should be fulfilled: the need for relatedness, the need for competence, and, above all, the need for autonomy. The satisfaction of the basic needs and the consequent more autonomous (or intrinsic) motivation have been proved to be related to several positive outcomes, such as high energy levels (Ryan and Deci, 2008) and persistence (Deci, 1972; Vallerand and Blssonnette, 1992), enthusiasm and engagement (Rich, 2006), job satisfaction and commitment (Gagnè et al., 2010), thriving (Spreitzer et al., 2005), creativity (Gagnè and Deci, 2005), well-being (Nix et al., 1999), performance quality (Cerasoli et al., 2014; Kuvaas et al., 2017), and so on (Gagnè and Deci, 2005; Ryan and Deci, 2008; Gagnè et al., 2010; Cerasoli et al., 2014; Van de Broeck et al., 2016; Kuvaas et al., 2017).

Given the above-mentioned link between intrinsic motivation and several positive outcomes, and considering that usually intrinsic motivation is not the only driver of people's behavior, the question arises of what happens when intrinsic motivation interacts with other sources of motivation. The aim of this paper is indeed to discuss the effects of the interaction between intrinsic motivation and other sources of motivation, both external and internal.

The paper is structured as follows: Section 1.2 illustrates what happens when intrinsically motivated subjects are exposed to external interventions (monetary compensation, controlling devices, and so on); this topic is analyzed separately for psychological and for economic studies by underlying the differences in results and methodologies, and by suggesting the strengths and weaknesses of the different approaches. The section concludes by presenting an overview of the studies attempting to fill the gap between these two strands of research, and that focus on the interaction between intrinsic and extrinsic motivations into workplace contexts. Section 1.3 analyzes how the effects of the interaction between intrinsic motivation and external interventions are likely to depend also on subjects' social interactions, at least in three ways: first of all, external interventions are likely to affect simultaneously people's intrinsic motivation and their social/personal image; then, intrinsic motivation tends to be undermined by those interventions that are perceived as signal of distrust; finally, external interventions risk to shift the individual's decision frame from a social frame to a monetary frame, with a consequent decrease in intrinsic

motivation. Section 1.4 suggests a positive link between intrinsic motivation and subjects' identity (or identification with the firm, the job, the task), and that they can be both either undermined or enhanced by external interventions. Section 1.5 explores the relation between intrinsic motivation and different achievement goals (mastery, performance approach, and performance avoidance), and between intrinsic motivation and different levels of goal (general or task-specific); moreover, it illustrates our perplexities about a direct connection between goal setting and intrinsic motivation. Section 1.6 concludes.

1.2 Intrinsic motivation and external interventions

Subjects' behavior is very often influenced not only by their intrinsic motivation, but also by the external motivation determined by the introduction of external interventions, such as monetary compensation, control devices and surveillance, feedbacks, and so on. Both economic and psychological studies have explored the effects of the interaction between intrinsic motivation and external interventions, and the next sub-sections will illustrate the different approaches in exploring the consequences of this interaction.

1.2.1 Psychological studies

The seminal psychological paper presented by Deci (1971) is the first to suggest that the introduction of a performance-contingent monetary reward can be detrimental for intrinsic motivation: his experiment was divided in three phases and in each phase the subjects were offered the possibility either to solve some puzzles or to read magazines. Neither in the first nor in the third phase the subjects were paid, but in phase 2 subjects in the treatment condition were paid \$1 when they solved a puzzle, while subjects in the control group were not paid. During each phase the experimenter left the room for few minutes saying the subjects to do whatever they want during his absence (free-choice period): by comparing the changes in intrinsic motivation between phase 1 and phase 3, measured as the amount of time that subjects spent in completing the task during the free-choice period, the results indicated that the removal of the monetary reward crowded-out intrinsic motivation.

In the following decades, several psychological studies have expanded the findings of Deci (1971) by focusing on how people's behavior changes after the reward

removal and measuring intrinsic motivation as a combination of free-choice behavior and self-reported interest (rated through a questionnaire that subjects were asked to complete after the task). Deci et al., (1999)'s meta-analysis reviewed and collected evidence from more than 120 psychological studies: they showed that most tangible rewards significantly undermined the free-choice measure of intrinsic motivation, except for tangible rewards that were connected to uninteresting activities, not contingent on task behavior, or unexpected. Moreover, they suggested the undermining effects of negative performance feedback and threats, deadlines, evaluations, directives, and surveillance; on the other hand, positive feedback, choice and opportunity for self-direction, and acknowledgment of feelings were proved to enhance intrinsic motivation.

These findings have been interpreted mainly in light either of the self-perception theory (Bem 1972) or of the self-determination theory (Deci and Ryan, 1985). The main assumption of the self-perception theory is that people are not perfectly aware of the reason leading them to perform a task, either intrinsic or external (Fehr and Falk, 2002). In order to understand it, they infer it from the circumstances in which they are performing the task: therefore, when people are given a strong and salient reward for performing an activity that they would do even in the absence of this remuneration, the *over-justification effect* arises (Lepper et al., 1973). In absence of this reward, indeed, the completion of the task would have been attributed to the intrinsic features of the task itself; however, when the specific external reward is introduced, subjects reduce the motivation they can control for (intrinsic motivation) because it has become unnecessary to be intrinsically motivated. As a consequence, if the external reward is removed, the subjects end up with lower level of intrinsic motivation (Frey, 1997; Fehr and Falk, 2002; Festrè and Garrouste, 2015).

On the other hand, self-determination theory assumes that an external intervention can either undermine or enhance subjects' intrinsic motivation depending on its ability in satisfying three basic psychological needs: the need for competence, the need for autonomy, and the need for relatedness. The need for competence (White, 1959) is related to "the natural propensity to explore, to master the environment, and to actively seek challenges that extend physical and psychological functioning" (Vansteenkiste et al., 2008: 196); this need is satisfied when the subject perceives self-efficacy in performing an activity. On the other hand, the need for autonomy (de Charms, 1968) is satisfied when the subject feels an internal locus of causality, meaning that he perceives himself as the origin of his own behavior (Ryan and Deci,

2000; Gagnè and Deci, 2005; Dysvik et al., 2013; Vansteenkiste et al., 2008). Finally, the need for relatedness is linked to the need for feeling respected and cared for by the person's social group (Deci and Ryan, 2000; Ryan and Deci, 2000; Vansteenkiste et al., 2008). According to the self-determination theory, as long as an external intervention is able to satisfy these needs, it is likely to enhance intrinsic motivation; otherwise, it will crowd-out intrinsic motivation (Deci and Ryan, 2000; Vansteenkiste et al., 2008; Dysvik et al., 2013; Festrè and Garrouste, 2015).

As we have already mentioned, most psychological studies have measured the change in intrinsic motivation as the difference between the amount of time that subjects spend on completing the task during the free-choice period *before* the external intervention, and the amount of time spent in completing the task during the free-choice period *after* the intervention. This measure has been largely criticized, mainly because the change in behavior can be attributed to several causes, independent from intrinsic motivation (Fehr and Falk, 2002): first of all, since during the intervention provision subjects tend to exert higher effort, a decrease in effort after the intervention can be due to a satiation effect (Dickinson, 1989); secondly, if subjects receive a reward for performing a task and after a while the reward is withdrawn, they are likely to exert lower effort because they are disappointed by the reward removal; finally, subjects can interpret the reward as a signal that the experimenter see the task as barely interesting, and it can induce them to perceive the task as less motivating (Bénabou and Tirole, 2003; 2006).

Another feature that is common to most psychological studies is the attention in using interesting tasks in order to generate and to capture intrinsic motivation, such as puzzle solving (Deci, 1971; Calder and Staw, 1975; Zuckerman et al., 1978), drawing pictures (Lepper et al., 1973), finding hidden figures (Harackiewicz, 1979; Elliot et al., 2000), building constructions with blocks (Fabes et al., 1988), playing computer games (Hitt et al., 1992), and so on. The reason for this choice is that intrinsic motivation is said to raise only for those activities that are initially interesting for the subject, therefore it is not possible to explore crowding-in or crowding-out effects for dull tasks (Calder and Staw, 1975; Deci et al., 1999; Ryan and Deci, 2000; Deci et al., 2001; Dessi and Rustichini, 2015; Festrè and Garrouste, 2015). This design choice is surely methodologically convincing, however at least two perplexities arise. First of all, the initial interest in the task is often hypothesized and only superficially examined (Hidi and Harackiewicz, 2000): for example, some papers included in Deci et al. (1999)'s meta-analysis presented their tasks as

interesting without checking for the effective initial interest (e.g. Deci, 1971; Zuckerman et al., 1978), or measuring only the relative interest in the task with respect to another one (McLoyd, 1979). Secondly, in a design with such interesting and enjoyable tasks, payments and rewards are likely to be situationally inappropriate and maybe unexpected; therefore, it risks to be far from representing a situation in which, for example, an employee expects to be paid for providing some effort (Fehr and Falk, 2002).

1.2.2 Economic studies

Economists attention was firstly raised towards crowding-out effects by Titmuss (1970), who suggested that, when people receive money for donating blood, they are less likely to engage in this behavior. After this glimmer on the undermining effect of external rewards, a strand of economic studies has developed on the circumstances in which this effect does arise with the main focus on exploring, both theoretically and experimentally, the crowding-out effects into a principal-agent setting. Frey (1993; 1997) distinguished three situations that can derive from the impact of an external intervention on people's intrinsic motivation and behavior in a principal-agent setting (Frey, 1997: 21):

1. According to the standard economic theory, external interventions such as monetary compensation or fines produce the so-called relative price effect: that is, they increase people's performance because they increase the marginal cost of shirking. The same result in terms of performance is obtained when the introduction of an external device raises people's intrinsic motivation (*crowding-in effect*): the marginal benefit of performing is higher and the relative price effect works in the same direction of the crowding effect.
2. On the other hand, external intervention can reduce people's intrinsic motivation (*crowding-out effect*): as a consequence, the marginal benefit of performing decreases and the performance is lower.
3. Usually, both the price effect and the crowding-out effect influence people's behavior, and the strength of these effects determines whether the intervention is beneficial for the performance or not.

An external intervention is said to crowd-out intrinsic motivation as long as it is perceived controlling, because it is likely to mortify the person's needs for self-

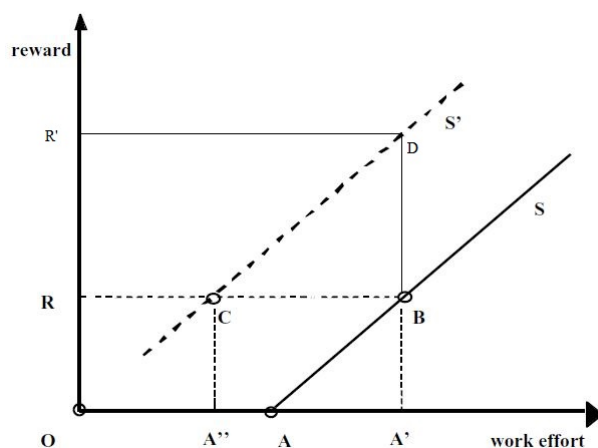


Figure 1.1: Net outcome of the price effect and the crowding-out effect (Frey and Jegen, 2001)

determination and for self-esteem¹; on the other hand, when an external intervention is perceived as supportive, or it is administered in an autonomy-supportive climate, it will enhance intrinsic motivation (Gagné and Deci, 2005).

Figure 1 shows what happens when the relative-price effect and the crowding-out effect interact (Frey, 1997; Frey and Jegen, 2001). S represents the classical supply curve when only the price effect is working: when an external reward is introduced (from 0 to R), the effort supplied increases from A to A' . Instead, when the price effect interacts with the crowding out effect, the supply curve shifts to S' and the work effort is lowered to A'' . It is interesting to observe that, when the supply curve is influenced both by the price effect and the crowding-out effect, in order to induce the subject to exert the effort A' it is necessary to provide an higher reward R' .

Starting from the 1990s, experimental economics has been largely focused on exploring the crowding-out effect: differently from the psychological studies, here the objective has been the analysis of the final result of the interaction between the price-effect and the crowding-out effect *during* the intervention provision. Most economic studies have explored the crowding-out effect of the introduction of control and fines (Nagin et al., 2002; Fehr and Gächter, 2002; Fehr and List, 2004; Falk and Kosfeld, 2006; Dickinson and Villeval, 2008; Ziegelmeyer et al., 2012) and different compensation schemes (Frey and Götte, 1999; Gneezy and Rustichini, 2000; Hossain

¹The need for self-determination is somehow similar to the above-mentioned need for autonomy and for feeling an internal locus of control; the need for self-esteem, instead, is related to the person's need for an acknowledgment of his competence and involvement in the activity

and Li, 2014; Dessi and Rustichini, 2015; Goto et al., 2015), and their findings supported the connection between subjects' perception of control and low motivation and performance; moreover, they confirmed that, when subjects are motivated and a payment is introduced, it is necessary to make this payment generous in order to induce the subjects to increase their performance. For an exhaustive analysis of the results, see section 1.3; for now, let us draw few general considerations on the methodology and the findings of the economic studies.

First of all, it is necessary to underline that most economic studies do not provide much attention to the initial interest in the task, especially when the aim is to find support to the *hidden cost of control* hypothesis: indeed, most experimental designs are based on principal-agent settings with stated effort (Fehr and Gächter, 2002; Fehr and List, 2004; Falk and Kosfeld, 2006; Ziegelmeyer et al., 2012) or, when the effort is real, it does not seem much interesting, such as working in a call center (Nagin et al., 2002), progressing along a curve in a laboratory game (Dickinson and Villeval, 2008), doing data entry (Hossain and Li, 2014), rice planting (Goto et al., 2015), and so on.² The reason for that is probably related to the fact that the main aim of these studies is to explore the effect of fines and incentives on subjects' performance, not on subjects' intrinsic motivation: indeed, subjects' intrinsic motivation is usually not measured, neither with a behavioral measure nor through a questionnaire. The change in motivation is suggested later as a possible determinant of the performance decrease, together with other possible causes such as distrust, negative reciprocity or a reaction to the signals that the principal sends by using a specific kind of incentive (Gneezy et al., 2011; Bowles and Polania-Reyes, 2012; Festrè and Garrouste, 2015).

Secondly, not all the economic studies on the effects of incentives and fines on people's motivation and performance agree on considering crowding-out a relevant topic: for example, Prendergast (1999) showed some skepticism about the relevance of crowding-out effects for industrial organizations, mainly because the empirical evidence about workplace settings was scarce and most psychological studies used interesting tasks that risked to be far from the workplace ones (Festrè and Garrouste, 2015); Fehr and Falk (2002), instead, were mainly concerned about the im-

²Despite most economic studies on intrinsic motivation are based on uninteresting tasks, there are at least two noteworthy exceptions that address the relation between task meaning and remuneration: Ariely et al. (2008), who asked subjects to assemble Lego models; Chandler and Kapelner (2012), who ran a natural field experiment where subjects were asked to label medical images (we warmly thank professor Pelligra for this remark).

possibility of disentangling intrinsic motivation from signaling reactions, and from disappointment effects. Other studies suggested that monetary compensation and intrinsic motivation can be complementary in determining subjects' performance when the monetary incentives are either small (Dessi and Rustichini, 2015), indirectly performance-salient (Cerasoli et al., 2014), or even performance-contingent (Fang et al., 2013; Ledford, 2014). The debate on whether intrinsic and extrinsic motivation are positively or negatively related is still ongoing, and some questions remain open: How is it possible to relate laboratory findings to real-world scenarios? What is the interactive impact of incentives and intrinsic motivation on performance? What is the role of psychological need satisfaction in determining subjects' performance? The next sub-session attempts to deal with these doubts by presenting the latest developments.

1.2.3 Narrowing the gap and practical implications

In the last decade, few studies have attempted to bridge the gap between the psychological and the economic approach, and they have been mainly focused on developing a link between incentives, satisfaction of the three basic psychological needs, and performance into workplace contexts. Gagnè and Forest (2008) hypothesized that laboratory rewards affect subjects' motivation differently from real-life monetary incentives (Rynes et al., 2005), and they proposed an analysis of how different components of compensation can influence the need for competence, for autonomy, and for relatedness, and consequently intrinsic motivation. They suggested that perceived competence should be positively influenced by the base-pay level (Kuvaas, 2006) and the need for relatedness should be satisfied by profit sharing, stock ownership, group incentives (as long as subjects' do not feel peer pressure and monitoring, Han and Shen, 2007); moreover, an overall needs satisfaction should be obtained through skill-based pay plans, a perceived distributive fairness, an organizational culture that supports cooperation, a supportive work climate, and interesting and meaningful jobs. Furthermore, if the work climate is perceived as supportive, also contingent reward can be perceived as satisfying the basic psychological needs, mainly because they can be seen as fair and consequently increase subjects' sense of competence.

The link between pay-per-performance and intrinsic motivation, however, is still controversial. On the one hand, some authors suggested a positive link between pay-per-performance, perceived autonomy and perceived competence (Fang and Gerhart,

2012), mainly because employees have the possibility to materialize their competence in higher pay, and to perceive their behavior as the only origin of their pay (Fang et al., 2013; Gerhart and Fang, 2015). On the other hand, Cerasoli and colleagues (2016) used a meta-analysis to explore the link between directly-salient and indirectly-salient incentives, the satisfaction of the three basic psychological needs, and performance: they found that those subjects who perceived their needs to be satisfied tended to outperform others, and only those incentives that were indirectly connected to performance tended to increase needs satisfaction. Because of the great impact of the joint effect of indirectly-salient incentives and needs satisfaction on performance, they proposed some intervention to bolster the psychological needs such as encourage employees to set specific and attainable goals, and provide them feedback and public recognition (need for competence); create a supportive environment, for example using telework (need for autonomy); respect employees and adhere to agreed-upon policies, make the employees feel trusted and treated fairly (need for relatedness).

To these interventions, Gerhart and Fang (2015) added other factors to be incorporated in the management practices in order to facilitate the internalization of external motivation, such as a careful use of external rewards in giving different priorities to different goals, in order to avoid that the incentive becomes the major driver of goal choice; a wise use of different compensation schemes in order to attract different subjects: for example, high performers were said to prefer (and to be more intrinsically motivated) when the pay-performance link is strong; the incorporation of equity considerations, both in terms of social comparisons and in terms of link between performance and pay. Other interventions that are likely to fulfill the psychological needs are said to be: allowing employees to have more autonomy in their choices, and acknowledging their responsibilities and contributions (Lynch et al., 2005; Stone et al., 2009); giving precise and sincere feedbacks that underline employees' engagement and initiative (Stone et al., 2009); training employers in the principles of the self-determination theory (Hardrè and Reeve, 2009; Deci et al., 2017); providing a transformational leadership, that is leading through inspiring, encouraging, stimulating, and empowering (Bass, 1985; Gözükar and Simsek, 2015; Deci et al., 2017); rewarding employees with public awards (Frey and Neckermann, 2008).

1.3 Social context

1.3.1 Reputational concerns

(...) consider the following scenario. An individual is considering buying a new environmentally friendly hybrid car which is more expensive than an equivalent car with a standard gasoline engine. Driving an automobile that is clearly a hybrid car would probably add to one's positive image(...). Suppose the government introduces a well-publicized and large tax benefit for those who purchase a hybrid car. On the one hand, the tax incentive reduces the price of the hybrid car, making its purchase more attractive. On the other hand, the tax incentive decreases the image value derived from driving the hybrid. Without the tax incentive, buying a hybrid car definitely shows the individual cares for the environment (positive image); with the tax incentives, it does not (Ariely et al., 2009: 548).

Image motivation, or reputational concern, refers indeed to individuals' tendency to be partially motivated by how others perceive them; therefore, it is related to the desire to be liked and respected by the others and by the self. If individuals are looking for social approval in their behavior, then they should try to signal traits which are defined as good based on social norms and values. Bénabou and Tirole (2006) proposed a theoretical study that explores the interaction between intrinsic motivation and image motivation: they demonstrated how extrinsic rewards can undermine intrinsic motivation when people have reputational concerns, including both social image and self-image concerns. Agents' behavior reflects a mix of three motivations (intrinsic, extrinsic, and reputational) that has to be inferred from their choices and the context. The authors suggested that extrinsic rewards can crowd-out intrinsic motivation, mainly because of the over-justification effect: since people take pro-social actions in part to signal one's own identity to others (and/or to themselves), the presence of even small extrinsic rewards can spoil the reputational value of good deeds, creating doubts about the extent to which they are performed for the incentives rather than for themselves. Moreover, since external incentives are typically quite specific while the intrinsic features of the task are more uncertain, pro-social behavior is more likely to be attributed (either by the others and by the subject himself) to the external incentive rather than to the intrinsic motivation.

Bénabou and Tirole's reputational model is supported by an extensive body of experimental literature that has explored how people's motivation is affected by

receiving an external reward for behaviors that are usually made voluntarily; this body of literature spreads over different fields, such as blood donation (Titmuss, 1970; Ireland and Koch, 1973; Wright, 2002; Mellström and Johannesson, 2008), social norm adherence in everyday life (Gneezy and Rustichini, 2000), volunteering (Myers and Carpenter, 2007; Fiorillo, 2009), charity giving (Ariely et al., 2009) and so on. We have already mentioned the seminal book by Titmuss (1970), which argued that monetary compensation for donating blood might reduce the quantity of the blood donated and would be economically inefficient: indeed, the introduction of an external reward may decrease the opportunity for the donor to signal (to the others, but also to himself) his altruistic intentions and his intrinsic motivation. Following in Titmuss' footsteps, maybe the most widely-cited study is the field experiment ran by Gneezy and Rustichini (2000): they introduced a monetary fine for those parents who arrived late to collect their children from a daycare center, and reported a significant increase in the number of parents coming late after the introduction of this penalty. The interpretation of this evidence in light of the Bénabou and Tirole's model suggests that before the introduction of the monetary penalty, parents were likely to be motivated also by concerns for daycare center workers (or for other parents) and by a desire to signal that they are responsible and sincerely concerned for others (Rebitzer and Tayler, 2011). The imposition of a monetary penalty diluted this signal, and therefore reduced the strength of these motivating forces. Finally, in Ariely et al. (2009)'s experiment, subjects could donate to a charitable organization by clicking two keys on the keyboard either in a public or in a private setting, and were randomly assigned to receive (in addition to the donation made on their behalf) monetary incentives. The results show that monetary incentives are less effective in inducing public pro-social activity: that is, with extrinsic incentives the signal of a pro-social act is diluted, the image value decreases, and consequently the incentive becomes less effective. If the pro-social decision is private, there is no signal to send to other players, and extrinsic incentives are very likely to increase pro-social behavior.

1.3.2 To trust or not to trust?

According to the standard agency theory, the disciplining effect of monitoring should lead to an increase of performance: since the principal-agent relation is characterized by a conflict of interest between the parties and the effort is costly for the self-interested agent, the principal should use control devices to dissuade the agent from the most opportunistic actions. After the introduction of monitoring and/or

finer, the agent is likely to work harder to reduce the probability of a sanction (Prendergast, 1999).

What if, besides the explicit contract between the parties, there is also an implicit psychological contract that makes the relation less impersonal? Agents are likely to become frustrated when they perceive the controlling devices introduced by principals as signals of distrust. As a consequence, this perceived distrust might reduce agents' intrinsic motivation and the marginal benefit they get from work effort; consequently, the introduction of a controlling device might encourage opportunistic behavior. This mechanism can be connected to the social exchange theory (Homans, 1958; Blau, 1964) that posits the existence of a system of exchange of *gifts* between principals and agents: principals "give" trust, loyalty and recognition to workers, and workers "give" effort in return. In this context, monitoring signals a breach of trust to which workers respond by breaking their part of social exchange contract and by lowering their effort level. Frey (1993) proposed a theoretical framework that accounts also for the negative effects of monitoring on agents' effort (Falk and Kosfeld, 2006). He identified the conditions in which the crowding-out effect of monitoring is more likely to prevail over the disciplining effect, and the conditions in which the relation is reversed: by presenting some experimental and econometric evidences, he concluded that the more interpersonal is the principal-agent relationship, the more likely it is that monitoring backfires on the principal and actually reduces agent's effort (Dickinson and Villeval, 2008).

The crowding out of agents' intrinsic motivation due to a perceived distrust, and consequently the reduction of their effort, is a very well supported phenomenon. For example, a stream of experimental literature has broadly documented the undermining effects of the controlling devices that are likely to send a weak signal of distrust, such as monitoring and surveillance systems (Lepper and Greene, 1975; Pittman et al., 1980; Plant and Ryan, 1985; Enzle and Anderson, 1993; Griffith, 1993; Nagin et al., 2002; Schulze and Frank, 2003; Falk and Kosfeld, 2006; Dickinson and Villeval, 2008; Ziegelmeyer et al., 2012): Lepper and Greene (1975) compared the performances of some children who were told that they would be monitored via a television camera with that of children in the non-surveillance condition, and they showed that monitored children were less intrinsically motivated. Using a simple data entry task, Griffith (1993) found that performance was lower with physical monitoring than with no monitoring, except when there was an active supervisor. Dickinson and Villeval (2008) showed that monitoring was more likely to under-

mine intrinsic motivation when the monitoring intensity exceeded its equilibrium level and when the employment relationship was based on interpersonal links, as in the model proposed by Frey (1993). Falk and Kosfeld (2006) used a modified gift-exchange game to suggest that a reduction in motivation can be caused not only by the introduction of monitoring and controlling devices, but also by the requirement of minimum performance. Their results have been confirmed and extended by Ziegelmeyer et al. (2012), though in their study the hidden costs of control were not always significant enough to reduce the effectiveness of economic incentives.

1.3.3 Social frame and monetary frame

In all the situations mentioned in this section, people's behavior follows some social norms whose prescriptions are independent of any external rewards. Donating blood, charity giving, and volunteering may be considered as moral duties to the community that one should perform as often as possible. Showing trustworthiness to trusting people may be seen as aimed at reciprocating the counterpart in return for a previously obtained benefit. We have already seen how image concerns and the destruction of a trust climate can lead the individual to lose his intrinsic motivation and to perform poorly, but this is not the whole story. Several authors suggested that the introduction of extrinsic rewards might not only reduce the individual's intrinsic motivation, but even shift the individuals' decision frame from a social frame to a monetary one (Clark and Mills, 1979; Fiske, 1992; Kreps, 1997; Gneezy and Rustichini, 2000; Fehr and Gächter, 2002; Gneezy, 2003; Heyman and Ariely 2004; Bowles, 2008; Hossain and Li, 2014; Dessi and Rustichini, 2015; Goto et al., 2015). In a communal (or social) relationships, "the giving of a benefit in response to the recipient's need for the benefit is appropriate, while in an exchange relationships is more appropriate for individuals to give a benefit only in response to the receipt of another benefit" (Clarks and Mills, 1979: 12). Given this context, the introduction of a monetary reward may lead to a shift from the desire of following the social norms -which are likely to rule the communal relationship- to maximizing profits (Kreps, 1997). More precisely, Heyman and Ariely (2004), looking at Fiske's relational theory (1992), stated and proved that the relation between payment and effort depends on the type of exchange between the counterpart: in social-market relations, the amount of compensation is irrelevant and individuals work as hard as they can regardless of payment (Trivers, 1971; Batson et al., 1997; Cialdini, 1997); in money-market relationships, the individual's level of effort is directly influenced by the amount of compensation he received, and his aim becomes the maximization

his payoff (Clark and Mills, 1993; Rabin, 1993; Fehr and Falk, 2002).

Several experimental papers have explored the consequences of a shift from a social frame to a market frame, but the results are not so straightforward as the theory could suggest. On one hand, Goto et al. (2015) investigated the interplay between economic incentives and social norms in formulating rice planting contracts in Philippines: by comparing the effectiveness of fixed wages with that of individual or group piece rate, they found that under fixed wage, altruistic people with guilt-averse or non-envious preferences exerted more effort. However, the important role played by social preferences in the fixed wage treatment disappeared once the monetary incentives of the individual piece rate contract were introduced, and subjects' intrinsic motivation was crowded-out. Dessi and Rustichini (2015) compared two experiments in which the subjects were asked to solve an IQ quiz either in a "race against themselves" or as a work for an artificial employer, with different compensation schemes (fixed wage, low or high piece rate). Their results supported perfectly the theory proposed by Heyman and Ariely (2004): in the "race against themselves" treatment there were no significant differences in performance across treatments, while in the market-frame the piece rate had an highly significant positive effect on performance.

On the other hand, in Hossain and Li (2014)'s field experiment, the experimental subjects were given the possibility to spend voluntarily some time in entering data in a software, either as a favor to an employer (social frame) or as simple work (work frame), and with four possible wage rates (free, low, medium, high) for each line of additional data entry. They observed that, in the social frame, the rate of participation in the voluntary task dropped down from free to low wage rates, and then it increased significantly for medium and high wages; conversely, under the work frame, there were no differences between treatments. However, for what regards the number of lines written, there was not a framing effect and a positive wage rate significantly increased the data entered under both frames; therefore, crowding out occurred only when social preference was explicitly induced.

Moreover, there is an extensive stream of research showing that when people are intrinsically motivated, the introduction of external rewards leads to a decrease in productivity only for small incentives; on the contrary, when the incentives are large enough, the productivity increases (Frey and Götte, 1999; Gneezy and Rustichini, 2000; Gneezy, 2003; Pouliakas, 2010). This result is perfectly in line with Figure 1.1.

For example, Frey and Götte (1999) used a unique data set from Switzerland to explore the effects of financial rewards on the effort put into volunteer work; they found that, when volunteers received a small monetary reward, they worked less than non-paid volunteers; on the other hand, those volunteers who were given an higher remuneration, tended to work for more hours. Gneezy and Rustichini (2000) compared students' performance on a quiz under different compensation schemes: a fixed participation fee, a low piece rate and an high piece rate. The results revealed that the average performance was higher in the fixed fee treatment than in the low piece rate treatment, but the highest average performance was found with a higher piece rate. That is, when students were completing the task without being rewarded according to their performance, performing well was a sort of race against themselves, and therefore subjects were intrinsically motivated. When a piece rate was introduced, students' intrinsic motivation dropped, and their aim became the maximization of their payoff. Therefore, if the piece rate was large enough to compensate their effort in performing the quiz, their performance increased; if not, students did not find any reason to work hard and their performance decreased. The same authors (Gneezy and Rustichini, 2000) found similar results analyzing the efforts of teenage volunteers in collecting charitable donations: when they were given a small percentage of the charitable donations, they collected less money than those who volunteered for free; and those who received higher percentages performed as well as the volunteers who did not receive any payment. Few years later, Gneezy (2003) named this pattern as the *W effect* and corroborated the previously obtained results: using a proposer-responder game in which the responder had the possibility to punish or reward the proposer in different ways (depending on the treatment), he found that when proposers were allowed to dictate the allocation, they gave more money than in the treatments with either a small reward or a small fine. On the other hand, when the fine or the reward was large enough, proposers were more generous.

1.4 Identity

Several experiments in social psychology, and increasingly in economics, have shown that people's behavior is influenced by who individuals think they are (Sherif et al., 1954; Tajfel et al., 1971; McLeish and Oxoby, 2007; Chen and Li, 2009) and by which social category they think to belong to (Shih et al., 1999; Hoff and Pandey, 2006). Moreover, it has been well established that people tend to behave more fa-

vorably towards those who belong to their own group, and that group identity is somehow easy to manipulate (Tajfel et al., 1971; Götte et al., 2006; Chen and Li, 2009); finally, it is needless to underline the before mentioned connection between intrinsic motivation and need for relatedness, that is depicted as "a need for a sense of belongingness and connectedness to the persons, group, or culture disseminating a goal" (Ryan and Deci, 2000: 64) and can be easily linked to the idea of group identity. These findings are likely to suggest to incorporate *identity* into the economics of organization and work incentives, and to consider the change in identity as a way to motivate employees, complement (or substitute) to monetary incentives.

Some theoretical studies argued that workers' intrinsic motivation is strongly linked to the way in which they see themselves in relation to the firm (Akerlof and Kranton, 2000, 2005, 2008; Berdud and Cabasés, 2012; Polidori and Teobaldelli, 2017). Workers' identification with their positions, jobs, tasks, etc. is likely to lead to higher performance in the organization, due to the higher productivity of those motivated and identified workers (Berdud et al., 2016). According to Akerlof and Kranton (2000, 2005), identity can be an important supplement to monetary compensation, which as sole motivator is likely to be both costly and ineffective. They suggested that workers' utility function can change as people take on different possible identities, and they proposed an illustrative model of work incentives and organizations. Workers are classified into two social categories: the insiders (N), those who identify with the firm, and the outsiders (O), those who lack this identification. The overall utility of the worker can be written as

$$U(y, e; c) = \ln y - e + I_c - t_c |e^*(c) - e|$$

where U is the worker's utility, y is his income, e is his actual effort, c is his social category (outsider, insider), I_c is his identity utility from being in category c , and $t_c |e^*(c) - e|$ is the dis-utility from diverging from the ideal effort level for category c . According to this utility function, worker's decisions are influenced by his social category and her norms, and his utility decreases when the effort he exerts differs from the effort he thinks it is appropriate for his social category³: moreover, workers who belong to different categories should be remunerated with different wages in order to induce them to exert the same level of effort. For these reasons, a firm might be willing to invest to change a worker's identity from an outsider to an insider, in order

³In Akerlof and Kranton (2000; 2005)'s studies, *norms* refer to the way in which people think that they and others should behave, and they vary with their social category

to rely on identity-based incentives instead of (or complements to) extrinsic rewards.

Few years later, the authors extended their own model by examining the relation between work-group identity, incentives and supervisory policies (Akerlof and Kranton, 2008): workers could identify themselves as outsiders or members of a work-group, and a supervisor has the possibility to observe workers' actions either with strict or loose supervision. The authors showed a trade-off between these regimes: with strict supervision, the information about workers' efforts are surely more complete, but since workers are likely to suffer from being monitored (see subsection 1.3.2) they are less likely to identify with the firm and its goals. Consequently, the workers are led to consider the supervisor as part of management, to become outsiders and eventually to require higher pay to perform. On the other hand, under a loose supervision regime, less information about workers' effort are gathered, but workers are more likely to view the supervisor as part of the work-group, to identify themselves with the work-group, to be more motivated and consequentially to exert higher effort at the same pay level. The authors concluded that sometimes it could be more useful, for a firm, to choose a loose supervision regime, in order to induce workers to identify with the work-group.

The model proposed by Akerlof and Kranton (2005, 2008) was extended by Berdud and Cabasés (2012), who used a principal-agent game in which doctors (agents) are intrinsically motivated and can have different identities, and their intrinsic motivation and identity can be undermined or enhanced by the contract proposed by their health managers (principals).

Related to the concept of intrinsic motivation, the authors introduced the concept of *mission*, "as the way in which doctors would like to perform in their profession: they have preferences to be empathetic with patients, to do extra work when this is required for the wellness of patients, and so on "(Berdud and Cabasés, 2012: 7). The authors showed that, in presence of identity concerns and intrinsic motivation, the sole use of monetary incentive is likely to cause crowding out of doctors' intrinsic motivation and a loss in their identity: moreover, they argued that when a doctor develops a sense of identification in organization, he becomes more willing to work for lower monetary incentives. As a consequence, the authors suggested that it could be useful for organizations to invest in supporting doctors' mission, in order to encourage their identity, and crowd-in their intrinsic motivation.

Polidori and Teobaldelli (2017) applied the model presented by Akerlof and Kranton (2005) to the public sector, and they allowed agents to be intrinsically motivated

and to behave in conformity to their perceived social category and self-image. The agent's effort is private information and, depending on the monitoring technology, it may be detected by the principal. They proved that when agents are guided by intrinsic motivations, it might be optimal for the principal to choose a relatively inefficient monitoring technology and to reduce monetary incentives.

The above mentioned theoretical interaction between identity, intrinsic motivation and monitoring has been investigated also in a laboratory setting by one experimental paper (Riener and Wiederhold, 2016). They used a principal-agent game, in which each principal-agent couple could either be exposed to a team building activity, or not. After the activity, the agent was asked to exert an effort on behalf of the principal, and the principal was allowed to restrict the agent's effort choice by introducing a minimum effort. Finally, the agent performed a real-effort task and decided how to share his remuneration with the principal. They found that these two mechanisms (the team-building activity and the control device), taken *per se*, were able to increase agents' effort; nevertheless, when agents were exposed to the activity finalized to develop a team identity, they tended to respond more negatively to control devices. They concluded that the simultaneous introduction of control devices and team-building activities is not advisable. This result confirms the field evidence reported by Barkema (1995), who proposed a study in a series of Dutch firms and found that when managers are controlled by an in-house CEO, they decrease the number of working hours.

1.5 Goals

1.5.1 Goal achievement theory

It has been widely suggested that there is a link between the reason that lead a person to engage in an achievement activity and his intrinsic motivation in completing that activity (Ames, 1992; Heyman and Dweck, 1992; Elliot and Harackiewicz, 1996; Lee et al., 2003; Gómez-Miñambres, 2012; Corgnet et al., 2015). According to many early achievement goal theorists, two distinct forms of achievement goals are delineated (Dweck, 1986; Ames, 1984; Dweck and Leggett, 1988; Nicholls, 1989; Molden and Dweck, 2000): mastery goals (also called learning, intrinsic, or task goals) and performance goals (ego, extrinsic, or ability goals). Mastery goals are related to subjects' desire to achieve a sense of competence and mastery based on self-

referenced standard; mastery oriented people believe that they will obtain this sense of mastery by exerting a profound effort in performing the task. For this reason, mastery goals are said to encourage task involvement, support self-determination and finally generate intrinsic motivation in performing the task (Ames, 1992; Elliot and Harackiewicz, 1996; Locke and Latham, 2006). On the other hand, performance goals are linked to subjects' desire to prove their competence and to outperform others; therefore the completion of the task is not seen as enjoying or involving in itself, but only as functional to the achievement of success with respect to the others (Ames, 1992; Rawsthorne and Elliot, 1999; Barron and Harackiewicz, 2001; Molden and Dweck, 2000). As a consequence, performance goals are perceived as generating lower levels of intrinsic motivation (Ames and Archer, 1988; Deci and Ryan, 1990; Ryan et al., 1991).

In the early nineties, Elliot (1994) conducted a meta-analysis on the literature linking intrinsic motivation and achievement goal dichotomy, and he found that the binomials mastery goal–crowding in and performance goal–crowding out were shown in less than 50% of the studies: the reason was that the mastery/performance partition did not take into account that people with performance goals could desire either to demonstrate their competence or to avoid a demonstration of incompetence. In an attempt of discerning these two motives, Elliot and Harackiewicz (1996) proposed a trichotomous achievement goal model of mastery, performance-approach and performance-avoidance goals: performance approach–goals are related to the aim of obtaining favorable judgments of competence and outperforming others, while performance avoidance–goals are aimed at avoiding failure or negative judgments. The authors suggested that both performance-approach and mastery goals are related to attaining competence, and these approach orientations usually lead to processes that facilitate optimal task engagement and foster intrinsic motivation; on the other hand, the avoidance orientation seems to be linked to processes that are antithetical to the intrinsic motivation construct. In order to prove that, they ran two laboratory experiments about puzzle solving in which participants could have either a negative or positive outcome focus, and the target task was diagnostic of either failure or success. Their findings supported the hypothesis that only those situations framed to generate performance-avoidance goals lead to a crowding-out of intrinsic motivation.

Starting from this general background, the link between achievement goal theories and intrinsic motivation has been expanded in several ways. For example, Dweck and colleagues (Müller and Dweck, 1998; Molden and Dweck, 2000) analyzed how

people motivation is influenced by the *meaning* that they give to an achievement situation. They argued that when people perceive a task as measuring one fixed attribute of the self (such as fixed intelligence), they tend to reduce their level of intrinsic motivation after a failure; on the other hand, when people believe that succeeding in performing a task depends on their effort or on a current level of an acquirable ability, their intrinsic motivation is not influenced by their success or failure. The authors supported their hypothesis simply by praising some students with different feedbacks (either for their ability or for their intelligence) for two sequential tasks of increasing difficulty: they found clear decrease in performance and in intrinsic motivation in the second task (the most difficult) for those subjects who received intelligence feedback.

Another stream of research has investigated how different levels of goals, either general or task-specific, influence subjects' intrinsic motivation (Harackiewicz and Sansone, 1991; Harackiewicz and Elliot, 1998; Barron and Harackiewicz, 2000; Durik and Harackiewicz, 2003). The higher level goal, or purpose, represents the reason for engaging in a task or what subjects hope to achieve by performing the task; task specific goals, or targets, are more concrete and provide specific behavioral guidelines. According to the model proposed by Harackiewicz and Sansone (1991), intrinsic motivation is maximized when both the purpose and the target goals are oriented towards the same objective (either mastery or performance), and target goals make the obtainment of purpose goals easier (Harackiewicz and Elliot, 1998: 676). Moreover, they identified three processes through which purposes and targets could influence subjects' intrinsic motivation: perceived competence, that has already identified as a mediator of interest (Bandura and Schunk, 1981); competence valuation, that is people's evaluation about their performance in the activity; and task involvement, meaning the degree to which people become absorbed in the activity (Harackiewicz and Sansone, 1991; Harackiewicz and Elliot, 1998; Barron and Harackiewicz, 2000).

Our little excursus shows a multifaceted picture of the relation between intrinsic motivation and goal achievement. Indeed, people's intrinsic motivation results to be influenced not only by the reason that lead them to engage in a particular activity, could be either learning, outperforming others, or avoiding failure; but it is also affected by people's perception of the meaning of an achievement situation, and by the coherence of hierarchical goals. And the situation becomes even more tangled if we consider also the motivational power of goal setting.

1.5.2 Goal setting

According to the goal setting theory, hard and specific goals lead to a higher level of task performance than do easy or vague goals such as the exhortation to "do your best" (Locke and Latham, 1990, 2002, 2006; Locke, 1996): as long as a person is committed to the goal, has sufficient ability to attain it, and does not have conflicting goals, goal difficulty is positively linked to task performance (Locke and Latham, 2006).

Nevertheless, it is not straightforward to determine the effect of the introduction of a specific goal on people intrinsic motivation: goals are said to be motivational (Locke and Latham, 2002; 2006; 2013), but the motivation that these authors are referring to is different from intrinsic motivation as we have depicted it. Indeed, their concept of motivation can be related to the intrinsic task motivation *à la* Thomas and Velthouse (1990), in which the term *task* is referred to a set of activities directed toward a purpose, therefore it includes both activities *and* a purpose; on the other hand, the Deci and colleagues' model of intrinsic motivation (Deci, 1971; Deci and Ryan, 1985) refers only to activities, and therefore it is focused mainly on the interest in performing an activity. According to the goal setting theory, the introduction of a goal creates a psychological discrepancy between one's current position and one's desired position (that is, the attainment of the goal): it is indeed the existence of this discrepancy that motivates people to work hard to fill it (Schröder and Fishbach, 2015; Locke and Latham, 2006). Furthermore, goals provide workers with reference points for their utility and satisfaction, and for their performance (Heath et al., 1999; Locke and Latham, 2002; Koch and Nafziger, 2011; Goerg, 2015): with regards to this reference point, workers can measure their gains and losses, and their loss aversion motivates them to work hard to avoid falling short of the goal.

As we can see, what drives people's behavior is not the interest or enjoyment in the activity, but their desire to fill the above-mentioned psychological discrepancy or to avoid being dissatisfied: consequently, the task is not perceived as an end in itself but rather as a mean to an end.

There are four processes through which goal setting is said to influence people's motivation and performance (Locke and Latham, 2002; Latham, 2004): the first two mechanisms are related to the power of goals to direct people's actions towards goal-related activities, and to increase people's effort in an attempt to reach the targets. As we have already mentioned, the idea of behaving with the aim of reaching a target, and focusing only on the activities finalized at its obtainment, is different

from the concept of intrinsic motivation.

Third, goals lead people to be more persistent in performing the activity, and it can be easily related to their desire of avoiding the dissatisfaction generated by a failure in reaching the goal. It is worthwhile to underline the difference between this kind of persistence, and the persistence of those people who are intrinsically motivated in performing the task: indeed, in the last case people keep on completing the task simply for the sake of performing it. The final mechanism refers to how goals motivate people to use their existing ability, or to search for new knowledge, in order to attain them. This process can effectively increase subjects' intrinsic motivation by increasing their perceived competence: both Csikszentmihalyi (1975) and Deci (1975) suggested that intrinsically motivated behavior requires optimal challenge, because people who are able to succeed in challenging tasks feel an higher sense of competence (Deci and Ryan, 2000). As a consequence, the introduction of a goal that makes the task more challenging and lead people to get hold of their abilities, or even search for new ones, is likely to increase their perceived competence and intrinsic motivation (Abuhamdeh and Csikszentmihalyi, 2012).

To summarize, let us draw some final considerations about the interaction between goal setting and intrinsic motivation. Despite our perplexity about a direct connection between goal setting and intrinsic motivation in the activity (perplexity determined by the above exposed analysis of the mechanisms that are said to link goal setting to intrinsic motivation), several papers have proved that goals are differently motivational by creating a gap between the present situation and a situation the subject aspires to achieve (Locke and Latham, 2002; 2006; Schröder and Fishbach, 2015); the motivational power of goals has been captured even for initially boring activity (Bryan and Locke, 1967; Mossholder, 1980), and even when they are not related to monetary incentives (Goerg and Kube, 2012; Corgnet et al., 2015; Goerg, 2015). Finally, the introduction of goals can effectively increase subjects' intrinsic motivation at least by inducing them to use their abilities and to search for new ones to reach the goals.

1.6 Concluding remarks

In the last decades, psychologists' and economists' interest has grown on intrinsic motivation as a potential driver of people's performance, and the relation between intrinsic motivation and several positive outcomes has been repeatedly pointed out

(Gagnè and Deci, 2005; Ryan and Deci, 2008; Gagnè et al., 2010; Van de Broeck et al., 2013; Cerasoli et al., 2014; Kuvaas et al., 2017). However, most human activities are not solely driven by the interest/enjoyment in the activity itself, but they are rather moved also by other motivational forces. For example, let us consider a salesperson whose main activity is to sell cars: he probably derives some enjoyment or pleasure from the selling process itself, but for sure this is not his only motivation. He is likely to receive a compensation, to be exposed to some form of control, to be influenced by the work climate and culture, to develop some social relations with his supervisor and his colleagues, to identify himself (totally, partially or not at all) in his job or firm, to behave according to his personal goals and to externally set goals.

The aim of this survey was indeed to review the possible effects deriving from the interaction between intrinsic motivation and other sources of motivation, both external (such as external interventions, social context, and externally set goals) and internal (such as subjects' identity and personal goals).

We illustrated the complex relation between external interventions and intrinsic motivation, both from a psychological and from an economic point of view, by highlighting the marked differences in approaches and methodologies. Psychological studies have been mainly focused on what happens to subjects' intrinsic motivation when they are paid to complete interesting tasks, and then the reward is removed: by referring mainly to self-determination theory, rewards are assumed to crowd-out intrinsic motivation as long as they are perceived as controlling and not satisfying the human needs for competence, autonomy and relatedness. On the other hand, economic studies have explored the crowding-out effect as a change in performance during the intervention provision, totally neglecting the initial interest in the task and leaving aside the psychological forces that lead to this effect. Especially in the last decade, some papers have attempted to fill the distance between these two strands of literature, and they have explored the relation between external regulation, the satisfaction of the basic needs, and performance in the workplace: moreover, they have proposed some management practices that are likely to fulfill the psychological needs.

Then we interpreted the interaction between subjects' intrinsic motivation and external interventions in light of their social context. Several studies have suggested that external interventions are likely to undermine not only subjects' intrinsic motivation, but also their reputational concerns; other papers have proved the crowding-

out effects of controlling and monitoring devices, especially when the introduction of these mechanisms is perceived as a signal of distrust. Moreover, the introduction of external rewards has been proved to shift subjects' decision frame from a social frame to a monetary one: indeed, when people behave in a social frame, they do their best regardless of their compensation, while when they think to be in a monetary frame, the effort is strictly linked to the compensation received.

Thirdly, we describe the effects of the incorporation of subjects' identity among the motivational forces of their behavior: we proposed some studies pointing out that intrinsic motivation and identity can be powerful drivers of people's performance, and that both of them can be either undermined or enhanced by external interventions.

Finally, we explored how the presence of goals, either personal or externally specified, can affect intrinsic motivation. For what concerns the reason that lead a person to engage in an activity, it has been suggested that when the activity is performed with a mastery goal or a performance-approach goal, the subject is likely to become more engaged in the task and more intrinsically motivated; moreover, intrinsic motivation is maximized when both the task-specific goal and the general purpose for performing a task are aligned towards the same objective. On the other hand, also externally set goals are said to be motivational, but we argued that in this context is somehow difficult to relate this driver to an increase of intrinsic motivation: indeed, a task with an externally set goal is likely to be no more perceived as an end in itself, but rather as a means to fill the psychological discrepancy between the subject's current position and the subject's desired position (the attainment of the goal).

To conclude, the interaction between intrinsic motivation and the other forces that drive people's behavior results to be multifaceted and not easy to delineate, mainly because several psychological components are at stake and need to be considered simultaneously. This paper offers an overview of some motivational forces and their interplay, and provides some suggestion on how to relate to intrinsically motivated people in order to preserve and even increase their motivation. Despite this review is far from being comprehensive, hopefully it will help in shedding some light on this still nebulous topic.

CHAPTER 2

WAGE DELEGATION AND INTRINSIC MOTIVATION: AN EXPERIMENTAL STUDY

with Marco Faillo

The aim of this study is to investigate experimentally whether and to what extent subjects' intrinsic motivation and performance change when they are allowed to self-set their own wage for performing a task; moreover, it investigates how differently motivated subjects react to the possibility of determining their own wage. We propose a novel experimental design, in which the subjects are asked to perform a complex real-effort task under two different conditions: wages can be either chosen by the subjects themselves, or randomly determined. With this setting, we are able to disentangle intrinsic motivation from the reciprocity concerns that are likely to characterize the standard principal-agent interaction. Our main result is that subjects increase their performance more when they are delegated the wage choice than when they receive a random payment; moreover, subjects who are both highly motivated *and* delegated their wage choice are those who perform better.

Keywords: Compensation, Incentives, Delegation, Motivation, Experiment.

JEL Classification: C91; J33; M52; M54

2.1 Introduction

In most labor relations, employees performance can be neither perfectly observed nor perfectly enforced; consequently, according to standard economic theory, employees should exert the minimum effort and there is no reason for employers to offer an above-minimum wage. Nevertheless, the quality of work has been theorized to be positively influenced by an above-minimum wage in different ways (by reducing shirking, Shapiro and Stiglitz, 1984; by improving workers effort, Akerlof, 1982; by reducing workers' turnover, Salop, 1979; and so on); moreover, several experimental papers have shown a positive relation between the wage offered and the effort exerted (Fehr et al., 1993; Charness, 2004; Fehr et al., 2007; Falk et al., 2008; Fehr et al., 2009; Charness et al., 2012), suggesting the importance of reciprocity in employment relations. But increasing workers' wages does not always ensure higher performance: an ever-growing number of experimental studies has found that sometimes monetary incentives and control devices can be detrimental for employees' performance, especially for those workers who are *intrinsically motivated* (Deci, 1971; Deci et al., 1999; Fehr and Falk, 2002; Falk and Kosfeld, 2006; Gneezy et al., 2011; Dessi and Rustichini, 2015).

This issue raises the need to find an approach that could be complementary to monetary compensation and that is likely to motivate employees to exert the desired effort. A possible solution to this problem can be found by taking cue from some HR practices effectively adopted in the real business management; indeed, in the last few decades many companies have enhanced the discretionary power of their employees in an attempt to increase their sense of responsibility, satisfaction, motivation, and consequently, productivity. For instance, the Brazilian manufacturing company Semco is considered an example of workplace democracy: its employees work in self-managed teams that are responsible for scheduling, setting their own goals, and controlling the quality of their products. Some of them are allowed to set their own wages and to choose a preferred payment structure among several options, including the possibility to link their compensation to the achievement of self-set annual goals (Semler, 1993, 1994, 2003). A growing number of firms have started to implement empowerment policies and to increase the responsibility of their employees to the point of letting them decide their own wages; these firms notably include Skyline Construction and Virgin. Companies using wage delegation claim

that this policy is highly successful in terms of employee and customer satisfaction, and company revenues.

Based on this promising anecdotal evidence, a stream of experimental literature has developed on the effect of wage delegation on employees' effort (Charness, 2000, 2004; Charness et al., 2012; Franke et al., 2016; Mellizo et al., 2014; Charness et al., 2015; Jeworrek and Mertins, 2015). By investigating this effect in a laboratory or in a controlled field setting, these studies have disentangled the wage delegation effect from the effects of other policies usually implemented in those companies with self-determined wages (e.g., more discretion about work-time or organization in self-managed teams) (Jeworrek and Mertins, 2015). Moreover, several interpretations have been proposed of the causal connection that links participation in wage choice and performance, and they refer mainly to (positive or negative) reciprocity (Charness, 2004; Corgnet and González, 2014; Franke et al., 2016), or to the responsibility alleviation effect (Charness et al., 2012). Only one experimental paper has interpreted the causal link between wage delegation and performance by referring to intrinsic motivation, and it proposes a positive effect of wage delegation on intrinsic motivation (Mellizo et al., 2014); they suggest that to the extent that workers' voice satisfies their basic psychological needs for autonomy, competence and relatedness, they are intrinsically motivated to produce more (Deci and Ryan, 1985; 2000a; 2000b)

The aim of our paper is to explore experimentally whether and to what extent the wage delegation affects the intrinsic motivation and the performance of the delegated employees; moreover, it investigates whether subjects with different levels of intrinsic motivation react differently to wage delegation. In order to pursue these aims we propose a novel design with a real-effort task: the subjects are asked to write down as many words as possible that have to be related to one of these categories: movies, flora and fauna, forenames, and food and beverage. We opt for such a complex task in the hope that the participants will perceive it as interesting or even enjoyable. Indeed, several studies have shown that the initial interest in the task is a needed requirement to generate intrinsic motivation (Deci et al., 1999; Fehr and Falk, 2002; Bénabou and Tirole, 2003); moreover, they have suggested that the effects of external interventions on intrinsic motivation (either undermining or enhancing) occur only with activities of initial interest to participants (Calder and Staw, 1975; Deci et al., 1999; Weibel et al., 2007; Dessi and Rustichini, 2015; Festrè and Garrouste, 2015).

Each session of our experiment is divided into two phases: in the first one the payment is fixed, while the payment for the second one depends on the treatment. In the control treatment the subjects are given a randomly determined wage, while in the delegation treatment the subjects are delegated the choice of their own wage level.¹ Between phase 1 and phase 2, we introduce a free-choice period, that is a non-paid period in which subjects have the possibility to keep on performing the task, play tetris, or simply wait for the beginning of phase 2; the number of words written during this free-choice period represents our first measure of intrinsic motivation (the behavioral measure). Our second measure of intrinsic motivation (the self-reported measure) is derived from the questionnaire we give to the subjects at the end of the experiment; this questionnaire's items are aimed at reporting the subjects' interest/enjoyment in the task and their perceived competence.

The combination of free-choice behavior and self-reported interest is one of the most adopted solution to the well-known problem of how to measure intrinsic motivation (Deci, 1971; Ryan et al., 1991; Deci et al., 1999), although neither of these measurement tools is fully convincing (Fehr and Falk, 2002). For example, free-choice behavior can be influenced by factors which differ completely from intrinsic motivation concerns, such as loss aversion, negative reciprocity or signaling concerns (see section 1.1.2); on the other hand, the self-reported measures of interest are obtrusive and can be influenced by the subjects' attempt to avoid cognitive dissonance²: meaning that, individuals' assessments of interest can be linked to how they performed the task and not to the real enjoyment or interest. Through our experimental design, we are able to disentangle the effects of a change in intrinsic motivation from those arisen from loss aversion, negative reciprocity, or signaling concerns; unfortunately, we can not solve the problems related to the self-reported measure, but we reduce their salience by using a combination of the two measures.

Our first preliminary result support the previous studies on wage delegation and shows that when subjects are delegated the wage choice, they increase more their performance. Moreover, we find that subjects who are both delegated their wage choice *and* highly motivated are those who perform better: this novel result suggests that, in order to improve a strategy finalized at increasing subjects' autonomy, it

¹In the control treatment we randomly allocate the subjects to receive the same set of wages which the subjects in the delegation treatment have self-chosen.

²According to the cognitive dissonance theory (Festinger, 1957), an individual who experiences cognitive dissonance (that is, the mental stress or discomfort experienced in performing an action that is contradictory to one or more beliefs, ideas or values) is motivated to try to reduce it.

should be useful to generate a climate that is likely to support their intrinsic motivation. Finally, and in line with the literature on the the interaction between intrinsic motivation and external rewards, we find a negative correlation between motivation and asked wage.

Our study contributes to the existing literature on wage delegation and intrinsic motivation in at least two ways. First of all, we are unaware of any other work that investigates directly the relation between wage delegation, intrinsic motivation, and performance; only Mellizo et al. (2014) hypothesized that workers feel more intrinsically motivated when they have the right to vote for their own wage, but they did not explored the consequential link between these three variables. Secondly, we attempted to exclude the possibility that the effect of wage delegation on performance could be mediated by positive reciprocity; that is, that agents could reciprocate to the kind and trusting behavior of principals (that allow them to self-set their own wage) by exerting higher effort. In order to pursue this aim, we decided not to implement a principal-agent setting as it has been proposed in most studies on wage delegation (Charness et al., 2012; Charness et al., 2013; Corgnet and Gonzalez, 2014; Jeworrek and Mertins, 2015), but to let the subjects play individually by excluding the principal from the setting.³

The reminder of the paper is structured as follows: Section 2.2 examines the related literature on delegation and intrinsic motivation; Section 2.3 describes our experimental design; Section 2.4 illustrates our results and Section 2.5 concludes. The instructions of the experiment and the final questionnaire from which we derive the self-reported measure of intrinsic motivation are presented in Appendix A and B.

2.2 Related literature and hypotheses

2.2.1 Delegation

The economic studies that explore theoretically the effects of delegating authority to employees have focused mainly on the following trade-off (Dougcouliagos,

³We are aware that, despite the individual nature of the task, reciprocity cannot be completely ruled out because of the interactions between subjects and the experimenter; however, with respect to the aboove mentioned studies, we attempted to reduce the possible impact of reciprocity by relaxing the link between principal and agents..

1995; Beckmann et al., 2015): on the one hand, the increased employees participation helps align employers' and employees' interests (Milgrom and Roberts, 1995); it offers a way to employ workers' knowledge in order to improve productivity and production (Brickley et al., 1997; Aghion et al., 2014); and it encourages workers' motivation (Bowles and Gintis, 1993; Aghion and Tirole, 1997; Deci and Ryan, 2000) and reciprocity (Homans, 1958; Blau, 1964) leading to higher effort. On the other hand, it may lead to inefficient and costly management (Kremer, 1997), to a waste of talent and resources (Williamson, 1980), and to free-rider problems (Alchian and Demsetz, 1972).

The empirical data on workplace surveys, reports, and on uncontrolled field data, have suggested a positive relation between workers' participation in the decision-making process and their performance, but there is insufficient and inadequate data to estimate the strength and the determinants of this causal effect (Harrison, 2004; Bryson et al., 2006; Golden, 2012; Goudswaard et al., 2012; De Varo and Prasad, 2013).

Because of this promising anecdotal evidence, in the last decade several experimental studies have investigated how an increase in workers' participation can affect their performance, and have attempted to understand the causal link between participation and performance. On the one hand, the experimental settings in which workers do not have total autonomy in deciding their own wages lead to controversial results: indeed, some evidence shows that workers increase their effort when they are consulted and listened (Corgnet and González, 2014), while other suggests that workers performance is not always influenced by the identity of the proposer of the employment contract (Charness et al., 2013), or is even lower for workers who have the right to participate in the wage choice (Franke et al., 2016).

On the other hand, a growing stream of experimental literature has shown that employees' performance tends to increase when they are totally delegated the choice of their own wage or payment structure. Charness et al. (2012) provided clear evidence that when employers delegated the wage choice to the employees, employees were more willing to exert high effort both with one shot and with repeated interactions. In Mellizo et al. (2014) setting, workers were assigned to groups of three to solve some mathematical problems, and when they had the opportunity to vote for the preferred compensation scheme their performance increased significantly. Finally, Jeworrek and Mertins (2015) conducted a natural field experiment by hiring employees for a half-day data entry job: they observed not only the well-studied

link between wage delegation and performance, but they also noticed higher performance for those workers who did not have the decision right but knew that some co-workers did.

2.2.2 Intrinsic motivation

An agent is said to be intrinsically motivated when "her primary focus is on rewards inherent in engagement with the activity, like novelty of the task, entertainment value, satisfaction of curiosity, and opportunities for the experience of effectance and the attainment of mastery" (Gilbert et al., 1998: 566). On the other hand, when a person has an extrinsic motivation orientation, the primary focus is on rewards that are mediated by, but not part of the target activity: the activity is seen as a "means to an end" (Kruglanski, 1975).

In the early 1970s, several studies began to investigate the effects of the interaction between intrinsic and extrinsic motivation. The pioneering experiment presented by Deci (1971) was the first to prove the existence of the so-called *crowding out effect*: that is, by measuring intrinsic motivation as the amount of time during a free choice situation which subjects spent working on a task, Deci's experiment showed that the introduction of extrinsic rewards undermined intrinsic motivation. Following this influential paper, an extensive body of research has replicated and expanded Deci (1971)'s results by investigating in which conditions the crowding-out effect did arise and affect performance. The meta-analysis conducted by Deci et al. (1999) well-summarized the evidence collected from more than 100 empirical studies, showing that most tangible rewards significantly undermined the behavioral measure of intrinsic motivation, except for performance-contingent reward and tangible rewards connected to uninteresting activities.

One of the main theoretical arguments provided to explain crowding out effect is based on the self-determination theory (SDT) (Deci and Ryan, 1985; Ryan and Deci, 2000; Vansteenkiste et al., 2008; Gagnè and Forest, 2011; Bowles and Polania-Reyes, 2013; Festrè and Garrouste, 2015). This theory analyzes how environment and social context affect the human innate psychological needs (Vansteenkiste et al., 2008: 196): the need for competence, the need for relatedness, and the need for autonomy. The specific focus of SDT is on the conditions that diminish or enhance intrinsic motivation. For example, external interventions are assumed to have a double meaning and their effects on intrinsic motivation depend on which aspect

people perceive as more salient: to the extent that the controlling aspect is prevalent, external interventions will undermine intrinsic motivation; otherwise, to the extent that the informational or supportive aspect is preponderant, SDT predicts that external interventions will maintain or enhance intrinsic motivation. Indeed, several studies have proved the enhancing effects of choice and the opportunity for self-direction (Swann and Pittman, 1977; Zuckerman et al., 1978), acknowledgment of feelings (Deci and Ryan, 1985), positive feedback (Deci, 1975), base pay level (Kuvaas, 2006), and the presence of indirectly performance-salient incentives (Cerasoli et al., 2014), as they allow people a greater sense of autonomy and/or perceived competence (Ryan and Deci, 2000a, 2000b)(for a more comprehensive review, see section 1.1.2).

2.2.3 Research Hypotheses

Our first hypothesis is strictly linked to the recent experimental literature on wage delegation, suggesting that when subjects are allowed to decide their own wage, they tend to perform better (Charness et al., 2012; Mellizo et al., 2014; Jeworrek and Mertins, 2015).

H1: When subjects are delegated their wage choice, they exert higher effort.

For what concerns the interaction between intrinsic motivation and performance, several experimental studies have shown that highly motivated subjects tend to perform better, both in terms of quality and quantity (Callahan et al., 2003; Vansteenkiste et al., 2004; Kuvaas, 2006; Kuvaas et al., 2016; for a review, see Cerasoli et al., 2014). Moreover, Cerasoli et al. (2014) suggested that the effects of intrinsic motivation on performance are mediated by those incentives that are indirectly salient with respect to the performance: therefore we hypothesize that the highest effort is exerted by those subjects who are highly motivated *and* have the possibility to choose their wage.

H2a: Subjects with higher intrinsic motivation tend to perform better than poorly motivated subjects.

H2b: Those subjects who are highly motivated *and* delegated their wage choice are those who exert the highest effort.

Finally, we hypothesize that the delegation of the wage choice can be perceived as a supportive intervention and therefore it can enhance subjects' intrinsic motiva-

tion. Indeed, when people receive the opportunity to self-set their own wage, both their need for competence and their need for autonomy should be satisfied: according to the self-determination theory, the satisfaction of these needs should crowd-in intrinsic motivation (Deci and Ryan, 1985; Ryan and Deci, 2000).

H3: When people are delegated their wage choice, their intrinsic motivation increases.

2.3 Experimental design and procedure

2.3.1 Treatments

In order to test our hypotheses, we ran a laboratory experiment with two treatments: the Delegation treatment and the Control treatment. In both of them, subjects are asked to write down as many words as possible that have to begin with a given letter (that changes every three minutes) and have to be related to one of these categories: movies, flora and fauna, forenames, and food and beverage. The experiment is completely computerized and participants' performance is measured as the number of words written in the right category. At the end of the experiment, they are asked to respond to a questionnaire in order to self-set their perceived competence in completing the task, and their intrinsic motivation/interest to perform it. This questionnaire is derived from the Intrinsic Motivation Inventory (IMI), that has been proposed by several other authors (Ryan, 1982; Ryan et al., 1991; Deci et al., 1994). We use only eleven items from this 45-items inventory, 7 items from the interest/enjoyment sub-scale and 4 from the perceived competence scale;⁴ the subjects are asked to answer to each item through a 7-points Likert scale, going from "I strongly disagree"(1) to "I strongly agree"(7). The answers to the interest/enjoyment sub-scale allow us to calculate the self-reported measure of intrinsic motivation, while the answers to the perceived competence sub-scale allow us to calculate the subjects' perceived competence, which is theorized to be positively

⁴The main reason we decide to use only eleven items from the inventory is to avoid redundancy, due to the fact that the list of items is long and several items of the inventory are rather similar. Moreover, by looking at the previous studies on intrinsic motivation, it becomes clear that the authors used different items and sub-scales of the IMI inventory, depending on the experimental framework and on the tasks (Ryan et al., 1983; McAuley et al., 1989; Ryan and Connel, 1989; Monteiro et al., 2015). It suggests that it is a rather common practice to adjust the inventory according to the experimental needs.

related to both the self-reported measure and the behavioral measure of intrinsic motivation. The self-reported measure of intrinsic motivation represents our ex-post measure of motivation. After the completion of this questionnaire, the subjects are asked to respond to few socio-demographic questions, and then they are paid in a separate room.

Delegation treatment

It is composed by two phases and both phases last for 15 minutes. Before the beginning of the first phase, subjects are told that for the first phase they will receive a fixed wage of 20 tokens (1 token = 0.25 euro), while for the second phase they will be delegated the choice of their own wage by deciding which wage they want to receive for the second phase into a range between 0 and 30 tokens. Then the first phase begins, and each participant has to write down words for 15 minutes without any interruption. After the first phase, a free-choice period is introduced in which participants are told that for six minutes they can do whatever they want: they can keep on inserting words, play tetris, use their cellphones, or simply wait for the beginning of the next phase. Participants also know that for the free-choice period they will not receive any compensation. The number of words written during this free-choice period represents the ex-ante (behavioral) measure of intrinsic motivation; we refer to the free-choice behavior as an ex-ante measure because it is collected before the introduction of the effective treatment. At the end of the free-choice period, subjects are asked to type the wage they want to receive for the second phase; after that, the second phase starts and its structure is identical to the first one. After the end of the second phase, the subjects are given the questionnaire and then paid.

Control Treatment:

The only difference between the Delegation Treatment and the Control Treatment is that, in the last one, participants do not have the possibility to self-set their own wage at the beginning of phase two; instead, their wages are randomly determined from the wage distribution generated by those subjects who are delegated the choice of their wage in the Delegation Treatment. Therefore, they are told about their second phase wage only before the beginning of the second phase.

2.3.2 Procedure

The experiment was run at the University of Trento with 156 voluntary participants: eighty subjects participated in the four sessions of the Control treatment, and seventy-six in the four sessions of the Delegation treatment. We exclude 1 observation from the Control treatment and 3 from the Delegation treatment for lack of available data, therefore we used 152 observations. All participants were undergraduate students, most of them were male (58%), they were on average about 22 years old, about half of them were enrolled in an economics major (54%), and on average they have already participated to almost 8 experiment. No subject participated in more than one treatment or session. All the experimental subjects received a show up fee of 3 euro, and they earned on average 15.24 euro (including the show up fee). Each session lasted about 1 hour/1 hour and 30 minutes.

All sessions were computerized and conducted in the CEEL (Cognitive and Experimental Economics Laboratory), using the Delphi software⁵. At the beginning of each session, participants were asked to seat randomly in the lab and the instructions were read aloud by one experimenter: they were asked to play individually and no participant was allowed to observe other players' outcome. Participants played for 10 rounds (plus two rounds during the free-choice period) in 6 sessions and for 12 rounds (plus two) in 2 sessions, one with the Control treatment and one with the Delegation treatment. In these last two sessions we introduced a preliminary phase before the beginning of the real experiment in order to let the subjects familiarize with the task, but the results were not significantly different from those of the other sessions; therefore, we pooled all the results together.

2.4 Results

2.4.1 Provided effort

Table 2.1 summarizes the number of words written during each round across the different phases of our experiment, the average wage received in phase 1 and the average wage chosen (in Delegation treatment, from now on DT) or received (in Control treatment, from now on CT) for phase 2: in the first column we pooled the data of both treatments, in the second column we consider only the data from the CT and in the third column we consider only the data from the DT.

⁵We warmly thank Marco Tecilla for developing the software we used for the experiment.

Table 2.1: Summary of effort (n° of words per round) and wage by treatment

	Overall		Control		Delegation	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
N° of words in phase 1	12.63	(3.63)	13.19	(3.48)	12.03	(3.73)
N° of words in free-choice period	7.24	(5.78)	7.1	(5.44)	7.41	(6.17)
N° of words in phase 2	13.38	(4.35)	13.5	(4.34)	13.25	(4.40)
Wage 1	20	(0)	20	(0)	20	(0)
Wage 2	28.98	(2.76)	28.99	(2.74)	28.97	(2.80)

Standard deviations are in parentheses.

The first result that we can observe is in line with the previous literature on the gift-exchange game: when subjects are given higher wages, they exert higher effort. Indeed, the first column of Table 2.1 shows how overall participants earn significantly higher wages in phase 2 with respect to phase 1 ($p < 0.01$, two-tailed Wilcoxon-Mann-Whitney test) and exert higher effort ($p < 0.01$, two-tailed Wilcoxon-Mann-Whitney test). It appears clearly that the main driver of this result is participants' behavior in DT: when subjects are delegated their wage choice, the increase in performance between phase 1 and phase 2 (measured as the difference in number of words written in phase 1 and in phase 2) is much higher than when they are given a random wage ($p < 0.01$ in DT, one-tailed Wilcoxon-Mann-Whitney test; $p = 0.38$ in CT). It is worthwhile to recall that in phase 1 subjects are paid independently from their performance in both treatments, thus we can consider the effort they exert in phase 1 as a proxy for their ability in the task; for that reason we are not interested in the absolute measure of effort exerted in phase 2, but rather on the change in performance between phase 1 and phase 2 as the effect of the introduction of our treatment.

Result 1: *People increase more their effort when they are delegated their wage choice than when they are assigned a random wage.*

Moreover, by comparing the increase in performance between phase 1 and phase 2 in CT and DT *controlling for the ex-ante motivation*, it appears that participants' performance is significantly higher in DT than in CT independently from their intrinsic motivation ($p = 0.03$, two-tailed Wilcoxon-Mann-Whitney test); meaning that, subjects with the same ex-ante intrinsic motivation tend to increase more their effort when they are given the possibility to self-set their own wage.

Table 2.2: OLS regression on effort exerted in phase 2

	(1)	(2)	(3)
<i>Treatment</i>	4.137 ⁺ (2.482)	3.255 (2.388)	12.344 (8.551)
<i>Phase 1</i>	0.899*** (0.073)	0.803*** (0.074)	0.928*** (0.103)
<i>Wage</i>	-0.014 (0.456)	0.071 (0.437)	0.079 (0.432)
<i>Free-choice</i>	-	0.412*** (0.110)	0.154 (0.165)
<i>Phase1 x treat</i>	-	-	-0.249 ⁺ (0.141)
<i>Free x treat</i>	-	-	0.468* (0.222)
<i>Observations</i>	152	152	152
<i>Adjusted R²</i>	0.542	0.580	0.590

⁺ p<0.1, *p<0.05, ** p<0.01, ***p<0.001. Standard errors are in parentheses.

Our dependent variable is the number of words written in phase 2. The independent variables are a dummy variable which is equal to 1 in DT (*Treatment*) the number of words written during phase 1 (*Phase 1*), and the wage asked/received (*Wage*). In Column 2 we introduce the number of words during the free choice period (*Free-choice*); in Column 3 are added the interaction between treatment and n° of words written in phase 1 (*Phase 1 x treat*), and between treatment and n° of words written during free-choice period (*Free x treat*). Our control variables are gender, age, course of study, income and number of past experiments.

Result 2: *People with the same intrinsic motivation tend to increase more their effort when they are delegated their wage choice.*

In order to gain some insight into the determinants of subjects' performance, we run ordinary least squares (OLS) regressions on the effort exerted in phase 2. Column (1) of Table 2.2 presents the results of an OLS regression on the effort exerted in phase 2 in both treatments, where the explanatory variables are a dummy variable which is equal to 1 in DT (*Treatment*), the number of words written during the first phase (*Phase 1*), and the wage asked or received (*Wage*). We control also for subjects heterogeneity: our control variables are gender, age, income, education (a dummy equal to 1 when subjects attend courses of economics or management) and number of past experiments. In Column (2) we control also for the number of words written during the free-choice period (*Free-choice*), that we consider as a measure of subjects' ex-ante motivation. Column (3) adds the interactions between treatment

and subjects' ability (*Phase 1 x treat*) and between subjects' ex-ante motivation and treatment (*Free x treat*). From the observation of this Table, we can derive mainly two conclusions: on the one hand, it becomes clear that the effort exerted in phase 2 is strongly influenced by subjects' ability in both treatments, although in DT the effect of subjects' ability in determining their effort is significantly lower. On the other hand, we can notice that neither our treatment nor subjects' intrinsic motivation is able to influence subjects' effort *per se*, but when we consider the interaction between these two variables, the effect on subjects' effort is positive and significant. It means that only when subjects are both delegated their wage choice *and* intrinsically motivated, they will increase their performance.

Result 3: *People who are both delegated their wage choice and highly motivated are those who perform better.*

2.4.2 Wage

For what concerns subjects' wages, we have to look again at Table 2.1: for construction, each subject in DT has the possibility to decide his own wage for phase 2 and the wages' distribution in CT is the same of DT. Therefore, Wage 2 has almost the same mean and standard deviation in DT and CT⁶.

First of all, it should be not underestimated the result that not all the participants in DT chose the highest possible wage : 17 subjects over 73 (almost 18%) asked for a wage which is lower than 30. Even more interestingly, the decision of asking a lower wage is not correlated with a low ability in the task; instead, we find a negative correlation between the asked wage and subjects' ex-ante motivation (Spearman's $\rho = -0.18$, $p = 0.06$). Although this results is driven by few participants' behavior, it suggests that more motivated subjects tend to ask for lower wages while less intrinsically-motivated subjects ask for a wage premium to perform more, and it seems to be in line with all the literature regarding intrinsic motivation: this evidence represents an intriguing spark, but more observations need to be collected to make it more reliable.

Finally, we compare the increase in performance between phase 1 and phase 2 *controlling for the wage* in DT and in CT; we found that it is much higher when

⁶The slight differences are due to the fact that we exclude some observations from DT and CT for lack of available data

Table 2.3: Correlation between measures of intrinsic motivation

	Free-choice ratio	Intrinsic motivation	Competence
Free-choice ratio	1	–	–
Intrinsic motivation	0.29 (0.000)	1	–
Competence	0.19 (0.008)	0.47 (0.000)	1

Standard deviations are in parentheses.

subjects have the possibility to self-set their wage ($p = 0.02$, two-tailed Wilcoxon-Mann-Whitney test) ⁷. It means that, regardless of the wage received, subjects perform better when they are given the possibility to choose it; this result seems to suggest that one powerful driver of performance could be not the wage itself, but rather the possibility to determine it.

Result 4: *Regardless of the wage received, subjects perform better when they have the possibility to determine it.*

2.4.3 Intrinsic motivation

As above mentioned, we use another measure of intrinsic motivation that is calculated starting from a questionnaire proposed at the end of the experiment, the Intrinsic Motivation Inventory (IMI): from the analysis of this questionnaire, we were able to calculate both the self-reported measure of intrinsic motivation, and the subjects' perceived competence.

First of all, it is important to verify whether the two measures of intrinsic motivation (the effort during the free-choice period and the self-reported measure) are correlated: Table 2.3 shows that the correlation is positive and significant ($\rho=0.29$ and $p= 0.000$, Spearman correlation test), therefore we find some support to our choice of using these two measures together. Our results also support the theorized relation between perceived competence and free-choice behavior ($\rho=0.19$, $p=0.0008$), and between perceived competence and self-reported intrinsic motivation ($\rho=0.47$,

⁷That is, we compare the ratio between the difference in effort between phase 1 and phase 2 and the wage, and we found that in DT is much higher (mean 0.20, SD = 0.5) than in CT (mean 0.05, SD = 0.48)

Table 2.4: Self-reported measures of intrinsic motivation by treatment

	Overall		Control		Delegation	
	Mean	(SD)	Mean	(SD)	Mean	(SD)
Intrinsic motivation	4.35	(1.46)	4.29	(1.55)	4.41	(1.35)
Competence	3.1	(1.11)	3.02	(1)	3.18	(1.22)

Standard deviations are in parentheses.

Table 2.5: OLS regression on self-reported measure of intrinsic motivation

	DT	CT
<i>Phase 1</i>	0.008 (0.009)	0.022* (0.011)
<i>Free-choice</i>	0.025 ⁺ (0.014)	0.036* (0.017)
<i>Wage</i>	-0.123 ⁺ (0.065)	-0.053 (0.061)
<i>Observations</i>	73	79
<i>Adjusted R²</i>	0.110	0.175

⁺ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Standard errors are in parentheses.

Our dependent variable is the the self-reported measure of intrinsic motivation. The independent variables are the number of words written during phase 1 (*Phase 1*), during the free choice period (*Free-choice*), and the wage asked/received (*Wage*). Our control variables are gender, age, course of study, income and number of past experiments.

$p=0.000$). Moreover, we found that perceived competence is actually linked to subjects' initial ability in the task ($\rho=0.26$, $p=0.000$).

Result 5: *The behavioral measure and the self-assessed measures of intrinsic motivation are positively correlated.*

The next step is comparing the different self-reported measures of intrinsic motivation in DT and in CT. Table 2.4 summarizes the results obtained for the self-report measures of intrinsic motivation and perceived competence by treatment: as we can see, both intrinsic motivation and competence are higher in DT than in CT, but none of these differences is significant.

In order to understand whether there are some differences in the determinants shaping ex-post intrinsic motivation in the two treatments, we run some OLS regressions on the self-reported measure of intrinsic motivation separately for CT and

DT. Columns DT of Table 2.5 refers to delegation treatment, while columns CT refers to control treatment; the dependent variable is the self-reported measure of intrinsic motivation. The independent variables are the number of words written during phase 1 (*Phase 1*), during the free choice period (*Free-choice*), and the wage asked or received (*Wage*). We control for subjects heterogeneity. From the observation of Table 2.5 it appears clearly that the ex-post measure of intrinsic motivation is positively and significantly correlated to subjects' ex-ante motivation, both in CT and in DT. For what concerns the other determinants, we need to consider separately the two treatments. The first intriguing result found in DT is that final intrinsic motivation is not influenced by subjects' initial ability: it means that when subjects are delegated their wage choice for completing a task, they can report to be intrinsically motivated even if they are not so able in its completion. On the other hand, to explain the negative wage effect on ex-post motivation, it is worthwhile to remember that higher levels of ex-ante motivation are found to be linked to lower asked wages; therefore, it can be supposed that higher wages could be asked by less motivated subjects who experience more disutility from the task (with respect to more motivated subjects), but despite this monetary premium their motivation keeps on being low. Moreover, we can hypothesize that those subjects who ask for higher wages can be affected by an *over-justification* effect: this effect appears when motivated individuals are exposed to outside incentives, therefore their behavior becomes over-justified (by intrinsic motivation and external rewards). As a consequence, they reduce the factor that they can control, that is intrinsic motivation (Frey, 1997).

For what concerns the control treatment, the table shows that the other main determinant of subjects' ex-post motivation is their initial ability in the task: this result suggests that, in the control treatment, subjects' self-reported intrinsic motivation in performing a task is influenced *both* by their initial intrinsic motivation and their ability in completing it.

Summarizing, the self-reported measure of intrinsic motivation is positively influenced by ex-ante motivation both in DT and in CT; furthermore, when subjects are delegated their wage choice, those subjects who ask for higher wages report lower ex-post motivation. Finally, participants' final intrinsic motivation is influenced by their initial ability only when they are not allowed to self-set their own wage.

2.5 Concluding remarks

By investigating the relation between wage delegation, intrinsic motivation and performance, this study attempts to help in shedding some light over the determinants that lead people to perform better when they are given the possibility to self-set their wage; moreover, it addresses the issue of how differently motivated subjects behave when they are given the possibility to determine their own wage. In order to pursue these aims, we used a novel experimental design in which the subjects are asked to perform a complex real-effort task under two different conditions: the subjects' wages can be either chosen by the subjects themselves, or randomly determined. Our results show that when subjects are delegated their own wage choice, they tend to increase more their performance than when they are assigned a random wage; our first result clearly supports what the literature on wage delegation has already suggested. Furthermore, we find that highly motivated subjects who have the possibility to self-set their wage are those who perform better. Finally, it should not be disregarded the unforeseen negative link between subjects' ex-ante intrinsic motivation and the wage that they ask; despite it represents only a hint because it is determined by few subjects' behavior, it seems an intriguing evidence to be deepened with further research. Indeed, this result suggests that highly motivated subjects exploit the possibility to show that their good performance is driven by their real interest in the task rather than by an high wage; on the other hand, poorly motivated subjects are willing to complete the task that they do not enjoy only if they are substantially remunerated.

Nevertheless, the self-reported measure of intrinsic motivation does not seem to be much affected by our treatment. It means that subjects' final intrinsic motivation in the task does not change whether they have the possibility to determine their wage or not. Maybe the problem is in the nature itself of this measure: by deriving it from a questionnaire, it risks to be a so-fleeting kind of measure that it could be affected by other variables we cannot control for. One possible solution is to use the behavioral measure of intrinsic motivation both before and after the introduction of the delegation treatment, in order to have a clearer idea of the impact of letting subjects decide their wage and to make these measures comparable. Another determinant of this result is likely to be linked to the exclusion of the principal from the experimental setting: probably when the delegation of the wage choice is extrapolated from the principal-agent context, it ceases to be a tool to recognize subjects' capability of making decisions or their competence in per-

forming the task. As a consequence, even when subjects are allowed to self-set their own wage, neither their need for competence nor their need for autonomy is satisfied.

With this novel experiment we attempted to provide a contribution to the existing literature on the interaction between intrinsic motivation and external rewards, also from a methodological point of view. Further investigations could certainly help in understanding which could be the most appropriate task to generate intrinsic motivation, which could be most suitable experimental design for disentangling intrinsic motivation from other effects, and which are the most fitting measures of intrinsic motivation.

CHAPTER 3

CASH POSTERS IN THE LAB

with Marco Faillo and Luigi Mittone

Our paper reproduces the cash posters framework *à la* Homans (1953, 1954) in a laboratory setting with a twofold aim: first of all, it explores the gift-exchange between employers and employees, both in terms of wage-effort and in terms of effort-potential leniency in punishment; secondly, it investigates whether employees' behavior is driven also by solidarity concerns towards their unlucky peers. We propose a novel experimental design with a modified version of the gift-exchange game with real effort, punishment, and multiple rounds (Fehr et al., 1997): each employer is matched with two employees and she has the possibility to punish each of them if their individual production is lower than that asked. Each employee's production risks to be reduced by a random intervention and, in our treatment, each employee has the possibility to renounce to a part of his production to give it to his coworker. Our data support the well-known relation between wage and effort, but suggest that employers are not willing to overlook employees non-compliance, neither when employees exerted high effort in the past, nor when their coworkers exert high effort. In our treatment, employees not only exploit the possibility to help their needy peers, but they tend also to exert higher effort towards their employers. Consequently, the employers are those who earn more from employees' solidarity, and the gap in earnings between employers and employees becomes even greater in our treatment.

Keywords: Solidarity, Gift-exchange, Reciprocity, Experiment.

JEL Classification: C91; M52; D91; D81

3.1 Introduction

In a famous study conducted at the Costumers Accounting Division of the Boston Edison Company, George Homans (1953, 1954) spent several months in observing the social relations among some clerical workers. His focus was mainly on a group of ten young cash posters whose job consisted in recording customers' payments: since their duties were rather repetitive and their performance easy to monitor, they represented the perfect target for a field study aimed at combining "the measurement of individual effectiveness with the systematic observation of social behavior" (Homans, 1954: p. 724).

Cash posters were required to pull at least 300 cards per hour and they were paid a flat wage. Beside that, they received no monetary incentive: neither a punishment for those who failed in reaching the quota, nor a prize for those who outperformed the requested minimum. Nevertheless, the average number of cards per hour recorded by Homans was more than 17 percent higher than the minimum quota required by the company; moreover, few subjects worked almost 50 percent more than the standard requested (Akerlof, 1982). From the observation of this data, at least one question arises: since there were not economic incentives, why did the cash posters work so hard?

Years later, George Akerlof (1982) interpreted cash posters' behavior by referring to the concept of *gift-exchange*: according to this interpretation, the excess of effort exerted by the cash posters was seen as a gift to the firm. Because of the essential reciprocal nature of gift-giving (Mauss, 1954), the gift given by the clerical workers was expected to be exchanged with appropriate gifts given by the firm: first of all, cash posters were remunerated with an above the minimum wage. Besides that monetary gift, the firm repaid cash posters' effort with a twofold *leniency* in the work rules. Firstly, potential leniency for future errors or slowdown: meaning that, by exerting higher effort in the present, each clerical worker could build a sort of self-insurance for her own future slackness. Secondly, the firm reciprocated to the high performance of *some* cash posters by reducing the pressure on *all* of them; therefore, the hard-workers could benefit from the firm's generous treatment of those coworkers who perceive work rules as a constraint (Akerlof, 1982).

Since among the cash posters it was rather simple to distinguish the hard-workers

from the poor performers, we can presume that hard-workers' behavior was also driven by *solidarity* with their slower coworkers. There is a profound difference between the driver of workers' behavior towards the firm (reciprocity) and the driver of workers' behavior towards their coworkers (solidarity): indeed, reciprocity implies the expectation of receiving something back, while solidarity is "a willingness to help people in need who are similar to oneself but victims of outside influences" (Selten and Ockenfels, 1998: 518). We suggest to incorporate also solidarity concerns among the drivers of cash posters' behavior, despite Akerlof (1982) never broached them in his analysis, by pointing out a probable relation between the "outside influences" mentioned by Selten and Ockenfels (1998) and the random distribution of ability at work between cash-posters; furthermore, we argue that those who were more able in cash-posting were willing to help the others because of their empathy with the coworkers in need.

The relation between firm and workers has been widely studied as a gift-exchange. The seminal paper by Fehr et al. (1993) was the first to introduce the gift-exchange game to mimic a labor relation in an experimental setting, and it confirmed the positive relation between wage and effort observed in Homans (1953). Starting from this influential study, several papers have expanded the basic setting proposed by Fehr and colleagues with the aim of exploring in which conditions reciprocity does survive. For example, some experimental works have investigated whether workers are still moved by reciprocal concerns when there are multiple employees working for the same employer (Falk and Ichino, 2006; Maximiano et al., 2007; Gächter et al., 2012); they showed that workers are very sensitive to peers' behavior, and that their reciprocity holds out and even increases if workers observe others behaving reciprocally. Another stream of literature has developed on settings in which the employer has the possibility to respond to workers' behavior through fines and/or rewards (Fehr et al., 1997; Fehr and Gächter, 2002; Fehr et al., 2007). Here the results are more mixed: when employers have the possibility of both punishing and rewarding after the observation of workers' effort, both employers and workers tend to behave more reciprocally (Fehr et al., 1997); moreover, when employers have decided *a priori* whether to punish or to reward workers' behavior, workers' reciprocity is much higher with a rewarding contract (Fehr et al., 2007); finally, when employers have no power in choosing the preferred contract (among a trust one and an incentive one), both employers and workers are less willing to reciprocate under the incentive contract (Fehr and Gächter, 2002). Moreover, other experimental studies have proved that reciprocity survives (at least in the short term) also in settings

with real effort tasks (Gneezy and List, 2006; Bellemare and Shearer, 2009; 2011; Carpenter, 2017).

Despite the large number of studies on reciprocity between employers and employees, to the best of our knowledge, no study has investigated the interaction between reciprocity and another factor that is likely to drive employees' behavior: solidarity. Solidarity concerns have been explored, separately, by a narrow stream of experimental literature starting with the pioneering study by Selten and Ockenfels (1998): they proposed a solidarity game in which participants were asked to play a one-shot three-players game, and they had the possibility either to win a certain amount of money or to receive anything. Before the random draw, each of them was asked how much he/she was willing to give to the loser(s) in the group in the case he/she won the amount of money; therefore, these transfers were conditional on being a winner. This game creates a situation in which "ex ante everybody is in the same situation but the ex post distribution of payoffs may be very uneven unless the inequality is mitigated by positive conditional gifts" (Selten and Ockenfels, 1998: 531), and it was found that these conditional gifts were actually substantial.

But the structure of the solidarity game, as presented by Selten and Ockenfels (1998), risks to be far from representing the complex workplace dynamics observed by Homans. First of all, the framework of the solidarity game is such that all the players have the same informations, make the same decisions simultaneously, and there is no conflict of interests nor interaction among them: therefore, it totally lacks the principal-agent nature which is typical of labor relations (Jensen and Meckling, 1976). Secondly, in the standard solidarity game subjects decide on how to split an amount of money which is given to them by the experimenter. It is very difficult to observe situations like this in reality. In addition, it has been largely proven that when subjects have to earn their endowment before deciding how to split it in a dictator game, they tend to become more selfish than when they receive money as a windfall (Cherry et al., 2002; Cherry and Shogren, 2008; Reinstein and Riener, 2009; Mittone and Ploner, 2012; Carlsson et al., 2013).

Our study falls between these two strands of experimental research, with the aim of filling the gap among them in representing a workplace framework in which the workers are moved also by solidarity concerns. We propose a novel design with a modified version of the gift-exchange game, in which workers are allowed to show their solidarity concerns. Players are assigned a role that can be either employer

or employee, and each employer is matched with two employees: in the baseline (Control Treatment, CT), people within each group play together for 10 rounds (partners matching). The structure of the game is as follows: in the first phase of each round, each employer proposes a contract (s, s_{min}, p^*) to both her employees¹: s represents a wage, s_{min} a minimum wage that is lower than s , and p^* is the asked level of effort. The employees have the possibility to see the proposed contract, then they are asked to exert an individual real effort by counting the exact number of 1 in tables composed by 0 and 1 for 90 seconds. Each player knows that after these 90 seconds, each of the following events has the same probability to occur: 1) the production of employee 1 is halved, 2) the production of employee 2 is halved, 3) nor the production of employee 1 nor the production of employee 2 is halved. We introduce this random device in order to let employees' final performance be determined not only by their effort, but also by an event that is independent from their behavior; this is aimed at mimicking those uncertain events that in real life can modify individuals productivity, despite of the effort produced (such as unforeseen inconveniences in workplace, familiar problems, machinery malfunctions, and so on). Before knowing which of these events will effectively happen, each employee decides how to allocate his production between himself and his employer: for each kept table he earns 0.4 tokens, for each table given to the employer, the latter earns 0.6 tokens.² The number of tables effectively given to the employer by one employee represents his effective effort p . If $p \geq p^*$ the employer is forced to pay him the higher wage s , while if $p < p^*$ the employer can choose either to pay him the wage s or the minimum wage s_{min} . After the payment of the wage, the round ends.

We compare this baseline with a Solidarity treatment (ST), in which each employee is allowed to allocate his production of tables between himself, his employer, and also his coworker in the three above mentioned hypothetical situations. If some tables are given to the coworker, these tables are directly passed from the coworker to the employer, and the employer perceive them as coming from the coworker. Indeed, the employer is not aware of the table exchange between her employees, but she is only able to see the final number of tables received by each of them.

We decided to implement such a complex design in order to mimic the cash posters framework as close as possible and to capture solidarity concerns: indeed, with this

¹For simplicity, from now on we refer to employer as female, and to employee as male.

²These parameters are aimed at representing a situation in which the tables are profitable for the employee that decides to keep them for himself, but when they are given to the employer the amount of wealth generated is even higher.

setting we are able to explore the gift-exchange observed by Homans (1953, 1954), both in terms of wage-effort relation and in terms of effort-potential leniency. Moreover, we can test whether lucky workers ³ are moved also by solidarity concerns towards unlucky coworkers.

We find that some behaviors are effectively moved by reciprocity concerns: for example, the minimum wage offered by the employers is higher than the minimum possible, and employees' effort is positively influenced by the offered wage. However, we do not find the relation between effort and potential leniency hypothesized by Akerlof (1982): indeed, employers are not willing to forgive employees' non-compliance, neither when the employees themselves exerted high effort in the past, nor when the employers receive high effort from the coworkers. Furthermore, our data show that when employees are allowed to show their solidarity towards their coworkers, they effectively exploit this possibility; this solidarity concern is found to be influenced also by a sort of reciprocity towards coworkers, meaning that employees are more supportive towards those coworkers who have helped them in the previous round. Moreover, in the solidarity treatment employees are unexpectedly willing to exert higher effort towards their employers. As a consequence, the employers become the greatest beneficiaries of the solidarity drivers, and the gap between employers' and employees' payoffs is even higher in the solidarity treatment.

The reminder of the paper is structured as follows: Section 3.2 illustrates our research hypotheses; Section 3.3 describes our experimental design and procedure; Section 3.4 illustrates our results and Section 3.5 concludes. The instructions of the experiment are presented in Appendix C.

3.2 Research Hypotheses:

If both the employer and the employees were perfectly rational and selfish agents, and the frame was characterized by common knowledge, their aim should be the maximization of their own payoff and we can develop some predictions about their behavior. Starting the analysis from the last phase, the employer should never pay the higher wage if she is not forced to. Since the employee can predict this behavior, he should decide how many tables consign to the employer according to these simple

³We define "lucky" those workers whose number of tables is not halved, and consequently those who know that their wage will be s for sure.

considerations: first of all, he should check whether the offered wage is *appropriate* for the asked effort. Indeed, it is easy to suppose that an employee will exert the asked effort p^* as long as the offered wage is at least equal to $0.4p^*$; when this is not the case, the employee will maximize his payoff by keeping all the tables for himself. Secondly, the employee should compare his effective effort with the asked effort: if the number of tables completed is lower than p^* , there is no reason to give a positive amount of tables to the employer. Moreover, the employee should never give any tables to the coworker (in ST), because it would directly lower his own payoff; finally, assuming that the effort of completing tables is costly and that the cost of completing tables is increasing and convex, he would complete tables until the marginal cost of completing tables would become higher than the benefit he gets from each completed table (0.4 tokens).

To conclude the analysis, in the first phase the employer should propose a contract with these two properties: first of all, the asked effort and the offered wage should be related in such a way that $s = 0.4p^*$; secondly, the minimum wage should be equal to 0.

Nonetheless, as we have already mentioned, a huge body of literature has shown that people's behavior is driven by other forces besides the selfish concerns, such as the desire to reciprocate kindness or to punish unkind behaviors (Fehr et al., 1993; Fehr et al., 1997; Fehr et al., 2007; Fehr et al., 2009; Charness et al., 2012), but also empathy and solidarity with people in need (Selten and Ockenfels 1998; Eberlein and Przmeck, 2006; Buchner et al, 2007).

Therefore, we hypothesize that the employer's decision about the contract can be determined also by her desire to induce a reciprocal behavior into her employees: as a consequence, she can offer a wage which is higher than (or at least equal to) the minimum acceptable for the asked level of effort ($s \geq 0.4p^*$). And again, she can offer a minimum wage which is higher than zero and she can pay the higher wage even when she is not forced to, especially to an employee who has already given a number of tables higher than that asked.

H₀1: The employer offers a contract in such a way that the wage is, on average, not greater than the minimum acceptable for the asked level of effort.

H₀2: The offered minimum wage is, on average, equal to zero.

H₀3: The employer exploits the possibility to pay the minimum wage all the times that an employee gives her a number of tables $p < p^*$.

From the side of the employee, if also his behavior is effectively influenced by reciprocity considerations, we can expect that his effort is positively influenced by the wage proposed by his employer. Moreover, we can hypothesize that even if the employee is not able to give the asked level of effort, he is likely to consign to the employer a number of tables that is greater than zero, even just to show off his goodwill.

H₀₄: The number of tables given by one employee to the employer is equal to the number of asked tables only when the offered wage is at least equal to $0.4p^*$; otherwise, the employee gives zero tables.

H₀₅: When the employee is not able to give the asked level of effort, he consigns to the employer zero tables.

If we compare ST with CT under the hypothesis of rationality, the two treatments should be extremely similar in terms of results: indeed, there is no reason for employees to give any tables to the coworkers, since this behavior generates only a cost for them. However, given the before mentioned definition of solidarity (Selten and Ockenfels, 1998; Bierhoff and Fetchenhauer, 2001; Buchner et al., 2007), we can suppose that in ST participants' behavior could be driven even by *horizontal solidarity* concerns: that is, we hypothesize that in ST each employee is willing to help the coworker who finds himself in difficulty by consigning him some of his completed tables. Moreover, since the essential basis of solidarity is to help someone in need, we can suppose that an employee should be more willing to help his coworker when his coworker finds himself in effectively unlucky circumstances (i.e., his tables are reduced). Finally, employees' behavior in ST should be influenced also by reciprocity concerns: indeed, because of the partner matching protocol, each employee could expect to be treated kindly by his coworker if he treats him kindly. That is, one employee could give some completed tables to his coworker not only because he is willing to help him, but also because he expects to induce his coworker to give him some tables in the successive rounds. But if an employee discovers that his coworker is not willing to give him some of his completed tables, it can destroy employee's reciprocity and, consequently, the number of exchanged tables is likely to drop down.

H₀₆: The number of tables effectively given by an employee to his coworker is, on average, equal to 0.

3.3 Experimental design and procedure

3.3.1 Treatments

In order to test these hypotheses, we ran a laboratory experiment that consists of two treatments: the Control treatment, and the Solidarity treatment. Each of them represents a modified version of the gift-exchange game with punishment, as that presented by Fehr et al. (1997).

Control treatment:

At the beginning of each session, participants are randomly divided in employers and employees; then, groups of three people (1 employer and 2 employees) are formed. Participants are randomly and anonymously grouped, therefore no one knows the other people he/she is playing with; they only know that the groups will remain unchanged until the end of the session.

Each session is made of 10 rounds, plus 2 preliminary rounds which are identical to the others except that in these rounds the subjects are not remunerated. At the beginning of each round, each employer is given an endowment of 20 tokens and each employee is given an endowment of 8 tokens. Each round is composed by three phases:

1. In the first phase, each employer chooses the contract to be offered to both her employees. The contract is composed by: an asked level of effort p^* , a wage s , and a minimum wage s_{min} that should be lower than the wage. The asked effort should be within the range $[0, 20]$, while both the wage and the minimum wage should be within $[0, 10]$.
2. In the second phase, each employee is told about the contract offered by his employer, and then he is asked to exert a real effort for 90 seconds: that is, he is asked to count the exact number of 1 in tables made by 0 and 1. After the completion of this task, each of these three events can happen with the same probability within each group: the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events.

Before knowing which of these events will effectively happen, each employee has to decide how to allocate his completed tables between himself and his employer in each of the three hypothetical situations: meaning that he has to decide how many tables keep for himself and how many tables give to the employer when 1) his tables are reduced 2) the tables completed by his coworker

are reduced and 3) neither his tables nor the tables of his coworker are reduced. For each completed table he decides to keep for himself, he earns 0.4 tokens; for each completed table given to the matched employer, he does not earn anything and the employer earns 0.6 tokens.

After this choice, each employee discovers which event has happened and consequently which of his strategies has been implemented. The number of tables effectively given to the employer by one employee represents his effort (p).

3. The employer observes how many tables each employee has effectively sent her and the average number of tables completed by *all* the employees in the previous round; moreover, she is aware about the possibility that the number of tables completed by one of her employees is reduced, but she does not discover which of the three above mentioned events has effectively happened. After having observed the number of tables consigned by each employee, the employer has to decide their individual wages:

- If the number of tables consigned by one employee is greater or equal to the asked level of effort, the employer is forced to pay the higher wage s to that employee.
- If the number of tables consigned by one employee is lower than the asked level of effort, the employer has the possibility to choose between the higher wage s and the minimum wage s_{min} .

The employer is then asked to guess the total number of tables that each of her employees wanted to keep. This elicitation of belief is incentivized, meaning that, if the employer guess the right number of kept tables, she is paid additional 1 token.

This is the end of phase three and the end of the round.

After 12 rounds, all the participants are asked to complete a questionnaire aimed at investigating their propensity to risk (BRET; Crosetto and Filippin, 2012) and they are asked few demographic questions; then their tokens are converted in money with a conversion rate of 1 token = 0.05 euro and they are paid privately in a separate room.

Solidarity treatment:

The only difference between the Solidarity treatment and the Control treatment is that in the Solidarity treatment, employees have the possibility to consign their completed tables not only to the employer but also to the employee they are working

with. That is, each employee has to decide how to allocate his own tables between himself, the other employee, and the employer in the three possible situations (the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events). If the employee decides to give some of the completed tables to his coworker, these tables are automatically sent from the coworker to the employee: meaning that, the coworker can not decide to keep them for himself. In this way, both the tables directly given to the employer and those given to the coworker are substantially consigned to the employer: the only difference among them is that the employer perceive the first ones as given by the employee himself, and the second ones as given by his coworker. This is because the employer is not aware if a tables' exchange between her employees has taken place nor, eventually, to which extent: she only knows that each of her employees has the possibility to give some tables to his coworker, but she does not know if they effectively do exploit that possibility.

Payoff

In both treatments, participants' payoffs are determined in this way. Employers' payoff is given by

$$\Pi_{employer} = 20 - s_1(s_{min1}) - s_2(s_{min2}) + 0.6(p1 + p2)$$

where 20 is the initial endowment, $s_1(s_{min1})$ and $s_2(s_{min2})$ represent the wage (minimum wage) given to employee 1 and to employee 2, $p1$ and $p2$ represent the number of tables effectively received by employee 1 and by employee 2. On the other hand, employees' payoff is equal to:

$$\Pi_{employee} = 8 + s(s_{min}) + 0.4(kt)$$

where 8 is the initial endowment, $s(s_{min})$ represents the wage received and kt is the number of tables that the employee decides to keep for himself.

3.3.2 Procedure

The experiment was run in the CEEL Lab at the University of Trento. The experiment was completely computerized and it was programmed using oTree Software (Chen et al., 2016). We conducted 8 experimental sessions, and 156 subjects participated voluntarily: no subject participated in more than one treatment or session. All the participants were undergraduate students, 62.8% were female, they

were on average 21.6 years old, they have already participated on average in 5.9 experiments, and 47.3% of them were enrolled to an economics major. All the experimental subjects received a show up fee of 3 euro, and they earned an average extra sum of 9.7 euro by participating in the experiment. Each session lasted about 1 hour and 30 minutes.

Before the beginning of each session, the participants were welcomed and they were asked to seat randomly in the lab; then the instructions were read aloud by one experimenter and the participants were asked to answer to some control question in order to verify their comprehension. During each session they were not allowed to chat nor to use their cellphones. In each period, each group was allowed to observe only the outcome of the group itself: the participants did not observe nor the behavior nor the outcome of the participants outside their own group.

3.4 Results

3.4.1 Proposed contracts

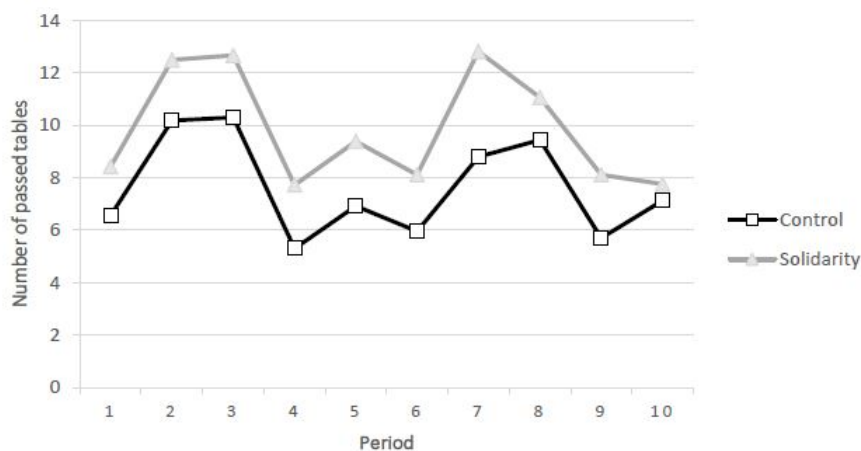
In the first stage of each round, each employer decides the contract to be offered to her two employees: meaning that, she asks for a number a tables p^* , and she decides how to remunerate them by choosing the minimum wage s_{min} and the wage s . Table 3.1 shows that the difference between the three contract components in CT and in ST is almost irrelevant; however, we can see that in both treatments the proposed minimum wage is higher than the absolute minimum wage, 0 (p-value<0.00 for both CT and ST, two-tailed Wilcoxon-Mann-Whitney test). Since s_{min} represents the minimum wage that the employer decides to pay to the employees no matter what is the number of tables that she receives, this evidence seems to suggest an attempt of inducing some kind of reciprocity in employees' behavior.

Table 3.1: Contract offers by treatment

	CT		ST	
	Mean	(SD)	Mean	(SD)
Wage	6.29	(1.55)	6.26	(2.01)
Minimum wage	0.52	(0.53)	0.68	(0.82)
Asked effort	15.24	(3.03)	16	(2.94)
Ratio of incentive-compatible p^*	0.67	(0.37)	0.58	(0.39)

Standard deviations are in parentheses.

Figure 3.1: Total number of tables passed across periods



Result 1: *The minimum offered wage is greater than 0 both in CT and in ST.*

The other observation that we can draw from Table 3.1 is that the majority of contracts, both in CT and in ST, are proposed in such a way that the wage is appropriate for the asked number of tables: that is, $s \geq 0.4p^*$. Nevertheless, the ratio of the contracts in which p^* is incentive-compatible is significantly higher in CT than in ST ($p = 0.05$, two-tailed Wilcoxon-Mann-Whitney test): the interpretation of this results could be that, since employers are aware of employees' possibility of exchanging tables, they are likely to ask for more tables being equal the offered wage. Moreover, the amount of asked tables is found to increase over time: the average number of asked tables in the last five rounds is significantly higher than the number of tables asked in the first five rounds, both in CT and in ST ($p = 0.03$ both for CT and ST, two-tailed Wilcoxon-Mann-Whitney test). This result is probably driven by the fact that, for each round, each employer is allowed to observe the average number of tables completed by all the employees: since the average number of completed tables is much higher than the average number of tables given to the employers (as we will see in the next sub-sessions), employers ask few tables in the preliminary rounds,⁴ and then they are likely to update their requests according to employees' capabilities. On the other hand, the offered wages are stable across periods for both treatments.

⁴The amount of tables asked in the preliminary rounds is significantly lower than that asked in the other rounds (p -value = 0.01 in CT and p -value < 0.00 in ST, two-tailed Wilcoxon-Mann-Whitney test)

Table 3.2: Number of passed tables by treatment

	CT		ST	
	Mean	(SD)	Mean	(SD)
Own tables halved (empl.)	3.18	(2.21)	4.36	(2.76)
Coworker's tables halved (empl.)	9.49	(4.32)	11.25	(4.38)
Tables not halved (empl.)	9.41	(4.21)	11.43	(4.6)
Effectively passed (empl.)	7.62	(1.88)	9.2	(2.17)
Own tables halved (cow.)			0.38	(0.64)
Coworker's tables halved (cow.)			1.06	(1.2)
Tables not halved (cow.)			0.65	(1.38)
Effectively passed (cow.)			0.64	(0.35)
Total passed (empl.)	7.62	(1.88)	9.85	(1.88)

Standard deviations are in parentheses.

Result 2: Most of the offered contracts are such that $s \geq 0.4p^*$, but in CT the ratio of incentive-compatible p^* is higher.

3.4.2 Effort levels

In our experimental design, the employee's level of effort is represented by the total number of tables that he effectively gives to the employer: Figure 3.1 depicts the average number of tables passed to the employer across periods in CT and in ST. Despite the time pattern is similar in the two treatments, we can clearly see that the effort exerted in ST is higher than the effort exerted in CT in all the periods: this remark is confirmed by a two-tailed Wilcoxon-Mann-Whitney test ($p = 0.04$).

Result 3: The total number of tables effectively passed to the employer is always higher in ST than in CT.

In both treatments, this number is determined by the number of tables that the employee would like to give to the employer, and by the effect of the intervention of the random device; moreover, in ST the number of tables given by one employee to the employer is determined also by the number of tables that his coworker decides to give him. Since the random device is made to hit employees with the same probability in CT and ST, our analysis will be focused on the other two components: the number of tables directly given to the employer, and the number of tables received by the coworker.

Table 3.3: Tables passed to the employer (no interactions among coworkers)

	(1)	(2)	(3)
(Intercept)	9.45*	4.50	4.78
	(3.84)	4.18	(5.18)
Solidarity	1.73 ⁺	1.78*	1.65 ⁺
	(0.98)	(0.88)	(0.9)
Proposed wage		0.87***	
		(0.12)	
Completed tables			0.15
			(0.09)
Incentive-compatible asked effort			2.85***
			(0.73)
Wage received in t-1			0.05
			(0.08)
Tables passed by the coworker in t-1			0.14***
			(0.03)
R.sq.overall	0.03	0.08	0.08
Wald Chi(2)	12.26	74.17	63.57
Num. obs.	1030	1030	927

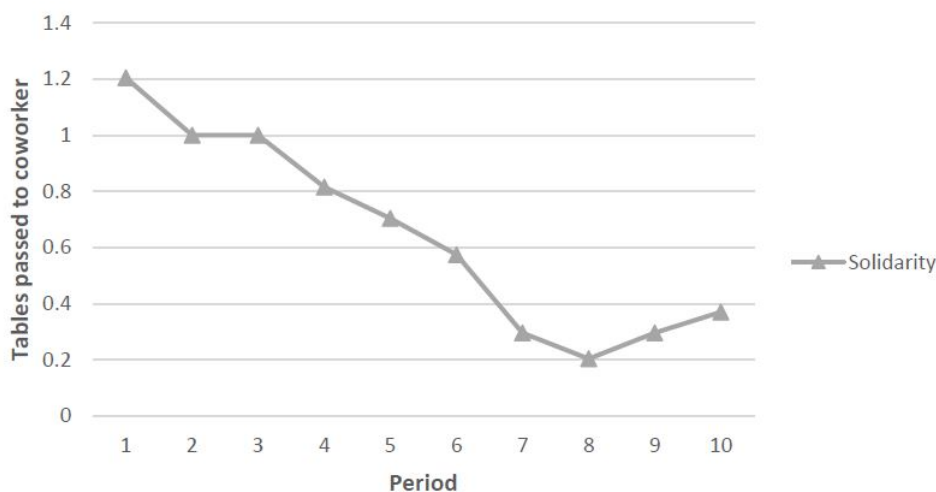
Random effects GLS (Standard error adjusted for clusters in group in parentheses)

Controls: age, nationality, major, gender, number of past experiments, guess about average number of tables completed by the others. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

Table 3.2 shows, for both treatments, the average number of tables that the employees want to pass to the employer and to the coworker in the three hypothetical situations (their own tables are halved, the tables of the coworker are halved, or none of these events), the average number of tables effectively passed to the employer⁵ and to the coworker according to the effects of the random device, and the total number of tables passed to the employer. Since this last number is nothing but the sum of the tables effectively passed to the employer plus those effectively received by the coworker, in CT this number is equal to the number of tables effectively passed to the employer because employees are not allowed to exchange tables. By looking at this table it is easy to see that, when the employees are given the possibility to show their solidarity with the coworkers in need, they tend to be more generous even with their employers. Indeed, the number of tables effectively given to the employer

⁵This number is calculated without considering the possible exchange of tables between coworkers in ST

Figure 3.2: Average number of tables passed to the coworker across periods



is higher in ST than in CT (p-value = 0.07, two-tailed Wilcoxon-Mann-Whitney test), and this is the first component of Result 3.

Result 3.1: *When the employees are allowed to show their solidarity with their coworkers, they tend to be more generous even with their employers.*

The panel analysis presented in Table 3.3 confirms this result and provides some insights into the drivers of employees' decision on passing tables to the employer: indeed, all the regressions show that the employees in the Solidarity treatment pass around 1.7 more tables than those in the Control treatment. In column (2) we can observe the well-known and well-proved positive relation between wage and effort; moreover, the regression in column (3) shows that the number of passed tables is significantly higher when the employer asks for an effort that is incentive-compatible. The second evidence offered by column (3) is that employees' behavior is positively influenced by their peers', as other experimental studies have proven before (Falk and Ichino, 2006; Mas and Moretti, 2009): that is, the number of tables passed by one employee to the employer is slightly but positively influenced by the number of tables passed by his coworker to the employer in the previous round. The peer effect that we found is likely to be related to Result 3.1: that is, in ST employees pass more tables to the employer because they want to overcome the comparison with the coworkers, and they know that their coworkers' performance is increased by the tables that the employees themselves have passed them. Finally, employees' behavior in one round does not seem to be influenced by the wage received in the previous round.

Table 3.4: Tables passed to the coworker

	Random effects GLS
(Intercept)	-2.42 (1.57)
Completed tables	0.00 (0.03)
Wage proposed	0.04* (0.02)
Asked tables	-0.06+ (0.03)
Tables received by the coworker in t-1	0.17*** (0.04)
R.sq.overall	0.21
Wald.Chi (2)	120.69
Num. obs.	486

Random effects GLS (Standard error adjusted for clusters in group in parentheses)

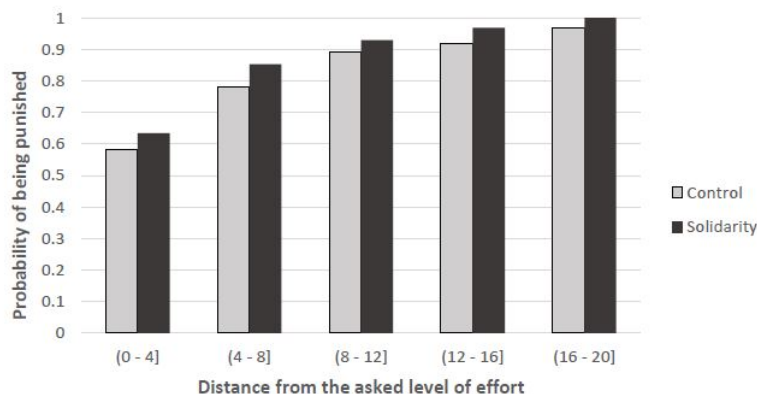
Controls: age, nationality, major, gender, number of past experiments, guess about average number of tables completed by the others. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

The second component of Result 3, as we have already mentioned, is represented by the number of tables received by the coworker. Table 3.2 provides us some cues about employees' behavior towards coworkers: the first evidence is that they do exploit the possibility of helping coworker in all the hypothetical situations, and the number of tables passed to the coworker is always higher than 0 (p-value < 0.00 for all the hypothetical situations, two-tailed Wilcoxon-Mann-Whitney test).

Result 3.2: *Employees do exploit the possibility of showing solidarity towards their coworkers.*

Moreover, employees' solidarity is not *tout court*: indeed, Table 3.2 shows that the number of tables given to the coworker when the tables of the coworker are halved is higher than that given in the other two hypothetical situations (p-value < 0.00 for both hypothetical situations, two-tailed Wilcoxon-Mann-Whitney test). It means that employees pass significantly more tables to their coworkers when they know that their coworkers are effectively in need; this situation resembles the classic solidarity game context in which only the player who wins the lottery (the lucky one) has the possibility to show his solidarity towards those who lose it (Selten and Ockenfels, 1998; Ockenfels and Weimann, 1999; Buchner et al., 2007).

Figure 3.3: Probability of being punished as a function of the distance $p^* - p$



Result 4: *Employees pass significantly more tables to their coworkers when they know that their coworkers are effectively in need.*

If we look at the trend of the average number of tables effectively passed to the coworker across periods in Figure 3.2 (therefore, considering the intervention of the random device), it is easy to identify a decreasing pattern⁶. One possible interpretation can be linked to conditional cooperation: an employee is willing to show solidarity towards the coworker as long as the coworker is reciprocating his help. Therefore, as time goes by, the initial solidarity of some employees tends to disappear because they meet some selfish coworkers that do not reciprocate the initial help. The negative reciprocity is confirmed also by the regression shown in Table 3.4: indeed, it is clear that the number of tables received by the coworker in $t-1$ strongly and positively influences the number of tables passed to the coworker in t . Moreover, and not surprisingly, it shows that employees tend to pass less table to their coworkers when they are asked to exert higher effort. Finally, the number of tables given to the coworker is positively influenced by the wage proposed by the employer: meaning that, when employees know that they have the possibility to earn an high wage, they are probably more willing to renounce to a part of their tables to help their coworkers.

Result 5: *Employees' solidarity is influenced by their reciprocity towards coworkers.*

⁶This pattern can be easily linked to the decay in contribution that has been observed by several studies on public good games (Ledyard, 1995; Chaudhuri, 2011).

Table 3.5: Determinants of punishment

	(1)	(2)
(Intercept)	0.47** (0.15)	-2.13 (3.13)
Solidarity	0.02 (0.04)	0.02 (0.04)
(p* - p)	0.02*** (0.00)	0.02*** (0.00)
(p* - p) in t-1	-	-0.004* (0.00)
(p* - p) coworker	-	-0.006** (0.00)
R.sq.overall	0.14	0.19
Wald Chi(2)	40.25	46.09
Num. obs.	605	536

Random effects GLS (Standard error adjusted for clusters in group in parentheses).

Controls: age, nationality, major, gender, number of past experiments, guess about average number of tables completed by the others.

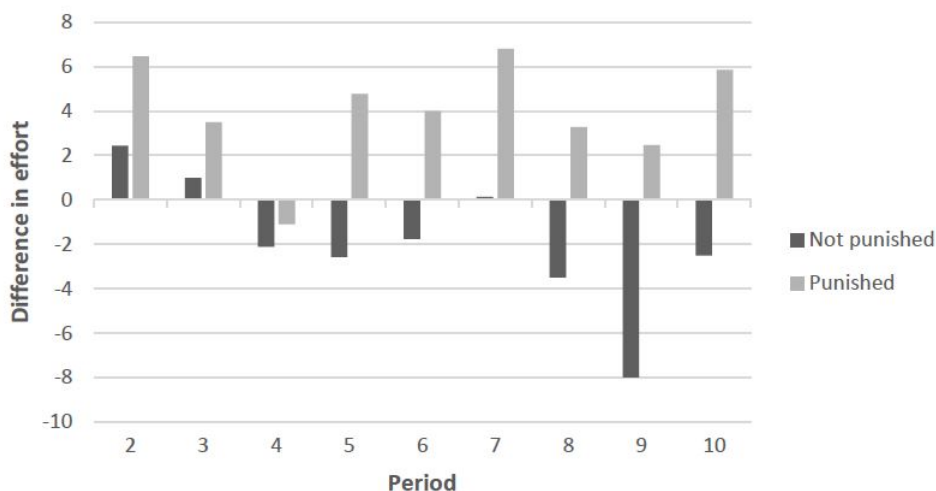
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$, + $p < 0.1$

3.4.3 Punishment behavior

The final move of each round is up to the employers: they have to decide how to remunerate their employees, and they are allowed to punish one of them only if they receive from that employee a number of tables lower than that asked. The first result that stands out is that employers punish non-compliant employees almost all the times that they are allowed to (86% of the times for CT and 90% for ST, no statistical difference) and the probability of being punished is stable across rounds for both treatments (comparing the first five rounds and the last five rounds we do not find statistical differences).⁷ However, not all the non-compliant employees have the same probability of being punished: indeed, Figure 3.3 shows that the probability of being punished is strictly linked to the distance between the asked number of tables and the number of tables effectively consigned. Table 3.5 confirms

⁷It should be noticed that the probability of being punished is much lower in the preliminary rounds than in the other rounds (p-value < 0.01 for both treatments, two-tailed Wilcoxon-Mann-Whitney test); this results is related to the fact that subjects receive no payment for the preliminary rounds, and those employers who renounce to their possibility to punish are probably attempting to induce their employees to reciprocate in the successive rounds.

Figure 3.4: Employees' reaction to punishment across periods

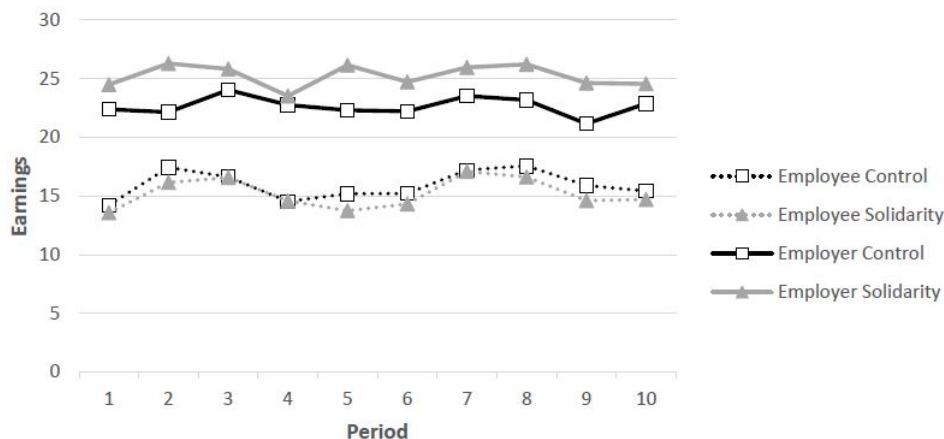


the causal link between the distance between the asked effort and the exerted one, and the probability of being punished. Furthermore, column (2) sheds some light on the other determinants of this probability: indeed, it shows that the probability of being punished decreases as long as the difference in effort ($p^* - p$) provided by the coworker increases, and as long as the difference in effort ($p^* - p$) provided by the employee in $t-1$ is high. It seems to suggest that employers consider coworkers' behavior and employees' behavior in the previous round as a reference point: for example, if employers are aware that also in $t-1$ the employee failed in reaching the objective, or that neither the coworker was able to reach it, they can think that they asked too many tables and they are less willing to punish the non-compliance.

Result 6: *Employers exploit the possibility of punishing their non-compliant employees almost all the times, both in CT and in ST.*

One possible reason that lead employers to not overlook employees' non-compliance can be guessed by looking at the reactions to punishment. The y-axis of Figure 3.4 represents the difference in number of tables consigned to the employer between $t-1$ and t of those employees whose effort in $t-1$ was lower than that asked; therefore, the bars show the difference in effort of those who have been punished (light gray) and of those who have not been punished (dark gray). It is easy to see that in all the periods those employees who are punished for their non-compliance tend to increase more (or decrease less) their effort from $t-1$, the period in which they are punished, to t ; this difference in effort is significant both in CT and in ST (p -value <0.00 for both treatments, two-tailed Wilcoxon-Mann-Whitney test). Therefore, by looking

Figure 3.5: Employers' and employees' earnings across periods



at the consequences of their behavior, employers *learn* that punishment is the best option to induce employees to exert higher effort (reinforcement learning, Sutton and Barto, 1998). To conclude, it becomes more efficient for the employers to punish non-compliant employees for two reasons: firstly, they save some money by paying them a lower wage; and secondly, employees tend to exert higher effort after being punished.

3.4.4 Earnings

Finally, let us give a look at how employers' and employees' earnings differ across treatments. Figure 3.5 shows that employers' payoffs are much higher than employees' in all the periods in both treatments, and this difference becomes even stronger in ST with respect to CT. Indeed, employers' payoffs in ST are significantly higher than employers' payoff in CT (p-value < 0.00, two-tailed Wilcoxon-Mann-Whitney test) and employees' payoffs in ST are significantly lower than employees' payoff in CT (p-value < 0.00, two-tailed Wilcoxon-Mann-Whitney test). The determinants of this evidence are at least threefold: first of all, employees complete almost the same number of tables in CT and in ST (22.5 in CT and 22.7 in ST, p-value = 0.7 two-tailed Wilcoxon-Mann-Whitney test); despite this, in ST the number of tables directly given to the employer is higher than that given in CT; and finally, in ST employees give some tables even to their coworker, and these are indirectly passed to the employer.

3.5 Concluding remarks

The main goal of this study was to explore whether people are moved also by solidarity concerns when they interact with peers in need into a workplace context; moreover, by mimicking the cash posters' framework *à la* Homans, it tested the gift-exchange between employers and employees, both in terms of wage-effort and in terms of effort-potential leniency. In order to pursue these aims, we proposed a novel experimental design in which subjects are assigned either the role of employer or employee, and each employer is matched with two employees; they are asked to play a modified gift-exchange game with punishment, in which each employer proposes a contract (composed by a minimum wage, a wage and an asked level of production), and each employee is asked to exert a real effort that is nothing but counting the number of 1 in a series of tables. For each correctly counted table the employees are allowed to decide either to keep it for themselves, and receive a small payment, or to pass it to their employer; after this decision, the number of tables they decided to give to the employer risks to be reduced by a random device. If an employee's final effort⁸ is at least equal to that asked, the employer is forced to pay him the regular wage; if the effort is lower than that asked, the employer can choose to pay him the regular or the minimum wage. In our treatment, each employee has the possibility to help the coworker in need by renouncing to a part of his tables and giving it to the coworker, in order to prevent his needy peer receiving the minimum wage.

We did find some behaviors driven by that reciprocity that is widely-proved to characterize gift-exchange games (Fehr et al., 1993; Fehr et al., 1997; Fehr et al., 2007): indeed, employers offer a minimum wage that is significantly higher than the minimum possible and employees' effort is strongly influenced by the proposed wage. Nevertheless, employers do not seem to be willing to overlook employees' non-compliance, neither when the employee exerted a high effort in the past, nor when his coworker exerts a high effort; therefore, we did not find any evidence of the twofold leniency in the work rules that Akerlof (1982) ascribed to the firm's behavior in the cash poster framework. One possible reason of this result can be related to the artificial time compression that is typical of lab experiments, and that makes the link between punishment and employees' behavior much more salient than that observed in the Homans' framework. This unwillingness to forgive non-compliant

⁸By *final effort* we mean the number of tables given by one employee to the employer after the intervention of the random device.

employees can be also linked to the consequences of forgiveness: indeed, when employees are not punished for their non-compliance in one round, they tend to exert even less effort in the next round, while punishment is an effective tool for increasing employees' performance.

When employees are allowed to show their solidarity towards the coworker in need, they effectively exploit this possibility, and this result is in line with the previous evidence on people's behavior in the solidarity game (Selten and Ockenfels, 1998; Ockenfels and Weimann, 1999; de Oliveira et al., 2014); it means that, despite the workplace context and the fact that subjects have to work before deciding whether to provide help or not, solidarity concerns still hold. It is worthwhile to underline that the interactions among employees are shaped not only by solidarity concerns, but also by reciprocity: that is, one employee is willing to help his coworker as long as the coworker reciprocates this help. Further development of this research should be focused on disentangling reciprocity from solidarity concerns, in order to explore whether people still help peers in need without expecting anything back.

Another result of our treatment is that employees not just show their solidarity towards their peers, but they are also willing to exert higher effort towards their employers. This finding is undoubtedly counterintuitive: indeed, since employees complete approximately the same number of tables in both treatments and in the solidarity treatment they renounce to a part of them to help the coworker, by giving more tables to the employers in the solidarity treatment they end up with keeping less tables for themselves. One possible interpretation of this result could be related to the observed positive link between the number of tables given by one employee to the employer in one round, and the number of tables given by his coworker in the previous round: since employees' performance is influenced by a peer effect, and in solidarity treatment each employee knows that his coworker's performance is increased by the tables that the employee himself has passed him, in order to overcome the comparison with the coworker each employee should pass even more tables to the employer.

As a consequence, the gap between employers' and employees' payoffs became even greater in the solidarity treatment: indeed, employers' payoffs increase and employees' payoffs decrease with respect to the control treatment. This is due to the fact that employees take the opportunity to show their solidarity towards coworkers, and exert higher effort even towards their employers: on the other side, employers

exploit this situation and ask for more effort without increasing the offered wage nor their willingness to forgive non-compliance. We can also hypothesize that solidarity among coworkers can be even increased by employers' exploiting behavior, and that employees tend to help one another to face together the "mean" employer; posit that the employer is able to predict this behavior, he is likely to become even more severe to induce more solidarity. This result may have some nice implications in real-world organizations: indeed, by creating a climate and a structure that allow employees to help each other in performing the requested tasks, employers are likely to create the foundations for a collaboration that could be advantageous especially for themselves. Furthermore, we hypothesize that in a context in which the employees know each other and the employer is made aware of the possible solidarity among them, employees are even more likely to help each other in the hope of determining a sort of reciprocal behavior from the employer.

To summarize, the main conclusion that we can draw from our results is that employees' behavior seems to be moved also by solidarity concerns, and that the employers are the major beneficiaries of this driver. Further investigation could certainly help in disentangling solidarity from reciprocity concerns, for example by using a strangers matching protocol instead a partners one; moreover, it should be explored whether our main results hold when the number of employees is higher, and whether solidarity concerns might interact with some sort of intrinsic motivation.

CONCLUSIONS

The aim of this dissertation was to explore some motivational forces that are less evident than monetary rewards, but still very powerful in driving human behavior: intrinsic motivation and solidarity towards peers.

Chapter 1 explores how intrinsically motivated subjects are influenced by the presence of others motivational factors, in particular: 1) external interventions (such as monetary incentives, fines, control devices, feedbacks, and so on) 2) social context 3) subjects' identity and identification with their task, job, firm 4) their goals, both in terms of their personal achievement motives and in terms of externally set goals. We decided to begin with a review chapter in order to provide the reader with an overall picture of the complex phenomenon of intrinsic motivation; indeed, it risks to result really tricky to deal with this motivation, especially when it is not the only driver of subjects' behavior. A better understanding of the effects of these interactions could help in developing a total reward system that is able to maintain, and even increase, employees' intrinsic motivation: indeed, money appears to be not always the best answer to motivational problems, and sometimes can even become detrimental to motivation. This result suggests the need to insert monetary incentives within a broader context of rewards that takes account of the above-mentioned psychological motives, and to resort to them only in the understanding of their interplay with the other motivational drivers.

The laboratory experiment presented in Chapter 2 investigates the relation between intrinsic motivation, wage delegation and performance. The aim of this study was indeed to test whether subjects who are given the possibility to determine their own wage perceive an increase in intrinsic motivation; in addition, it tested also

whether heterogeneously motivated subjects react to wage delegation in different ways. Our findings show that subjects exert higher effort when they are delegated the wage choice, and the best performers are those who are both highly motivated and delegated their wage choice. These results suggest that, in order to obtain the highest benefits from a strategy aimed at allowing employees to have more autonomy, it is important to contextualize it in a framework that facilitates their intrinsic motivation. Nevertheless, wage delegation does not seem to influence subjects' intrinsic motivation; we will see in the next sub-session some possible explanations and further research.

Chapter 3 is focused on another internal motivation of human behavior: solidarity towards peers. Indeed, it illustrates a laboratory experiment with a modified gift-exchange game aimed at investigating not only reciprocity concerns within the employer-employee relation, but also solidarity among coworkers. Our results confirm the existence of reciprocity, at least in terms of wage-effort relation; moreover, they suggest that also solidarity can play an important role in determining subjects' behavior, since employees are proved to be willing to help the coworkers in need, especially when they have received some help from them in the past. Unexpectedly, when employees are allowed to show their solidarity concerns, they become more generous even towards their employers: consequently, the greatest beneficiaries of solidarity concerns appear to be employers. Especially this last result suggests not to underestimate the importance of this not so explored motivation: indeed, by simply allowing employees to help one another it is possible to generate greater wealth, even if its distribution becomes more unequal.

Limitations and further research

As we have already mentioned, this doctoral dissertation relies mainly on laboratory evidence: the review presented in Chapter 1 illustrates mostly the results of laboratory experiments, while Chapter 2 and Chapter 3 present the findings of two novel laboratory experiments. The reason for this choice is that laboratory experiments seem to be advantageous for one main reason: in a laboratory setting is easier to disentangle the different psychological motives driving subjects' behavior, while in a field setting they can be only inferred from the observation of subjects' actions or derived from questionnaires compiled by the subjects themselves. Of course, our laboratory findings can not be generalized *tout court* to real world scenarios, but they can still give some cues about the real determinants of human behavior; how-

ever, our results would certainly be stronger and more reliable if supported by field study evidence. Moreover, both Chapter 2 and Chapter 3 would surely benefit from the collection of more observations.

In the experiment illustrated by Chapter 2 we used two different measures of intrinsic motivation: a behavioral measure before our treatment, and a self-assessed measure after our treatment. In order to make them comparable, it might be appropriate to use twice the same measure, the behavioral one, both before and after the treatment; in doing so, maybe we can obtain different results for what concerns the effect of the treatment on the ex-post measure of intrinsic motivation. Another limitation of this design is related to our choice to exclude the principal from the setting in order to let the subjects play individually: even if this choice allowed us to disentangle reciprocity from wage delegation effects, the lack of the principal is likely to prevent the subjects from perceiving wage delegation as an intervention aimed at recognizing their autonomy and competence.

Finally, Chapter 3 might be improved with a treatment with a strangers matching protocol instead of a partners matching, in order to disentangle solidarity among coworker from reciprocity. Another useful integration might be related to the number of workers connected to the same employer: indeed, the increase of the number of coworkers is likely to generate an interesting mechanism for determining who should help whom.

APPENDIX A: EXPERIMENTAL INSTRUCTIONS

Since the experiment was conducted in Trento, the original instructions were in Italian. This is a translated version.

Good morning and thank you for your participation to this experiment! You are going to take part in an experiment with scientific purposes. First of all, please read carefully the instructions that we gave to you; an experimenter will read them aloud. After that, please answer to the control questions that you will find at the end of the instructions. After all participants have answered to these questions, one experimenter will read aloud the correct answers. Please check whether your answers were correct or not. May you have any doubts, do not hesitate to ask!

During the experiment, you will receive an amount of money according to a procedure that you will be told in a while. In addition, you will receive 3 euro for arriving on time. During the experiment, your payment will be calculated in tokens with a conversion rate of:

$$1 \text{ token} = 0.25 \text{ euro}$$

The experiment is characterized by anonymity. During the experiment, you will not be allowed to talk to other participants; otherwise, you will be excluded from the experiment. At the end of the experiment, you will be asked to respond to a brief questionnaire; after that, you will be paid in cash in a private room.

Phases:

The experiment is composed by two phases.

In both phases, you will be asked to complete a task which consists of writing words according to the following procedure. On your screen there will be four boxes, each of them corresponding to one category: *movies*, *flora & fauna*, *food & beverage*, and *forenames*. At the beginning of each phase, on the top of the screen there will be a letter, and every three minutes this letter will be replaced by another one (different from the previous one). Your task is to write down as many words as you can that have to be related to one of the four categories, and have to begin with the letter given in that moment. After three minutes, a new letter will appear on the top of the screen, and the words you write down will have to begin with this new letter. For example, if the letter on your screen is G, you will have to write down as many words as you can that have to begin with letter G and have to be related to one of the above mentioned categories. In order to write a new word, it will be sufficient to insert it in the designated box and then push the bottom OK.

This first phase will last for 15 minutes.

At the end of the first phase, the screen will show you the number of correct words that you will have inserted: this number represents your performance. Misspelled words, words that do not begin with the given letter or that are not related to the category in which you want to insert them, will be considered incorrect and will be not taken in consideration to compute your performance. If you try to insert an incorrect word, the sentence WORD NOT FOUND will appear on your screen, and it will prevent you from inserting the word. While you are completing the task, please remember the following rules:

- Only Italian words will be considered for computing the performance.
- Abbreviations and uncompleted forms will not be considered for computing the performance.
- Similar (but different) words will be considered separately for computing the performance.
- Capital letters will not influence words' correctness.
- Stressed words will not be considered for computing the performance. In order to write them correctly, it is necessary to write them without stress.
- If the same word is written twice in the same category, or in different categories, only one of these two forms will be considered for computing the performance.

- For what concerns *movies* category, the only punctuation marks allowed are: dot (.), comma (,), colon (:), exclamation mark (!), question mark (?), and ampersand (&). Only entirely written titles will be considered for computing the performance.
- For what concerns *flora & fauna* category, only singular forms will be considered for computing the performance.
- For what concerns *food & beverage* category, only singular forms will be considered for computing the performance, except from pasta shapes that are correct only in the plural form.
- For what concerns *forenames* category, only Italian forenames will be considered for computing the performance; moreover, compound forenames will be considered correct only if they are written as an unique word.

Example: letter G

(We substitute the original version of the example, that was in Italian, with a re-adapted example in English, in order to preserve its effectiveness)

Movies	<i>Correct?</i>	Flora&fauna	<i>Correct?</i>
Gomorra	Yes	Goat	Yes
gangs of new york	Yes	Goats	No
gangs	No	goose ⁺	only one
ghostbuster*	only one	German Pinscher	Yes
ghostbuster*	only one	German Shepherd	Yes
ghostbusters 2	Yes		
G.I. Joe: retaliation	Yes		
G.I. Joe- retaliation	No		
Food&beverage	<i>Correct?</i>	Forenames	<i>Correct?</i>
grapefruit	Yes	giulia	Yes
grapefruits	No	Giancarlo	Yes
gnocco	No	Gian carlo	No
gnocchi	Yes	Gregory	No
goose ⁺	only one		

gangs = it is the shortened version of 'gangs of new york', therefore it is incorrect;

ghostbusters, ghostbusters = it is the same word repeated in the same category, only one of them will be considered for computing the performance;

ghostbusters 2 = it is similar to ghostbusters, but they are different movies; therefore, they will both be considered for computing the performance;

G.I Joe- retaliation= there is a punctuation mark that is not allowed, therefore it will not be considered for computing the performance;

goats = it is a plural form, therefore it will not be considered for computing the performance;

goose (*Flora & fauna*), goose (*Food and beverage*) = it is the same word repeated in different categories, only one of them will be considered for computing the performance;

German Pinscher, German Shepherd = they are similar but different forms, therefore they will both be considered for computing the performance;

grapefruit, grapefruits = only grapefruit is correct because it is the singular form;

gnocco, gnocchi = the correct form is gnocchi because it is a shape of pasta;

Gian carlo = it is a compound forename written with two separate words, therefore it will not be considered for computing the performance;

Gregory = it is not an Italian forename, therefore it will not be considered for computing the performance;

During the task completion, for each letter your screen will show you the remaining time for inserting words, which words you have already inserted and your performance, that is the number of correct words inserted. At the end of phase 1 you will receive a fixed payment of 20 tokens, therefore your payment will not depend on your performance.

At the end of phase 1, and before the beginning of phase 2, you will be asked to wait for 6 minutes; during these minutes you will have the possibility to keep on performing the task, play tetris, or simply wait for the beginning of the next phase. You will not be remunerated for this phase.

After 6 minutes, phase 2 will begin. The task of phase 2 is absolutely identical to that of phase 1, and also phase 2 lasts for 15 minutes.

For Control Treatment:

For completing phase 2, you will receive a fixed payment within a range between 0 and 30 tokens; this payment will be determined through a random process before the beginning of phase two. Therefore, you will know your remuneration for phase

2 only after the end of phase 1, and before the beginning of phase 2. Your final payment will be equal to 3 euro for your participation + 20 tokens for phase 1 + the random payment for phase 2.

The experiment will end after phase 2.

For Delegation Treatment:

Before the beginning of phase 2, you will be asked to decide your own payment for that phase. You will have the possibility to opt for an amount included within a range between 0 and 30 tokens. Your final payment will be equal to 3 euro for your participation + 20 tokens for phase 1 + the payment you ask for phase 2.

The experiment will end after phase 2.

CONTROL QUESTION:

Before the beginning of the experiment, please answer the following questions in order to verify whether you comprehend the instructions.

1. During phase 1, player A writes 23 correct words and player B writes 40 correct words. Which is the player who receives the highest payment? Why?
2. (*For Control Treatment*) Before the beginning of phase 2, you are told that you will receive 25 tokens for completing the task in phase 2. Which is the total amount of money that you receive for the experiment? (*For Delegation Treatment*) Before the beginning of phase 2, you ask to be paid 25 tokens for completing the task in phase 2. Which is the total amount of money that you receive for the experiment?
3. Check whether these forms are correct or not: *Giraffes, george, gattaca, Gorilla, garlic.*

APPENDIX B: QUESTIONNAIRE

This is a translated version of the original questionnaire, which was in Italian. We created this questionnaire starting from the Intrinsic Motivation Inventory (IMI) (Ryan, 1982).

FINAL QUESTIONNAIRE

For each of the following statements, please indicate how much do you agree, using the following scale:

1	2	3	4	5	6	7
I strongly disagree			I somewhat agree			I strongly agree

1. While I was doing this activity, I was thinking about how much I enjoyed it.
2. This activity did not hold my attention at all.
3. I thought this activity was quite enjoyable.
4. I think I did pretty well at this activity, compared to other students.
5. I thought this was a boring activity.
6. I enjoyed doing this activity very much.
7. I would describe this activity as very interesting.
8. I am satisfied with my performance at this task.

9. After working at this activity for awhile, I felt pretty competent.
10. I think I am pretty good at this activity.
11. This activity was fun to do.

APPENDIX C: EXPERIMENTAL INSTRUCTIONS

Since the experiment was conducted in Trento, the original instructions were in Italian. This is a translated version.

CONTROL TREATMENT

Good morning and thank you for your participation to this experiment!
You are going to take part in an experiment with scientific purposes. Please read carefully the instructions that we gave to you; an experimenter will read them aloud. May you have any doubts, don't hesitate to ask!
During the experiment, you will have the possibility to earn an amount of money according to a procedure that you will be told in a while. In addition, you will receive 3 euro for arriving on time. During the experiment, your payment will be calculated in tokens with a conversion rate of:

$$1 \text{ token} = 0.05 \text{ euro}$$

The experiment is characterized by anonymity. During the experiment, you are not allowed to talk to other participants nor to use your phone; otherwise, you will be excluded from the experiment. At the end of the experiment, you will be asked to respond to a brief questionnaire; after that, you will be paid in cash in a private room.

General informations:

Participants will be randomly assigned the role of employer or employee. At the beginning of the experiment you will find out which will be your role, and you will

maintain the same role throughout the entire experiment. Participants will be then randomly assigned to groups that consist of three people: two employees and one employer. You will not know the identity of the other components of your group, and they will not know yours.

Rounds:

The experiment consists of ten identical rounds. Before the proper experiment begins, there will be two trial rounds that will be absolutely identical to the experimental rounds, except that participants will not be paid for these two rounds. When the proper experiment begins, groups formed during the trial rounds will be separated and participants will be randomly rematched in new groups. The new groups will remain unchanged until the end of the experiment: it means that you will interact with the same people for all the rest of the experiment. Participants' role will not change after the trial rounds: meaning that, those who are employees in the trial rounds keep on being employees also in the proper rounds, and those who are employers in the trial rounds keep on being employers also in the proper rounds.

After the trial rounds, your earnings for each round will depend on your decisions and on the decisions of the participants you will be grouped with. At the beginning of each round, each employer will receive an endowment of 20 tokens, while each employee will receive an endowment of 8 tokens. Each round consists of three stages.

Stage 1: the contract

Each employer will have the possibility to choose the contract to be proposed to both her employees. The contract is composed by: an asked level of effort p^* , a wage s , and a minimum wage s_{min} that should be lower than the wage. The asked effort should be within the range $[0, 20]$, while both the wage and the minimum wage should be within $[0, 10]$.

Stage 2: the production

Each employee will be told about the contract offered by his employer; then a sequence of tables made by 0 and 1 will appear on his screen, and he will be asked to count the exact number of 1 in each table. This task will last 90 seconds.

During these 90 seconds, employers will be given the possibility to play "snake", but their performance will not influence their earnings.

After 90 seconds, each of these three events can happen *with the same probability* within each group: the number of tables completed by employee 1 is halved,

the number of tables completed by employee 2 is halved, or none of these events. It means that for example, if employee 1 has completed 6 tables during the production phase, there is a probability equal to $\frac{1}{3}$ that his production is halved and he has only 3 tables at his disposal.

BEFORE knowing which of these events will effectively happen, each employee has to decide how many tables keep for himself and how many tables give to the employer in each of the three possible situations, meaning 1) if his tables are reduced 2) if the tables completed by his coworker are reduced and 3) if neither his tables nor the tables of his coworker are reduced. For each completed table he decides to keep for himself, he will earn 0.4 tokens; for each completed table given to the matched employer, the employer will earn 0.6 tokens.

After this choice, each employee will discover which event has effectively happened and consequently which of his three potential strategies will be implemented. The number of tables effectively given to the employer by one employee represents the employee's level of production (p).

Stage 3: the payment of the wage

In this stage each employer will observe how many tables each employee has effectively sent her, but she will not discover which of the three events has effectively happened (whether the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events). Moreover, she will be told about the average number of tables completed by all the employees in the previous round.

If the number of tables consigned by one employee to the employer is greater or equal to the asked level of effort (p^*), the employer will be forced to pay the higher wage s to that employee; on the other hand, if the number of tables consigned by one employee to the employer is lower than the asked level of effort (p^*), the employer will have the possibility to choose whether to pay him the higher wage s or the minimum wage s_{min} . The employer will have the possibility to pay a different wage to her employees.

The employer will be then asked to guess the total number of tables that each of her employees wanted to keep; if the employer guess the right number of kept tables, she will be paid additional 1 token. This is the end of stage three and the end of the round.

At the end of each round, each participant will be told about everything hap-

pened in that round, the payment he obtained, and the cumulative payment that he has obtained up to that round. The rules used to calculate participant's earnings are summarized in the session *Earnings per round*. After 12 rounds, all the participants will be asked to complete a questionnaire; then their tokens will be converted in money, and they will be paid privately in a separate room.

Earnings per round

$$\text{Employee's earnings} = 8 + s(s_{min}) + 0.4(\text{number of kept tables})$$

$$\text{Employer's earnings} = 20 - s_1(s_{min1}) - s_2(s_{min2}) + 0.6(p1 + p2)$$

$s_1(s_{min1})$ and $s_2(s_{min2})$ represent the wage/minimum wage given to employee 1 and to employee 2; $p1$ and $p2$ represent the number of tables effectively received by employee 1 and by employee 2.

EXAMPLE:

The employer proposes a contract composed by $p^* = 10$, $s = 8$, $s_{min} = 0$.

Both employee 1 and employee 2 complete 20 tables.

The number of tables completed by employee 1 are halved, therefore employee 1 has only 10 tables. Employee 1 decides to give 10 tables to the employer and he does not keep anything for himself; employee 2 decides to give 5 tables to the employer and to keep 15 tables for himself.

The employer decides to pay the minimum wage $s_{min} = 0$ to employee 2, while employee 1 receives a wage equal to $s = 8$.

Earnings:

$$\text{Employee 1} = 8 + 8 = 16$$

$$\text{Employee 2} = 8 + 0 + 0.4 * 15 = 8 + 6 = 14$$

$$\text{Employer} = 20 - 8 - 0 + 0,6 * (10 + 5) = 12 + 9 = 21$$

CONTROL QUESTION:

The employer proposes a contract composed by $p^* = 12$, $s = 8$, $s_{min} = 1$.

Employee 1 completes 16 tables, and employee 2 completes 13 tables. Neither the number of tables completed by employee 1 nor the number of tables completed by employee 2 is halved. Employee 1 decides to give 3 tables to the employer and to keep for himself 13 tables; employee 2 gives 13 tables to the employer and he does not keep anything for himself. The employer decides to pay the minimum wage $s_{min} = 1$ to employee 1, while employee 1 receives a wage equal to $s = 8$. Which are the participants' earnings?

SOLIDARITY TREATMENT

Good morning and thank you for your participation to this experiment!
You are going to take part in an experiment with scientific purposes. Please read carefully the instructions that we gave to you; an experimenter will read them aloud. May you have any doubts, don't hesitate to ask!
During the experiment, you will have the possibility to earn an amount of money according to a procedure that you will be told in a while. In addition, you will receive 3 euro for arriving on time. During the experiment, your payment will be calculated in tokens with a conversion rate of:

$$1 \text{ token} = 0.05 \text{ euro}$$

The experiment is characterized by anonymity. During the experiment, you are not allowed to talk to other participants nor to use your phone; otherwise, you will be excluded from the experiment. At the end of the experiment, you will be asked to respond to a brief questionnaire; after that, you will be paid in cash in a private room.

General informations:

Participants will be randomly assigned the role of employer or employee. At the beginning of the experiment you will find out which will be your role, and you will maintain the same role throughout the entire experiment. Participants will be then randomly assigned to groups that consist of three people: two employees and one employer. You will not know the identity of the other components of your group, and they will not know yours.

Rounds:

The experiment consists of ten identical rounds. Before the proper experiment begins, there will be two trial rounds that will be absolutely identical to the experimental rounds, except that participants will not be paid for these two rounds. When the proper experiment begins, groups formed during the trial rounds will be separated and participants will be randomly rematched in new groups. The new groups will remain unchanged until the end of the experiment: it means that you will interact with the same people for all the rest of the experiment. Participants' role will not change after the trial rounds: meaning that, those who are employees in the trial rounds keep on being employees also in the proper rounds, and those who are employers in the trial rounds keep on being employers also in the proper

rounds.

After the trial rounds, your earnings for each round will depend on your decisions and on the decisions of the participants you will be grouped with. At the beginning of each round, each employer will receive an endowment of 20 tokens, while each employee will receive an endowment of 8 tokens. Each round consists of three stages.

Stage 1: the contract

Each employer will have the possibility to choose the contract to be proposed to both her employees. The contract is composed by: an asked level of effort p^* , a wage s , and a minimum wage s_{min} that should be lower than the wage. The asked effort should be within the range $[0, 20]$, while both the wage and the minimum wage should be within $[0, 10]$.

Stage 2: the production

Each employee will be told about the contract offered by his employer; then a sequence of tables made by 0 and 1 will appear on his screen, and he will be asked to count the exact number of 1 in each table. This task will last 90 seconds.

During these 90 seconds, employers will be given the possibility to play "snake", but their performance will not influence their earnings.

After 90 seconds, each of these three events can happen *with the same probability* within each group: the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events. It means that for example, if employee 1 has completed 6 tables during the production phase, there is a probability equal to $\frac{1}{3}$ that his production is halved and he has only 3 tables at his disposal.

BEFORE knowing whether his tables will be effectively halved or not, each employee has to decide how many tables keep for himself, how many tables give to the other employee, and how many tables give to the employer in each of the three possible situations: meaning that he has to decide how many tables to give and how many to keep 1) if his tables are reduced 2) if the tables completed by his coworker are reduced and 3) if neither his tables nor the tables of his coworker are reduced. If he decides to give one or more tables to his coworker, his coworker will not have the possibility to keep these tables for himself, but rather these tables will be automatically sent from the coworker to the employer. Consequently:

Tables received by the employer from emp1: tables consigned by emp1 + tables consigned by emp2 to emp1

Tables received by the employer from emp2: tables consigned by emp2 + tables consigned by emp1 to emp2

For each completed table the employee decides to keep for himself, he will earn 0.4 tokens; for each completed table given to the matched employer or to his coworker, the employer will earn 0.6 tokens.

After this choice, each employee will discover which event has effectively happened and consequently which of his three potential strategies will be implemented. The number of tables effectively given to the employer by one employee represents the employee's level of production (p), and it is composed by: the number of tables given by employee 1 to the employer + the number of tables given by employee 2 to employee 1.

Stage 3: the payment of the wage

In this stage each employer will observe how many tables each employee has effectively sent her, but she will not discover which of the three events has effectively happened (whether the number of tables completed by employee 1 is halved, the number of tables completed by employee 2 is halved, or none of these events). Each employer will have the possibility to see only the *total* number of tables that each employee has sent her, but she will not see whether there was a tables exchange among workers. Moreover, she will be told about the average number of tables completed by all the employees in the previous round.

If the number of tables consigned by one employee to the employer is greater or equal to the asked level of effort (p^*), the employer will be forced to pay the higher wage s to that employee; on the other hand, if the number of tables consigned by one employee to the employer is lower than the asked level of effort (p^*), the employer will have the possibility to choose whether to pay him the higher wage s or the minimum wage s_{min} . The employer will have the possibility to pay a different wage to her employees.

The employer will be then asked to guess the total number of tables that each of her employees wanted to keep; if the employer guess the right number of kept tables, she will be paid additional 1 token. This is the end of stage three and the end of the round.

At the end of each round, each participant will be told about everything happened in that round, the payment he obtained, and the cumulative payment that he

has obtained up to that round. The rules used to calculate participant's earnings are summarized in the session *Earnings per round*. After 12 rounds, all the participants will be asked to complete a questionnaire; then their tokens will be converted in money, and they will be paid privately in a separate room.

Earnings per round

$$\text{Employee's earnings} = 8 + s(s_{min}) + 0.4(\text{number of kept tables})$$

$$\text{Employer's earnings} = 20 - s_1(s_{min1}) - s_2(s_{min2}) + 0.6(p1 + p2)$$

s_1 (s_{min1}) and s_2 (s_{min2}) represent the wage/minimum wage given to employee 1 and to employee 2; $p1$ and $p2$ represent the number of tables effectively received by employee 1 and by employee 2.

EXAMPLE:

The employer proposes a contract composed by $p^* = 10$, $s = 8$, $s_{min} = 0$.

Both employee 1 and employee 2 complete 18 tables.

The number of tables completed by employee 1 are halved, therefore employee 1 has only 9 tables. Employee 1 decides to give 9 tables to the employer, 0 to employee 2, and he does not keep anything for himself; employee 2 decides to give 7 tables to the employer, 2 to employee 1, and to keep 9 tables for himself.

The employer decides to pay the minimum wage $s_{min} = 0$ to employee 2, while employee 1 receives a wage equal to $s = 8$.

Earnings:

$$\text{Employee 1} = 8 + 8 = 16$$

$$\text{Employee 2} = 8 + 0 + 0.4 \cdot 9 = 8 + 3.6 = 11.6$$

$$\text{Employer} = 20 - 8 - 0 + 0.6 \cdot ((9+2) + (7+0)) = 12 + 10.8 = 22.8$$

CONTROL QUESTION:

The employer proposes a contract composed by $p^* = 12$, $s = 8$, $s_{min} = 1$.

Employee 1 completes 16 tables, and employee 2 completes 13 tables. Neither the number of tables completed by employee 1 nor the number of tables completed by employee 2 is halved. Employee 1 decides to give 3 tables to the employer, 1 to employee 2, and to keep for himself 12 tables; employee 2 gives 11 tables to the employer, 2 to employee 1, and he does not keep anything for himself. The employer decides to pay the minimum wage $s_{min} = 1$ to employee 1, while employee 1 receives a wage equal to $s = 8$. Which are the participants' earnings?

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