Self-Chosen Goals

Dalton, Patricio; Gonzalez Jimenez, V.H.; Noussair, Charles

Document version:
Early version, also known as pre-print

Publication date:
2016

Link to publication

Citation for published version (APA):
Dalton, P. S., Gonzalez Jimenez, V. H., & Noussair, C. (2016). Self-Chosen Goals: Incentives and Gender Differences (revision of 2015-021). (CentER Discussion Paper; Vol. 2016-036). Tilburg: Economics.

No. 2016-036

SELF-CHOSEN GOALS: INCENTIVES AND GENDER DIFFERENCES

By

Patricio S. Dalton, Victor H. Gonzalez, Charles N. Noussair

6 September 2016

This is a revised version of CentER Discussion Paper No. 2015-021

ISSN 0924-7815
ISSN 2213-9532

Self-Chosen Goals: Incentives and Gender Differences*

Patricio S. Dalton† Victor H. Gonzalez† Charles N. Noussair‡

September 6, 2016

Abstract

To boost employees' performance, firms often offer monetary bonuses when production goals are reached. However, the available evidence indicates that the particular level at which a goal is set is critical to the effectiveness of this practice. Goals must be challenging yet achievable. Computing optimal goals when employees have private information about their own abilities may be impossible for an employer. To solve this problem, we propose a compensation scheme, in which workers set their own production goals and bonuses. We provide a simple model of self-chosen goals and test its predictions in the laboratory. The model predicts that (a) the self-chosen goal contract is more cost effective than a piece rate contract for an employer interested in attaining a desired level of output, and that (b) workers set goals that they systematically outperform. Our experimental data support both predictions. We also observe sharp gender differences in the experiment. The self-chosen goal contract increases the performance of men but not of women relative to a piece rate contract. Women set lower goals, but outperform them to a greater extent than men.

JEL: C91, C92, J16, J24.

Keywords: Contracts, Bonus, Goal-dependent preferences, Endogenous Goals, Productivity, Gender Differences.

*We are grateful to participants in seminars at Tilburg University, the French Experimental Economics Association (ASFEE) conference, the conference in honor of John Ledyard at the California Institute of Technology, the Tilburg Institute of Economic and Behavioral Research (TIBER) symposium, the Economic Science Association (ESA) meetings and the Nordic conference on Behavioral and Experimental Economics, for helpful comments. We thank the Center for economic research at Tilburg University for funding the experiments reported in this paper.

†Tilburg University, Department of Economics and CentER, Warandelaan 2, 5037 AB, Tilburg, The Netherlands. E-mail: `p.s.dalton@uvt.nl` and `v.h.gonzalezjimenez@uvt.nl`.

‡University of Arizona, Eller College of Management, McClelland Hall 401X, Tucson, AZ 85721 E-mail: `cnoussair@email.arizona.edu`.

1 Introduction

Monetary bonuses for achieving performance milestones are used to incentivize employees in a wide range of industries, including finance, insurance, retailing (Banker et al., 2000), manufacturing (Enis, 1993), energy services (Rajagopalan, 1996) and charities (Baber et al., 2002). According to the last WorldatWork's "Survey of Bonus Programs and Practices" more than eighty percent of American firms use at least some type of bonus program (WorldatWork, 2014).[1] On average, American firms pay bonuses to their executives equal to twenty-three percent of their base pay (WorldatWork, 2014).

The main theoretical rationale for bonuses is to improve performance. As long as standard conditions on preferences and costs of effort hold, a monetary bonus can stimulate greater effort (Gibbons, 1998). A large number of studies have empirically shown that bonuses are positively associated with employees' performance (Groves et al., 1994; Baker et al., 1988; Banker et al., 2000; Enis, 1993; Jones and Kato, 1995; Kahn and Sherer, 1990), and that, indeed, cause performance improvements. (Bandiera et al., 2007; Lazear, 2000).

Typically, bonuses are awarded only if a certain performance target is reached. This threshold feature can give the target the status of a reference point. Thus, reference-or goal-dependent preferences can potentially be brought to bear to better understand how bonuses affect performance. There is evidence that once an individual has a goal, she exerts more effort on the associated task (Locke and Latham, 1990; Locke, 1996; Locke and Latham, 2002). However, there is also evidence that the level at which the goal is set is critical to its effectiveness: goals must be challenging yet achievable. Goals that are too easy or too difficult to attain are not effective. Wu et al. (2008) substantiate this intuition in a model in which individuals respond to exogenously-set goals. Their model predicts that performance is an inverted V-shaped function of the goal level, implying that there is an optimal *challenging yet attainable* goal that boosts performance to the maximum.

Computing optimal goals for an employee when her individual ability is private information can be cumbersome, or even impossible, for a firm. However, the firm could offer a menu of self-chosen goal contracts, in which agents sort themselves according to their types, as in classical optimal contracting (Holmstrom, 1979; Laffont and Tirole, 1993).

We propose a compensation scheme inspired by this idea. In our scheme, workers set their own production goals. With the right incentives, they set challenging goals that induce themselves to produce as much as they can, given their abilities. This aligns the incentives of both employers and workers as in classical optimal contract theory.[2] It also allows the

[1]According to Joseph and Kalwani (1998), 72% of firms use bonuses to incentivize sales. See also Lemieux et al. (2009), who document evidence of the increasing use of bonuses in the US labor market.

[2]There is evidence from the accounting literature that participating in the budgetary process improves managers' motivation and performance (Kren, 1992; Brownell and Mcinnes, 1986; Becker and Green, 1962).

principal to take advantage of the reference point a goal creates to lower the cost of attaining a given production level.

Under our scheme, the agent chooses her own goal from a menu that is prespecified by the principal. The proposed menu of contracts provides sufficient monetary incentives for the agent to announce challenging, yet attainable, goals. The contract includes a monetary bonus for achieving the goal, and this bonus increases monotonically with the magnitude of the goal. In this way, setting ambitious goals is incentivized monetarily.

In Section 2, we introduce a theoretical model of optimal self-chosen goals. The model builds on a linear piece rate contract and considers the consequences of the addition of a bonus for achieving a goal that is set by the agent himself. The model initially assumes preferences over only monetary outcomes and the cost of output. It is then extended to include goal-dependent preferences of a specific form, in which the goal serves as a reference point that defines domains of relative gains and losses (Wu et al., 2008; Corgnet et al., 2015).

The model yields a number of testable predictions. The first is that agents increase their output as the piece rate increases. The second is that agents increase their output when they are allowed to set their own goal. The third is that output always strictly exceeds the goal. This last prediction is a consequence of goal-dependent preferences, and in their absence, output is exactly equal to the goal.

We design a laboratory experiment to test these predictions. In the experiment, described in Section 3, participants engage in a real effort task, which consists of counting the number of zeros in a table with approximately 150 zeros and ones. Output is measured as the number of tables completed correctly.[3] We compare three contracts with regard to the output they generate. Two of these are piece rate contacts: one with a relatively low piece rate (LOPR) and another with a higher piece rate (HIPR). The third contract is a *self-chosen goal* contract (GOAL), which includes both a piece rate monetary compensation and a monetary bonus that is paid if and only if a goal is reached. The higher the goal, the higher the monetary bonus paid if the bonus is achieved. These contracts can be ranked according to their cost per produced unit, with HIPR being the most expensive one, LOPR being the cheapest contract and GOAL being an intermediate option for the principal.

The experimental results are reported in Section 4. While the model predicts that output would be greatest in the HIPR treatment, second highest in GOAL, and lowest in LOPR (HIPR > GOAL > LOPR), we observe that output is equal in the HIPR and GOAL treatments, with both exceeding that under LOPR (HIPR = GOAL > LOPR). Thus, we find that a higher piece rate leads to greater output than a lower one, and that supplementing a piece rate contract with a self-chosen goal increases output compared to

[3]This task has been previously used by other researchers. See for example Abeler et al. (2011).

the piece rate on its own. The GOAL contract achieves the same output as HIPR, but at lower cost. We also find that subjects systematically set goals that they outperform, suggesting that at least some participants have goal-dependent preferences.

In Section 5 we describe sharp gender differences in the responses to the incentives provided by the self-chosen goal contract. While the self-chosen goal contract makes men increase their performance compared to the low-powered piece rate contract, it does not affect the performance of women. To understand the reasons for these gender differences, we study goal-setting behaviour. We find that women are relatively more conservative than men when they set their goals, i.e. their actual performance tends to exceed their goal by a larger margin than for men. Their relatively more modest goals translate into lower bonuses and hence, lower earnings. We observe this pattern systematically across all nine rounds of the experimental sessions. That means that the differences persist when both men and women have had opportunities to learn about their abilities, ruling out risk preferences or biased beliefs as plausible drivers of the gender differences. The gender differences in the effectiveness of the self-chosen goal contract are consistent with our model, if it is assumed that the genders tend to differ in the average parameter values of the goal-dependent component of their preferences.

Our paper relates to several strands of literature. The first is the literature on mechanism design (Hurwicz, 1973), in that it studies a setting in which a principal offers a contract that aligns the incentives of both principal and agent. Our contract allows the agent to self-select into a bonus scheme that is well-suited to her particular individual cost of effort profile. In this manner, the choice of one's own goal resembles the choice of one's own linear contract (Laffont and Tirole, 1993), by adapting the marginal incentives in the contract to the agents' type. The new element here is that a self-chosen goal contract allows the principal to exploit an agent's goal-dependent preferences to attain a higher payoff.

Second, it adds to the literature on personnel economics (see Gibbons and Roberts (2013) for a review) by studying a pay-for-performance incentive scheme with an unconventional element. There is a large literature on such systems (Lazear, 1986, 2000), including on bonus contracts (Fehr et al., 1998, 2007), but the type of bonuses that this literature studies are typically those exogenously set by the firm.

Third, a number of recent theoretical papers (e.g., Koch and Nafziger (2009), Koch and Nafziger (2011) and Hsiaw (2013)) have considered the effects of endogenous goals in attenuating self-control problems in other contexts. Like us, they assume that goals are endogenous reference points and that agents are loss averse. Our paper differs from this literature in two distinct ways. First, in this literature the goals are not incentivized with money. Second, the focus is on decision problems where time plays a basic role. One key insight from this literature is that an increase in the goal level set now can raise an individual's motivation to work hard in the future. If the individual has present bias, he may be tempted to shirk in the future. However, if he is sophisticated enough, he can use a goal as a self-motivating device to attenuate future shirking. The role that a goal plays here is different. Present bias is not a factor in our model because we work in a static framework and the motivation to set a goal emerges directly from the incentives of the contract.

Fourth, the paper contributes to the literature on goals as performance enhancers initiated by Locke (1996) and taken up by Heath et al. (1999). This literature argues that goals act as reference points, and due to the properties of the prospect theory value function, they boost performance. Wu et al. (2008) formalize this intuition in a model in which individuals respond to exogenously-set goals. Gómez-Miñambres (2012) and Corgnet et al. (2015) develop this idea further. They show that under perfect information, an optimising principal chooses a challenging but attainable goal for an average-ability worker, and that this optimal goal increases the worker's performance.[4]

The two most closely related experimental studies to ours are those of Corgnet et al. (2015) and Goerg and Kube (2012). Corgnet et al. (2015) consider an environment in which an employer has the option of providing with a goal for performance in a real effort task, summing up matrices of 36 numbers. Workers can also switch from the task to a leisure activity, browsing the internet, whenever they wish. The goal has no monetary consequences for either the worker or the employer. They find that the presence of a goal improves performance and increases the time spent working. Employers set challenging goals and increase them over time. The principal differences between our study and that of Corgnet et al. (2015) is that in our experiment, each agent chooses his *own* goal, and attaining the goal yields a monetary payment to the worker.

Goerg and Kube (2012) report a field experiment in which workers were recruited to restructure a library, which required locating and moving books currently on the library shelves. Performance was measured as the number of books moved. In one treatment, individuals were paid a piecerate, and in two of the other treatments, exogenous goals were set by the experimenter. In yet another treatment, workers could choose their own goal. Attaining a goal yielded a bonus which was larger the higher the goal was. They found that their GOAL treatment induced greater output than did the piecerate. The two exogenous goal levels that they studied yielded higher output than the piecerate, but not as high as the self-chosen goal. The main differences between their experiment and ours is that their experiment is conducted in the field outside of the laboratory, they consider a one shot setting, where adaptation from feedback about performance cannot be studied, and their

[4] Gómez-Miñambres (2012) also studies a principal-agent model, where the principal sets a goal for the agent, and the agent derives utility from accomplishing the goal. He shows that the agent's production and the goal set by the principal both increase with the agent's belief about how challenging the goal is.

self-chosen goal contract does not contain a piecerate that incentivizes workers to work beyond their goal.

In our paper, we provide a theoretical framework for analysing self-chosen goals that yields a number of insights. The first is the existence of piling-up, performing strictly in excess on one's goal, even when goals are self-chosen. The agent systematically sets a goal that is strictly lower than her optimal production level. The size of the piling-up effect decreases with the marginal monetary benefits from achieving a goal, and increases with the weight given to the psychological payoff. We show that the level of loss aversion does not influence the level of goal or the piling-up, since the optimum is always in the domain of gains relative to the goal, and loss aversion only influences incentives in the domain of losses. The second is that in a context of rational decision makers, goal-dependent preferences do not affect the agent's output, but only serve to lower her goal. Thus, goal dependent preferences have the effect of reducing the cost to the employer of achieving a given level of output.

2 The model

In this section, we develop a simple theoretical framework for the analysis of self-chosen goals, from which we derive the predictions that we test in the laboratory. We use elements of Wu et al.'s (2008) theoretical framework. However, in our model, we study the case in which the principal leaves the decision of setting a goal and producing output entirely to the agent.

Consider a risk neutral agent who chooses a level of production $y > 0$. The cost of production to the agent, $c(y, \theta)$, satisfies the following assumption:

Assumption 1: $c(0, \theta) = 0, c_y(y, \theta) > 0, c_{yy}(y, \theta) \geq 0$ and $c_{y\theta}(y, \theta) < 0$, for all y, θ.

The parameter $0 < \theta \leq 1$ is interpreted as the agent's ability; higher values of this parameter flatten the cost function and allow the agent to achieve a higher level of production with the same effort.

2.1 Piecerate and goal contracts under standard preferences

We first consider an agent facing a piece rate incentive scheme of the form $w = ay$. Under this contract, the agent's utility is

$$U(y) = ay - c(y, \theta),$$

where $a > 0$ is the compensation that the agent receives for each unit she produces. The agent chooses y to maximize $U(y)$. The optimal choice satisfies the following first order condition:

$$a - c_y(y_P, \theta) = 0.$$

Where y_P is the optimal production level. Suppose now that in addition to the piecerate compensation, the principal introduces a bonus B for attaining an exogenously given output goal g. In that case, the payoff of the agent is given by

$$w(y, B(y, g)) = ay + B(y, g),$$

where we assume a bonus of the form

$$B(y, g) = \begin{cases} bg, & \text{if } y \geq g \\ 0, & \text{if } y < g. \end{cases}$$

The employer awards a larger bonus for achieving a more ambitious goal, and the bonus is not awarded if the target level of output is not attained. Under this bonus scheme, the worker must choose whether to work towards the bonus or not. She must compare the payoff from the optimal level of output below the target level, with that resulting from the optimal output level that equals or exceeds the target.

Denote the optimal choice of output below the target as $\underline{y}$, and the resulting utility level as

$$U(\underline{y}) = a\underline{y} - c(\underline{y}, \theta).$$

Similarly, let the optimal output in the region of output above or equal to the target level be denoted as $\bar{y}$, and the corresponding utility level as

$$U(\bar{y}) = a\bar{y} + bg - c(\bar{y}, \theta).$$

It is optimal not to try to achieve the goal, when the goal is set so high that it becomes too costly to attain, i.e. $U(\underline{y}, g) > U(\bar{y}, g)$. This is the case when the marginal cost of achieving the additional output required to surpass the goal, $c(\bar{y}, \theta) - c(\underline{y}, \theta)$, is greater than the marginal benefit from doing so, $a\bar{y} - a\underline{y} + bg$. Also note that for $\bar{y} > y_P$, if $c(\bar{y}, \theta) - c(\underline{y}, \theta) \leq bg + a\bar{y} - a\underline{y}$, the worker exerts extra effort to attain the goal beyond the amount she would have exerted if there were no bonus in place. Therefore, an exogenously set goal that is challenging yet achievable, has the potential to increase output.

Generically, however, the principal will have incomplete information about the type of the worker, and therefore will not know the level at which he should set his output target.

For this reason, we consider contracts in which the worker can set his own goal. For the rest of this section we model the goal and output as set by the agent. We begin our analysis by showing that when a worker is allowed to do so, she will set her goal exactly equal to her optimal level of output. This is formally stated in the following proposition.

Proposition 1: *An agent with standard preferences chooses a goal equal to $g^* = y^*$, where y^* satisfies the first order condition $a + b - c_y(y^*, \theta) = 0$.*

Proof. We first show that at an optimum, it must be the case that the optimal output level is equal to the optimal goal chosen, i.e. $y^* = g^*$. Second, we show that y^* must solve $c_y(y, \theta) = a + b$. First, note that when $y \neq g$, either y or g is not optimal. Consider a given y_l such that $y_l < g$. Then, $U(y_l, g) = ay_l - c(y_l, \theta)$. By reducing her goal and setting $g = y_l$, the agent achieves a strictly greater payoff, $U(y_l, y_l) = ay_l + by_l - c(y_l, \theta)$. Now consider a given y_h, such that $g < y_h$. The agent's payoff is $U(y_h, g) = ay_h + bg - c(y_h, \theta)$. By increasing the goal to $g = y_h$, the agent's payoff increases to $U(y_h, y_h) = ay_h + by_h - c(y_h, \theta)$. Therefore, y must be equal to g.

The second step is to derive the optimal goal. By the first step of the proof, we know that the agent will always work exactly as much as needed to receive the bonus. Her earnings are then given by $ay + by - c(y, \theta)$. To derive the optimal goal, we consider the first order condition for the maximization of earnings with respect to output,

$$a + b - c_y(y, \theta) = 0.$$

The above implies that $g^* = y^*$, with y^* satisfying the first order condition $a+b-c_y(\theta, y^*) = 0$.

□

The optimal output levels for both the piece rate and the self-chosen goal contracts are illustrated in Figure 1. The diagonal line indicates the marginal cost of output for the functional form $c(y, \theta) = \frac{(\frac{y}{\theta})^2}{2}$, with slope $\frac{1}{\theta^2}$. The horizontal lines represent the marginal benefit of output under each contract. Under a standard piece rate contract, the marginal benefit is a. Under the endogenous bonus contract, the marginal benefit, expressed in terms of output, is $(a + b)$. From the figure, it is clear that increasing the piece rate or adding a self-chosen goal increases output.[5] Under a cost of effort $c(y, \theta) = \frac{(\frac{y}{\theta})^2}{2}$, as depicted in the

[5]An analogy that is perhaps useful in understanding Figure 1 is to long-run and short-run costs in producer theory. In the short run, the quantity of labor employed can be changed, and in the long run, the amount of capital can be adjusted as well. Here, one can view the choice of output as a factor that can be varied in the short run, and the goal as a choice that cannot be adjusted in the short run. The horizontal

figure, the optimal goal equals $g^* = (a+b)\theta^2$.

[Figures 1 and 2: About Here]

2.2 Goal-dependent preferences

Now suppose that the worker has goal-dependent preferences, which are represented by the following utility function.

$$U(y,g) = ay + B(y,g) + V_I(y,g) - c(y,\theta).$$

The third term on the right side of the equation represents the intrinsic, non-monetary, utility derived from the presence of the goal. We assume, following Wu et al. (2008), that the goal is treated as a reference point, and that the intrinsic component of the utility function satisfies the properties of Kahneman and Tversky's (1979) value function. The intrinsic component takes the following functional form.

$$V_I(y,g) = \begin{cases} \mu(y-g)^r, \text{ if } g \leq y, \\ -\lambda\mu(g-y)^r, \text{ if } y < g. \end{cases}$$

The goal acts as a reference point dividing the output space into gains, where the goal is attained or exceeded, and losses, where the goal is not attained. The parameter $\lambda > 1$ captures the degree of loss aversion. The parameter $0 < r < 1$ reflects the diminishing sensitivity of payoffs, as output deviates farther from the target. The parameter $\mu > 0$ represents the weight that the individual places on the goal-dependent component of her preferences.

The overall utility of the worker then can be summarized as

$$U(y,g) = \begin{cases} ay + bg + V_I(y,g) - c(y,\theta), \text{ if } y \geq g, \\ ay + V_I(y,g) - c(y,\theta), \text{ if } y < g. \end{cases}$$

The goal enters the utility function in two ways. On one hand, it enters positively as a monetary bonus that is increasing in the magnitude of the goal. For this reason, the agent prefers higher to lower goals, provided that the higher goal is attainable. Secondly, the goal divides the output space into psychological loss and gain domains.

The agent chooses her goal and output levels simultaneously. To derive the optimal choices, first note that it cannot be optimal to get $y = g$, as in the case of standard

line at $a+b$ in Figure 1 represents a long-run marginal payoff function, the upper envelope of short-run payoff functions for different fixed goal levels.

preferences. As y approaches g, the marginal utility of output approaches infinity, while the marginal cost of output is bounded above (as shown in figure 2). In other words, it cannot be optimal to set $y = g$, since $\frac{\partial_+ V_I}{\partial y} > \frac{\partial c(y,\theta)}{\partial y}$. Thus, we restrict attention to the levels of y and g that satisfy the requirement $y \neq g$.

Consider the region in which $y < g$. Note that if $y < g$, then $g > 0$, since $y \geq 0$. If y and g are optimal they must satisfy the following first order conditions.

$$a + \mu\lambda r(g - y)^{r-1} - c_y(y, \theta) = 0, \tag{1}$$

and

$$\mu\lambda r(g - y)^{r-1} = 0. \tag{2}$$

Equation (2) implies that the only potential solution requires that $y = g$, which is not feasible, since we assume $y < g$. This shows that any optimal solution must have the property that $y > g$.

Now assume that $y > g$. The optimal tuple (y, g) must satisfy the following first order conditions.

$$a + \mu r(y - g)^{r-1} - c_y(y, \theta) = 0, \tag{3}$$

and

$$b - \mu r(y - g)^{r-1} = 0. \tag{4}$$

Define the optimal output and goal levels implied by these equations as (y^{**}, g^{**}). The second order sufficient conditions for (y^{**}, g^{**}) to be a maximum are that: 1)$\mu(r-1)r(y - g)^{r-2} - c_{yy}(y, \theta) < 0$ for all y, g, and 2) $det|H| = -c_{yy}(y, \theta)(r-1)r(y-g)^{r-2} > 0$ for all y, g, such that $y > g$. It is straightforward to verify that these conditions hold at any $y > g$, as $\mu(r-1) < 0, r(y-g) > 0$, and $c_{yy}(y, \theta) > 0$. Therefore the solution to (3) and (4) is a maximum.

The optimal goal and output of an agent with goal-dependent preferences is described in proposition 2.

Proposition 2: *An agent with goal dependent preferences chooses an output level y^{**}, where y^{**} satisfies $a + b - c_y(y^{**}, \theta) = 0$. The agent chooses a goal $g^{**} < y^{**}$, where $g^{**} = y^{**} - (\frac{b}{\mu r})^{\frac{1}{r-1}}$.*

Proof. We first show that $y^{**} = y^*$. To see this, subtract (4) from (3). This results in the condition $a+b-c_y(y, \theta) = 0$, which is the same first order condition on output in the absence of goal dependent preferences. From equation (4), we have that $y^{**} - g^{**} = (\frac{b}{\mu r})^{\frac{1}{r-1}}$. $\square$

The solution (g^{**}, y^{**}) exhibits some interesting features. The first is the existence of piling-up. The agent systematically sets a goal that is strictly lower than her optimal production level. The size of the piling-up effect decreases with the marginal monetary benefits from achieving a goal, b, since a higher b increases the incentive to set a higher goal. The extent of piling up also increases with the weight given to the psychological payoff, μ. The level of loss aversion does not influence the solution, since the optimum is always in the domain of gains relative to the goal, and loss aversion only influences incentives in the domain of losses.

The second important feature is that goal-dependent preferences do not affect the agent's output, only her goal. Thus, goal dependent preferences have the effect of reducing the cost to the employer of achieving a given level of output. This is because they lead the agent to reduce her goal to a less costly level, $g^{**} < y^{**}$, than an agent with standard preferences would set, $g^{*} = y^{*} = y^{**}$. Because lower goals represent lower expenditure to the employer, goal-dependence reduces the cost of incentivizing an agent to produce a target level of output y^{**}.

3 The experiment

3.1 The general setting

Our dataset consists of 25 sessions, conducted at the CentERLab at Tilburg University. All 235 subjects who took part in the experiment were students at the university. Subjects were recruited via an online system. On average, each session lasted approximately one hour. Between five and eighteen subjects took part in each session. No subject participated more than once in the experiment. The currency used in the experiment was Euros and we used Z-Tree (Fischbacher, 2007) to implement the experiment. Subjects earned on average 14.13 Euros.

In the experiment, subjects performed a time-consuming real effort task under either a self-chosen goal or a piece rate incentive scheme. The real effort task was the one employed by Abeler et al. (2011), which consisted of counting the number of zeros in tables composed of 150 randomly ordered zeros and ones. Just after submitting their answer, subjects would be informed about whether their calculations were right or wrong and a new table would appear. The task was unfamiliar to all participants. It entailed a cost of effort in terms of attention and patience. In addition, the output of the task was of no use to the experimenter so that the impact of any social preferences with regard to the experimenter were minimized.

Each session consisted of nine five-minute rounds of the same task. We paid subjects at the end of the last round according to the total number of correct tables over the nine rounds. There were three treatments that differed only in the performance incentives in effect for the task: one that included a self-chosen goal (GOAL), one with a low piece rate (LOPR) and a third with a high piece rate (HIPR). Forty-two subjects participated in LOPR, ninety-three in HIPR, and one hundred in GOAL. The differences between the conditions are described in the following subsection.

3.2 The Three Treatments

In the GOAL treatment, subjects had to choose, at the beginning of each round, a target level g of correctly solved tables for that round. Achieving that goal would yield a monetary bonus B, which was increasing in the goal level at a rate $b = 20$ (20 Eurocents). In addition to the bonus if the goal is reached, subjects received a piece rate of $a = 20$ (20 Eurocents) per correctly solved table y. Therefore, the payoff function of a participant assigned to the GOAL condition in each round, in terms of Eurocents, was:

$$w^{GOAL} = 20 \cdot y - 20 \cdot \lfloor \frac{1}{3} i \rfloor + B(g, y),$$

with

$$B(g, y) = \begin{cases} 20 \cdot g & \text{if } y \geq g \\ 0 & \text{if } y < g. \end{cases}$$

For every third incorrectly solved table, i, a participant had 20 cents subtracted from her earnings. This punishment was introduced to reduce guessing on the part of participants, as well as to capture a situation in which there is a cost to the worker of making errors, such as for example producing defective units of output.

In the LOPR treatment, subjects were paid a constant piece rate of $\alpha = 20$ (20 Eurocents) for each unit of output. A penalty of 20 cents for every third incorrectly solved table was also in effect. The per-round payoff function of a participant assigned to this condition was the following:

$$w^{LOPR} = 20 \cdot y - 20 \cdot \lfloor \frac{1}{3} i \rfloor.$$

The HIPR treatment was identical to LOPR except that subjects received a piece rate of $\alpha = 50$ (50 cents) for each unit of output, yielding a per-round payoff function of:

$$w^{HIPR} = 50 \cdot y - 50 \cdot \lfloor \frac{1}{3} i \rfloor.$$

As in the other conditions, for every third incorrectly solved table, a participant incurred a penalty equal to the piece rate of producing one unit of output (50 cents in the case of HIPR).

[Figure 3: About Here]

Figure 3 illustrates the incentives in effect in each condition. The horizontal axis indicates the number of units of output (i.e. the number of correctly solved tables), and the vertical axis measures the monetary earnings. The figure shows that for any level of output, the compensation associated with HIPR strictly dominates that associated with LOPR and GOAL. In turn, the earnings in GOAL weakly dominate those under LOPR for any output profile.

3.3 Predictions

The model proposed in Section 2 makes two predictions about treatment differences that we evaluate in our experiment. The first is the predicted ranking of output among the three treatments.

Prediction 1: *Output is highest under HIPR, second highest in GOAL, and lowest under LOPR.*

Predicted output is given by the solution to $a + b - c_y(y, \theta) = 0$. Though $c(y, \theta)$ is not observable in the experiment, there is no reason to believe that it differs among the three treatments. In the LOPR treatment, a = 20, and b = 0, since there is no bonus available. In the HIPR treatment, a = 50 and b = 0. In the GOAL treatment a = 20 and b = 20. Because $c_y > 0$ it must be the case that the level of output that solves $a + b - c_y(y, \theta) = 0$ is greatest under HIPR, followed by GOAL, and lowest under LOPR.

The second prediction concerns the difference between goals set and output attained, and places the two different assumptions on preferences in the model in a competing position.

Prediction 2: *In the GOAL treatment, piling up occurs. That is, agents achieve an output strictly exceeding their goal.*

This prediction is a consequence of the goal-dependent preferences described in section 2. Under goal-dependent preferences, an individual's output, y^{**}, must strictly exceed her goal g^{**}. Under standard preferences, her output y^* equals her goal g^*. Evaluating this prediction is a means of discriminating between the two competing assumptions on preferences.

4 Results

4.1 Output

We first compare the output generated under each treatment. To that end, we estimate (5) below, using a Poisson count regression specification. The estimates are given in Table 1. We measure total output as the total number of correctly solved tables by a participant from round 2 onwards. We take performance in round 1 only as a measure of ability to solve the task, as it was the first time that they face the task.[6]

$$Output_j = \beta_0 + \beta_1 \cdot HIPR + \beta_2 \cdot GOAL + \Gamma' Abilities_j + \epsilon_{sj} \tag{5}$$

$Output_j$ denotes the number of correctly solved tables by subject j in rounds 2 to 9. Model 1 shows that without controls, the treatment differences are not significant. However, when the ability controls are included, both HIPR and GOAL contracts induce an output that is higher than the LOPR contract, as predicted by the model in Section 2. The differences between model (1) and the other models in the table indicate that output is similar at the outset in the three treatments, varying based on the ability level of the individual participant, and that the the treatment differences emerge with repetition of the task.

[Table 1: About Here]

Compared to the output under LOPR, output is on average 7.07% (p=0.012) higher under the HIPR contract and 3.83 % (p=0.067) higher under the GOAL contract.[7] There is no significant difference in output between the HIPR and GOAL conditions ($\chi^2(1)$= 1.34, p=0.247). Hence, if the intention of the employer is to increase total output, both raising the piece rate, as in HIPR, and introducing the self-chosen goal option, as in GOAL, are effective. However, the GOAL contract is more cost effective than is HIPR, in that it costs less to an employer to achieve the same level of output. While subjects under the HIPR contract produced 2.16 tables per euro that they were paid, they produced 3.29 tables per euro under the GOAL contract.[8] We summarize this discussion as the following result:

[6]As it can be seen from Figure 4, subjects goals were far from realistic in round 1 and then they adjust immediately after feedback in round 2. This makes us believe that the first round can be taken as a rough proxy of ability. Analogous measures of ability, based on first round performance, were used by Corgnet et al. (2015) and Goerg and Kube (2012) in testing for differences between treatments in their studies.

[7]These calculations are based on the coefficients presented in Table 1. For example, to compare output in HIPR and LOPR, we use the HIPR coefficient of model (3) and transform it with the exponential function to yield $exp(0.068) = 1.070$

[8]Subjects in the LOPR treatment earned 7.66 Euros on average, while in HIPR they earned 18.79 Euros, and in GOAL they earned 12.52 Euros.

Result 1 (Differences in output): *The GOAL and the HIPR contracts yield higher output than the LOPR contract, and similar output to each other. However, the GOAL contract is more cost-effective for the employer than the HIPR contract.*

4.2 Piling-up

In this subsection we test for the presence of piling-up. In Section 2, we showed that if agents have goal-dependent preferences, they outperform their goals. This is precisely what we observe in the GOAL treatment. While the average output is 4.09 tables per round, the average goal is 3.75. This gap of 0.34 tables is statistically significant ($p<0.001$) though relatively small (9% greater than the goal).

[Figure 4: About Here]

Figure 4 shows that the piling-up effect appears from round 3 onward. By that time, presumably, subjects have had the opportunity to learn about their ability to solve the task and adjust their goals accordingly. We observe an increase over time in both goal levels and the rate at which they are achieved, which goes from 62% in round 1 to 86 % in round 9. The fact that the piling-up effect exhibits a non-decreasing trend suggests that it is a long-run feature. This means that agents have settled on their choice to pile up even after considerable experience with the task and feel that it is a good principle to follow. If piling up were caused by mistakes in forecasting or risk aversion, it would presumably become less pronounced with repetition, as participants' uncertainty about their own performance diminishes. Result 2 summarizes these observations.

Result 2 (Piling-up): *Subjects tend to outperform their goals in a systematic manner, and the gap remains even as they gain more information about their performance.*

In the next sub-section, we study whether and how the self-chosen goals correlate with performance.

4.3 Correlation Between Goals and Output

In the experiment, we observe a positive relationship between goals and output (see Figure 5), for goals that are attainable. When the goal lies between four and seven tables, the correlation coefficient is $\rho_{correct_j,goal_j}$=0.3557 ($p<0.01$). Goals in this range are attained in

70% of instances. The highest output level is reached at what seems to be the maximum attainable goal for a representative individual (seven tables). When the goal level is higher than seven tables, it is never attained and in fact, the correlation between output and goals that are too high is negative ($\rho_{correct_j,goal_j}$=-0.1992). However, all of the observations in this range come from period 1. Goals lower than four tables are attained in 90% of instances, but the goal-output correlation coefficient is lower than that within the range of goals between 4 and 7 ($\rho_{correct_j,goal_j}$=0.2286, p<0.01). All in all, this evidence suggests that there is an optimal self-chosen goal within a range of challenging yet attainable goals. We summarize this evidence in the following result.

Result 3 (Goals and Output): *Self-chosen goals and output are complements when goals are attainable.*

[Figure 5: About Here]

5 Gender Differences

We have seen that there are treatment differences in output. In this section, we investigate whether the effects are similar for women and men. There is evidence from previous studies that women and men react differently to incentives. For instance, some previous studies report that men perform better in tournaments than under piece rate schemes, while women's performance is the same under both (Gneezy et al., 2003; Niederle and Vesterlund, 2007). In turn, women perform better under flat rate wages than under pay-for-performance schemes, and they tend to self-select into the former more often (Masclet et al., 2015). In this section, we consider whether women respond differently than men to the incentives in a self-chosen goal contract.

5.1 Gender Differences in Treatment Effects

We start by studying gender differences in output across treatments. To that end, we split the sample by gender, and estimate the main model of equation (5). The results are reported in Table 2. Compared to the LOPR contract, men increase their output by 14.03 % (p=0.018) when they work under the HIPR contract and by 14.11 % (p=0.048) when they work under the GOAL contract. The results are very different for women, who achieve similar output under the three incentive schemes. While there is no significant difference between the performance of women and men under HIPR (p=0.246), or under LOPR (p=0.255), women produce approximately 15% less output than men under the

GOAL contract (p=0.048). Thus, the self-chosen goal contract is conducive to an increase in productivity, but only for men.

Result 4 (Gender Differences in Output): *Compared to the low piece rate contract, men produce greater output under the self chosen goal and high piece rate contracts. Women's performance is not different under the three contracts.*

[Table 2: About Here]

5.2 Gender Differences in Goal Setting

What explains the gender differences in performance under the self-chosen goal contract? To answer this question, we start by comparing the goals that women and men set. As Table 3 shows, on average, women choose significantly lower goals than men. This is true in each of the nine rounds of the experiment (see Figure 6). The average goal set by women is roughly half of a table lower than that set by men (p<0.001). Moreover, women outperform their goals by 0.29 tables more than men do (p<0.05).[9] Our model suggests that this, together with the fact that the ability of women and men to perform the task is similar, reflects a gender difference in terms of the goal-dependent component of their preferences.

[Table 3 and Figure 6: About Here]

There are other potential explanations for why women might set lower goals than men, relative to their performance. Two of these have to do with risk aversion and beliefs about one's own ability. Compared to men, women tend to be more risk averse (Croson and Gneezy, 2009; Eckel and Grossman, 2008) and have more pessimistic beliefs about their own ability (Scholz et al., 2002; Britner and Pajares, 2006). While higher risk aversion and more pessimistic beliefs could, in principle, explain why women set lower goals when they are uncertain about their abilities, they cannot explain why women set lower goals systematically across all rounds, because such uncertainty is greatly reduced by the late rounds. Hence, differences in risk preferences or beliefs cannot explain the gender differences under the GOAL contract.

[9] This result is robust to exclusion of the first round (p=0.088). In the first round, men set considerably higher goals than women (p<0.01), as can be observed in Table 3. In fact, all of the unattainable goals ($g > 7$) are set by men in the first round. However these men adjust their goals in the second round, setting them within the attainable range $g < 8$.

Another possible explanation is that women and men update their goals differently after receiving feedback about their performance. Buser (2016), and Gill and Prowse (2014), show that women and men react differently to losing a tournament. Men react by demonstrating a greater willingness to compete, while women react in the opposite manner. Given this previous evidence, it might be that women and men also react differently to reaching or failing to reach their goals, and this could shed some light in understanding the gender differences under the GOAL contract. We consider this in the following subsection by looking at the dynamics of goal adjustment.[10]

5.3 Goal Adjustment Dynamics

In order to study the manner in which subjects update their goals from one round to the next, we estimate the following regression:[11]

$$\begin{aligned}\log(g)_{jr} = \theta_1 \cdot \log(g)_{j,r-1} + \theta_2 \cdot \max(0, g_{j,r-1} - y_{j,r-1}) + \\ \theta_3 \cdot \max(0, y_{j,r-1} - g_{j,r-1}) + \theta_4 \cdot \log(g)_{j,1} + \nu_{jr},\end{aligned} \tag{6}$$

where j is an individual and r indexes the round of the experimental session. Table 4 presents the Arellano-Bond estimation of this model. The estimates show that subjects react to success by setting higher goals in the next round, and react to failure by setting lower goals. Notably, men and women adopt the same adjustment behaviour in reaction to success or failure. They both decrease their goals by 8% after failing to achieve their goal and increase their goals by 7 % when the previous round's goal is achieved. F-tests of the appropiate restrictions yield p=0.587 and p=0.372, respectively.

Moreover, after accounting for adjustments to successes and failures, we observe that subjects increase their goals by 32% with respect to the goal of the previous round. This trend, however, is significant only for men, whose average growth rate of goals is 41.5%. In contrast, there is no significantly increasing trend in goals for women, perhaps reflecting a convergence toward the desired level of piling-up. This comes at a monetary cost to women, though it may yield a more than offsetting gain in intrinsic utility. Under the GOAL contract, women earn on average 7.5% less than men, even though they have a similar ability

[10] Another possible explanation for gender differences in the GOAL contract regards differences in preferences for competition. Niederle and Vesterlund (2007) show that women shy away from competition with others while men like to compete. Inasmuch as setting challenging goals is interpreted as establishing a competition with oneself, this could be consistent with women systematically setting lower goals than men. However, because we do not observe how goals are interpreted, our design does not allow us to evaluate this conjecture.

[11] Note that this specification allows for the possibility that the goal is updated asymmetrically in response to success or failure. Including only a one-round lag in the goal setting process has a similar fit as models including lags of two or more rounds.

to perform the task and the same opportunity to learn about their ability.[12] These observations are summarized in the following result.

Result 5 (Gender Differences in Goal Setting): *Both men and women tend to increase their goals after successfully attaining them, and to decrease their goals after failing to do so. However, controlling for these effects, men tend to increase their goals over time, while women do not.*

6 Conclusion

In this paper we introduce a compensation scheme, in which workers set their own production targets and, as a consequence, their own bonuses. Our theoretical analysis of this system yielded two results. First, a self-chosen goal contract leads to a boost in performance equal to that of an an equivalently powered piece rate contract. Indeed, if the worker has reference-dependent preferences, with the goal serving as the reference point, the improvement in performance is obtained at a lower cost to the employer than with an increase in the piece rate. Second, when the agent has goal-dependent preferences, it is optimal for her to choose a goal that she strictly outperforms.

In a controlled laboratory setting, we test the predictions of the model. As predicted by the model, a higher piece rate leads to greater output. A contract in which a piece rate is supplemented by the possibility to set one's goal and bonus also increases output. We also find support for the presence of goal dependent preferences. There is widespread piling-up, that is, subjects systematically outperform their self-chosen goal. A comparison of behavior under HIPR and GOAL reveals that a given output level can be attained at a lower cost to the employer with a self-chosen goal contract than with a standard piece rate incentive scheme.

The goal contract is more effective in increasing output for men than for women. While the self-chosen goal contract increases men's output compared to a low piece rate contract, it does not affect women's production levels. Women tend to set more modest goals in comparison to their abilities. The gender differences in the effectiveness of the self-chosen goal contract are consistent with our model, if it is assumed that the genders tend to differ in the average parameter values of the goal-dependent component of the preferences. For example, if women tend to have larger values of μ, placing more weight on goal-dependent

[12] This result is not minor, considering, for example, that the gender gap in earnings in the United States for workers between 19-24 years old, the age of the subjects in our sample, is about 11% (U.S.Bureau of Labor Statistics, 2013).

preferences, their performance will tend to exceed their goals by a greater margin than that of men.

We also find that output is higher under HIPR than under LOPR for men, but not for women. This is also consistent with our model, if it is the case that the cost function of output tends to differ between genders. If the marginal cost of output is steeper in the relevant range, an agent's behavior displays less responsiveness to a change in the piece rate. Nonetheless, although it is not included in our model, income effects may be present that cause the supply of labor to be backward-bending, and thus cause individuals to produce less output under a higher piece rate. If the average magnitude of these effects differ between the genders, they can generate differences between them in terms of average responsiveness to changes in the piece rate.

A natural question to ask is how a self-chosen goal might compare to a contract where the goal is chosen by the employer. The chief advantage of the self-chosen goal contract is that it can exploit the private information that the employee has about his/her own ability, and potentially align the incentives of employer and employee. On the other hand, an exogenous goal set by an employer might be able to benefit from an additional motivating force for the worker, the desire to reciprocate a generous wage offer chosen by an employer (Fehr et al., 1998). This is an issue to be explored in future research.

References

Abeler, J., Falk, A., Goette, L., and Huffman, D. (2011). Reference Points and Effort Provision. *American Economic Review*, 101(2):470–492.

Baber, W. R., Daniel, P. L., and Roberts, A. a. (2002). Compensation to managers of charitable organizations: An empirical study of the role of accounting measures of program activities. *Accounting Review*, 77(3):679–693.

Baker, G. P., Jensen, M. C., and Murphy, K. J. (1988). Compensation and Incentives: Practice vs. Theory. *The Journal of Finance*, 43(3):593–616.

Bandiera, O., Barankay, I., and Rasul, I. (2007). Incentives for managers and inequality among workers: Evidence from a firm-level experiment. *Quarterly Journal of Economics*, (May):729–773.

Banker, R. D., Lee, S.-Y., Potter, G., and Srinivasan, D. (2000). An empirical analysis of continuing improvements following the implementation of a performance-based compensation plan. *Journal of Accounting and Economics*, 30(3):315–350.

Becker, S. and Green, D. (1962). Budgeting and Employee Behavior. *The Journal of Business*, 35(4):392–402.

Britner, S. L. and Pajares, F. (2006). Sources of science self-efficacy beliefs of middle school students. *Journal of Research in Science Teaching*, 43(5):485–499.

Brownell, P. and Mcinnes, M. (1986). Budgetary Participation , Motivation , Managerial Performance. *Accounting Review*, 61(4):587–600.

Buser, T. (2016). The Impact of Losing in a Competition on the Willingness to seek Further Challenges. *Management Science*, (Forthcoming).

Corgnet, B., Gómez-Miñambres, J., and Hernán-gonzalez, R. (2015). Goal Setting and Monetary Incentives : When Large Stakes Are Not Enough. *Management Science*, 61(12):2926–2944.

Croson, R. and Gneezy, U. (2009). Gender Differences in Preferences. *Journal of Economic Literature*, 47(2):448–474.

Eckel, C. C. and Grossman, P. J. (2008). Differences in the Economic Decisions of Men and Women: Experimental Evidence. In Plott, C. R. and Smith, V. L., editors, *Handbook of Experimental Economics Results*, volume 1, chapter 57, pages 509–519. Elsevier.

Enis, C. R. (1993). Earnings-Based Compensation Plans, Performance, and Capital Expenditure Policy Carrier in the Motor Carrier Industry. *The Accounting Review*, 68(4):928–941.

Fehr, E., Kirchsteiger, G., and Riedl, A. (1998). Gift exchange and reciprocity in competitive experimental markets. *European Economic Review*, 42(96):1–34.

Fehr, E., Klein, A., and Schmidt, K. M. (2007). Fairness and Contract Design. *Econometrica*, 75(1):121–154.

Fischbacher, U. (2007). Z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, 10(2):171–178.

Gibbons, R. (1998). Incentives in Organizations. *The Journal of Economic Perspectives*, 12(4):115–132.

Gibbons, R. and Roberts, J. (2013). *The Handbook of Organizational Economics*. Number 3. Princeton Unversity Press, Princeton.

Gill, D. and Prowse, V. (2014). Gender Differences and Dynamics in Competition: The Role of Luck. *Quantitative Economics*, 5(2):351–376.

Gneezy, U., Niederle, M., and Rustichini, A. (2003). Performance in competitive Environments: Gender differences. *The Quarterly Journal of Economics*, 118(3):1049–1074.

Goerg, S. J. and Kube, S. (2012). Goals (th) at Work. *Preprints of the Max Planck Institute for Research on Collective Goods*, 2012/19.

Gómez-Miñambres, J. (2012). Motivation through goal setting. *Journal of Economic Psychology*, 33(6):1223–1239.

Groves, T., Hong, Y., MacMillan, J., and Naughton, B. (1994). Autonomy and Incentives in Chinese State Enterprises. *The Quarterly Journal of Economics*, 109(1):183–209.

Heath, C., Larrick, R. P., and Wu, G. (1999). Goals as reference points. *Cognitive psychology*, 38:79–109.

Holmstrom, B. (1979). Moral hazard and observability. *Bell Journal of Economics*, 10(1):74–91.

Hsiaw, A. (2013). Goal-setting and self-control. *Journal of Economic Theory*, 148(2):601–626.

Hurwicz, L. (1973). The Design Resource of Mechanisms Allocation for. *American Economic Review*, 63(2):1–30.

Jones, D. C. and Kato, T. (1995). The Productivity Effects of Employee Stock-Ownership Plans and Bonuses: Evidence from Japanese Panel Data. *American Economic Review*, 85(3):391–414.

Joseph, K. and Kalwani, M. U. (1998). The Role of Bonus Pay in Salesforce Compensation Plans. *Industrial Marketing Management*, 27(2):147–159.

Kahn, L. M. and Sherer, P. D. (1990). Contigent Pay and Managerial Performance. *Industrial and Labor Relations Review*, 43(3):107S–120S.

Koch, A. K. and Nafziger, J. (2009). Motivational goal bracketing. *IZA Discussion Paper*, (4471).

Koch, A. K. and Nafziger, J. (2011). Self-regulation through Goal Setting. *Scandinavian Journal of Economics*, 113(1):212–227.

Kren, L. (1992). Budgetary Participation and Managerial Performance: The Impact of Information and Environmental Volatility. *The Accounting Review*, 67(3):511–526.

Laffont, J. J. and Tirole, J. (1993). *A Theory of Incentives in Procurement and Regulation*. MIT-Press, Cambridge(Mass.).

Lazear, E. P. (1986). Salaries and Piece Rates. *The Journal of Business*, 59(3):405.

Lazear, E. P. (2000). Performance Pay and Productivity. *The American Economic Review*, 90(5):1346–1361.

Lemieux, T., Bentley, M. W., and Parent, D. (2009). Performance Pay and Wage Inequality. *Quarterly Journal of Economics*, CXXIV(1):437–452.

Locke, E. (1996). Motivation through conscious goal setting. *Applied and Preventive Psychology*, 5(2):117–124.

Locke, E. and Latham, G. P. (1990). Work Motivation and Satisfaction: Light at the End of the Tunnel. *Psychological Science*, 1(4):240–246.

Locke, E. and Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation. A 35-year odyssey. *The American psychologist*, 57(9):705–717.

Masclet, D., Peterle, E., and Larribeau, S. (2015). Gender differences in tournament and flat-wage schemes: An experimental study. *Journal of Economic Psychology*, 47:103–115.

Niederle, M. and Vesterlund, L. (2007). Do Women Shy Away From Competition? Do Men Compete Too Much? *Quarterly Journal of Economics*, 122(3):1067–1101.

Rajagopalan, N. (1996). Strategic Orientations, Incentive Plan Adoptions and Firm Performance: Evidence from Electric Utility Firms. *CEO publication*, 18(10):761–785.

Scholz, U., Doña, B. G., Sud, S., and Schwarzer, R. (2002). Is general self-efficacy a universal construct? Psychometric findings from 25 countries. *European Journal of Psychological Assessment*, 18(3):242–251.

U.S.Bureau of Labor Statistics (2013). Highlights of Women's Earnings in 2012. Technical Report October.

WorldatWork (2014). Bonus Programs and Practices. Technical Report June.

Wu, G., Heath, C., and Larrick, R. (2008). A prospect theory model of goal behavior. *Mimeo*.

Tables

Table 1: Determinants of Output

	(1)	(2)	(3)	(4)
	(Output)	(Output)	(Output)	(Output)
HIPR	-0.00827	0.0684*	0.0709***	0.0683**
	(-0.13)	(2.21)	(2.62)	(2.52)
GOAL	-0.0106	0.0371	0.0395 *	0.0377 **
	(-0.16)	(1.54)	(1.74)	(1.83)
Mistakes(r=1)		0.0309	0.0299	0.0289
		(1.41)	(1.28)	(1.26)
Correct(r=1)		0.109***	0.109***	0.109***
		(11.01)	(10.95)	(11.03)
Time Table 1		-0.00216**	-0.00216**	-0.00224**
		(-2.14)	(-2.13)	(-2.16)
Session Number			-0.00146	-0.00156
			(-0.58)	(-0.64)
Female				-0.0452
				(-1.12)
Constant	3.551***	3.184***	3.202***	3.236***
	(63.37)	(35.89)	(28.40)	(26.33)
Observations	235	235	235	235

Note: This table presents the estimates of the model $Output_j = \beta_0 + \beta_1 \cdot HIPR + \beta_2 \cdot GOAL + \Gamma' Abilities_j + \epsilon_{sj}$ with $\epsilon_{js} \sim poisson(\mu)$. $Output_j$ is the number of correct tables in rounds 2 to 9 .$Abilities_j$ contains variables related to abilities such as number of correct tables in round 1, number of mistakes in round 1 and the time used to complete the first task. Session Number indexes the order in which sessions were run, beginning in April 2013 and ending in October 2013. All estimations use Poisson count regressions with clustered standard errors at the session level, which are presented in parentheses. Column (1) presents the estimates of this model when Γ is a zero matrix. Column (2) presents the estimates of the complete model. Column (3) presents the estimates of the model including session number. Column (4) presents the estimates of the complete model, a variable that controls for session number and a gender dummy.*** denotes significance at the 1 percent level, ** denotes significance at the 5 percent level and * denotes significance at the 10 percent level.

Table 2: Determinants of Output by Gender

	(1)	(2)	(3)	(4)
	Output	Output	Output	Output
Sample	(Female)	(Female)	(Male)	(Male)
HIPR	0.0371	0.0371	0.122**	0.131**
	(0.74)	(0.75)	(2.23)	(2.36)
GOAL	-0.0190	-0.0191	0.122**	0.132**
	(-0.43)	(-0.43)	(1.97)	(1.98)
Mistakes(r=1)	0.0239	0.0240	0.0427	0.0412
	(0.95)	(0.95)	(1.60)	(1.52)
Correct(r=1)	0.0891***	0.0890***	0.127***	0.127***
	(6.49)	(6.23)	(11.99)	(11.85)
Time Table 1	-0.00201 *	-0.00201*	-0.00268**	-0.00263**
	(-1.80)	(-1.81)	(-2.10)	(-2.08)
Session Number		0.0000733		-0.00285
		(0.03)		(-0.64)
Constant	3.272***	3.271***	3.085***	3.117***
	(33.95)	(32.46)	(30.47)	(25.22)
Observations	122	122	113	113

Note: This table presents the estimates of the model $Output_j = \beta_0+\beta_1 \cdot HIPR+\beta_2 \cdot GOAL+\Gamma' Abilities_j+\epsilon_{sj}$ with $\epsilon_{js} \sim poisson(\mu)$. $Output_j$ is the number of correct tables in rounds 2 to 9 .$Abilities_j$ contains variables related to abilities such as number of correct tables in round 1, number of mistakes in round 1 and the time used to complete the first task. Session Number indexes the order in which sessions were run, beginning in April 2013 and ending in October 2013. All estimations use Poisson count regressions with clustered standard errors at the session level, which are presented in parentheses. Column (1) presents the estimates of this model when Γ is a zero matrix and the sample is composed by male subjects. Column (2) presents the estimates of the complete model and the sample is composed by male subjects. Column (3) presents the estimates of this model when Γ is a zero matrix and the sample is composed by female subjects. Column (4) presents the estimates of the complete model and the sample is composed by female subjects.*** denotes significance at the 1 percent level, ** denotes significance at the 5 percent level and * denotes significance at the 10 percent level.

Table 3: Average Behavior by Gender in GOAL

Gender	Avg. Goal	Avg. Piling-up	Prob. Achieve Goal	First Round Goal
Male	4.049	.2380	.739	4.204
	(1.395)	(1.862)	(.439)	(1.925)
Female	3.557	.527	.773	3.352
	(1.246)	(1.694)	(.419)	(1.230)
Total	3.798	.385	.756	3.77
	(1.343)	(1.783)	(.4293)	(1.656)

Note: This table presents the averages and standard deviations of goal levels, the difference between the goal level and the output produced, the probability of achievement of the self-chosen goal and the goal set in the first round. Standard deviations are presented in parentheses.

Table 4: Determinants of Goal Setting

	(1)	(2)	(3)
	Total Sample	Male Subjects	Female Subjects
	Goal (Present round)	Goal (Present round)	Goal(Present round)
Goal (lag round) ($\log(g_{s,r-1})$)	0.329**	0.406***	0.164
	(0.133)	(0.131)	(0.172)
Success (lag round) ($\max(0, y_{j,r-1} - g_{j,r-1})$)	0.0653***	0.0748***	0.0528***
	(0.010)	(0.013)	(0.013)
Failure (lag round) ($\max(0, g_{j,r-1} - y_{j,r-1})$)	-0.0796***	-0.0795***	-0.0804**
	(0.018)	(0.018)	(0.032)
Female	-0.0336		
	(0.027)		
Initial Goal $\log(Goal_{r=1})$	0.689***	0.582***	0.871***
	(0.133)	(0.132)	(0.161)
N	700	343	357

Note: This table presents the Arellano-Bond panel data estimation of the model $\log(g)_{jr} = \theta_1 \cdot \log(g)_{j,r-1} + \theta_2 \cdot \max(0, g_{j,r-1} - y_{j,r-1}) + \theta_3 \cdot \max(0, y_{j,r-1} - g_{j,r-1}) + \theta_4 \cdot \log(g)_{j,1} + \nu_{jr}$. All regressions use robust standard errors, which are presented in parentheses. Regression (1) presents the estimates of this model using the whole sample. Regression (2) presents the estimates of this model using male subjects. Regression (3) presents the estimates of the model using female subjects. *** denotes significance at the 1 percent level,** denotes significance at the 5 percent level and * denotes significance at the 10 percent level.

Figures

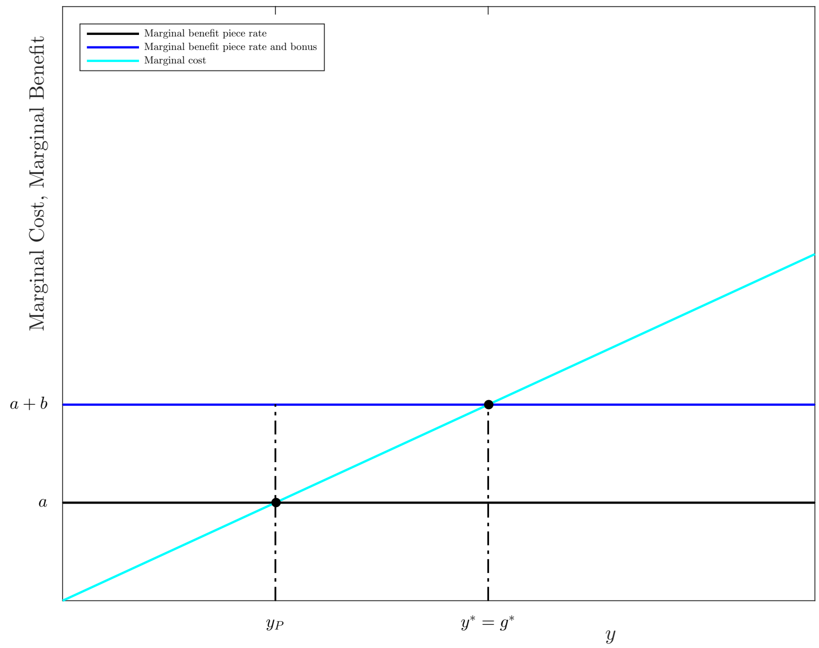

Figure 1: Optimal output under piece rate and self-chosen goal contract, standard preferences

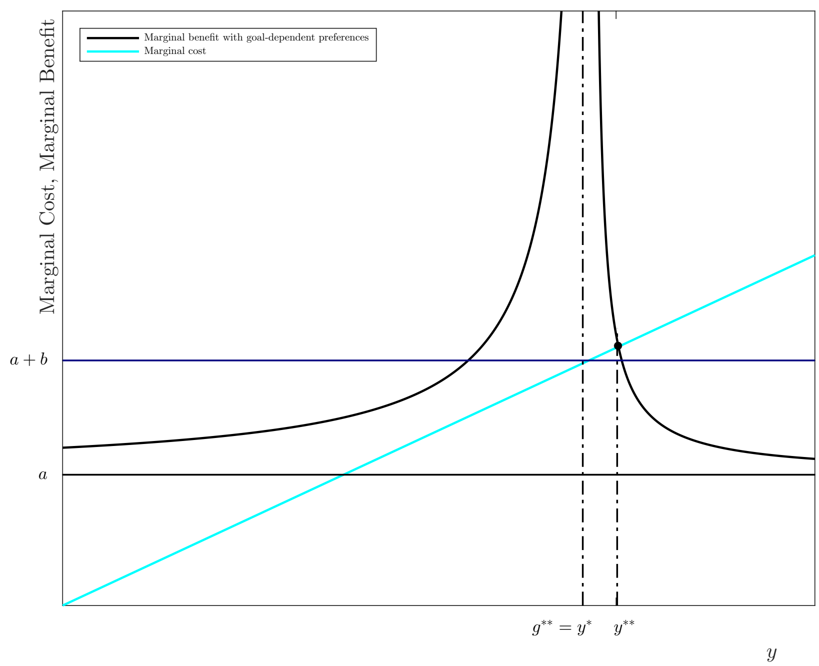

Figure 2: Optimal output and goal under goal-dependent preferences

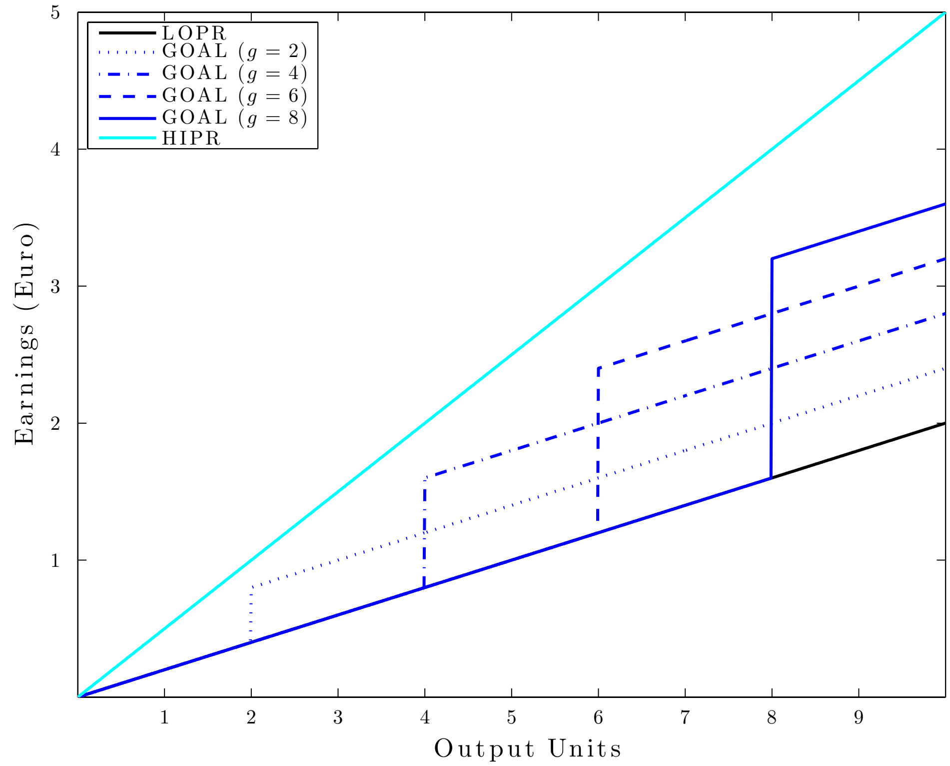

Figure 3: Incentives by treatment

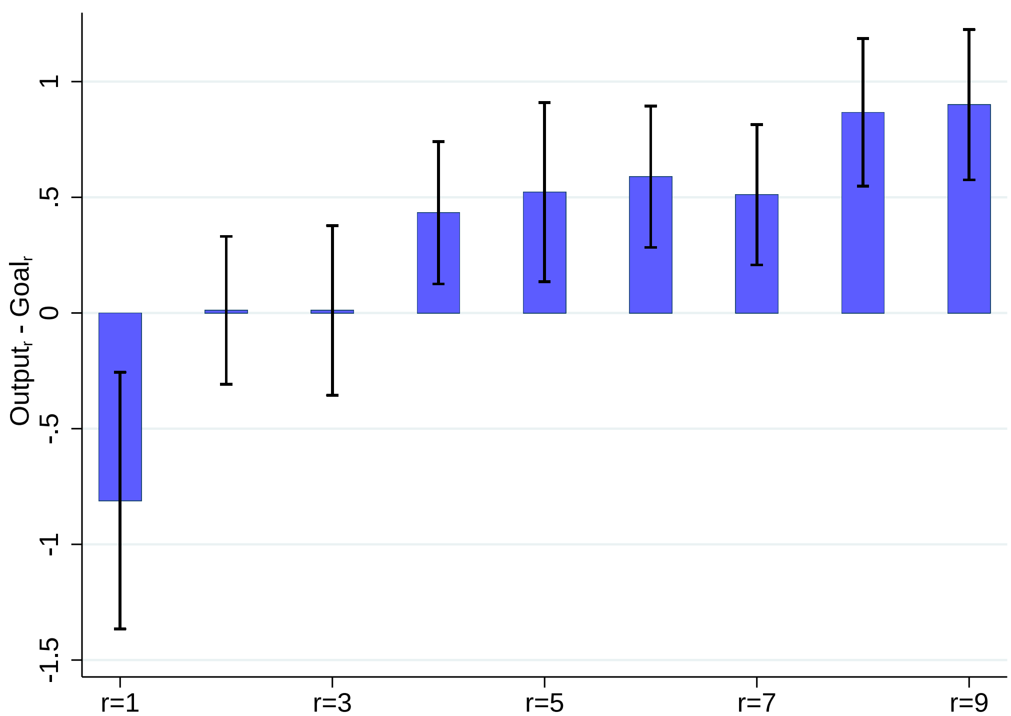

Figure 4: Average output minus goal (piling-up) by round

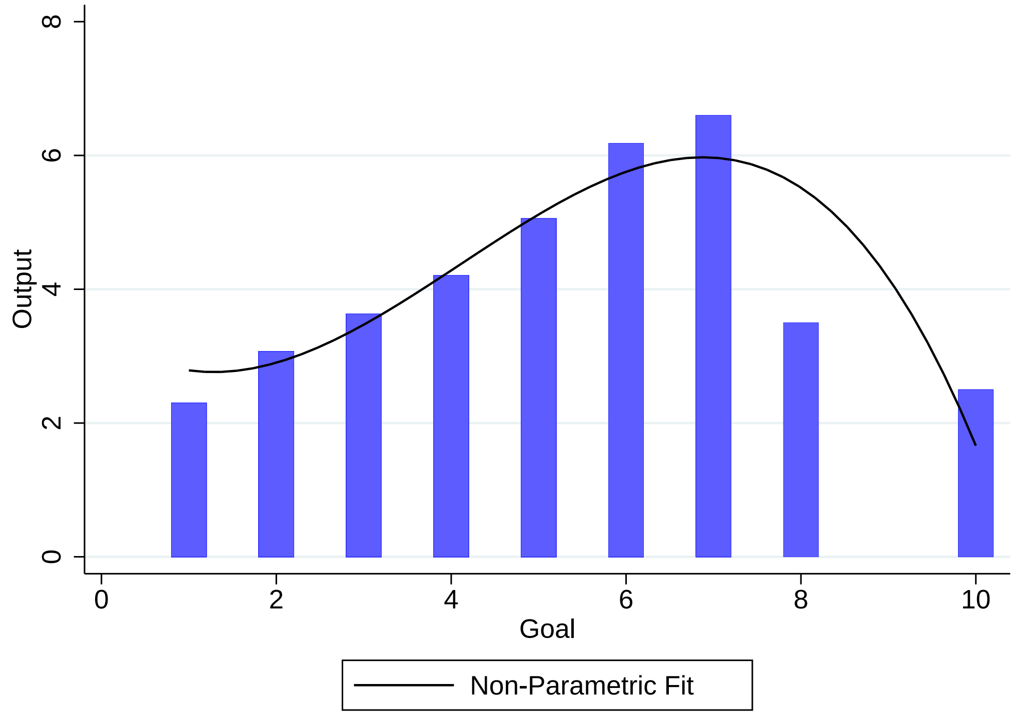

Figure 5: The relation between goal level and output

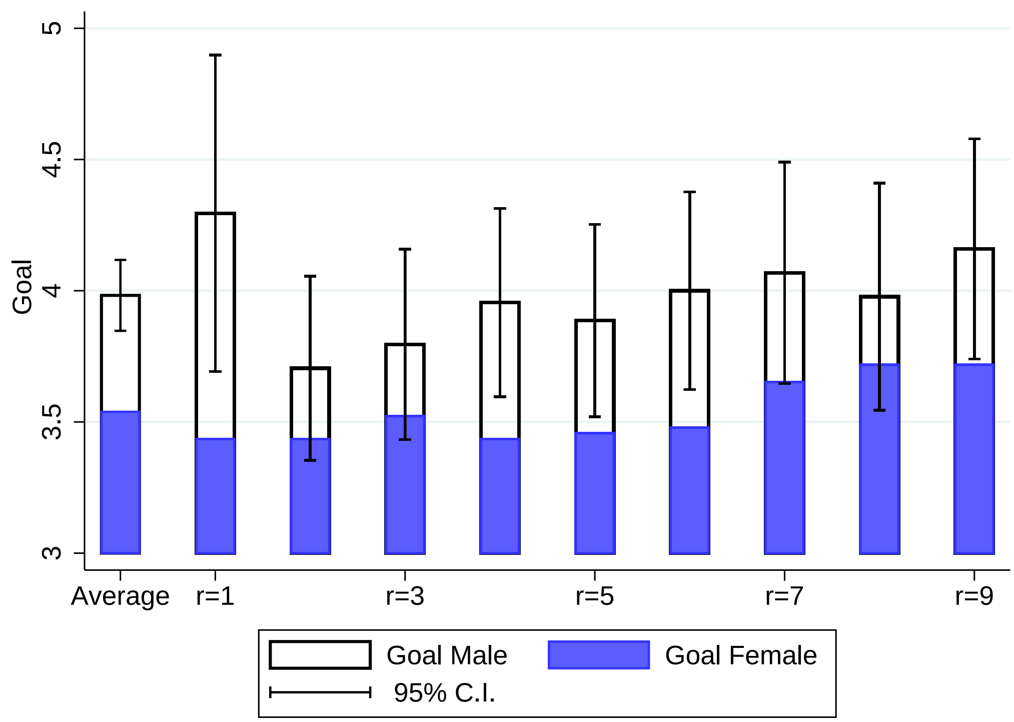

Figure 6: Average goal by gender and round