

Estimating Social Preferences and Gift Exchange at Work*

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Abstract

We design three field experiments to estimate the nature and magnitude of workers' social preferences towards their employers. The experiments vary the piece rates paid to workers, the return to the employer, and employer generosity towards workers ("gifts"). The piece-rate design allows us to estimate the elasticity of work outcomes to monetary incentives and thus benchmark the workers' social preferences toward the employer. The first experiment measures productivity—units of output produced in a fixed amount of time. The second and third experiments measure the willingness to do extra work. We document that productivity is rather unresponsive to financial incentives, while the willingness to perform extra work is very responsive. In terms of social preferences, we document, first, that workers exert effort for their employer even in the absence of private incentives, but are insensitive to the return to the employer. This result is consistent with models of warm glow or social norms regarding work effort, but not pure altruism towards the employer. Second, while we do not detect any effect of the gifts in the productivity experiment, we find moderate positive impacts in the extra-work experiments. We show that this difference is partly explained by disparate elasticities of productivity and extra work.

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1 Introduction

What motivates workers to exert effort? Monetary incentives surely play a large role. Yet, many jobs do not involve piece rates or other outcome-contingent pay, for example because of difficulties in measuring output or providing incentives to multi-tasking workers (Holmstrom and Milgrom, 1991). In such cases, workers may still work hard because they care about their contribution to the firm or its mission. For this reason, Akerlof and Kranton (2005) and Besley and Ghatak (2005) make the case that organizations should select workers with pro-social preferences. But what is the strength and nature of these pro-social preferences?

The literature points to examples of the role of workers’ social preferences towards their employers, such as Kahneman, Knetsch, and Thaler (1986)’s survey evidence on fairness in wage setting or Mas (2006)’s evidence of negative reciprocity after a disappointing pay increase. Overall, however, there is little systematic field evidence about the nature of workers’ social preferences towards employers. Do workers take into account the employer’s payoff, as in pure altruism models (Becker, 1974)? In this case, employees would work harder when their effort is of higher value to the employer. Or is the right model one akin to warm glow (Andreoni, 1989) or social norms regarding effort? In that case, workers may value contributing to the employer, but could be insensitive to the actual employer payoff. Also, does extra employer generosity matter, as in gift-exchange models pioneered by Akerlof (1982)? Is there a negative response to ungenerous employers, as suggested by Mas (2006) and Krueger and Mas (2004)?

Our paper showcases three field experiments designed to estimate the nature and shape of social preferences at work. As in prior gift-exchange field experiments, workers are hired for a one-time task, to shut down repeated-game incentives and thus isolate social preferences. They are then exposed to different employer actions, such as surprise pay raises (Gneezy and List, 2006), pay cuts (Kube, Marechal, and Puppe, 2013), or in-kind gifts (Kube, Marechal, and Puppe, 2012). We also create variation in the return to the employer from workers’ effort as in Englmeier and Leider (2012a). The differences in worker effort across the treatments provide evidence on workers’ baseline levels of social preferences as well as reciprocity to the employer’s generosity.¹

We link the design to a simple model of social preferences to identify the underlying social preferences toward employers. A general first insight of our work is that previous field experiments, while providing very valuable qualitative evidence on social preferences, did not allow for estimation of the social preferences. In particular, two elements were missing from the design.

First, a key unobservable is the cost of worker ‘effort’.² Assume for example that an unexpected

¹We focus on workers’ warm glow or pure altruism towards their employer / its mission, and how this varies with employer generosity. Other forms of social preferences could also be important in work settings, such as pay-inequity aversion (Breza, Kaur, and Sharmdasani, 2018) or concerns about a fair division of the surplus between the employer and workers. We do not study such preferences in this paper. Nor do we capture social preferences which emerge as a result of repeated interactions and social relationships between worker and employer.

²We use the term ‘effort’ to refer to the costly actions that workers must take to produce output that the employer values. In the case of the productivity experiment, effort involves working faster to produce more in a fixed amount of time. In the case of the extra-work experiments, effort corresponds to the additional time spent working or the additional units of work taken on. In both cases, we assume that effort maps one-to-one to the empirically-observed

pay increase leads to 20 percent higher effort, as is the case initially in Gneezy and List (2006). The increased effort could reflect 20 percent higher altruism towards the firm, under a cost function with unit elasticity, or a 100 percent higher altruism under an inelastic cost function with elasticity 0.2. Without information on the cost function, it is impossible to tell. Yet, the two estimates imply a very different role for reciprocity in the workplace.

Second, for the tasks used in these experiments, such as data entry, the return the worker’s effort generates for the employer is unclear, even though it is a key variable to distinguish different types of social preferences. Under pure altruism towards the employer, employee effort increases in the return to the employer. Under ‘warm glow’ (broadly construed to include positive feelings from doing meaningful work, adhering to a social norm of working hard, or signaling prosociality), effort may instead not depend on the employer’s profit. This distinction could not be tested in prior experiments since the return to the employer was typically unobserved and held constant.

We design three field experiments which address both issues. Similar to previous experiments, we set up a one-time job opportunity for a clerical task, and include gift treatments. Our experiments feature what we call a *piece-rate design*, in addition to the gift treatments, and a control treatment with no piece rate. Observing effort under different piece rates allows us to identify the cost of effort function, thus addressing the first issue noted above. In addition, we address the second issue by informing workers about the value of their work to the employer, or by ensuring that there is a natural measure for the value.

In Experiment 1, we measure productivity in a six-hour clerical job, where workers prepare mailers for multiple charities and a grocery store. We adopt a hybrid design that includes both within- and between-subject variation, with the aim to increase statistical power (as in Cohn, Fehr, and Goette, 2014). Also with power in mind, we hired a large sample of 446 workers.

The within-subject dimension is that, every 20 minutes, workers stuff a batch of envelopes for a different employer (charity). Each employer pays a different fixed and/or piece rate, and we also inform the workers about the different average per-envelope returns to the charities. To control for order effects, we randomize workers into two different orders.

The between-subject part of the experiment takes place in the final 2 (out of 10) batches. All participants work again for a charity that previously paid \$7 per batch. In the control group, the charity again pays \$7. In the *positive monetary gift* group (as in Gneezy and List, 2006), the charity now pays \$14. In the *in-kind gift* group (as in Kube, Marechal, and Puppe, 2012) the charity pays \$7, but in addition provides a gift-wrapped thermos of the value of \$14. In the *negative monetary gift* group (as in Kube, Marechal, and Puppe, 2013), the charity pays only \$3.³

We establish four key results. First, moving from a 0c piece rate to a 20c piece rate increases output by 12 percent. While this difference is highly statistically significant, it implies a modest

outcome variables (productivity or units of extra work), with different cost-of-effort functions.

³All the gifts—and more generally all payments to workers—are paid for by the employers, and the returns to worker effort (the raised donations) also go to the employer. As we tell the subjects (truthfully), the Becker Center at the University of Chicago is collaborating with the charities and facilitating the employment, while not paying for the work. The one exception is the two paid training sessions, which by design are paid by the Becker Center.

elasticity of productivity of 0.1. Second, worker productivity increases by 10 percent when the envelopes are utilized by the charity compared to when they are not, holding constant the piece rate. This suggests *some* form of social preferences: workers value that the work counts for the employer. Third, a doubling of the employer return in the form of a donor match leads to a negligible (and statistically insignificant) productivity increase of 1.6 percent. These findings are more consistent with a warm glow model than with pure altruism. Turning to the between-subject gift treatments, we estimate no statistically significant impact for any of the gift treatments.

This experiment allows us to consider, within one design, variation in incentives for the workers, return to the employer, and response to the gifts. Yet, it also has limitations. First, the within-subject structure is less natural, with the potential to confuse some subjects. Second, the precision of the social preference estimates is limited by the fact that the outcome (envelopes stuffed) is quite inelastic. Even sizable shifts in worker altruism or warm glow towards the employer, say due to a gift, would result in fairly small impacts on productivity, which are hard to detect. Indeed, it is only due to the large sample and within-subject structure that we can still extract reasonably precise inferences. This small elasticity appears to be the rule, rather than the exception, for real-effort productivity tasks: previous papers with piece-rate designs estimate elasticities of 0.03 (Araujo et al., 2016 and Goerg, Kube, and Radbruch, 2019) and 0.04 (DellaVigna and Pope, 2018).

To address these issues required us to identify a simpler, between-subject design that is still well-powered, i.e., where the outcome is significantly more elastic to incentives. We are aware of no work tasks with high elasticity of productivity. Instead, building on the design of Abeler et al. (2011), we move from measured output over a fixed unit of time—productivity—to how much *extra work* workers are willing to do—a form of labor supply.⁴

In Experiment 2, we hire 300 workers for a one-time 2-hour data coding job for \$60. After the two hours are completed, and we paid for the work, we ask “*Would you be willing to help us enter some more of the data for up to one hour?*” In a control group, we state that “*unfortunately, we cannot compensate you for this extra time.*” For the two piece-rate treatments, we inform them that “*we will pay you [$\$25/\50] for every minute of work that you do, up to one hour.*”⁵

In Experiment 3, we hire 2,000 workers online for \$1.60 to perform a one-time task of checking the accuracy of 40 mailing addresses of University of Chicago alumni. Upon completion, we ask workers if they would consider checking up to 20 more entries. For the piece rate treatments, we state that “*we will pay you [$1/2/4$] extra cents for every address you check, up to 20 addresses*”.

In both experiments, workers are highly responsive to financial incentives. In Experiment 2, the average number of extra minutes worked increases from 2.5 in the control group to 15.6 in the medium-piece-rate group and to 29.9 in the high-piece-rate group. In Experiment 3, the number of extra addresses checked increases from 3.8 in the control group to 8.4 in the low-piece-rate group,

⁴DellaVigna and Pope (forthcoming) in an online sample similarly show that this extra-work margin is highly responsive to financial incentives. In an alternative approach, Goerg, Kube, and Radbruch (2019) estimates an elasticity of 0.35 for a real-effort slider task if subjects are allowed to browse the internet during an experiment.

⁵Strictly speaking, this is not a piece rate but a wage rate (per minute of work). Experiments 1 and 3 instead employ actual piece rates (per unit of output). In both cases, the crucial feature is linear financial incentives for the observed work outcome. For ease of exposition, we abuse terminology and use the term “piece rate” in each case.

9.7 in the medium-piece-rate group, and 12.6 in the high-piece-rate group.

The other treatment arms are geared towards identifying social preferences. In Experiment 2, we focus on different gift treatments. In a *monetary gift* group, we give the workers, after completion of the 2 hours of work and before asking about the extra work, an additional \$15 as a token of appreciation. In an *in-kind gift* group, we give them a thermos of \$15 value. Further, to study whether any gift exchange would be sufficiently long-lasting, in an *early in-kind gift* group, we gift workers a thermos before they start the 2 hours of work. In all of these gift treatments, there is no piece rate for extra work. Finally, within each arm we inform half of the workers that their work has especially high value to the employer.

In Experiment 3, we have one *monetary gift* arm, giving workers an additional 40 cents before asking for the extra work. (The online setting made it implausible to give in-kind gifts, and an early gift would likely have affected attrition.) We also vary quantitatively the return to the employer, communicated as the cost saving to finding wrong addresses, which depends on the cost of mailers.

Turning to the effect of the gift treatments, in Experiment 2, they raise the average extra work by 5.6 minutes (monetary gift, s.e.=2.1), 4.2 minutes (in-kind gift, s.e.=2.3), and 6.6 minutes (in-kind early gift, s.e.=2.4). This constant effect across the gift treatments differs from the findings of a larger effect of non-monetary gifts in Kube, Marechal, and Puppe (2012) and the suggestive evidence of decay of the effect of the gift over time in Gneezy and List (2006). In Experiment 3, the monetary gift raises the number of additional addresses checked by 1.9 (s.e.=0.5).

Turning to the return to the employer of worker effort, we find no positive impact on effort. In Experiment 2, the qualitative statement on the high value of work to the employer has only a small and statistically insignificant impact of 2.2 minutes (s.e.=2.1). In Experiment 3, the quantitative higher value to the employer leads, if anything, to slightly less extra work (-0.7 envelopes, s.e. 0.4).

Recapping, the three experiments share a common piece-rate design, but differ in many ways. They span an office-type setting (Experiment 1 and 2) versus online work (Experiment 3); they involve a pay of \$60-\$70 (Experiments 1 and 2) versus \$2 (Experiment 3); they have a within-subject design (Experiment 1) versus a between-subject design (Experiments 2 and 3); they focus on inputs (time spent, Experiment 2) versus outputs (Experiments 1 and 3); and they present the value of work to the employer qualitatively (Experiment 2) versus quantitatively (Experiments 1 and 3). Despite these differences, two key findings emerge fairly consistently.

First, experimental variation in the perceived return to the employer, whether communicated quantitatively or qualitatively, does not seem to affect work effort sizably. This evidence fits most obviously with the model of motivation which we labeled ‘warm glow’ and is consistent with the findings of Englmeier and Leider (2012a).

Second, gifts have a statistically significant impact in Experiments 2 and 3, though of a magnitude smaller than even the lower piece-rate effect. How do we reconcile these findings with the null effect of gifts in Experiment 1? We show that the difference can be at least partially reconciled with the vast difference in elasticities. When we translate the gift results into estimates of the reciprocity parameters, we cannot reject that the impact of monetary gifts on social preferences is the same

in Experiment 1 ($a_{Gift} = 0.15$, s.e. 0.13), Experiment 2 ($a_{Gift} = 0.30$, s.e. 0.14), and Experiment 3 ($a_{Gift} = 0.07$, s.e. 0.03). The impact of the in-kind gift is statistically smaller in Experiment 1 ($a_{Gift} = -0.09$, s.e. 0.10) than in Experiment 2 ($a_{Gift} = 0.18$, s.e. 0.14 and $a_{EarlyGift} = 0.36$, s.e. 0.15), but the difference is nowhere near as large as in the reduced-form differences. We view this ability to compare across designs, and at least partially reconcile some of the differences, as a major advantage of the piece-rate design, and the structural estimation that it enables.

This paper relates to the literature on social preferences at work, providing evidence on workers’ *vertical* social preferences towards their employer and its mission (e.g., Besley and Ghatak, 2005; Cullen and Perez-Truglia, 2018), complementing a larger literature about *horizontal* social preferences between co-workers (e.g. Bandiera, Barankay, and Rasul, 2005; Charness and Kuhn, 2007; Cohn, Hermann, and Schneider, 2014; Hjort, 2014; Breza, Kaur, and Shamdasani, 2018). Our first contribution to this literature is providing evidence that worker effort *is* partly motivated by social preferences towards employers, but that these preferences are not consistent with pure altruism. Instead, they can be characterized by a form of warm glow (broadly construed).

Our second contribution is to the literature on gift exchange in the field, which is reviewed in Online Appendix Table 1. We contribute evidence for moderate levels of gift exchange, which can be detected only using the higher-elasticity extra work design in Experiments 2 and 3. This field-experimental literature builds on laboratory experiments on gift exchange, starting from Fehr, Kirchsteiger, and Riedl (1998). These experiments endow ‘workers’ with a ‘cost of effort’ function (a monetary transfer) and also inform subjects of how their ‘effort’ affects the payoffs of the other player (the ‘firm’). Our experiments methodologically build a bridge towards this lab design by estimating the cost of effort and specifying the impact on the employer payoff in the field.

Methodologically, our paper makes the case for a *piece-rate design* which is surprisingly uncommon in real-effort experiments. None of the gift exchange papers we are aware of have piece-rate treatments, and only 2 out of 10 behavioral real-effort experiments (not just on gift exchange) published in top-5 journals from 1999 to 2018 have them. It is also not common among field experiments on productivity, such as Breza, Kaur, and Shamdasani (2018). A piece-rate design enables the researcher to (i) estimate the underlying behavioral parameters and thus allow comparison across experiments with different tasks;⁶ (ii) to compute whether a null result is still consistent with a sizable psychological impact (because the task is insensitive to piece rates), and conversely (iii) to show whether the size of a reduced-form effect (say, of a gift) is plausible. Regarding (iii), we show that some of the findings in previous gift-exchange field experiments imply very large reciprocity effects, assuming an effort elasticity like the one we estimate and the ones in the literature.

⁶This is therefore related to the literature on *structural behavioral economics* (e.g., Laibson, Maxted, Repetto, and Tobacman, 2015; Conlin, O’Donoghue, and Vogelsang, 2007; Augenblick, Niederle, and Sprenger, 2015; DellaVigna, List and Malmendier, 2012; DellaVigna, List, Malmendier, and Rao, 2017), reviewed in DellaVigna (2018). Our design also relates to Al-Ubaydli et al. (2015), which contains comparisons of piece rates and positive reciprocity to show how the choice of incentive scheme conveys information to workers about the nature of monitoring.

2 A Simple Model

To provide a framework for our contribution, we begin by presenting a simple theoretical model of worker effort. The model formalizes the predictions regarding productivity (as in Experiment 1) and regarding extra work (as in Experiments 2 and 3). We abstract from specific features, such as the different batches of work in Experiment 1, which we detail in the structural estimation.

Worker i chooses optimal effort e_i as a function of pay incentives, social preferences and cost of effort. For simplicity, we assume risk neutrality. This allows us to write the worker's problem as

$$\max_{e_i \geq 0} u(e_i) = L + p_W e_i - C_i(e_i) + A(Gift, p_E, p_W) e_i \quad (1)$$

The first component of the utility function captures the monetary payoff from exerting effort e_i : a lump-sum payment $L \geq 0$ and a piece rate $p_W \geq 0$ to the worker. The second component is the cost of effort $C_i(e_i)$, which can differ across individuals i (to capture differences in individual ability). For any i , we assume the regularity conditions $C'() > 0$, $C''() > 0$, and $\lim_{e \rightarrow \infty} C'(e) = \infty$, guaranteeing the existence of a unique solution. Note that we assume that effort maps one-to-one to the observable work outcomes we study: productivity in Experiment 1 and extra work time or output in Experiments 2 and 3.

The third component captures a type of social preference: the worker cares about the payoff from his efforts to the employer with a social preference coefficient A , which may depend upon unexpected gifts $Gift$ from the employer. We discuss the altruism and warm-glow interpretations of this coefficient A below. This set-up is similar to Bellemare and Shearer (2011) and Englmeier and Leider (2012c), among others. Maximization problem (1) yields the first-order condition

$$p_W + A(Gift, p_E, p_W) - C'_i(e_i^*) = 0 \text{ or} \quad (2)$$

$$e_i^*(Gift, p_E, p_W) = C'^{-1}(p_W + A(Gift, p_E, p_W)). \quad (3)$$

where $C'^{-1}()$ is the inverse function of $C'()$, which exists and is monotonically increasing by the assumptions above. The second-order conditions are satisfied since $-C''(e^*) < 0$. In the following we will assume an interior solution.⁷ The optimal effort e^* is increasing in the social preference parameter A and in the piece rate p_W (provided A does not decrease enough in p_W). Thus, in our model, financial incentives and prosocial preferences provide the motivation to exert effort.⁸

Pure Altruism. Under this first interpretation, the worker takes into account the employer's actual *net* return from effort, $A = \alpha(p_E - p_W)$. An altruistic worker values each dollar the employer makes (through their effort) the same as α dollars in their own pocket. Capturing reciprocity models, the altruism parameter α towards the employer may depend on the receipt of a gift from

⁷A sufficient condition to ensure an interior solution is $C'(0) = 0$ and $A > 0$. While one of the assumed cost of effort functions will not satisfy this assumption, in practice zero effort is not observed in our experiment.

⁸We assume that financial incentives affect motivation directly without crowding out social preferences or intrinsic motivation. In our model, how much the return to the employer motivates workers depends on their social preferences. Similarly, whether gifts affect motivation depends on whether they change social preferences. How motivation in turn translates into effort (and thus output) depends on the cost of effort.

the employer. Thus, the social preference term is $A = (\alpha + 1_{Gift}\alpha_{Gift})(p_E - p_W)$.

Warm Glow. Models of warm glow, broadly construed, imply that the worker simply derives utility from doing their part by exerting effort for their employer, regardless of how the effort translates into payoffs for the employer; thus, $A = a\overline{p_E}$, where $\overline{p_E}$ is the average return to the employer and is included to normalize the a term. This case is inspired by the idea of warm glow in Andreoni (1989), where donors derive utility from giving to a charitable cause, but not necessarily from the public good provided itself.⁹ This specification also captures, in reduced form, mission preferences as in Besley and Ghatak (2005), intrinsic motivation (Benabou and Tirole, 2003), a social norm to exert effort for an employer, signaling (Benabou and Tirole, 2006), or a utility from exerting effort doing meaningful work (Ariely, Kamenica, and Prelec, 2008).¹⁰ As before, we allow for warm glow to change as a result of receiving an unanticipated gift, so $A = (a + a_{Gift}1_{Gift})\overline{p_E}$.

Standard Gift-Exchange Experiment. Consider a gift exchange experiment without a piece rate. For the combined altruism and warm glow case, the optimal efforts are:

$$\begin{aligned} e_{noGift}^* &= C'^{-1}(\alpha p_E + a\overline{p_E}) \quad \text{and} \\ e_{Gift}^* &= C'^{-1}((\alpha + \alpha_{Gift})p_E + (a + a_{Gift})\overline{p_E}). \end{aligned} \tag{4}$$

Can one back out the social-preference parameters from the observed effort e_{noGift} and e_{Gift} ? Two crucial pieces of information are missing. First, we do not know what workers assume the return to the employer p_E is, since they are not informed about it. Second, we do not know the cost function $C(e)$. Hence, it is impossible to identify the social preferences.

For illustrative purposes, consider a power cost function $c(e) = ke^{1+\gamma}/(1+\gamma)$, with a constant elasticity $1/\gamma$ with respect to the return to effort.¹¹ The solutions under pure altruism are:

$$e_{noGift}^* = \left(\frac{\alpha p_E}{k}\right)^{1/\gamma} \quad \text{and} \quad e_{Gift}^* = \left(\frac{(\alpha + \alpha_{Gift})p_E}{k}\right)^{1/\gamma}.$$

By dividing through and inverting, we obtain

$$\frac{\alpha + \alpha_{Gift}}{\alpha} = \left(\frac{e_{Gift}^*}{e_{noGift}^*}\right)^{1/\gamma}. \tag{5}$$

While we cannot back out the altruism (and reciprocity) parameters α and α_{Gift} without knowledge of the return p_E , we can infer the increase in altruism $(\alpha + \alpha_{Gift})/\alpha$, *provided* we know the curvature γ . In the quadratic cost-of-effort case ($\gamma = 1$), for example, an x percent increase in

⁹The warm glow could also depend on the return to the firm, in which case it would be indistinguishable from pure altruism in our setting.

¹⁰Explicitly modeling these motives would lead to additional predictions. For example, signaling (Benabou and Tirole, 2006) would dampen the response to a piece-rate increase because exerting effort is less diagnostic of intrinsic motivation under a higher piece rate. We recognize this limitation of our model and hope that future work will further disentangle these alternative social motives for worker effort.

¹¹The first-order condition is $k(e^*)^\gamma = v$ (in this case equal to αp_E and $(\alpha + \alpha_{Gift})p_E$ for the altruism case). Thus, $\partial e^*/\partial v = (1/k\gamma) * (v/k)^{1/\gamma-1}$ and the elasticity is $\eta_{e,v} = (1/k\gamma) * (v/k)^{1/\gamma-1} v (v/k)^{-1/\gamma} = 1/\gamma$.

effort due to a gift implies an x percent increase in altruism. But for higher curvature ($\gamma > 1$), the underlying increase in altruism is higher than x percent. Thus the elasticity $1/\gamma$ plays a key role in estimating the underlying preferences.

The power cost function has the special feature of constant elasticity. A plausible alternative is that the elasticity decreases as effort increases, such as in the case of the exponential cost function, $C(e) = k \exp(\gamma e) / \gamma$.¹² In this case, the solutions are

$$e_{noGift}^* = \frac{1}{\gamma} \log \left(\frac{\alpha p_E}{k} \right) \quad \text{and} \quad e_{Gift}^* = \frac{1}{\gamma} \log \left(\frac{(\alpha + \alpha_{Gift}) p_E}{k} \right).$$

We can transform the solution and divide through to obtain

$$\exp \left[\gamma (e_{Gift}^* - e_{noGift}^*) \right] = \frac{(\alpha + \alpha_{Gift})}{\alpha}. \quad (6)$$

Expression (6) highlights another implication. Consider an experiment with a positive gift treatment, which increases output by x units, and a negative gift treatment, which decreases output by x units. Would these equal-sized impacts of the gifts on effort imply that positive reciprocity has the same magnitude as negative reciprocity? Expression (6) shows that is not the case: the x unit increase for the positive gift requires a larger proportional change in altruism (positive reciprocity) compared to the corresponding change in altruism (negative reciprocity) for the negative gift. Intuitively, it is harder to increase effort at the margin than to reduce it.

Generalized Gift Exchange Experiment. What design would then allow for estimation of social preferences? As outlined above, one needs to measure the return to the employer, p_E , and to identify the cost of effort parameters k and γ .

To accomplish the first part, one can inform subjects about the return p_E , provided the task permits. To identify the cost of effort, however, one needs further identifying variation, such as varying experimentally the piece rate p_W . From (3) notice that

$$\frac{\partial e^*}{\partial p_W} = \frac{\partial C'^{-1}(p_W + A)}{\partial p} \left(1 + \frac{\partial A}{\partial p_W} \right). \quad (7)$$

Expression (7) shows that variation in piece rate p_W helps pin down the cost of effort function. However, the cost of effort will be identified jointly with the social preferences, given that A features in (7) and, in addition, for the altruism case $\partial A / \partial p_W = -\alpha$ (in the warm glow case $\partial A / \partial p_W = 0$). Thus, it is useful to also observe workers in a “training period,” in which the work does not benefit the firm and in which the incentive p_W is paid by a third party. In this case, we assume $A = 0$, and the effort of the worker is driven solely by piece rate incentives.¹³

¹²The first order condition is $k \exp(\gamma e^*) = v$ where v is the return per unit of effort. Thus, $e^* = (1/\gamma) \log(v/k)$. Then $\partial e^* / \partial v = (1/\gamma) * (k/v) / k$ and the elasticity is $\eta_{e,v} = (1/\gamma v) * v / ((1/\gamma) \log(v/k)) = 1 / \log(v/k)$.

¹³An implicit and common assumption is that the social preferences do not extend to the experimenter. In a robustness check we allow for some social preference also during the training period.

Next, consider how worker effort responds to changes in the return to the employer p_E :

$$\frac{\partial e^*}{\partial p_E} = \frac{\partial C'^{-1}(p_W + A)}{\partial p} \frac{\partial A}{\partial p_E}. \quad (8)$$

Under warm glow, $\partial e^*/\partial p_E = 0$: the workers do not respond to changes in the value of effort since $\partial A/\partial p_E = 0$. Under altruism, instead, the workers are sensitive to the return, since $\partial A/\partial p_E = \alpha$. Indeed, for the altruism case, combining (7) and (8) shows that the ratio of the response to the employer's return p_E and the response to the piece rate p_W identifies the altruism α :

$$\frac{\partial e^*}{\partial p_E} / \frac{\partial e^*}{\partial p_W} = \frac{\alpha}{1 - \alpha}. \quad (9)$$

3 Productivity Experiment (Experiment 1)

3.1 Design and Data

Design. Our first design follows previous gift-exchange field experiments in that: (i) we measure productivity in an office task, (ii) workers are recruited for a one-time task to avoid repeated-game confounds, and (iii) workers are assigned (in a between-subject design) randomly into a gift treatment or a control group to causally estimate the effect of a gift on productivity.

It differs in that (i) we implement a *piece-rate design* by varying the piece rate p_W offered to the workers, and (ii) we make explicit, and vary, the value of the task to the employer, p_E .

To do so, we combine between-subject and within-subject variation. Specifically, subjects work through several batches of a task. Across the batches, we vary *within subject* the piece rate and the return to the employer. To control for order effects, we randomize the order of the batches. In the final batches, we introduce *between-subject* unexpected ‘gifts’ from the employer.

The model above informs the choice of task and employer. Coding of library books, for example, does not lend itself readily to quantifying the return to the employer. We partnered with three charities to prepare envelopes for fund-raising campaigns. Since similar campaigns have been done before, we could convey the average employer return p_E of each envelope prepared, and the return could plausibly be higher for envelopes for which a donor (truthfully) pledged to match the raised funds. Furthermore, we set different piece rates p_W for each charity for a 20-minute batch: (\$7 fixed pay, no piece rate), (\$3.5, 10¢ piece rate), and (no fixed pay, 20¢ piece rate). The lump-sum pay is set such that the earnings are constant for a person of average productivity (about 35 envelopes per 20 minutes) and, hence minimize the gift effects from piece-rate variation.

We hire temporary workers with a Craigslist ad for a one-time six-hour job (in one day) on Saturdays and Sundays on the University of Chicago campus.¹⁴ The participants are taken to a room where a research assistant explains the work following a script. The Becker Center at the

¹⁴A typical ad reads: ‘The Becker Friedman Institute is seeking individuals to help prepare letters for fundraising and advertising campaigns. No experience necessary. Employment is for six hours over a single day THIS weekend. [...] Employees can expect to earn around \$60 for the day.’ We exclude anyone attempting to sign up a second time.

University of Chicago is truthfully presented as partnering with the employers – the charities – to facilitate the work. The participants receive a sheet indicating the pay for the ten batches of work, except for batches 9 and 10 which are reported as TBD (to be determined).

The workers fold and place materials in envelopes, working through a mailing list, for 20 minutes. They then take a 10-minute break, and move on to the next batch, and so on for ten batches. During the break, the research assistants count the envelopes produced by each participant and check the accuracy of five envelopes per worker. The envelopes include fund-raising material for three charities for 8 batches and an advertising campaign for a local grocery store for 2 batches.

We randomize the order as follows: Under Order A, shown in Figure 1, the participants fold envelopes at the 10-cent piece rate (and \$3.50 flat pay) for the first four batches, albeit with different treatments. The first batch is a training period. We tell the participants that they ‘*will earn a fixed amount of \$3.50 plus \$0.10 per envelope completed during this training. [...] The training is paid for by the Becker Center. We will be discarding all of the envelopes prepared in this training session.*’ Thus, the employer – the charity – does not directly benefit from the marginal productivity.¹⁵

In batches 2 and 3, workers stuff envelopes for charity 1: ‘*[Charity Name] will be paying for your work. The pay is \$3.50 plus \$0.10 per envelope completed, as noted on your schedule.*’ In batch 2, there is a higher return to the employer due to a donor match: ‘*[Charity Name] has received a matching grant that will match every dollar raised by these letters 1 to 1 up to \$2,000 total. [...] Historically, charities like [Charity Name] have yielded roughly \$0.60 per mailer with such campaigns, including the match. Given that [Charity Name] is offering a \$0.10 per-envelope payment today, it expects to get roughly \$0.50 for each additional envelope that you prepare during this session.*’ Notice that we emphasize the net return. In batch 3, there is the same piece rate, but no match. In batch 4, workers stuff envelopes for a grocery store at the same 10-cent piece rate and with a similar stated 30-cent return to the employer.¹⁶

After a 50-minute lunch break, the workers restart with a new training period (batch 5) on the material for Charity 2, which pays 20 cents per envelopes.¹⁷ Next, they engage in consequential work for Charity 2 in batch 6 at the same 20-cent piece rate. In batches 7 and 8, they then stuff envelopes for Charity 3 at the 0-cent piece rate, with a charity match in batch 8. In rounds 9 and 10, the gift exchange randomization takes place, as we discuss below.

The treatments in Order B are mirror images of Order A, other than for the training rounds: batch 8 in order A becomes batch 2 in order B, and so on. That is, while the training sessions remain in rounds 1 and 5, we switch the pay schemes in the training period between order A and B. The order randomization aims to disentangle the treatment effects from learning and tiredness.¹⁸

¹⁵There is no deception in the experiment and the envelopes, which have fictional names and addresses, are discarded as announced. These training batches are presented as necessary to ensure the accuracy of the later batches. We assume that the Becker Center, which pays for the training batch, does not enter the social preferences of the workers.

¹⁶This allows us to check whether there was anything special about having a charity as employer. The grocery store is not our main employer because we could not find a compelling way to vary the return to the employer.

¹⁷This second training session is justified by the (slight) difference in materials for the different employer.

¹⁸We did not do a full randomization of the order of the treatments for logistical reasons, but also because the two orders allowed us to maximize power by placing next to each other treatments we intended to compare, such as match and no-match (for the same piece rate), thus minimizing the confound of productivity changes over time.

The arrows in Figure 1 illustrate four planned comparisons:¹⁹ (i) batches 6 vs. 7 in order A (3 vs. 4 in order B) with the piece rate change from 0 cent to 20 cents, with the additional comparison with the 10-cent piece rate in batch 3 in order A (batch 7 in order B), though the treatments are not contiguous; (ii) batches 5 vs. 6 comparing when the effort counts at all for the employer, versus not (the training); (iii) batches 7 vs. 8 for the return to the employer; (iv) batches 3 vs. 4 in order A (6 vs. 7 in order B) for having a grocery store versus a charity as employer.

After batch 8, we randomize workers into the gift treatments, and therefore send the workers into separate rooms. In the Control treatment, we say that in this and the next session “[*Charity name*] will pay \$7 just as it paid in a previous session.” In the Positive Monetary Gift, we say that “[*Charity name*] will pay \$14 instead of the standard \$7 that it paid in a previous session.” In the Negative Monetary Gift, we say that “[*Charity name*] will pay \$3 instead of the standard \$7 that it paid in a previous session.” We follow Kube, Marechal, and Puppe (2013) in providing no explanation for the wage change. In the Positive In-Kind Gift, we say that “[*Charity name*] will pay \$7 as it paid in a previous session. As a token of appreciation, the charity is also giving you this thermos with a retail value of \$14.” We then offer a gift-wrapped thermos (as in Kube, Marechal, and Puppe, 2012) with the name of the charity to make clear the gift is coming from the employer. After the announcement of the gift (if any), the workers fold envelopes for batches 9 and 10. One of the two batches has a donor match raising the return to 60 cents.

At the end, we conduct a short debriefing survey, thank the subjects, pay them according to their accumulated earnings, and walk them to an exit.

Randomization. We randomize (i) into order A or B; (ii) the charities (into three orders) to the role of Charity 1, 2, and 3; (iii) whether the charity match is in batch 9 or 10. The order of the $2 \times 3 \times 2 = 12$ types of sessions was randomly drawn, and we then looped through the 12 sessions. The final randomization, to the gift treatments, is made at the individual level within a session, stratifying on the pre-lunch performance to maximize statistical power.

Data. We ran 24 sessions with 131 workers from October 2013 to January 2014.²⁰ We then paused to ensure that the design that we had settled on based on simulations worked appropriately. In November 2014, we registered the design, including the model and structural estimation, and the envisioned number of sessions (72 in total). The only design change was the addition of the in-kind gift treatment. Between November 2014 and May 2015, we ran 49 sessions with 319 subjects.²¹ After excluding 4 subjects who left early, the final sample includes 446 workers, the largest sample size that we are aware of among in-person gift exchange field experiments with workers.

The sample (Column 1 of Online Appendix Table 2) is 52 percent female, covers a wide age range, and overrepresents unemployed individuals. Column 2 shows that productivity is higher

¹⁹In the pre-registration we emphasize equally comparisons taking place in batches 1-4 and in batches 5-10. However, the steep learning in batches 1-4 confounds these comparisons. Thus, we focus on batches 5-10 for the reduced form results. The structural estimates use all of the variation in the data, including the early periods.

²⁰In September and October 2013, we ran 4 sessions with a pilot design. We used the data from the 17 subjects in this pilot to set the pay rate, since we aimed to equate on average earnings across the three different piece rates.

²¹The sessions add up to 73 because, in one of the sessions, one of the letters was shown incorrectly, and the research assistant opted to repeat the session. In the spirit of intent-to-treat, we also retain this session.

for employed individuals and females, as well as for 25-34 years olds relative to both younger and older participants. Using this specification, we form an index of predicted productivity. In Columns 3-6, we examine the randomization with respect to the covariates (Panel A), as well as with respect to the index of predicted effort (Panel B). Order A is somewhat overrepresented in males (who have lower productivity) and workers 55 years and older (who have somewhat higher productivity), with no evidence of selection of higher predicted-effort individuals (Panel B) into Order A. The randomization into the various gift treatments or into the different charity orders reveals no systematic patterns. Thus, the treatments are overall balanced on the covariates.

3.2 Experimental Findings

Online Appendix Figure 1 plots average output by batch for the two orders. The confidence intervals, as elsewhere for Experiment 1, are clustered at the session level to account for correlation within a worker over time and across workers in a session. There is substantial learning by doing over the first 4 batches, which flattens from batch 5 onwards, after the lunch break. Previewing the key findings, we detect a response to the piece rate: the only two instances in which productivity decreases substantially from one batch to the next are cases of piece-rate decreases: batches 6 to 7 in order A (20¢ to 0¢) and 8 to 9 in order B (10¢ to 0¢). We also observe a response to whether envelopes are used or discarded (holding constant the piece rate, batches 5 and 6), but only a very small impact of changes in employer return (batches 7 and 8).

Piece-Rate Response. As Figure 2a shows, increasing the piece rate from 0¢ to 20¢ leads to an increase of 4 envelopes (12 percent), a significant if small elasticity. Figure 2a also provides a comparison to the 10¢ piece rate, though the batches are not contiguous in this case.

Baseline Social Preferences. As Figure 2b shows, the batches with higher return to the employer (due to a match on the donations) yield (statistically insignificant) 0.6 additional envelopes (1.7 percent), an effect size much smaller than the piece-rate response. This finding speaks against a pure-altruism interpretation of workers' social preferences towards their employer.

Figure 2c presents complementary evidence on the impact of consequences to the employer, comparing the training round in batch 5, when the envelopes are discarded, to batch 6, when the envelopes are sent; notice that the piece rate is held constant. Productivity is 3.5 envelopes (10 percent) higher when the letters are used, a sizable and statistically significant difference.

Turning to additional experimental variation, worker effort does not differ between the charities (Online Appendix Figure 2a), which we thus pool. Employee effort is somewhat *higher* when the employer is a firm (a grocery store) versus a charity (Online Appendix Figure 2b), holding constant the return to the employer and the piece rate. This suggests that the social preferences we identify towards charities as employers may not over-estimate the social preferences towards employers.

Gift Exchange. Figure 2d presents empirical results for batches 9 and 10. Compared to the control group, the positive gift treatment produces 0.4 additional envelopes, a difference that is not significant. The negative monetary gift treatment has an even smaller effect, keeping productivity essentially constant compared to the control group. The in-kind gift actually leads to a *decrease* of

productivity of 1.1 envelopes, although the difference is not significant at conventional levels.

To enhance the statistical power in the estimate of the gift effects, in Table 1 we control for the average productivity of a worker in batches 1-8 (Column 2) and in batches 5-8 (Column 3). Since the specification in Column 3 has higher explanatory power, we use it for the subsequent analysis with controls. The addition of controls lowers the standard errors by a quarter, essentially without changing the point estimates. We can reject that the monetary gift increases productivity by more than 5.6 percent, much smaller than the 20 to 25 percent increases in Gneezy and List (2006) and Gilchrist, Luca, and Malhotra (2016). We cannot reject the 4 percent increase in output found in the highly-powered experiment of Cohn, Fehr, and Goette (2014), which combines within- and between-subject variation and plausibly involves an extra-work dimension as well. We can reject that a negative gift lowers effort by more than 1.6 envelopes, a 4.4 percent decrease, a much smaller effect than the 20 percent decrease in Kube, Marechal, and Puppe (2013). We can also reject that the in-kind gift increases productivity by more than 0.7 envelopes, a 2 percent increase, again much smaller than the 25 percent increase in Kube, Marechal, and Puppe (2012). The results are similar using log output as a measure (Columns 4-6), the specification implied by a power cost function.

In Online Appendix Figure 3 and Online Appendix Table 3, we also consider the decay of any gift effect, comparing batches 9 and 10, and find little evidence of systematic patterns. We also do not find evidence that the gift interacts with the return to the employer, comparing a batch with matching donation to a batch without. With regards to the heterogeneity in the gift effect, there are hints of an output increase with the positive gift at lower quantiles. Further, all the key results are parallel using log output (Online Appendix Figure 4), as implied by a power cost of effort, as well as restricting to participants who report being employed (Online Appendix Figure 5).

4 Extra Work Experiments (Experiments 2 and 3)

4.1 Design Idea

One major insight of the results so far is that productivity experiments—the most common design in the literature—feature low elasticity, which makes it difficult to identify the shape of worker preferences. In Experiments 2 and 3, instead of focusing on productivity within a given amount of time as in Experiment 1, we focus on the provision of extra work after a job task is completed, measured as extra time (Experiment 2) or extra units produced (Experiment 3). As we will document, this margin is more sensitive to incentives than the productivity margin and thus provides higher statistical power to detect even modest gift exchange effects.

Both experiments use a between-subject design. The treatment groups are (i) a control group with no compensation for extra work, (ii) two or three piece-rate groups with incentives to provide extra work, and (iii) one or more groups with a gift, but no monetary incentive to complete extra work. Further, within each of these groups, half of the workers are randomized to a high-value-of-work treatment, communicated either as a qualitative statement (Experiment 2), or through a quantitative measure of value to the employer (Experiment 3).

4.2 Design and Data, Experiment 2

Design. Figure 3a summarizes the design of Experiment 2. We hire workers for a one-time 2-hour data coding job at the Becker Center for \$60, advertising the position both on a campus bulletin as well as on the website Craigslist. As the workers come in, we escort each to individual offices and ask them to code sheets of data from a research project into a Google spreadsheet for 2 hours. Except for one arm (which we return to later), there is no experimental manipulation at this stage.

After the two hours of work are completed, the research assistant checks back into the offices, pays workers the promised \$60, and briefly reviews and accepts the completed work. At this point, the research assistant asks the worker: “*Would you be willing to help us enter some more of the data for up to one hour?*” Subjects are randomized into one of five conditions. In the control arm, we add: “*Unfortunately, we cannot compensate you for this extra time.*” For the two piece-rate treatments, we inform workers that “*we will pay you [$\$25/\50] for every minute of work that you do, up to one hour. For example, if you do an extra 20 minutes of work, we will pay you \$5 [$\10] extra.*” Finally, three arms feature gift treatments. For the *monetary gift* and the *in-kind gift* group, the script parallels the script in the control group up until the workers have finished the two hours of pay. At this point, in the *monetary gift* group, we tell workers “*In addition, as a token of appreciation, the Becker Center is giving you an additional \$15 for helping today. Therefore, we are paying you a total of \$75.*” We then pay \$75 and otherwise proceed as in the Control group. In the *in-kind gift* group, we tell workers “*In addition, as a token of appreciation, the Becker Center is giving you this thermos with a retail value of \$15 for helping today*” and we give workers a thermos with the University of Chicago name on it. The experiment then proceeds as in the Control group.

The explicit “ask” for extra work arguably provides a clearer channel for workers to reciprocate compared to the productivity experiment. One may however be concerned that asking subjects for extra work immediately after they were given a gift may set up a quid-pro-quo or create social pressure to do extra work. Alternatively, the gift may be seen as manipulative and thus backfire. We therefore introduced a gap between the gift and the request for extra work: the research assistant, after the pay and after the gift distribution but before asking for extra work, goes over and briefly checks some of the data coding. As a further robustness check, and to study the persistence of any gift effect, a final group, the *early in-kind gift* group, received a thermos before starting the 2 hours of coding, with the same exact wording as for the *in-kind gift* group.²²

In sum, we have six treatment arms, and we randomize the workers into each arm with equal probability. Further, we cross-randomize (also between subjects) a statement on the value of work to the employer. Directly before asking for extra work, we inform the *high-return* group (but not the *normal-return* group) “*Getting the extra data entered today is really valuable to us.*”²³

Data. We pre-registered our design in September 2018, including a power calculation using the structural estimates for the productivity experiment and assumptions for the elasticity of extra

²²The early gift treatment was intended to delink the gift from the “ask” for extra work. However, it could also be perceived as less strategic and thus be *more* effective.

²³While we interpret this treatment literally as increasing the perceived value of the work to the employer, it may also operate through increased social pressure.

work. Shortly after the registration, we started collecting data and stopped in May 2019 once we reached the pre-specified sample target of 300 workers. Our sample (Online Appendix Table 4) is 50 percent female, with 37 percent recruited via Craigslist, and the rest being students. The Craigslist participants, especially older ones, stay for a greater number of extra minutes (Column 2). The treatments are balanced on the observables (Columns 3-8).

4.3 Design and Data, Experiment 3

Design. Figure 3b presents the design of Experiment 3. We hire 2,000 workers online on the MTurk platform for a one-time task that lasts about 10 minutes for pay of \$1.60. The task consists of checking the accuracy of 40 mailing addresses of University of Chicago alumni. The 40 addresses are randomly drawn for each worker from a sample of 5,612 addresses. As we truthfully inform the workers, “*based on our experience with similar data, about 1 out of 10 addresses in our database are incorrect and in the past these mistakes have caused the letters to be returned to us. Using Google Maps, you will help us ensure that we are not sending envelopes to incorrect or nonexistent addresses.*” The workers are given instructions on how to search the addresses (without sharing the recipient’s name) and then label each address as correct or in error.

Upon completion of the task, we thank the workers and then provide them with (randomized) information on the value of the work that they have done: “*Thanks to your work, we estimate that for every address you check we are saving roughly 5 cents [10 cents in HI RETURN] on average (1 out of 10 addresses has a mistake on average. Each mistake you identify saves us approximately 50 cents [1 dollar in HI RETURN] in costs of mailing our next newsletter)*”. This variation, which is cross-randomized, is again truthful as some mailings cost more than others, such that identifying a wrong address saves the employer more money.

A control group is then asked “*If you happen to have some time and are willing to do some extra work, that would be appreciated. Unfortunately, we cannot compensate you for this extra work.*” The piece-rate groups see the same first sentence, but then see “*[We will pay you 1/2/4 extra cents [LOW/MID/HIGH PIECE RATE] for every address you check, up to 20 addresses. For example, if you check 10 additional addresses, we will pay you 10/20/40 extra cents. [LOW/MID/HIGH PIECE RATE]*” As in Experiment 2, the piece rate for the high-piece-rate group corresponds to the average pay in the initial task ($\$1.60/40=4$ cents per address), and half of that for the medium-piece-rate group. Unlike in Experiment 2, the larger sample of the online, low-cost setting allows us to add a low-piece-rate group, with a piece rate one quarter the initial compensation.

The monetary gift arm is similar to the control group, except that we add, before the information about the value of work, “*As a token of appreciation, the Becker Center is giving you an additional 40 cents for helping today. Therefore, we are paying you a total of \$2.00.*” The gift equals 25 percent of the initial pay, as in Experiment 2 and similar to Experiment 1. In this online experiment, we could not plausibly, and naturally, offer an in-kind gift. Similarly, we did not add an early-gift group, which would likely have affected attrition, a well-known issue for online tasks. (As it is, an advantage of the extra-work design is that the randomization takes place only *after* completion of

the initial task, with no room for differential attrition.)

To summarize, we have five experimental arms, with the share of the sample in parentheses: Control (25%), Low Piece-Rate (25%), Medium Piece-Rate (12.5%), High Piece-Rate (12.5%), and Gift (25%). Each arm is crossed with the High/Normal return to work manipulation.

Data. In February 2021 we pre-registered our design, and then collected data for 9 days until we reached the pre-specified sample of 2,000 workers. Following the pre-analysis plan, we eliminate workers with a high coding error rate, resulting in a final sample of 1,954 workers. Given that the task is a natural field experiment we did not collect demographic information.

4.4 Experimental Findings, Experiments 2 and 3

We present our empirical results for the amount of extra work in Experiments 2 and 3 in Figures 4 and 5 and in Table 2. As main outcome variables, we pre-specified the minutes of extra work in Experiment 2 and extra addresses checked in Experiment 3.

Piece-Rate Response. Figure 4a documents very sharp responses to varying piece rates in Experiment 2. The average number of extra minutes worked increases from 2.5 (control) to 15.6 (medium piece-rate) and 29.9 (high piece-rate). These differences are statistically significant and correspond to a high elasticity: a doubling of the piece rate (25¢ to 50¢) is associated with more than double the extra minutes worked, indicating an elasticity over 1. Figure 5a presents parallel evidence for Experiment 3. The average number of extra envelopes increases from 3.8 (control) to 8.4 (low piece-rate), to 9.7 (medium piece-rate) and to 12.6 (high piece-rate), indicating a similarly high elasticity. We are not aware of any real-effort experiment on productivity that even approaches such elastic responses. In our view, this is a major advantage of our chosen design.

Baseline Social Preferences. In Figure 4b we consider the response in Experiment 2 to the qualitative manipulation of the return to the employer, phrased as: “*Getting the extra data entered today is really valuable to us.*” Since this manipulation is cross-randomized, we pool across all six gift and piece-rate arms. We estimate a small and statistically insignificant increase of 2.5 minutes from receiving the high-return statement. In Figure 5b we consider the parallel manipulation for Experiment 3, which involved doubling the gross return to the employer of the work completed. The response to the higher-return condition is noisy, and if anything, negative.

Gift Exchange. Figure 4c compares the number of minutes worked in the control group to the minutes worked in the three gift groups in Experiment 2. We find clear evidence of gift exchange. The gift treatments increase the average labor supply from 2.5 minutes in the control group to 6-9 minutes, about halfway to the medium-piece-rate treatment. The effect is similar for the monetary gift and the early in-kind gift, and slightly smaller for the in-kind gift. Thus, not only is there a gift effect on labor supply, but the effect does not decay quickly over our time period used.²⁴

²⁴It is also possible to compare the productivity in the initial 120 minutes in the Early-Gift condition to the productivity in the other treatments to examine whether the gift has an impact on productivity. In the pre-analysis plan we did not focus on this comparison as we expected it to be statistically under-powered given the general inelasticity of productivity tasks and the relatively small sample receiving the (early) gift (50 workers). As Online Appendix Table 6 shows, there is no statistically significant evidence of a difference.

Figure 5c shows the parallel finding for Experiment 3 for the monetary gift treatment. The average number of extra addresses increases from 4.1 in the control group to 6 in the gift group.

Robustness. Figure 6a presents the c.d.f. of the number of extra minutes worked in Experiment 2 in the 6 main arms. The medium piece-rate treatment leads to an increase in the share staying extra time (the extensive margin) relative to the control group, but even more in the number of extra minutes among those staying longer (the intensive margin). The high piece-rate treatment is associated with a large increase along both margins. The gift treatments are associated with a substantial increase in the share of workers staying extra minutes compared to the control group; however, most of the workers that stay extra do not stay long. Thus, the gift triggers only a moderate amount of extra effort. The patterns are similar in Experiment 3, in which the effect of the gift is smaller than the effect of any of the piece rates (Figure 6b).

We can compare the results in Table 2 without controls to estimates in Online Appendix Table 5 with controls: gender, age groups, and an indicator for the Craigslist sample in Experiment 2, and fixed effects for the day of participation and the hour blocks in Experiment 3. The point estimates with controls are similar to the ones without. In Columns 3 and 4 of Table 2 we obtain similar estimates from tobit regressions modeling the censoring (at 0 and 60 minutes in Experiment 2 and at 0 and 20 envelopes in Experiment 3). In Columns 5 and 6 we present marginal effects from probit regressions on an indicator for doing extra work, yielding similar, but noisier, estimates. In Columns 2 and 4 of Online Appendix Table 5 we consider whether the effect of gifts in Experiments 2 and 3 is higher when workers are informed of a higher return for the employer, but we do not find any systematic relationship.

Turning to further robustness, Online Appendix Figure 6 shows that the results for Experiment 2 are parallel in terms of units of extra work as a fraction of the work completed in the first two hours, as opposed to merely extra time spent, addressing possible concerns that workers were not productive in the extra time. (The fraction is 0 for workers who do not stay extra.) Conversely, Online Appendix Figure 7 shows that the results for Experiment 3 are parallel if we measure the extra work in terms of units of time (minutes) as opposed to addresses coded. Online Appendix Figures 8 and 9 split the key findings for Experiment 2 for the subsample recruited through Craigslist versus on campus. In both samples, very few subjects stay extra time in the control group. The Craigslist sample, though, is more sensitive to both the piece-rate treatments and the gift treatments than the student sample. Methodologically, this might hold import for those interested in comparing results across subject populations.

5 Structural Estimates

We now move from a reduced-form analysis to our structural estimation. We are able to utilize data from all three experiments, and indeed find them complementary in a similar way in which they provided useful insights when combined in reduced-form.

5.1 Estimation Approach

Set-up. To estimate the model, we build on Shearer (2004) and Andreoni and Sprenger (2012) and assume that workers maximize (1) with a cost of effort:

$$C_i(e_i) = c(e_i) * \eta_i \quad (10)$$

For the first term in (10), $c(e)$, we consider two families: a power function, as used in some previous literature, and an exponential function. The power function is $c(e) = e^{1+\gamma}/(1+\gamma)$, with $\gamma > 0$ denoting the inverse of the elasticity of effort to the return to effort. In the exponential specification, $c(e) = \exp(\gamma e_{i,t})/\gamma$ with $\gamma > 0$. Both functions satisfy the desired properties $C'(e) > 0$, $C''(e) > 0$, and $\lim_{e \rightarrow \infty} C'(e) = \infty$.²⁵

The second term, η_i , introduces heterogeneity as a multiplicative factor. It η_i captures the impact of both the observables, X_i , and unobservables (a noise term). Since η_i ought to be positive (as a negative draw implies a negative cost of effort), we assume a log-normal distribution where the mean is potentially a function of the observables, $\ln(\eta_i) \sim N(k(X_i), \gamma^2 \sigma^2)$.

Under the power specification, the first-order condition (2) implies

$$p_W + A(Gift, p_E, p_W) - (e_i)^\gamma * \exp[k(X_i) - \gamma * \epsilon_i] = 0,$$

with $\epsilon_i \sim N(0, \sigma^2)$. Taking the second term to the right-hand side and taking natural logs, and solving for $\log(e_i)$, we obtain the estimating equation

$$\log(e_i) = \frac{1}{\gamma} [\log(p_W + A(Gift, p_E, p_W))] - \frac{1}{\gamma} k(X_i) + \epsilon_i. \quad (11)$$

The first term is the motivation term, which incorporates private incentives (the piece rate p_W) and the pro-social component A . This term also shows that $1/\gamma$ is the elasticity of effort to motivation. The second term is a level shifter due to differences in the level of the cost function; we return to this term below. The final term is the error term. We take a random-coefficients approach and assume that the source of the error term is unobserved differences in the (log-normal) cost of effort.

Similarly, under the exponential cost-of-effort specification, we obtain

$$e_i = \frac{1}{\gamma} [\log(p_W + A(Gift, p_E, p_W))] - \frac{1}{\gamma} k(X_i) + \epsilon_i. \quad (12)$$

The exponential function thus leads to the same specification, except with effort, rather than log effort as the outcome of interest. This model thus micro-founds reduced-form specifications with the outcome variables effort (under exponential cost) or log effort (under power cost).

Productivity Experiment. While this set-up is common to our three experiments, there

²⁵The exponential cost function does not satisfy the property $C'(0) = 0$, allowing for the possibility of optimal effort at the zero corner. In practice, this does not matter given that the lowest effort observed in any round in Experiment 1 is 7 envelopes and we include in the effort the required initial 120 minutes in Experiment 2.

are some differences, especially in the controls $k(X_i)$. In Experiment 1, we measure effort as the number of letters prepared in each of ten batches $t = 1, \dots, 10$. We also make the additional, identifying assumption that the cost function is additively separable across batches.²⁶ We can then write the utility maximization batch-by-batch, with a choice of effort $e_{i,t}$ for worker i in batch t .

Given that we observe an individual multiple times, we can control for individual fixed-effects k_i . In addition, we control for the evolution of the cost of effort over batches with a function $f(t)$, which captures learning by doing or fatigue. We allow for indicators d_2 , d_3 , and d_4 for batches 2, 3 and 4, d_{5-8} for batches 5-8 and d_{9-10} for batches 9-10. This specification is motivated by the overall flatness of the output function from batch 5 on. The indicator d_{9-10} ensures that the estimated gift effects are not biased by a change in the cost of effort in the last rounds.²⁷ As an auxiliary approach, we allow for a quadratic function $f(t) = \eta_1 t + \eta_2 t^2$ and similarly for a cubic.

Thus, the estimating equation for the power cost case is

$$\log(e_{i,t}) = \frac{1}{\gamma} [\log(p_{W,t} + A(\text{Gift}, p_{E,t}, p_{W,t}))] - \frac{1}{\gamma} k_i - \frac{1}{\gamma} f(t) + \epsilon_{i,t}. \quad (13)$$

and similarly for the exponential cost function, except with $e_{i,t}$ as outcome variable. We estimate equation (13) with a non-linear least-squares regression, clustering the standard errors by session.

Extra-Work Experiments. In Experiment 2, we measure effort as the total minutes worked inclusive of the required 120 minutes, since those initial minutes presumably contribute to the tiredness. Hence, an individual who stays 30 minutes is coded as exerting effort $e_i = 150$. Similarly, in Experiment 3, we code the total number of envelopes completed including the 40 required envelopes. The value to the employer p_E of each additional minute in Experiment 2 is the per-minute cost of an additional worker, that is, 50 cents (since we pay \$60 for 2 hours of work). In Experiment 3, it is the value we communicated, either 5 cents or 10 cents per address checked.

We model the censoring at the corner solution— $e_i = 120$ (workers who opt not to stay) and $e_i = 180$ (workers who stay for the full 60 extra minutes) in Experiment 2, and 40 envelopes versus 60 envelopes in Experiment 3—and estimate the model by maximum likelihood.

5.2 Estimates in the Productivity Experiment

Baseline Social Preferences. We first estimate the model using batches 1-8 in Experiment 1. We allow for both pure altruism towards the charity employer with social-preference weight A equal to $\alpha(p_E - p_W)$ and warm glow with social-preference weight A equal to $a\bar{p}_E$, where we take the

²⁶DeJarnette (2015) finds that effort in a real-effort task across rounds is mostly habit-forming, with a moderate effect size which mostly decays after 15 minutes. Given our 10-minute breaks between the batches and the use of two orders, violations in time separability, while certainly possible, are unlikely to have major effects on our estimates.

²⁷We cannot dummy out every batch, since that would take out the comparison to the training batches which are always in batches 1 and 5. The function $f(t)$ in the registration differs in two ways. First, we assumed $d_2 = 0.5 * d_3$, since we thought that we could not estimate d_2 separately from d_3 . Since we can in fact do so (though we do not reject the one-half restriction), we allow for a more general specification. Second, we assumed $d_{9-10} = d_{5-8}$, a restriction which we relax. We show that adopting the pre-registered specification leads to similar results.

average return to the employer $\overline{p_E}$ to be 0.3.²⁸ We first use the power-cost specification. Empirical estimates in Column 1 of Table 3 imply that social preferences are entirely of the warm-glow type, with significant warm glow ($\hat{a} = 0.46$, s.e. 0.07), putting weight on the average employer return equal to about half the weight put on private payoffs, and a precise zero for the pure altruism coefficient ($\hat{\alpha} = -0.01$, s.e. 0.04). We also estimate a substantial warm glow towards the grocer as employer, $\hat{a} = 0.73$ (s.e. 0.08). (We cannot tease apart altruism and warm glow given that the return to the grocer does not vary.) Finally, the estimated curvature of the cost function ($\hat{\gamma} = 9.5$) implies a low elasticity of effort of $1/9.5 = .10$.

To highlight the identification for α , note from (9) that $(\partial e^*/\partial p_E)/(\partial e^*/\partial p_W) = \alpha/(1 - \alpha)$. Output increases by 0.6 envelopes for a 30-cent increase in the employer return (that is, $\partial e^*/\partial p_E \simeq 2$) and by 4 envelopes for a 20-cent increase in the piece rate (that is, $\partial e^*/\partial p_W \simeq 20$), implying $\alpha \simeq 0.11$. The estimated value, which uses all the variation in the data, is even closer to zero.

To visualize the fit of the model, we compare the observed patterns with the fit of the models in Figures 2a-c assuming only altruism or only warm-glow social preferences (see Online Appendix Table 7). While both models fit the response to incentives well (Figure 2a), the altruism model has difficulty fitting the combination of a small response to the match rate (Figure 2b) and a large response to training (Figure 2c). The warm-glow model, instead, predicts no response to the match rate (as a core insight) and matches the training effect with a higher level of warm glow a .

We present a number of alternative specifications. In Column 3 of Table 3, we use the exponential cost-of-effort function, and thus the number of envelopes prepared, as opposed to the log, as the dependent variable. The results are nearly identical (except for the parameter γ which has a different scaling). In Online Appendix Table 8, we also show that the estimates are similar if (i) we model the learning-by-doing with quadratic or cubic polynomials rather than with a set of indicators; (ii) the altruism model includes only the return to the employer, $A = \alpha p_E$, i. e., does not take into account that the piece rate detracts from the employer return; (iii) we allow for some warm glow during the training rounds, restricted to be half the size of the other periods, $A = (1/2) * .3$. In the latter case, there is some (limited) evidence of pure altruism.

Gift Treatments. In Columns 2 and 4 of Table 3, we use the full data set from Experiment 1 (batches 1 to 10) to estimate the sensitivity of the social preference parameters to the gift treatments. Whether reciprocity is intention-based or action-based (Fehr and Gaechter, 2000; Charness and Rabin, 2002; Dufwenberg and Kirchsteiger, 2004; Falk and Fischbacher, 2006), a reciprocal worker who receives a surprisingly generous treatment from the employer is likely to display more positive social preferences towards the employer.

Given the results so far, we assume warm-glow social preferences. The estimates of baseline social preferences parallel, not surprisingly, the estimates using only the first eight batches. Importantly, we do not find statistically significant evidence of reciprocity for any of the gift treatments. We estimate a decrease of social preferences of -0.04 (s.e. 0.12) for the negative gift treatment, as

²⁸If we did not rescale and assumed $A = a$, all results would be identical, with the estimated warm glow coefficients equal to those in the table multiplied by 0.3 (and with the same statistical significance).

well as for the in-kind gift treatment, -0.09 (s.e. 0.10), and a more positive effect of 0.15 (s.e. 0.13) for the positive monetary treatments. We return to these magnitudes below.

In Online Appendix Table 9, we consider a series of robustness checks. First, we consider alternative specifications for the decay parameter $f(t)$, a quadratic or cubic polynomial in the batches, and a registered specification for the round indicators $f(t)$, yielding similar results.²⁹ Next, we allow for the warm glow effect of a gift, a_{Gift} , to decay to δa_{Gift} in round 10. We also present estimates assuming pure altruism, rather than warm glow. The model has trouble converging, but at least for the exponential cost function yields similar conclusions.

5.3 Estimates in the Extra-Work Experiments

Experiment 2. Regarding the baseline social preferences, we cannot separately estimate altruism and warm glow in Experiment 2 given that we do not have quantitative variation in the return to the employer. Thus, given the evidence in Experiment 1, we assume warm-glow preferences. In principle, the baseline warm glow parameter a is identified with the piece-rate variation. Yet, Columns 1 and 2 of Table 4 (corresponding to, respectively, exponential and power cost of effort) show a very wide confidence interval for a . Figure 4a shows the reason for such imprecise identification. The model predicts that effort should be a concave function of the piece rate, as equations (12) and (11) show. Yet, the increase in extra work is about linear in incentives: the increase from the medium piece-rate (25¢/minute) to the high piece-rate (50¢/minute) is about the same size as from the control group (0¢/minute) to the low piece-rate (25¢/minute). Since higher values of a contribute to a less concave predicted pattern, we cannot reject the upper bound for a .

The imprecise identification for the baseline warm-glow parameter a , though, does *not* compromise the identification of the other social-preference parameters, which are the focus of Experiment 2. The qualitative statement about high return to the employer raises social preferences by a modest 0.109 (s.e. 0.093). Importantly, the gift treatments increase the social preferences moderately, by 0.303 (s.e. 0.144) for the monetary gift, 0.181 (s.e. 0.139) for the non-monetary gift, and 0.360 (s.e. 0.146) for the non-monetary early gift. These estimates are nearly identical whether we assume an exponential cost function or a power cost function (Columns 1 and 2).

How is it possible to estimate the social-preference shifts if the level of the social preferences is not estimated with any degree of precision? This is a virtue of the piece-rate design: it “prices out” the parameter connected to a particular treatment comparison. As Figures 4a and 4c show, the impact on extra work of the gift treatments, compared to the control, is about half the size of the impact of the medium piece-rate treatment (25¢/minute). This prices out the reciprocal social preference, $a_{Gift} * \bar{p}_E$, to be less than 0.25. Given $\bar{p}_E = 0.5$, this implies $a_{Gift} \approx 0.2 - 0.4$. Similarly, the impact of the employer high-return treatment (Figure 4b) is clearly smaller than the effect of the medium piece rate, again identifying the underlying social preference.

²⁹Online Appendix Figure 10 presents the estimated time path under a quadratic or cubic polynomial, comparing to the benchmark specification. In Online Appendix Figure 11, we report the fit of the model across all ten rounds, for the benchmark indicator function $f(t)$ and for the exponential cost specifications, averaging across the different gift treatments in rounds 9-10. Overall, the model does well in fitting the data.

In Figures 4a-c we display the fit of the estimated model in Column 1 of Table 4. The estimates fit the observed patterns quite well, except for overfitting somewhat the number of minutes worked in the control group and in the gift groups. Relatedly, we compare the distribution of extra work in Figure 6a to the model prediction in Online Appendix Figure 12a. In the control and gift groups the model slightly underestimates the share of people staying over time, but at the same time it overpredicts the share staying for more than 20 minutes. The assumption of a log-normal error term, which we pre-specified, does not perfectly fit the distribution of types in the data.

In Online Appendix Table 10 we test further the robustness of the estimates. First, we estimate the model with maximum likelihood, but do not include the initial 120 minutes in the cost-of-effort calculation. Second, we employ a minimum-distance estimator, instead of maximum likelihood, using as moments the share of subjects who stay in each 5-minute bin. Third, we use another minimum-distance estimates with a sparser set of moments. For each of these three estimators, the estimates for the reciprocity parameters are similar to the benchmark.

Experiment 3. For Experiment 3, given the quantitative variation in the return to the employer, we estimate a model with both altruism towards the employer and warm glow in Columns 3 and 5 of Table 4. As in Experiment 1, we estimate a very precise zero pure-altruism coefficient, $\alpha = -0.006$ (s.e. 0.006). We estimate a sizable, if not very precisely estimated, degree of baseline warm glow at $a = 0.104$ (s.e. 0.071). Given the lack of evidence for pure altruism, in Columns 4 and 6 we estimate a warm-glow model in which we allow the information on the high return to the employer to affect the warm-glow coefficient. We estimate that higher returns to the employer, if anything, affect baseline social preferences *negatively*, possibly because a higher stated return to the employer leads the workers to be less satisfied with a given level of pay.

Turning to the reciprocity parameters, we estimate an impact of the monetary gift on the warm-glow coefficient of $a_{Gift} = 0.076$ (s.e. 0.028). The effect size can be inferred from the reduced-form estimates. The gift treatment leads to an increase in extra work that is less than half the size of the low-piece rate treatment, thus implying $a_{Gift} * \bar{p}_E$ is less than half of 0.01 (the 1-cent-per-address incentive in the low-piece-rate). Given $\bar{p}_E = 0.04$, this implies $a_{Gift} \approx 0.1$. Relative to the baseline warm glow of $a = 0.104$, the increase is large, although it is more modest in absolute terms.

The fit of the model for Experiment 3 is very good (displayed by the crosses in Figures 5a-c), including the fit of the distribution of effort (Online Appendix Figure 12b, compared to Figure 6b), save for the heaping at round numbers which the model does not reproduce. Online Appendix Table 11 shows that a similar set of robustness checks as for Experiment 2 yield very similar results for all the social preference parameters.

5.4 Comparison of Estimates in the Three Experiments

Across the three experiments, we estimate that baseline social preferences are substantial (even though in Experiment 2 they are estimated imprecisely), and do not respond to information, either quantitative or qualitative, on the return to the employer (provided this return is positive). Indeed, the estimates for the pure altruism parameter α for Experiment 1 and 3 are very close to zero and

nearly identical (Figure 7a). These results are consistent with a “warm glow” model, as opposed to pure altruism.

At the same time, the gift treatments appear to lead to divergent findings, as Figure 7b shows, when comparing effect sizes of the gift across the three experiments. Relative to the control group, the monetary gift increases productivity by only 1 percent, while it increases the extra work by over 200 percent in Experiment 2 and by 46 percent in Experiment 3. Similarly, there is a wide difference in the effect of the in-kind gift treatments.

In Figure 7c, we make the same comparison, but in terms of the underlying reciprocity parameters a_{Gift} , the shifts in the warm-glow baseline social-preferences, which become $a + a_{Gift}$ in response to the gift. The differences in the reciprocity parameters are nowhere near as large. In response to the monetary gift, we estimate $a_{Gift} = 0.15$ (s.e. 0.13) in Experiment 1, $a_{Gift} = 0.30$ (s.e. 0.14) in Experiment 2, and $a_{Gift} = 0.07$ (s.e. 0.03) in Experiment 3. We cannot reject that the three structural parameters are the same, as the p-values in Figure 7c show. For the in-kind gift, we estimate $a_{Gift} = -0.09$ (s.e. 0.10) in Experiment 1 and $a_{Gift} = 0.18$ (s.e. 0.14) and $a_{EarlyGift} = 0.36$ (s.e. 0.15) in Experiment 2. The difference is statistically significant compared to the early-gift results ($p = 0.008$), but the quantitative difference is nowhere near as large.

Thus, the comparison in terms of the social preference parameters attenuates what, *prima facie*, would appear to be a large and irreconcilable divergence between the two experiments in the impact of the gifts. It is accounting for the different elasticities of the outcomes, using the piece-rate design, that permits such partial reconciliation: the elasticity of productivity with respect to motivation is at least an order of magnitude smaller than the elasticity of extra work to motivation. Thus, for a given reciprocity shift due to a gift, the observed impact on productivity will tend to be at least an order of magnitude smaller than on labor supply.

5.5 Implications of Piece-Rate Design and Structural Estimates

The structural estimates allow us to compare results across our experiments, and thus to partially reconcile apparently conflicting findings. We highlight here three additional implications.

First, the structural estimates can be used for out-of-sample predictions. For example, in the pre-analysis plan for Experiment 2, we used the structural estimates from the productivity experiment, together with a conjecture about the elasticity of labor supply, to do a model-based power calculation for the new design, compared to alternative designs.

Second, the structural model allows us to revisit the estimates in previous gift-exchange field-experiments. As we discussed in Section 2, under a power cost of effort function, we can derive a measure of reciprocity, the proportional increase in warm glow $(a + a_{Gift})/a$ due to the gift, provided we know the elasticity $1/\gamma$ of productivity to motivation (equation 5). While we do not observe the elasticity from the previous experiments, a starting assumption is that it is comparable to the estimate from our productivity task. Under this assumption, as Online Appendix Table 12 shows, some previous papers imply very large reciprocity effects, such as a 400 or 700 percent increase in social preferences with a positive gift, and an 88 percent decrease with a negative gift.

Third, we can use the estimates for counterfactual exercises. While the social-preference estimates are context specific, as a calibration exercise in Online Appendix Figure 13a we consider how employee effort responds to piece rate variation (on the x axis) under the assumption of no social preferences ($a = 0$) versus for the baseline social preferences from the productivity experiment ($\hat{a} = .4$). Under no social preferences, introducing a piece rate has dramatic impacts on output; in the presence of warm glow, instead, effort is quite high even with no piece rate and it increases slowly with the piece rate increases. Given this, the optimal piece rate for firm profits (Online Appendix Figure 13b) is positive (3 cents) without social preferences, but is instead zero under our estimates for warm glow. As Englmeier and Leider (2012c) highlight, incentives and social preferences are largely substitutes in motivating workers.

6 Discussion and Conclusion

In this Section, we take stock of our results and discuss them in the context of the literature.

Baseline Social Preferences. In all three experiments, worker effort does *not* respond to variation in the stated return to the employer. Thus, workers’ social preferences towards the employer is not consistent with Beckerian altruism towards the employer. There is evidence, however, of *some* form of prosocial motivation, given positive effort in the absence of piece-rates, and the drop in effort when the work output is not used in Experiment 1 (in the training rounds).

These findings echo the results in real-effort experiments in which the experimenter donates money to charities as a function of the effort exerted (e.g., Imas, 2014, Tonin and Vlassopoulos, 2015, and DellaVigna and Pope, 2018). While subjects in these experiments work harder in response to these social incentives, the return to the charity does not affect the worker effort.

We interpret our findings in light of a “warm glow” model. Here, warm glow is broadly construed and may also stand in for norms in the workplace (‘one needs to put in effort’). We intend it as an alternative to the pure-altruism model that is typically used to capture workplace social preferences (e.g. Bandiera, Barankay, and Rasul, 2005), and a starting point to better understand social preferences in the workplace. Within this model, we estimate large and economically meaningful baseline social preferences in Experiment 1, sizable ones in Experiment 3, and imprecisely estimated ones in Experiment 2. Taken at face value, this implies that social preferences can play an important role as motivators at work, and have the potential to partially substitute for the role of incentives. The theme that social preferences towards employers may be important in the workplace is a classical one, but little previous field evidence pins down the nature of these preferences.

Gift Exchange. Another insight is that we find little evidence of gift exchange in the productivity experiment, consistent with the papers which find modest or null effects (Cohn, Fehr, and Goette, 2014; Esteves-Sorenson, 2018). Yet we find statistically significant—if quantitatively moderate—evidence of gift exchange in the extra-work experiment. As we discussed above, part of the disparity is due to the vast difference in elasticity of the outcome across the experiments: the much more elastic extra-work margin makes it possible to detect even modest-sized gift-exchange

effects. We find it intriguing that in the extra-work experiments we replicate the early finding in the literature of a positive impact of monetary gifts (e.g., Gneezy and List, 2006), which some recent experiments with a productivity design do not (e.g., Esteves-Sorenson, 2018). We also find an impact of in-kind gifts as in Kube, Marechal, and Puppe (2012), though not larger than the impact of monetary gifts. We hope that more papers will adopt the extra-work design employed in our paper, which could further our understanding of social preferences at work.

What remains is a partial puzzle for the lack of gift effects in Experiment 1, in particular for non-monetary gifts, for which we can reject that the effect is the same as in Experiment 2. We consider a number of possibilities for this discrepancy. A first possibility is that, given the complicated within-person design, the gift treatments did not trigger the required surprise and mood response to induce reciprocation. However, evidence from a short debriefing survey indicates that the gifts in the final batches did induce the intended emotions of happiness and even self-reported motivation.³⁰ A second possibility is that worker effort towards the end of the longer productivity experiment becomes habitual and unresponsive to incentives. However, we do find significant response to piece-rate variation even in the latter batches. A third possibility is that, for the gifts to have an impact, it helps to explicitly state a request, as we did in the Experiments 2 and 3, e.g., “*Would you be willing to help us enter some more of the data for up to one hour?*” Thus, the employer provides a clear “channel” for the worker to reciprocate. Ultimately, we leave it to future literature to conclusively address these possibilities.

Piece-rate design. Finally, this paper makes the case for a *piece-rate design*, which is relatively uncommon in the behavioral literature. We are not aware of papers on gift exchange in the field that employ a similar design (e.g., papers in Online Appendix Table 1). More broadly, among all real-effort experiments published in top-5 journals from 1999 to 2018, only 2 out of 10 papers employ this design (Online Appendix Table 13). Field experiments studying productivity at work, such as Breza, Kaur, and Shamdasani (2018), also do not typically employ it.

A piece-rate design enables the researcher to map from a reduced-form effect to underlying parameters, allows readers to judge the plausibility of an effect, and makes comparisons across experiments with different tasks easier. Moreover, estimating the elasticity of different outcomes enables researchers to identify more highly-powered experimental designs, such as the extra-work designs we employ, allowing for more precise and cost-effective inference.

³⁰For the last 65 workers in Experiment 1, we asked ‘*How did the pay in the last two periods make you feel? (Check all that apply) [] No particular reaction [] It made me happy [] Felt more motivated and energetic [] It was what I expected [] Surprised, it was more than I expected [] Surprised, it was less than I expected [] Felt unhappy [] Felt insulted [] It was unfair.*’ We coded the share that reported being happy or unhappy, as well as the share reporting a positive surprise or a negative surprise. As Online Appendix Figure 14 shows, in the positive gift treatments 70 to 80 percent of subjects report positive mood, compared to 20 percent in the control group and 5 percent in the negative gift group. The results are similar for positive surprise, and are reversed for unhappiness and negative surprise.

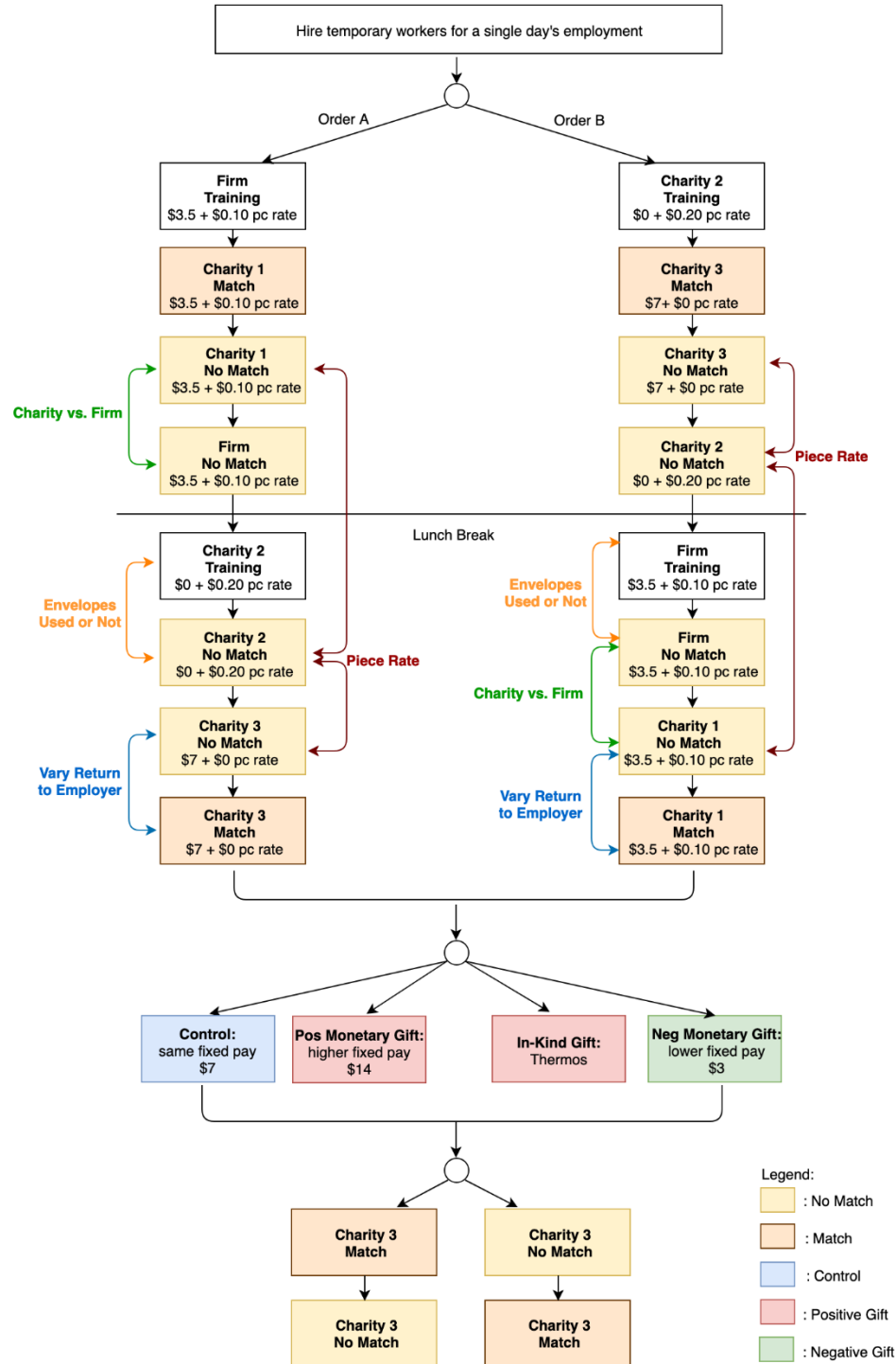
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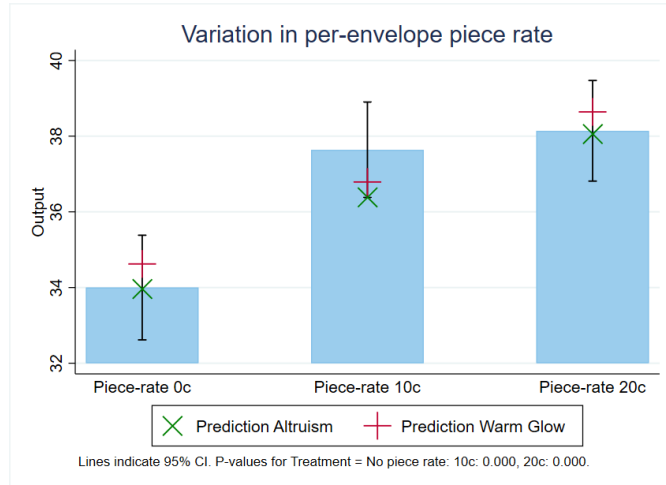
Figure 1. Productivity Experiment: Design



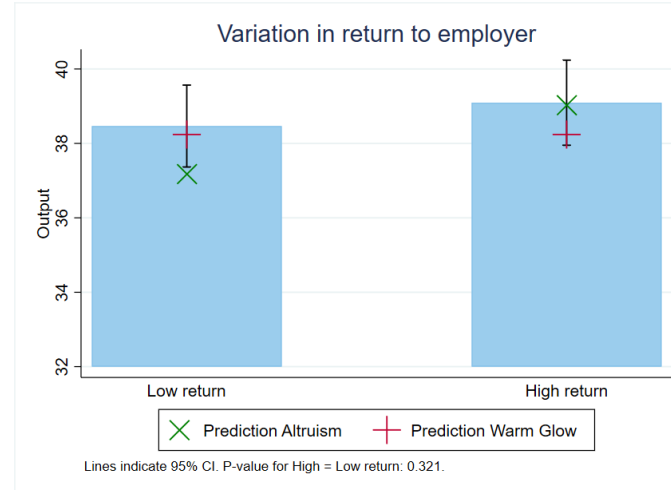
Notes: This figure displays the sequence of the 10 experimental rounds of envelope preparation, each of which lasting 20 minutes, for the productivity experiment. Between each round there is a 10 minute break, except between rounds 4 and 5 when there is a longer break for lunch. Subjects are randomized across sessions into Order A or Order B, as well as into three assignments of charities to be Charity 1, 2, and 3. In rounds 9 and 10, subjects are split within session into four gift exchange treatments (in the first 24 experimental sessions we did not run the in-kind gift treatment). Depending on randomized session assignment, either session 9 or session 10 involves a charity match (high return for the employer). The arrows indicate the main experimental comparisons evaluated in Figure 2a-d and in Online Appendix Figure 1a-b.

Figure 2. Productivity Experiment: Experimental Findings and Model Fit

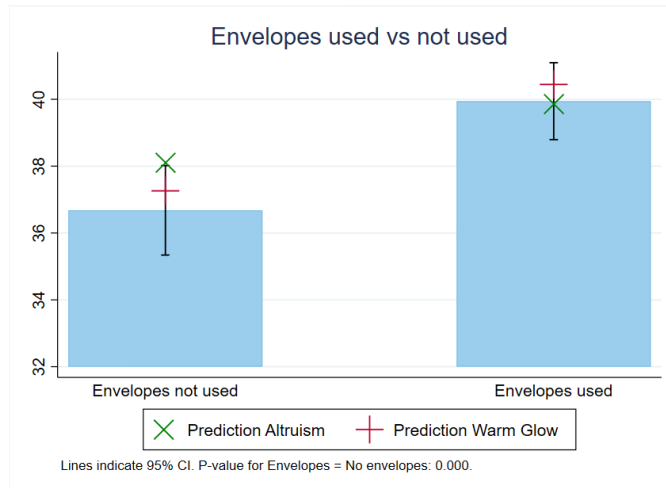
Panel a. Variation in Piece Rate



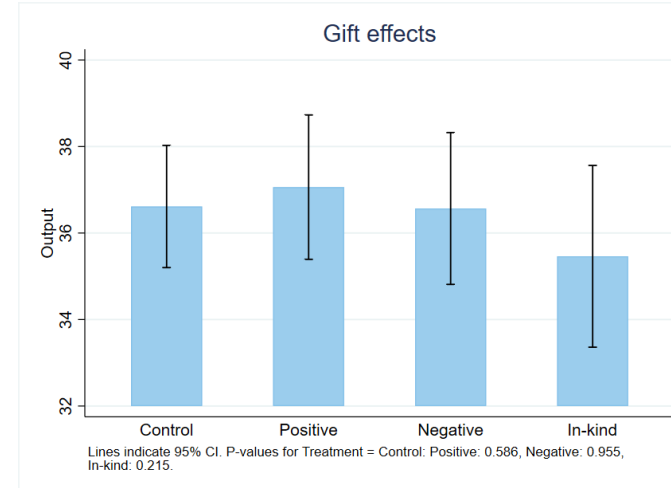
Panel b. Variation in Return to Employer (Match)



Panel c. Consequences to the Employer



Panel d. Effect of Gift Treatments



Notes: Figures 2a-c display key comparisons of average output (number of envelopes folded within a 20-minute round) across batches, as outlined by the arrows in Figure 1. The comparisons average across order A and B. Figure 2a compares the piece rates for 0c, 10c, and 20c (respectively, batches 7, 3, and 6 in Order A and batches 3, 7, and 4 in order B). Figure 2b compares the impact of high return to the employer (charity match) (batches 7 and 8). Figure 2c compares the impact of envelopes being used (batches 5 and 6). Figure 2d presents the key results for the gift exchange treatments in batches 9 and 10. The figures indicate 95% confidence intervals computed clustering by session. Figures 2a-c also indicate the average prediction for the model estimated with altruism (Online Appendix Table 6, Column 3) or with warm glow (Online Appendix Table 6, Column 4).

Figure 3. Extra Work Experiments: Design

Figure 3a. Experiment 2, Design

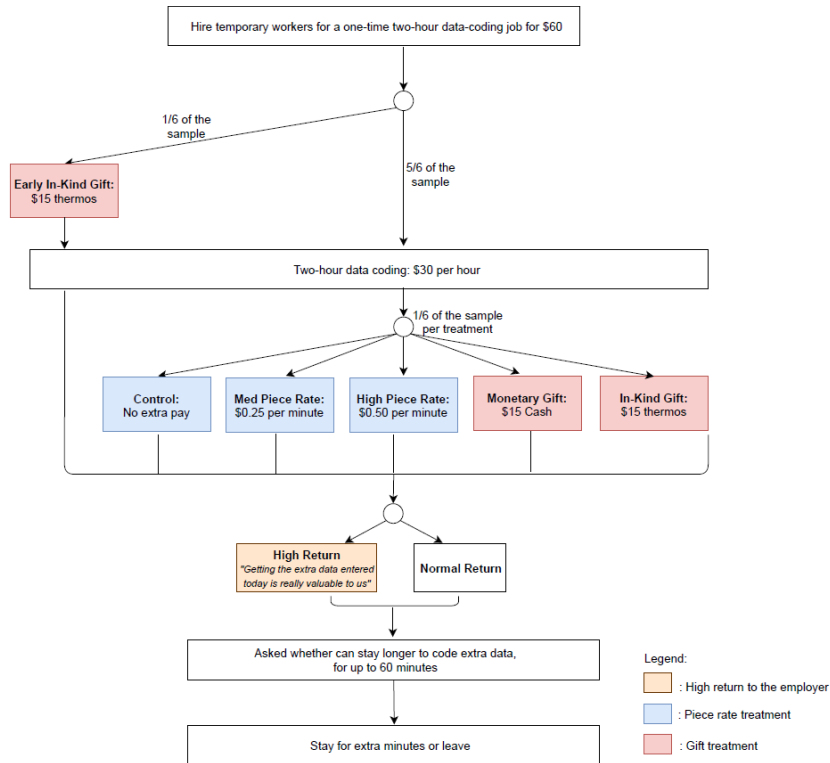
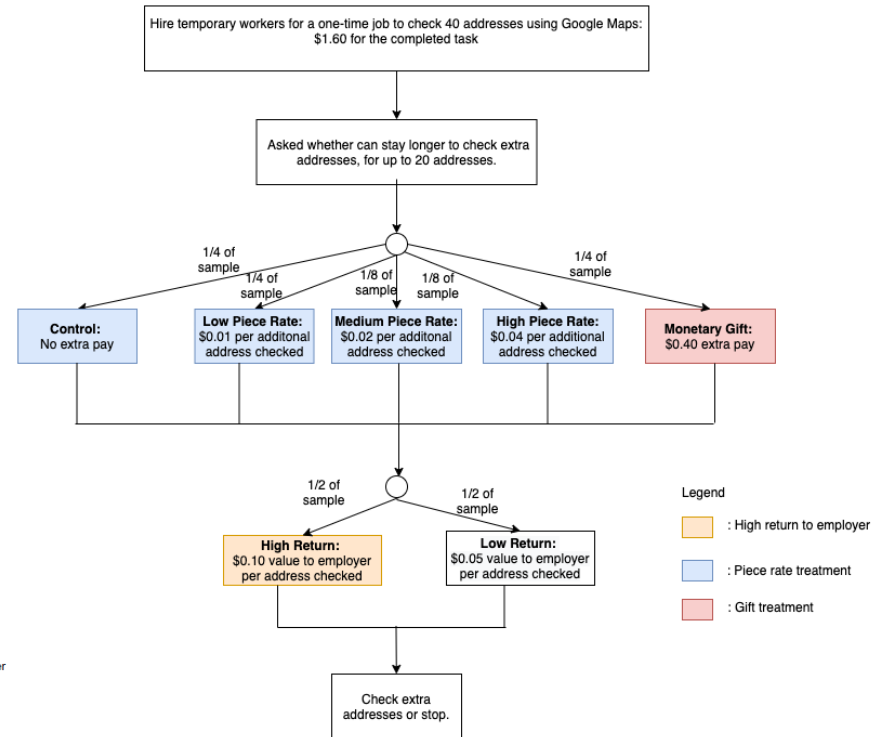


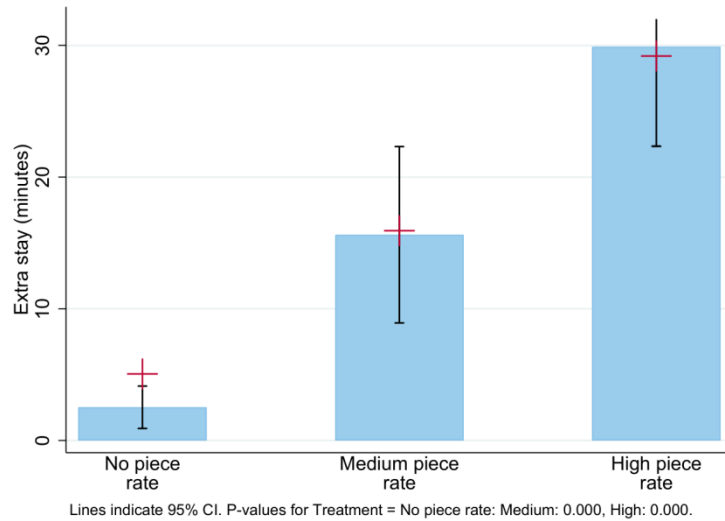
Figure 3b. Experiment 3, Design



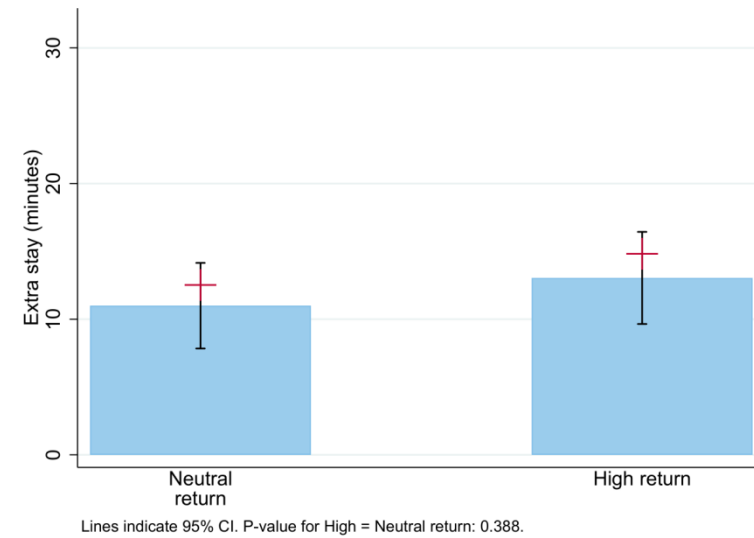
Notes: Figures 3a-b display the design for the extra-work experiments, Experiment 2 and Experiment 3.

Figure 4. Extra Work Experiment 2: Findings

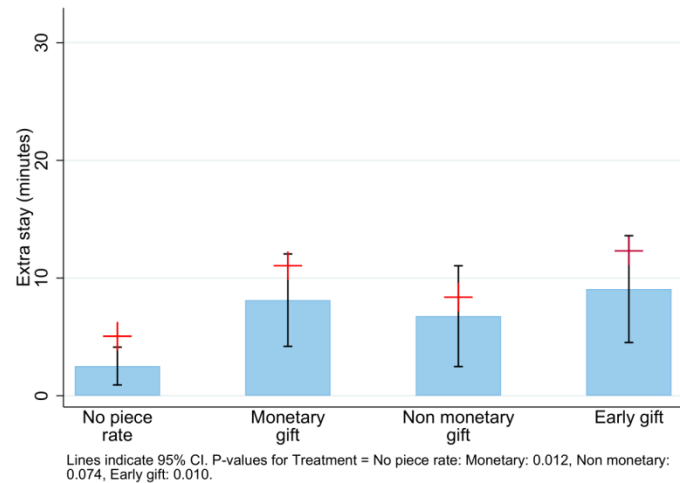
Panel a. Variation in Piece Rate



Panel b. Variation in Return to Employer



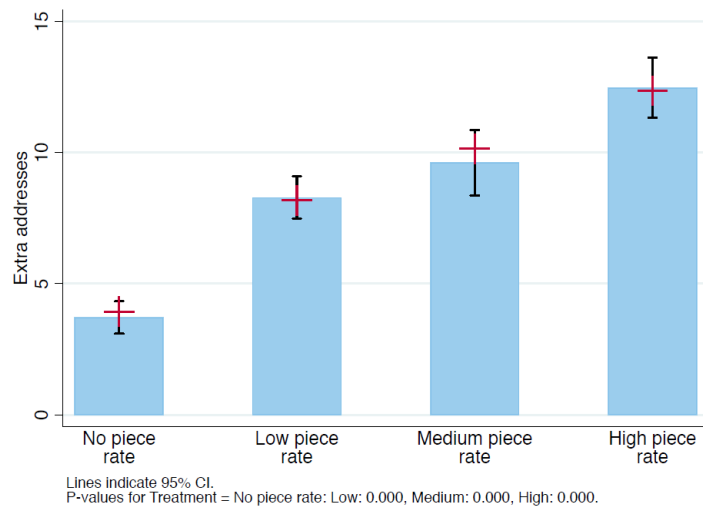
Panel c. Effect of Gift Treatments



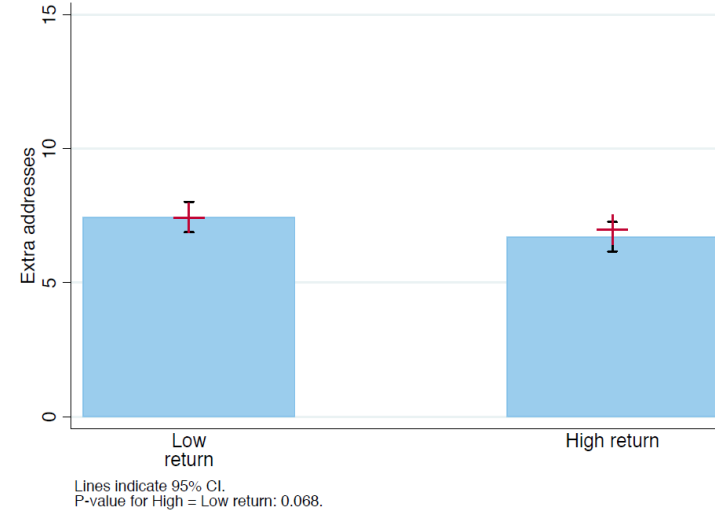
Notes: Figure 4 displays the experimental findings on the number of extra minutes of work in Experiment 2. Panels a and c compare this measure across the six main experimental arms. Panel b pools across the six experimental arms and compares the (cross-randomized) arms with stated high-return for the employer to the control arm. The figures also display as a red cross the model prediction for the parameter estimates in Column 1 of Table 4.

Figure 5. Extra Work Experiment 3: Findings

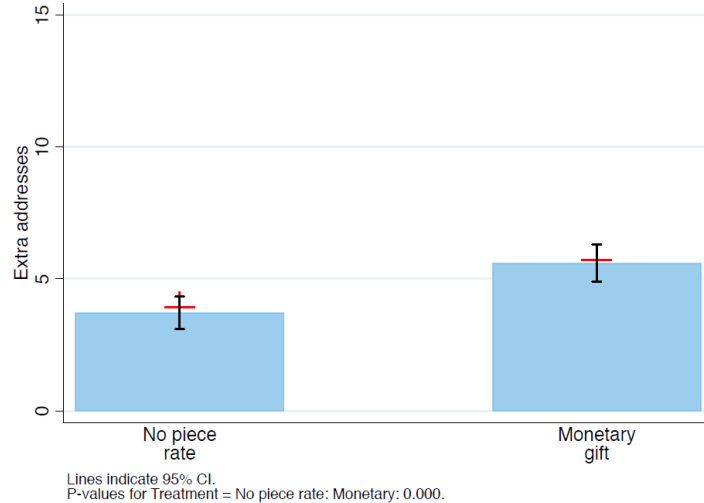
Panel a. Variation in Piece Rate



Panel b. Variation in Return to Employer

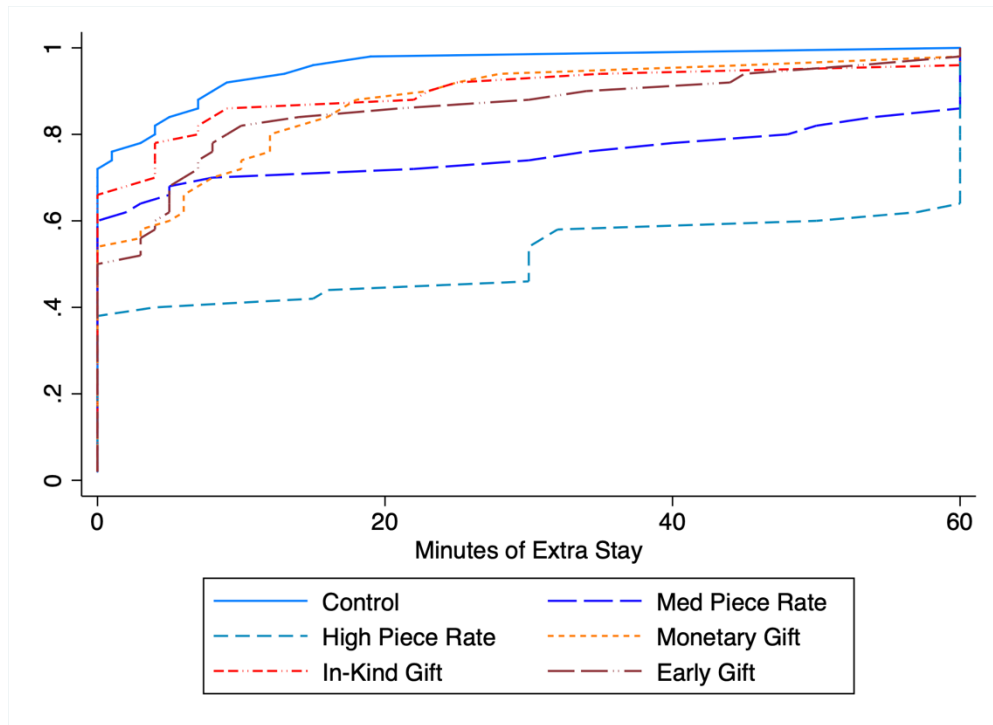


Panel c. Effect of Gift Treatments

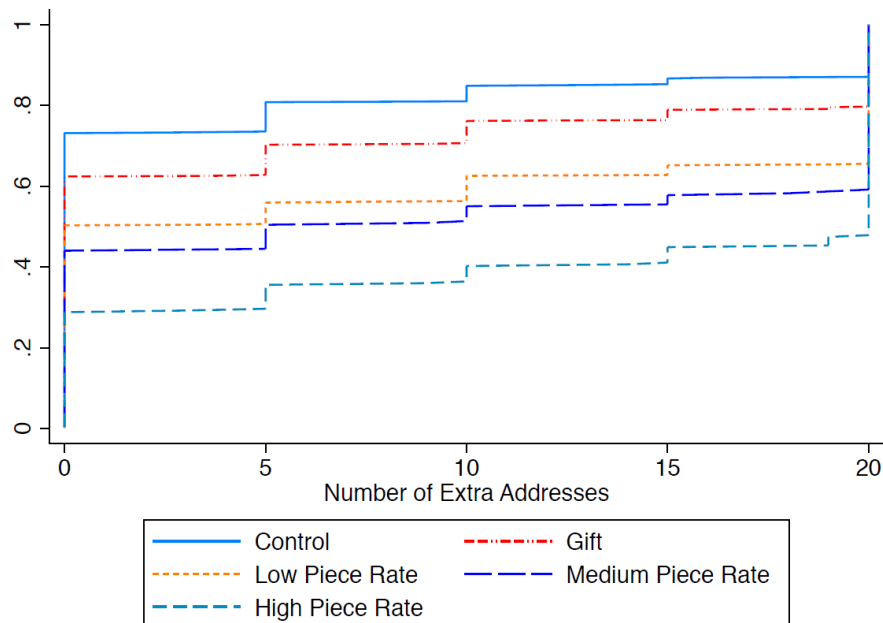


Notes: Figure 5 displays the experimental findings on the number of extra addresses checked in Experiment 3. Panels a and c compared this measure across the main experimental arms. Panel b pools across the experimental arms and compares the (cross-randomized) arms with stated high-return for the employer to the control arm. The figures also display as a red cross the model prediction for the parameter estimates in Column 4 of Table 4.

Figure 6. Extra Work Experiments: Distribution of Effort by Treatment
Panel a. Experiment 2



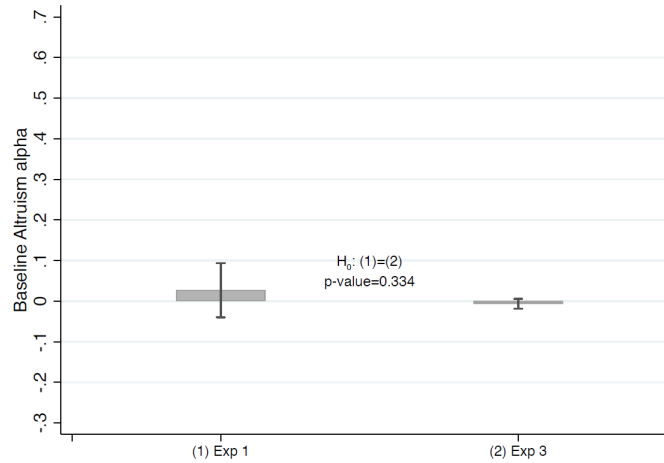
Panel b. Experiment 3



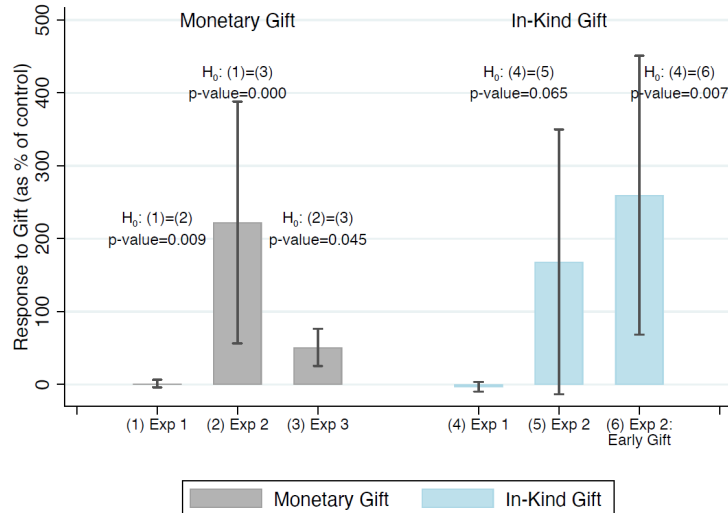
Notes: Panel a displays the c.d.f. of the number of extra-minutes stayed for the six experimental arms in Experiment 2. Panel b displays the c.d.f. of the number of extra addresses coded for the five experimental arms in Experiment 3.

Figure 7: Effect of Gift Treatments, Reduced-Form vs. Estimates of Social Preference Parameters

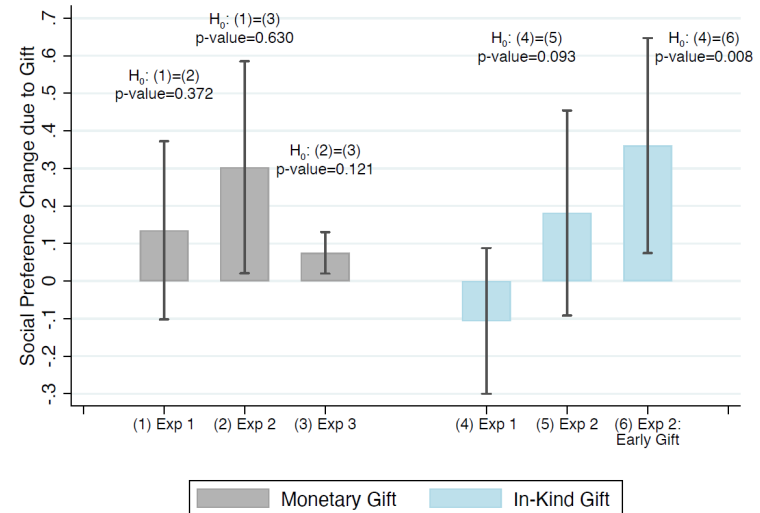
Panel a. Pure Altruism Parameter



Panel b. Reduced-Form Effort Change due to Gift



Panel c. Social Preference Change due to Gift (Reciprocity)



Notes: Panel a presents the estimate from the pure altruism parameter from Table 3, Column 3 and Table 4, Column 3. Panel b displays the reduced-form impact of the monetary and in-kind gift in the productivity experiment (labeled “Exp. 1”) and in the extra-work experiments (labeled “Exp. 2” and “Exp. 3”). The estimates are shown as percent increases over the average effort in the control group. Panel c displays the same comparison for the implied reciprocity estimates from, respectively, Table 3, Column 4, Table 4, Column 1, and Table 4, Column 3. The p-values refer to a test of equality of the results comparing across the experiments.

Table 1. Productivity Experiment, Findings for Gift Treatments

Specification:		OLS Regressions					
Dependent Variable:		Output in Batches 9 and 10					
Measure of Output:		Number of Envelopes Stuffed in 20 Minutes			Log of Number of Envelopes Stuffed in 20 Minutes		
		(1)	(2)	(3)	(4)	(5)	(6)
<i>Gift Treatments</i>							
Positive (monetary) gift		0.448	0.903	0.603	0.006	0.026	0.015
Treatment		(0.966)	(0.737)	(0.729)	(0.028)	(0.022)	(0.021)
Negative (monetary) gift		-0.046	-0.014	-0.047	-0.017	-0.012	-0.018
Treatment		(0.953)	(0.745)	(0.754)	(0.035)	(0.031)	(0.031)
Positive In-kind (Thermos) gift		-1.152	-1.011	-1.090	-0.040	-0.029	-0.033
Treatment		(1.242)	(0.973)	(0.927)	(0.037)	(0.029)	(0.028)
<i>Controls</i>							
Average Output Measure			0.867			0.782	
In Batches 1-8			(0.028)			(0.028)	
Average Output Measure				0.815			0.831
In Batches 5-8				(0.027)			(0.030)
Constant		36.613	6.223	5.149	3.572	0.826	0.561
		(0.709)	(1.045)	(1.118)	(0.020)	(0.099)	(0.110)
R squared		0.003	0.585	0.608	0.003	0.483	0.519
N		N = 892	N = 892	N = 892	N = 892	N = 892	N = 892

Notes: Estimates from an OLS regression of output (Columns 1 -3) and log output (Columns 4-6) in the final two batches (Batches 9 and 10) on the gift treatments. The omitted category is a Control treatment with no "gift" (pay is the same as previously experienced with the same charity). The standard errors are clustered at the session level.

Table 2. Extra Work Experiments, Findings

Specification:	OLS Regressions		Tobit Regressions		Probit Regressions	
Dependent Variable:	Extent of Extra Work (0-60 Minutes in Exp. 2, 0-20 Addresses in Exp. 3)				Indicator for Extra Work >0	
Experiment:	Exp. 2	Exp. 3	Exp. 2	Exp. 3	Exp. 2	Exp. 3
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Piece Rate Treatments</i>						
Low Piece Rate Treatment		4.584 (0.519)		28.557 (3.704)		0.243 (0.033)
Medium Piece Rate Treatment	13.1 (3.524)	5.900 (0.710)	31.765 (11.425)	35.889 (4.668)	0.131 (0.102)	0.307 (0.041)
High Piece Rate Treatment	27.424 (3.945)	8.761 (0.664)	65.287 (12.014)	51.003 (4.800)	0.351 (0.103)	0.464 (0.042)
<i>Gift Treatments</i>						
Monetary Gift Treatment	5.6 (2.132)	1.890 (0.481)	21.678 (9.284)	12.972 (3.449)	0.191 (0.102)	0.123 (0.033)
In-Kind Gift Treatment	4.24 (2.317)		12.914 (10.154)		0.067 (0.103)	
In-Kind Gift, Early Delivery Treatment	6.628 (2.458)		25.355 (9.364)		0.232 (0.102)	
<i>(Crossed) Employer Return Treatment</i>						
Treatment w/ High Return to the Employer	2.21 (2.145)	-0.712 (0.381)	6.43 (6.094)	-4.196 (2.395)	0.051 (0.058)	-0.029 (0.023)
Constant	1.415 (1.285)	4.068 (0.374)				
Hyp.: Gift Treatments = Control	p=0.001	p=0.000	p=0.011	p=0.000	p=0.051	p=0.000
R squared / Pseudo R Squared	0.193	0.104	0.032	0.035	0.039	0.061
Number of Subjects	300	1,954	300	1,954	300	1,954

Notes: Robust standard errors. Columns 6 and 7 report the marginal effects for the probit specification.

Table 3. Productivity Experiment, Social Preference Estimates

Estimation:				
Dependent Variable:	Log (No. of Envelopes in a Batch)		Number of Envelopes in a Batch	
	(1)	(2)	(3)	(4)
<i>Baseline Social Preferences</i>				
Altruism towards Employer (Charity)	-0.012 (0.038)		0.027 (0.034)	
Altruism towards Employer (Grocery Store)				
Warm Glow towards Employer (Charity)	0.461 (0.074)	0.443 (0.063)	0.422 (0.071)	0.462 (0.065)
Warm Glow towards Employer (Grocery Store)	0.730 (0.080)	0.720 (0.072)	0.694 (0.075)	0.716 (0.073)
<i>Reciprocal Social Preferences</i>				
Warm Glow Change -- Positive Monetary Gift		0.151 (0.128)		0.135 (0.121)
Warm Glow Change -- Negative Gift		-0.042 (0.123)		-0.001 (0.095)
Warm Glow Change -- In-Kind Gift		-0.095 (0.104)		-0.106 (0.099)
<i>Incidental Parameters</i>				
Cost Function Curvature (γ)	9.518 (0.841)	9.44 (0.737)	0.258 (0.019)	0.263 (0.018)
Cost of Effort Function:				
Std. Deviation of Error Term	0.130	0.144	3.952	4.318
Std. Dev. of Individual f.e.s * (1/γ)	0.014	0.241	8.160	8.014
R Squared	0.8374	0.7915	0.8532	0.8184
N	3568	4460	3568	4460

Notes: Specifications are from non-linear least squares regressions, with each observation being a worker-batch combination. The sample is restricted to the first 8 batches in Columns 1-3 and 5-7. The dependent variable is the log of the number of envelopes produced in that round in Columns 1-4 and is the number of envelopes produced in Columns 5-8. The specifications in Columns 1 and 5 allow for pure altruism towards the employer, in which the worker puts weight alpha on the return to the employer. The specifications in Columns 2 and 6 allow for a form of warm glow, that is, the worker puts a weight on the employer, but on the *average* return (30 cents per envelope), not the actual return (which varies by round). The specifications in Columns 3 and 7 include both altruism and warm glow coefficients, except for the grocery store for which there is no variation in return and thus one cannot separate altruism from warm glow. The specifications in Columns 4 and 8 include also batches 9 and 10. All specifications include fixed effects for worker i as well as indicators for rounds 2, 3, 4, and 5-8; Columns 4 and 8 also include indicators for batches 9-10. The standard deviations listed are the standard deviation of the error term and the standard deviation of the individual fixed effects divided by the curvature γ . The latter ratio indicates the variation in the individual productivity. The standard errors are clustered at the session level.

Table 4. Extra Work Experiments, Social Preference Estimates

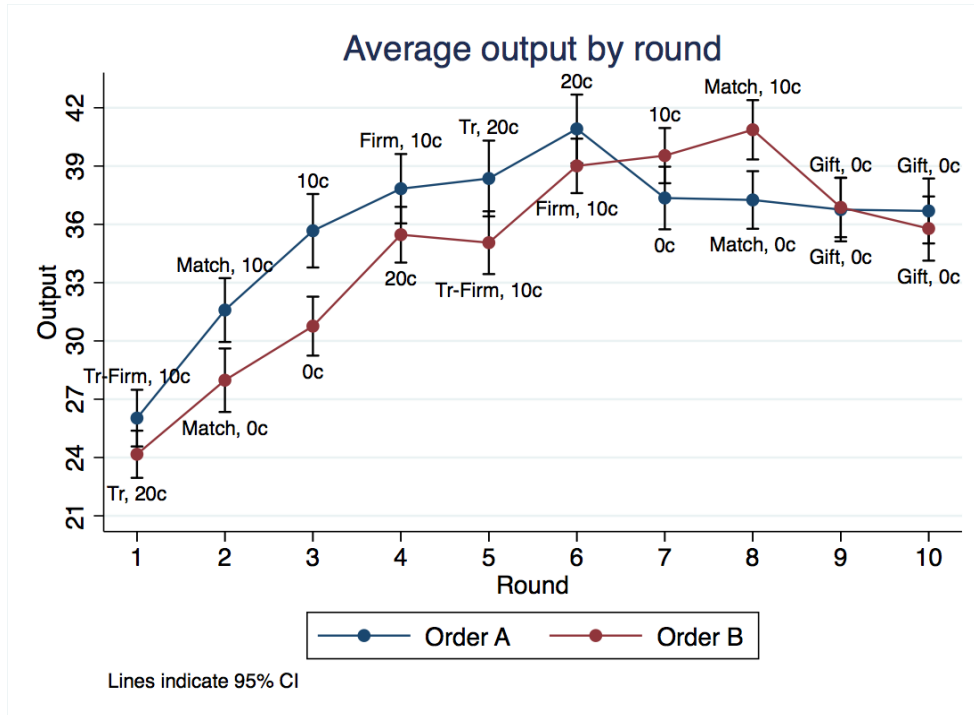
Estimation: Experiment: Dependent Variable:	Maximum Likelihood, Accounting for Censoring					
	Experiment 2		Experiment 3			
	Minutes	Log (Minutes	Log (Addresses		Log (Addresses	
	Worked	Worked)	Addresses Checked	Addresses	Checked	Checked)
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Baseline Social Preferences</i>						
Warm Glow towards Employer	0.813 [0.003, 100]	0.806 [0.003, 100]	0.104 (0.071)	0.095 (0.064)	0.104 (0.071)	0.095 (0.064)
Altruism Towards Employer	.	.	-0.006 (0.006)		-0.006 (0.006)	
Warm Glow Change - High Return for Employer	0.109 (0.093)	0.111 (0.096)		-0.024 (0.023)		-0.024 (0.023)
<i>Reciprocal Social Preferences</i>						
Warm Glow Change -- Monetary Gift	0.303 (0.144)	0.309 (0.140)	0.076 (0.028)	0.075 (0.028)	0.076 (0.029)	0.075 (0.028)
Warm Glow Change -- In-Kind Gift	0.181 (0.139)	0.181 (0.143)				
Warm Glow Change -- In-Kind Gift, Early	0.360 (0.146)	0.365 (0.144)				
<i>Incidental Parameters</i>						
Cost Function Curvature (γ)	0.007 [0, 0.079]	1.050 [0, 10.08]	0.051 (0.014)	0.051 (0.014)	2.510 (0.698)	2.510 (0.698)
Std. Deviation of Error Term	45.121 (4.104)	0.311 (0.028)	43.404 (2.332)	43.404 (2.332)	0.885 (0.047)	0.885 (0.047)
Cost of Effort Function:	Exponential	Power	Exponential		Power	
Log Likelihood	-637.99	-160.58	-2717.29	-2717.29	-1526.45	-1526.45
N	300	300	1956	1956	1956	1956

Notes: Maximum likelihood estimates for the number of minutes stayed (including the initial 120 required minutes) for Experiment 2 and the number of extra addresses check (including the required 40) for Experiment 3. Bootstrap standard deviations are in parentheses and 95% bootstrap confidence intervals are in brackets. The number of bootstrap draws is 1000. The upper bound of the baseline social preference parameter is set to be 100 in the estimation.

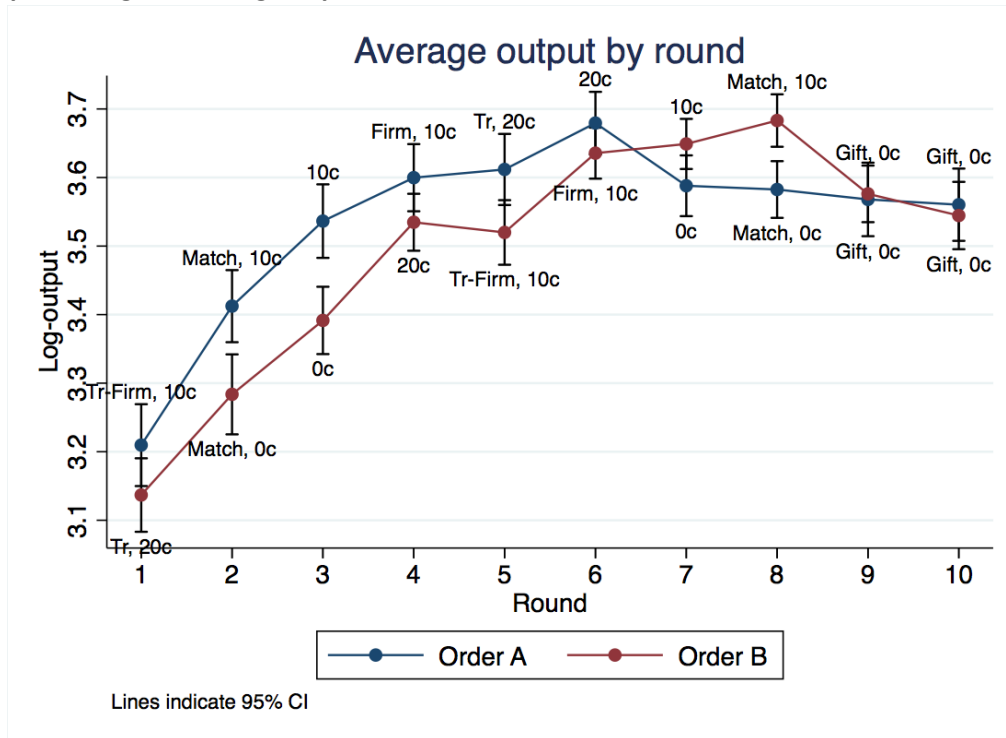
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Online Appendix Figure 1. Productivity Experiment: Average Effort over the 10 Batches, by Order

Online Appendix Figure 1a. Output



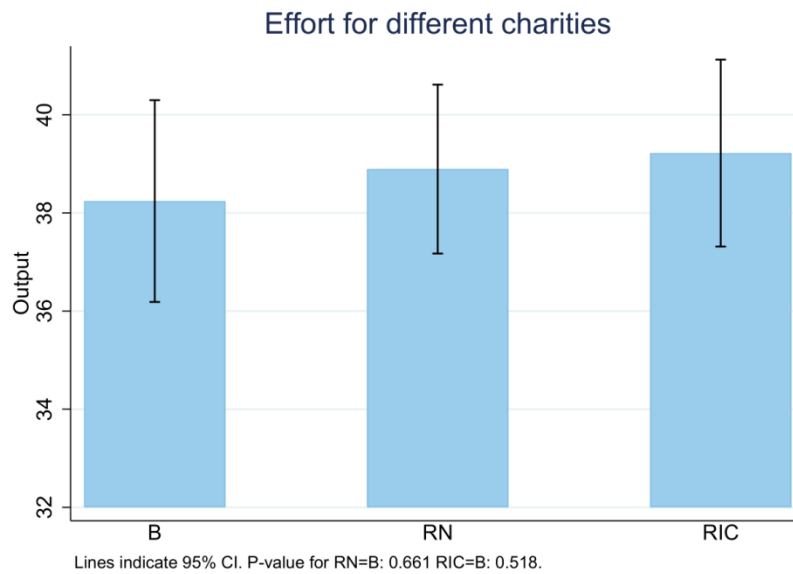
Online Appendix Figure 1b. Log Output



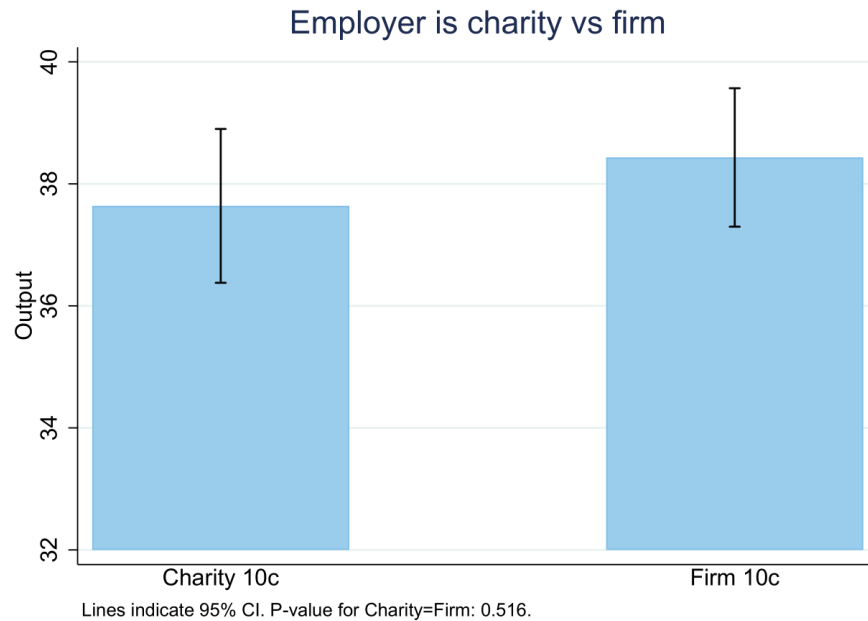
Notes: This figure displays the average output (number of envelopes folded within a 20-minute round) and log output in a batch (round). The figure indicates 95% confidence intervals computed clustering by session, thus allowing for correlation of errors among subjects in a session. Subjects are randomized into Order A or Order B. See Figure 1 for more detailed labeling of the 10 batches in each order. The output for batches 9 and 10 averages across the gift treatments displayed in Figure 1.

Online Appendix Figures 2a-b. Productivity Experiment: Additional Findings

Panel a. Effort Provided For Three Different Charities



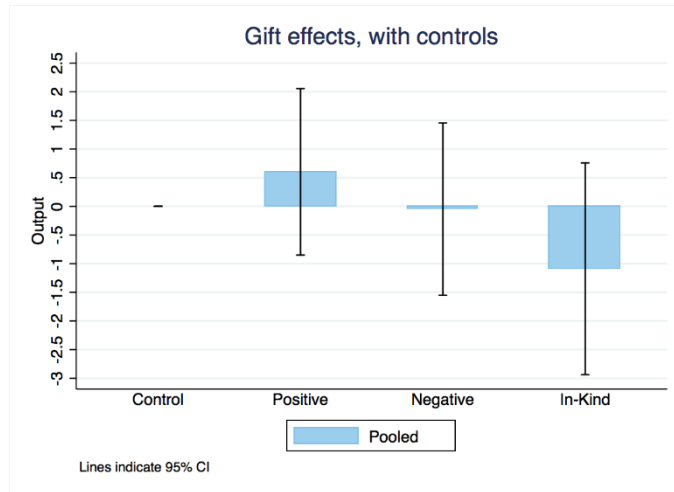
Panel b. Charity Employer versus Grocery Store Employer



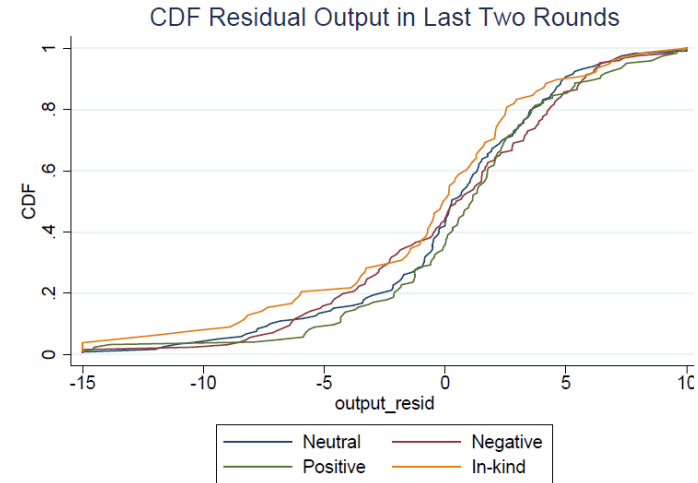
Notes: This figure displays additional experimental results on average output (number of envelopes folded within a 20-minute round). Online Appendix Figure 2a compares productivity across the three different charities used in the experiment. The charities are randomized in a rotating way to take the role of Charity 1, 2, and 3. The comparison uses output in all rounds except for the training rounds. Online Appendix Figure 2b compares output when producing for a charity versus for a firm (a grocery store) holding constant the piece rate at 10 cents and holding constant the perceived return to the employer at 30 cents per envelope. The rounds compared are outlined in Figure 1. The figures indicate 95% confidence intervals computed clustering by session.

Online Appendix Figure 3. Productivity Experiment: Additional Evidence on Gift Treatments

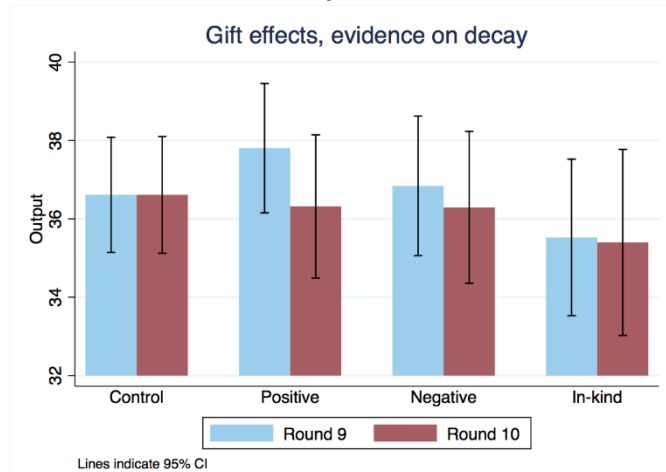
Panel a. Effect of Gift Treatments (With Controls)



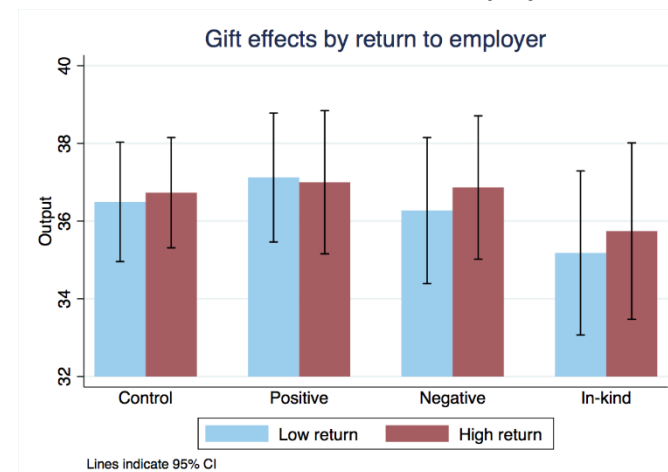
Panel b. Effect of Gift Treatments (With Controls)



Panel c. Evidence on Decay of Gift Effects



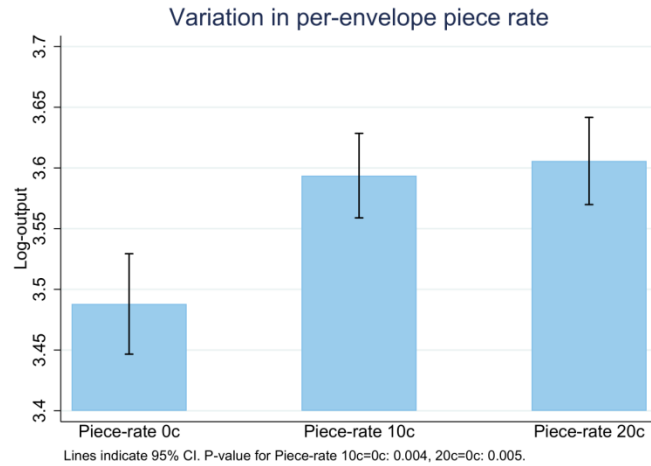
Panel d. Interaction with Return to Employer



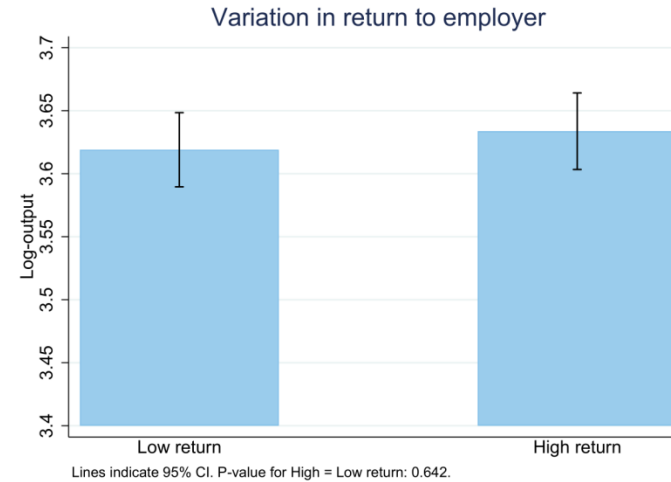
Notes: This figure presents additional results for average output (number of envelopes stuffed in 20 minutes) in the gift treatments in rounds 9 and 10 (see Figure 1). The figures include 95% confidence intervals obtained after clustering for session. Panel a presents the results controlling for average productivity in rounds 5-8 (Table 1, Column 3). Panel b presents the c.d.f. of the worker-level estimated gift effects. (We regress productivity in rounds 9 and 10 on average productivity in rounds 5-8, take the residuals and average the two residuals for each worker.) Panel c examines the possible decay of gift effects. Panel d splits the results by return to the firm: in either round 9 or round 10 (depending on a randomization) the employer earns a higher return due to a charity match.

Online Appendix Figure 4. Findings of Productivity Experiment, Log Output

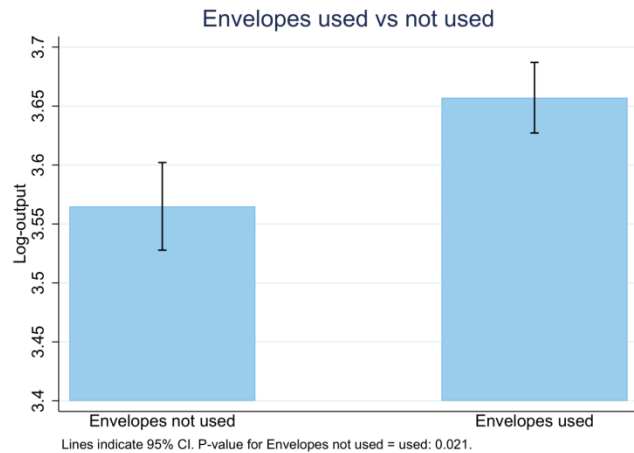
Panel a. Variation in Piece Rate



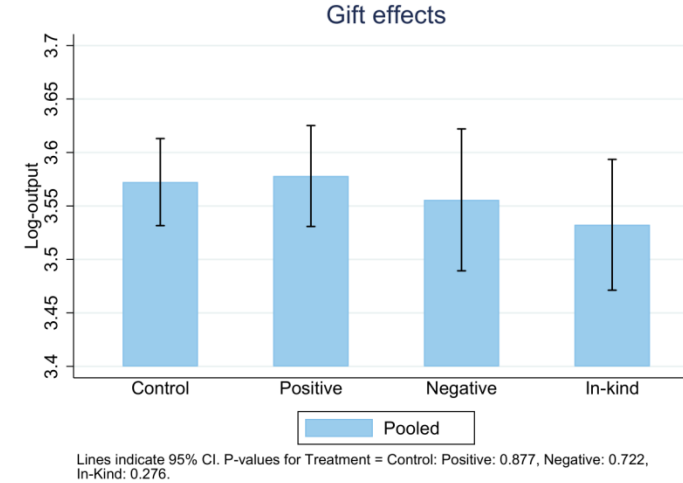
Panel b. Variation in Return to Employer (Match)



Panel c. Consequences to the Employer



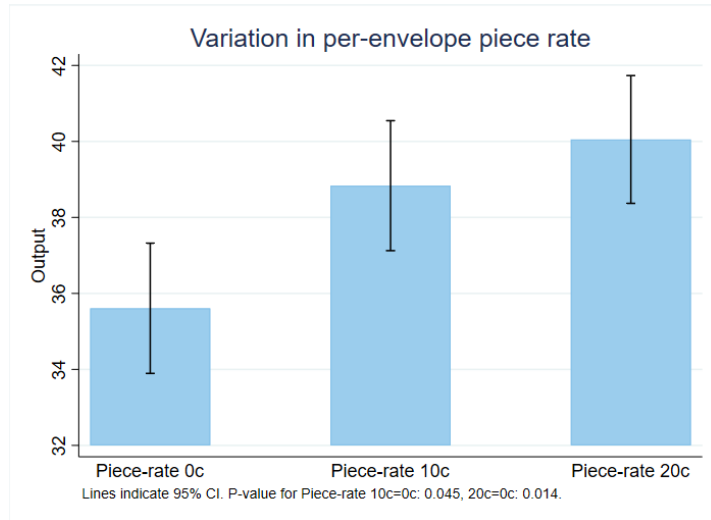
Panel d. Effect of Gift Treatments



Notes: This figure displays the key findings in Experiment 1 for log output (log of number of envelopes folded within a 20-minute round) rather than output.

Online Appendix Figure 5. Findings of Productivity Experiment, Output, Employed participants only

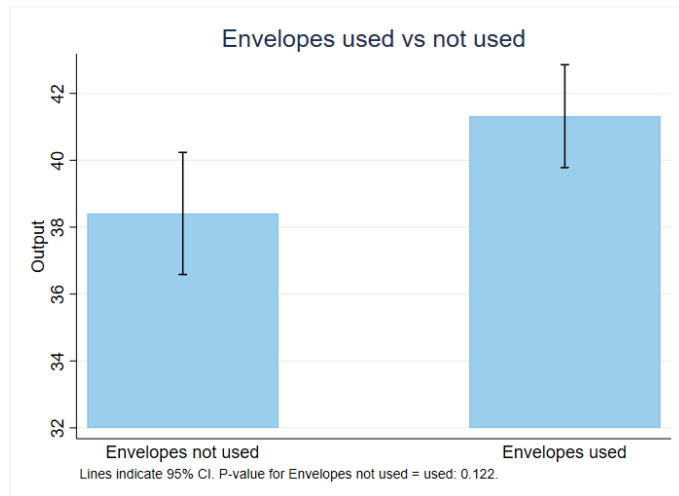
Panel a. Variation in Piece Rate



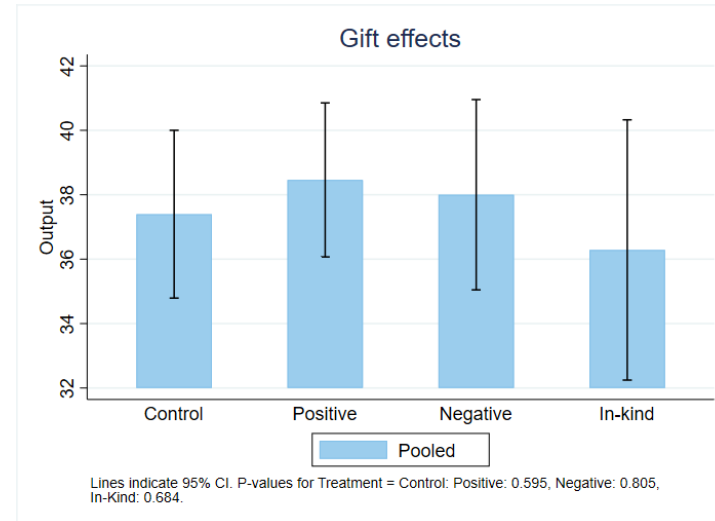
Panel b. Variation in Return to Employer (Match)



Panel c. Consequences to the Employer



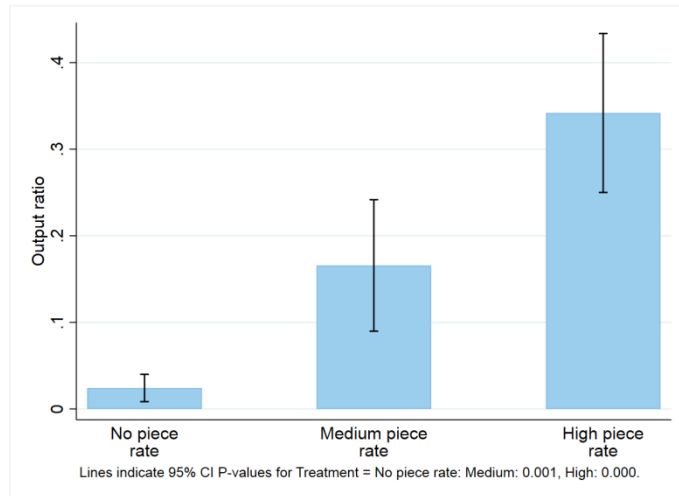
Panel d. Response to Gifts



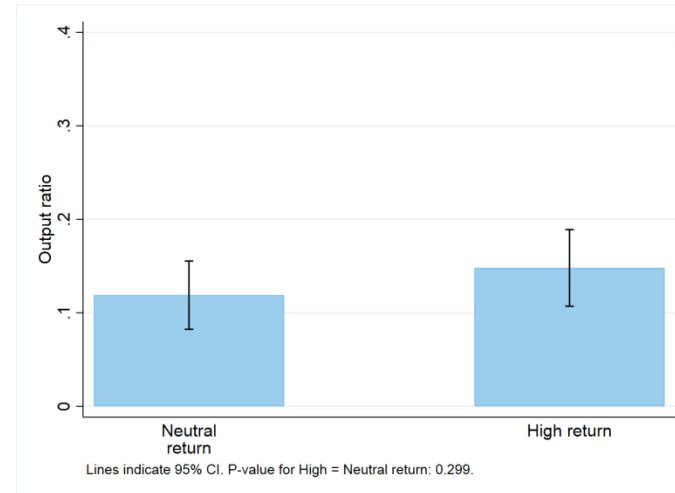
Notes: This figure displays key comparisons of average output (number of envelopes folded within a 20-minute round) including only employed workers.

Online Appendix Figure 6. Findings of Experiment 2, Output in Extra Minutes (As Fraction of Output in First 120 Minutes)

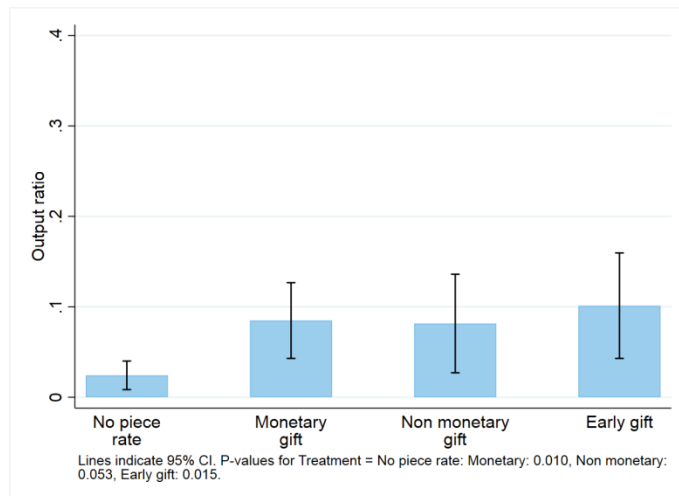
Panel a. Variation in Piece Rate



Panel b. Variation in Return to Employer



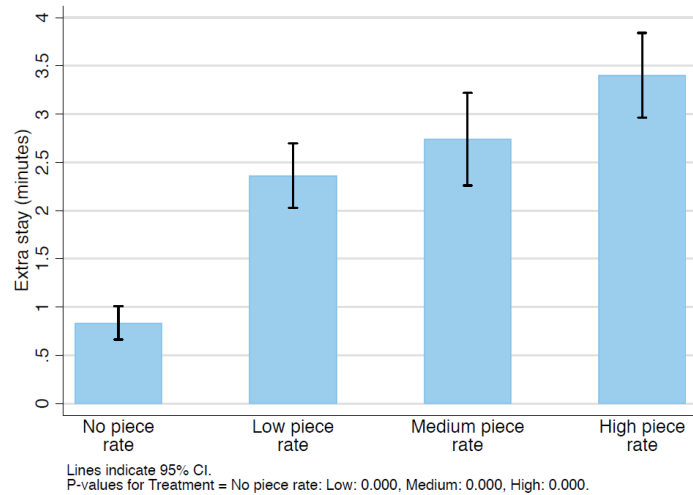
Panel c. Effect of Gift Treatments



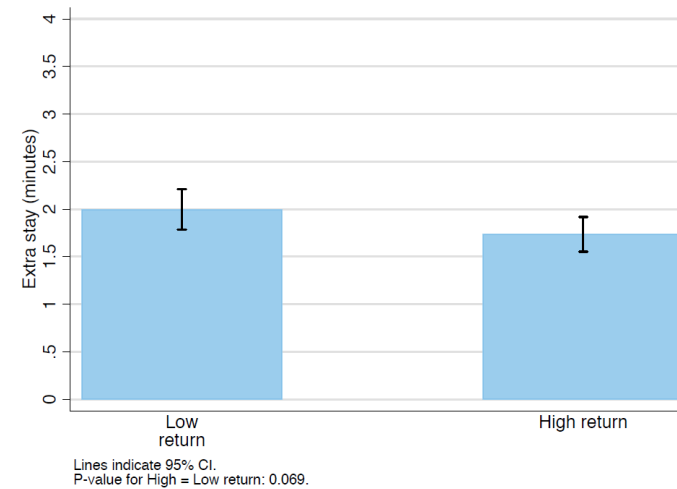
Notes: This figure presents the findings of the extra-work experiment 2 reporting the output (number of lines coded) produced in the extra minutes of work, as fraction of the output produced by that same subject in the initial 120 minutes of work. Output is 0 for subjects who do not stay extra.

Online Appendix Figure 7. Findings of Experiment 3, Extra Work Measured as Extra Minutes Worked

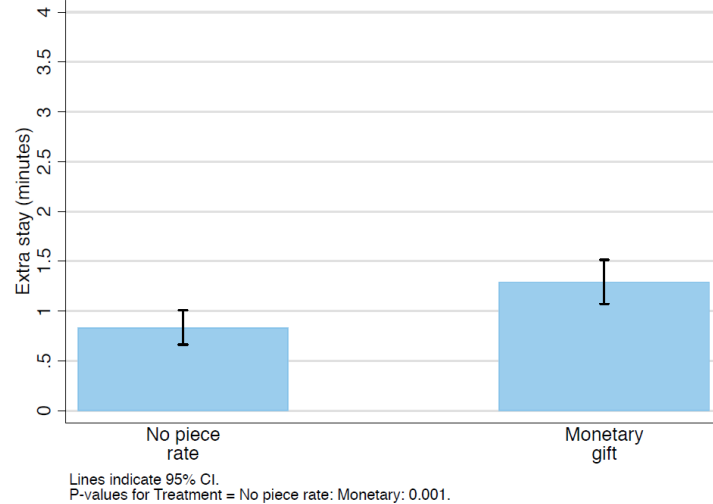
Panel a. Variation in Piece Rate



Panel b. Variation in Return to Employer



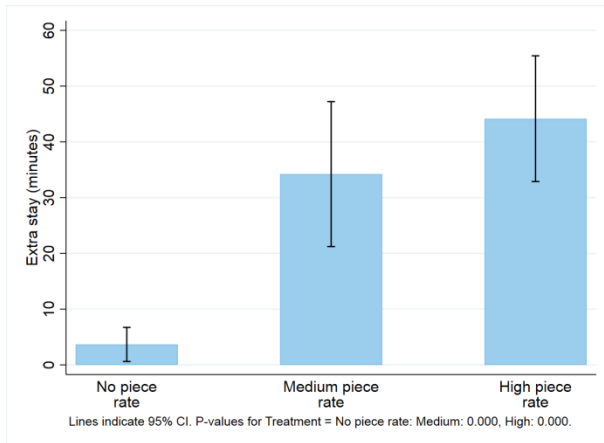
Panel c. Effect of Gift Treatments



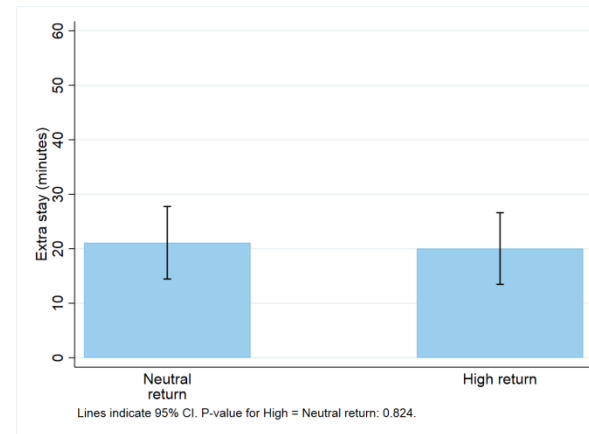
Notes: This figure presents the findings of the extra- work experiment 3, with as outcome variable the number of minutes worked, set as zero for those who do not work extra, and capped at 20 minutes..

Online Appendix Figure 8. Findings of Experiment 2, Craigslist Participants

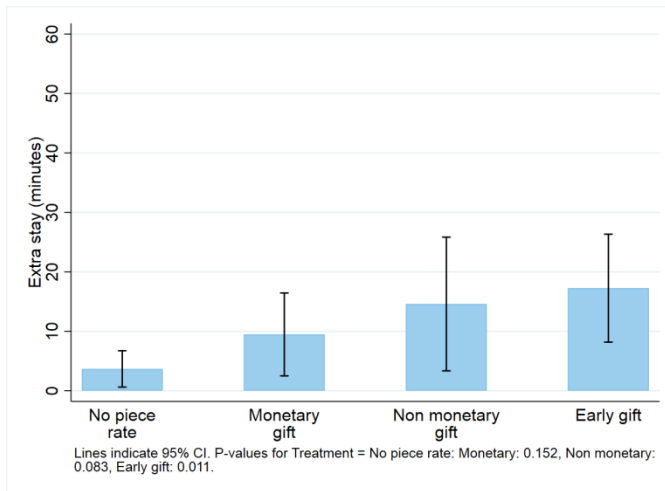
Panel a. Variation in Piece Rate



Panel b. Variation in Return to Employer



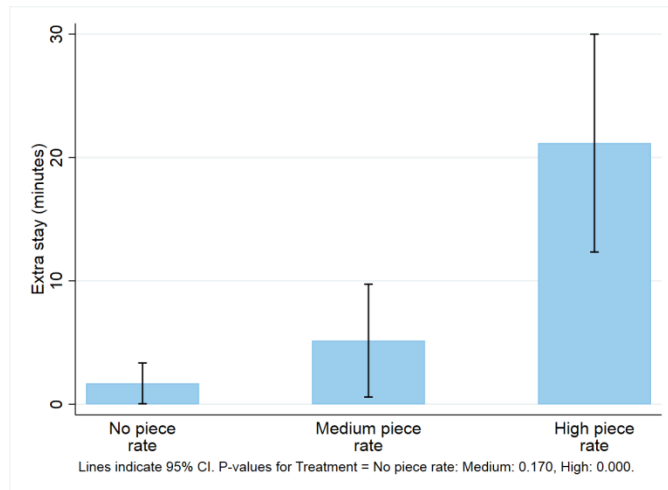
Panel c. Effect of Gift Treatments



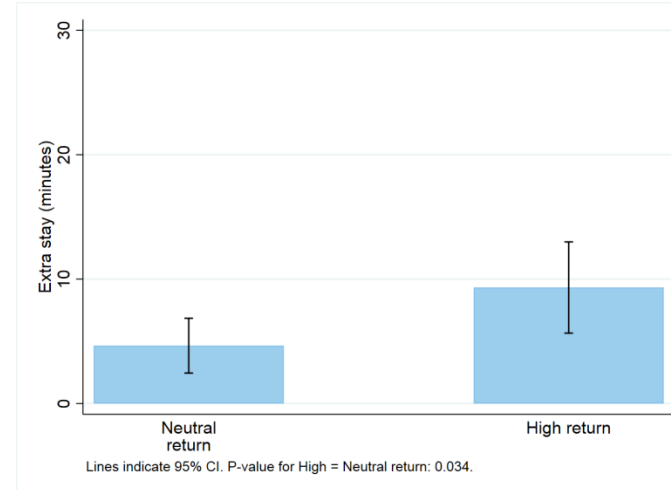
Notes: This figure presents the findings of the labor supply experiment, for the subjects recruited through Craigslist ads.

Online Appendix Figure 9. Findings of Experiment 2, Student Participants

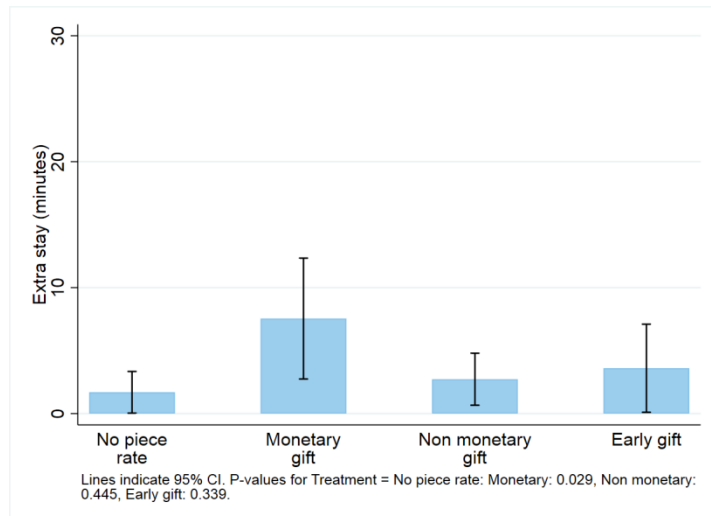
Panel a. Variation in Piece Rate



Panel b. Variation in Return to Employer

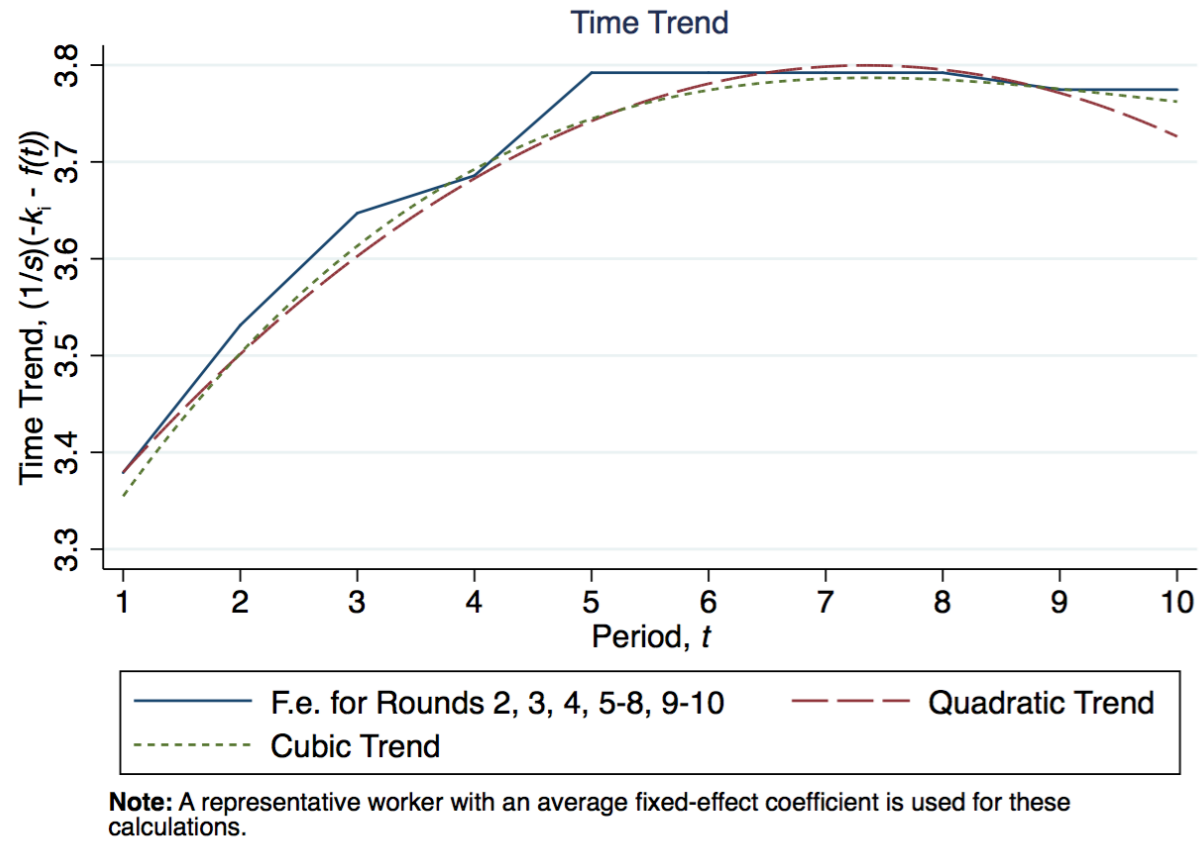


Panel c. Effect of Gift Treatments



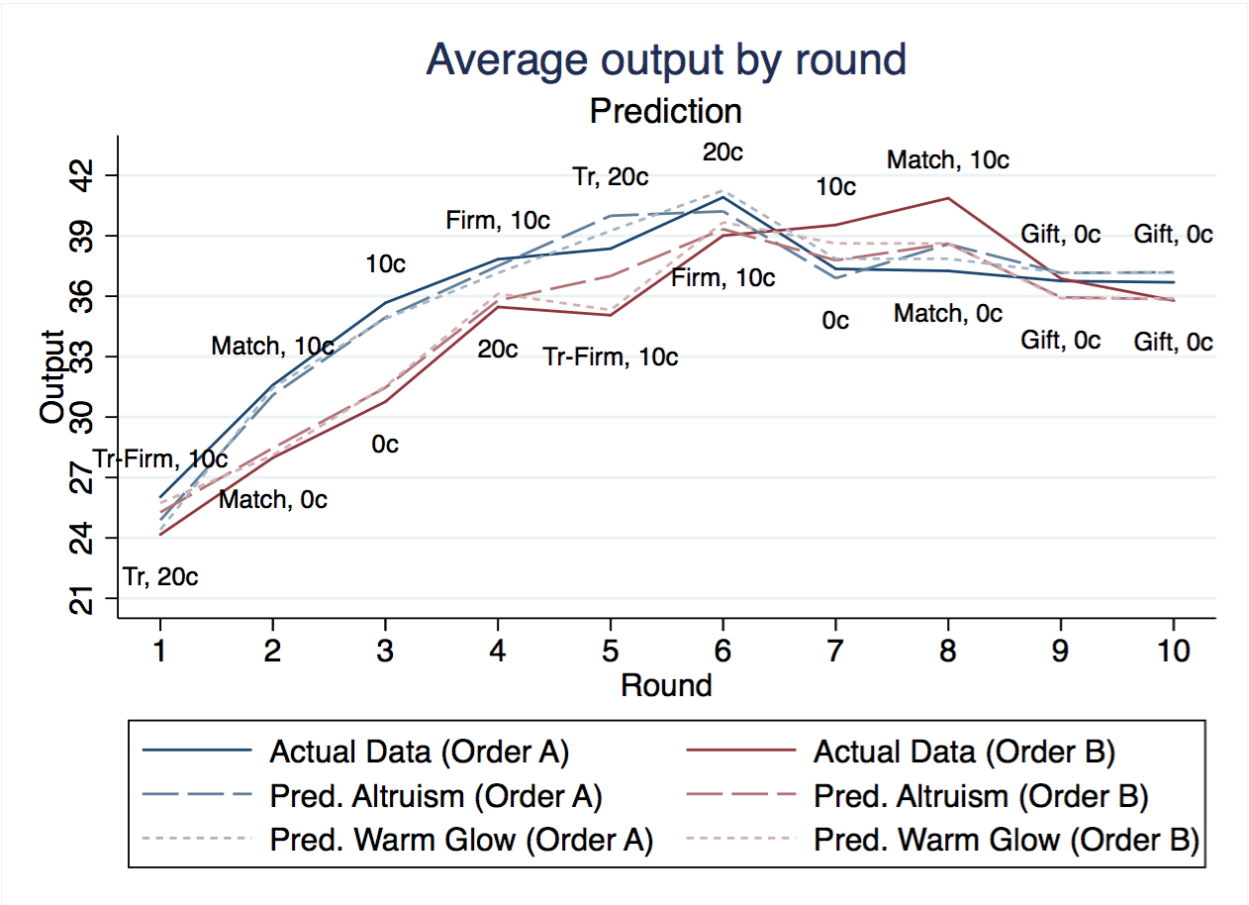
Notes: This figure presents the findings of labor supply experiment, for the subjects who are students.

Online Appendix Figure 10. Productivity Experiment, Estimated Productivity Effects, Different Models



Notes: This figure plots for Experiment 1 the estimated $(1/\gamma)(-k_t - f(t))$ function, that is, how the cost of effort function is estimated to change over time for an individual with representative k . The estimated coefficients are from specifications in Table 3, Column 1 (indicators for rounds), and from Online Appendix Table 8, Columns 1 (quadratic polynomial), and 2 (cubic polynomial).

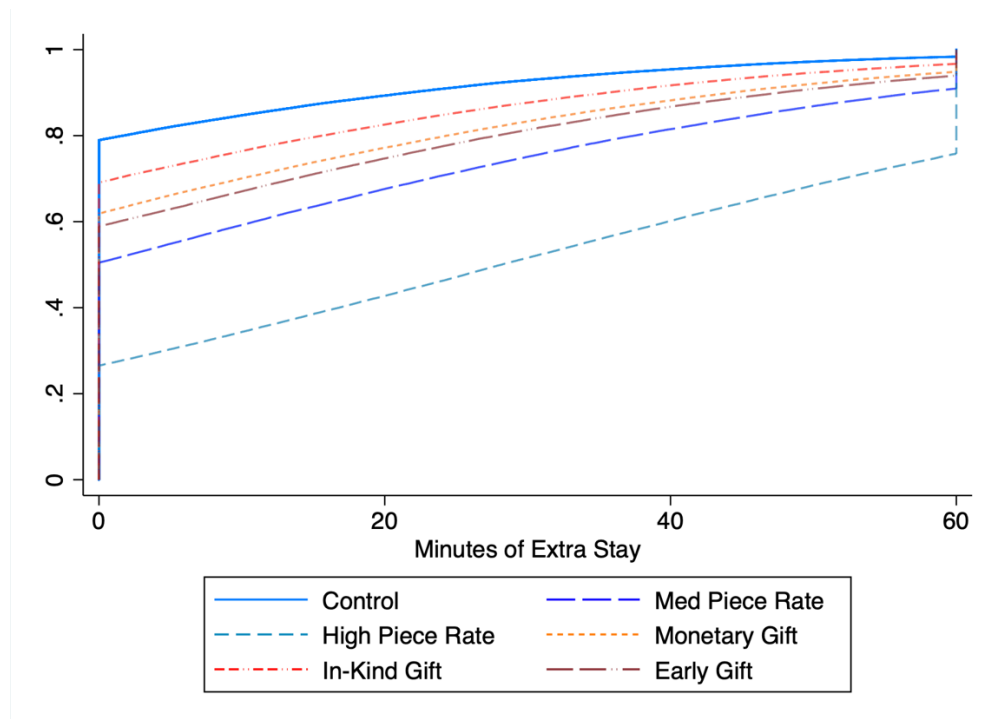
Online Appendix Figure 11. Fit of warm Glow versus Altruism Model, All 10 Rounds, Order A and B



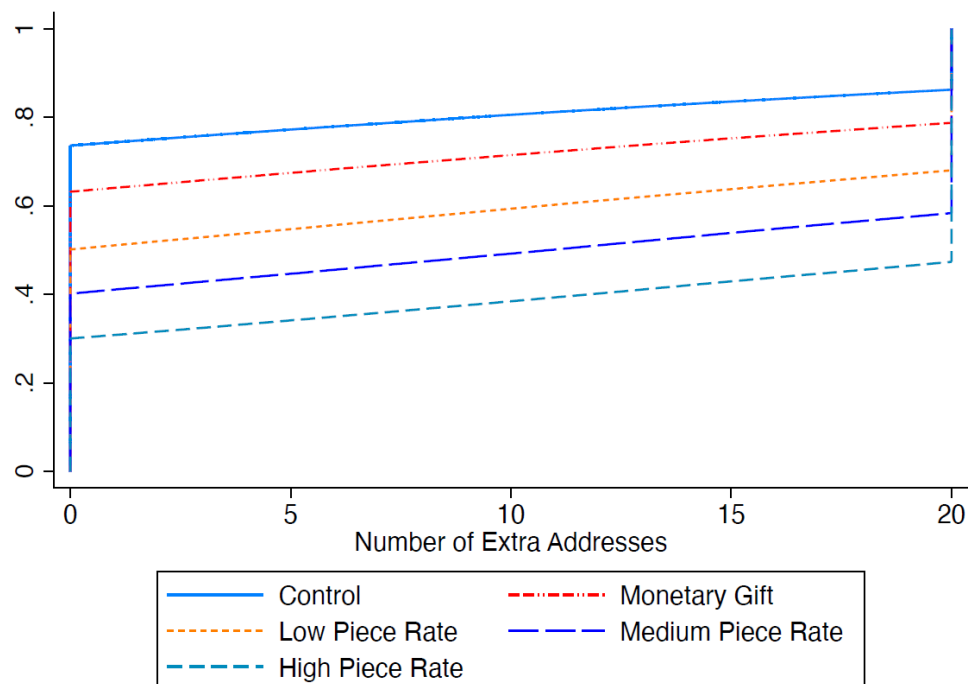
Notes: This figure displays the average output (number of envelopes folded within a 20-minute round) in a round for Order A and Order B, together with the predicted output according to the warm glow model (Column 4 in Online Appendix Table 7) and according to the altruism model (Column 3 in Online Appendix Table 7). See Figure 1 for more detailed labeling of the 10 rounds (batches) in each order. The output for rounds 9 and 10 averages across the gift treatments displayed in Figure 1.

Online Appendix Figure 12. Distribution of Extra Work in Experiments 2 and 3, Model Fit

Panel a. Experiment 2



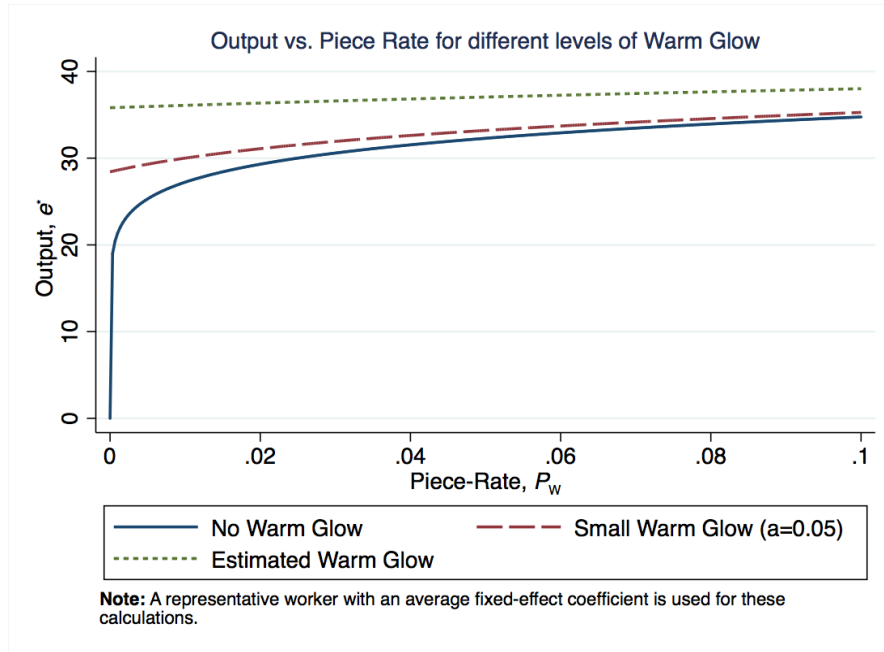
Panel b. Experiment 3



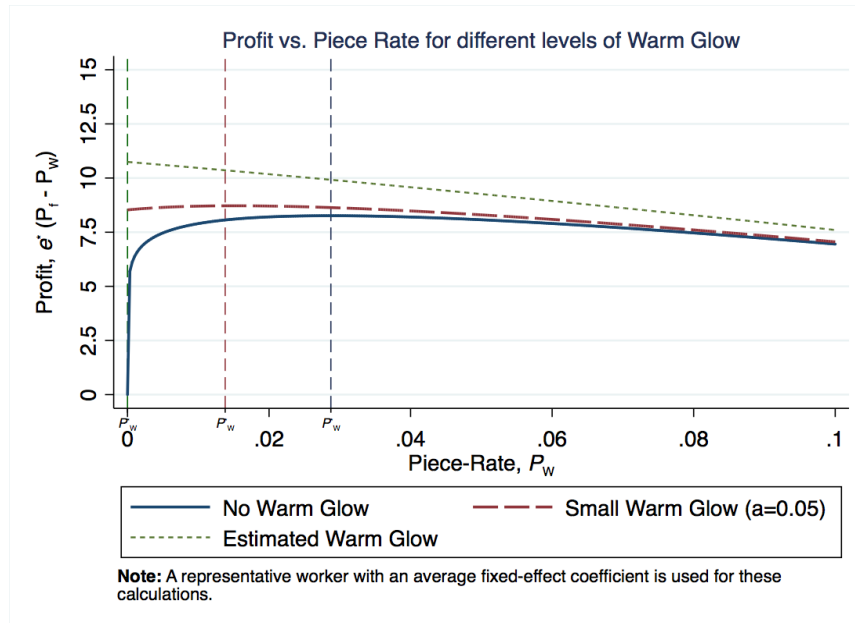
Notes: The panels display the c.d.f. of the extent of extra work (number of extra-minutes stayed in Experiment 2 and extra addresses checked in Experiment 3), as predicted by the models for the specifications in Column 1 and 3 of Table 4.

Online App. Figure 13. Productivity Experiment, Optimal Piece Rate for Estimated Social Preferences

Panel a. Effort as Function of Piece Rate



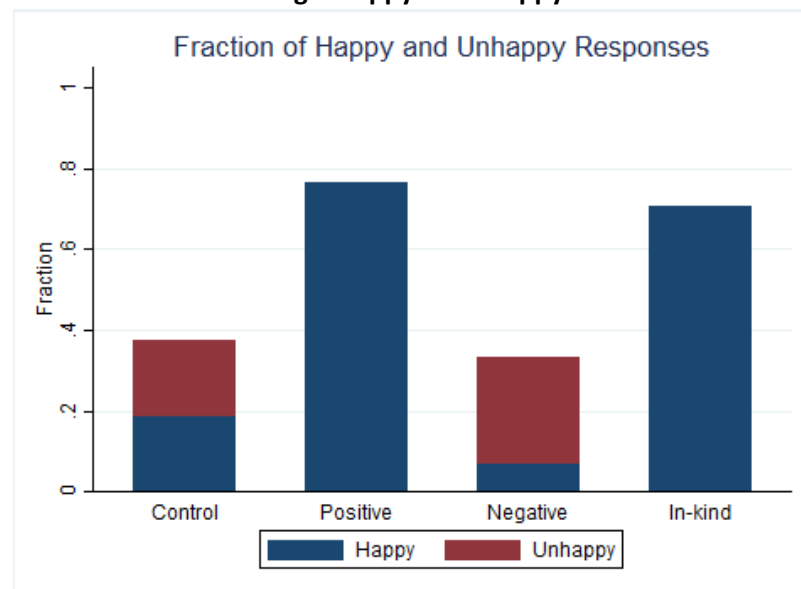
Panel b. Profit Rate as Function of Piece Rate



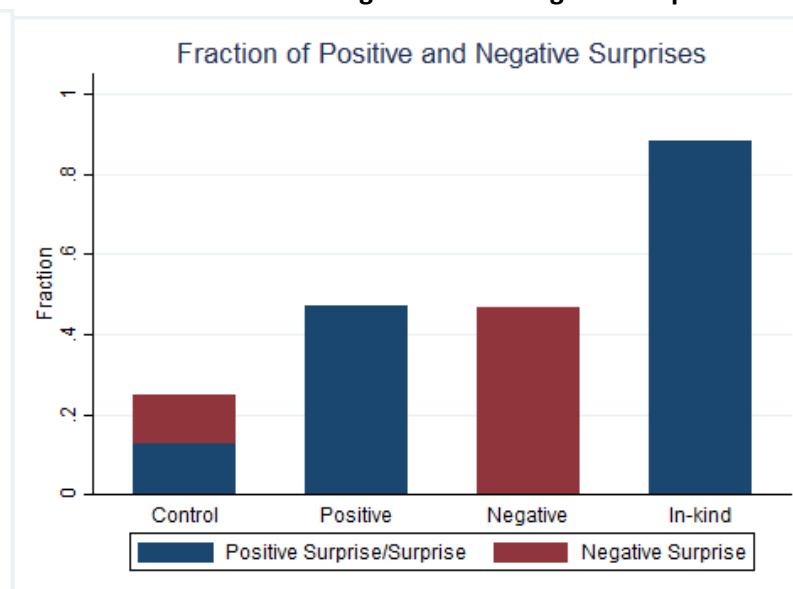
Notes: This figure for Experiment 1 takes the estimated parameters in the warm-glow specification and predicts the implied effort e^* (Panel a) and profit rate $e^*(P_f - P_w)$ (Panel b), for different levels of the piece rate P_w . Specifically, the plots examine the impact on profits of increasing the piece rate holding constant all else (including the lump-sum pay). We take the parameters from Column 2 in Online Appendix Table 7, assuming an individual with an average fixed effect k at the productivity estimated for batches 5-8. The continuous blue line indicates the counterfactual for the case with no social preferences. The dotted green line indicates the curves for the estimated warm glow. The dashed red line indicates the case with warm glow at one tenth of the estimated one, holding all other parameters the same.

Online Appendix Figure 14. Productivity Experiment, Effect of Gift Treatments on Worker Happiness and Surprise

Panel a. Fraction Stating a Happy or Unhappy Reaction



Panel b. Fraction Stating Positive or Negative Surprise



Notes: This figure presents the average response to a short debriefing questionnaire administered after the end of the productivity experiment. The sample size includes 65 subjects, since the questions were only asked for the last 65 subjects in the experiments. Panel a presents the fraction that indicates being happy and the fraction that indicates being unhappy for each of the various treatments. Panel b indicates the fraction stating a positive surprise versus negative surprise (with the other categories being “as expected” or “none”). For the in-kind treatment, the bar shows the fraction that reported being surprised (we did not ask for the share with negative surprise).

Online Appendix Table 1. Overview of Features of Selected Gift Exchange Papers

Authors (chronologically)	Gift in Treatment Condition	Task Assigned	Between- or Within-Subject Design? (B/W)	Piece-Rate Design? (Y/N)	Sample Size. Shaded if Larger than 100	Workers Know Return to Employer? (Y/N)	Vary Return to Employer? (Y/N)	Estimate Social Preferences? (Y/N)	Lab or Field Experiment?	Notes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
DellaVigna, List, Malmendier, Rao (2019), <i>Productivity Experiment</i>	\$7 (100%) increase / \$4 (57%) decrease relative to \$7 baseline	Folding Charity Envelopes	B for Gift Exchange	Y	446	Y	Y	Y	Field	
<u>Panel A. Real Effort Experiments</u>										
Gneezy and List (2006) <i>Study 1 - data-entry task</i>	\$8 (67%) increase relative to \$12 baseline	Library Book Coding	B	N	19	N	N	N	Field	First design of gift exchange in the field. Value of data entry to employer not clear
Gneezy and List (2006) <i>Study 2 - door-to-door fundraising</i>	\$10 (100%) increase relative to \$10 baseline	Door-to-door Fundraising	B	N	23	Y	N	N	Field	Subjects raise funds for charity and thereby can determine the return to employer
Bellemare and Shearer (2011)	\$80 (37%) increase relative to average daily earnings of \$215	Tree-Planting	W	N	18	N	N	Y	Field	All tree-planting workers receive \$80 bonus on the second of five working days; thus, variation for Gift is Within subject
Hennig-Schmidt, Rockenbach, and Sadrieh (2010), <i>Study 1 - Data Entry</i>	DM 2 (10%) / DM 8 (40%) increase relative to DM 20 baseline	Data-Entry Task	B for Gift Exchange	N	103	N	N	N	Field	Examine the effects of peer comparison among workers
Hennig-Schmidt, Rockenbach, and Sadrieh (2010), <i>Study 2 - Fold Envel.</i>	EUR 0.25 (10%) increase relative to EUR 2.50 baseline	Folding Envelopes in Lab	B	N	59	Y	N	N	Lab	Return to employer is stated by opportunity costs of outsourcing data-entry task
Englmaier and Leider (2012a)	\$5 (38%) increase relative to a \$13 baseline	Data-Entry Task	B	N	59	N	Y	N	Field	Experimenters get a "substantial bonus" (worth \$10, not known to subjects) if 50% of the work is done by the end of the week
Englmaier and Leider (2012b)	\$10 (100%) increase relative to \$10 baseline	"Managers" assign 25-minute coding	B	N	192	Y	Y	N	Lab	Subjects in lab exp. assigned to role of <i>managers</i> decide pay of \$20 or \$10 for worker; efficiency of work varies
Kube, Marechal, and Puppe (2012)	EUR 7 (19%) increase or Gift-wrapped thermos relative to EUR 36 baseline	Library Book Coding	B	N	117	N	N	N	Field	Interested in the effect of non-monetary gifts
Kube, Marechal, and Puppe (2013)	EUR 5 (33%) increase / EUR 5 (33%) decrease rel. to EUR 15 base	Library Book Coding	B	N	68	N	N	N	Field	Analyze asymmetric effects of pay raises and cuts
Esteves-Sorenson (2018)	\$6 (50%) / \$8 (67%) / \$12 (100%) increase relative to \$12 baseline	Data-Entry Task	B	N	162	N	N	N	Field	Examine several potential confounds of earlier studies
Cohn, Fehr, and Goette (2014)	CHF 5 (23%) increase relative to a CHF 22 baseline	Newspaper Distribution	B for Gift Exchange	N	196	N	N	N	Field	Interested whether fairness considerations drive gift exchange-induced effort increases
Gilchrist, Luca, and Malhotra (2016)	\$1 (33%) increase relative to a \$3 baseline	Entering CAPTCHAs	B	N	230	N	N	N	Field	Examine the effects of restructuring a portion of the wage as an unexpected gift
<u>Panel B. Stated-Effort Experiments</u>										
Fehr, Kirchsteiger, and Riedl (1993)	Firms post wages, workers can reciprocate according to known effort-cost-schedule	Stated Effort	B		35	Y	N	N	Lab	Test the fair-wage hypothesis in a one-shot setting with a fixed efficiency factor of 126. Return to the employer is given by (126-w)e
Brown, Falk, and Fehr (2004)	Wages determined by an open auction and fixed effort-cost schedule for workers	Stated Effort	B		140	Y	N	N	Lab	Third-party enforceability of contracts and identifiability of workers affects long-term relations, with employer return 10e-w
Kessler (2013)	0/5/10 units as a wage in a bilateral gift-exchange game	Stated Effort	B		44	Y	Y	N	Lab	Varies whether the firm is rich (R=1) or poor (R=0) compared to the worker and whether worker's effort is efficient

Notes: This table contains gift exchange real-effort studies (Panel A) and stated-effort laboratory gift exchange experiments (Panel B) that are categorized according to the following categories: (i) whether they have a piece-rate design; (ii) whether they show the return to the employer or the firm, (iii) whether they vary the return to the employer, and (iv) whether they estimate social preferences structurally. Moreover, the task, amount of the gift, whether the experiment has a between- or within subject design, whether the experiment is a lab or field experiment, and some comments on the feature of the experiment are included. Notice that the sample size refers to the number of subjects in the worker role, i.e., in the laboratory experiments it does not include subjects assigned the role of "firms".

Online Appendix Table 2. Summary Statistics and Covariate Balance, Productivity Experiment

Specification:		OLS Regressions				
Dep. Var.:	Summary Statistics	Output Predictors	Checks of Randomization			
		Average Output	Indicator for Order A	Indicator for Positive Gift	Indicator for Negative Gift	Indicator for In-Kind Gift
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Individual Demographics						
Is employed (self-reported)	0.397 (0.490)	2.022 (0.799)	0.070 (0.050)	0.025 (0.047)	0.012 (0.044)	-0.045 (0.039)
Female	0.522 (0.500)	2.535 (0.691)	-0.099 (0.049)	0.040 (0.043)	-0.010 (0.044)	0.011 (0.036)
Age 25-34	0.361 (0.481)	2.959 (0.875)	0.062 (0.058)	-0.110 (0.060)	-0.005 (0.052)	0.063 (0.048)
Age 35-44	0.191 (0.393)	0.989 (1.184)	0.039 (0.068)	-0.122 (0.067)	-0.063 (0.064)	0.052 (0.054)
Age 45-54	0.128 (0.334)	-2.122 (1.256)	-0.035 (0.093)	-0.082 (0.082)	-0.160 (0.066)	0.083 (0.057)
Age 55+	0.058 (0.235)	1.305 (1.753)	0.243 (0.100)	-0.002 (0.111)	-0.012 (0.120)	-0.021 (0.069)
Has donated to charity (self-reported)	0.691 (0.463)	0.183 (0.946)	-0.131 (0.059)	0.004 (0.057)	-0.000 (0.048)	0.026 (0.043)
Has volunteered before (self-reported)	0.843 (0.364)	1.159 (1.051)	0.096 (0.065)	-0.043 (0.060)	0.042 (0.070)	0.056 (0.056)
Mean of Dependent Variable		35.19	0.491	0.276	0.283	0.175
R squared		0.097	0.038	0.017	0.015	0.013
N	N = 446	N = 446	N = 446	N = 446	N = 446	N = 446
Panel B. Index of Demographics						
Predicted Effort Based on Demographics (Col. 2)			0.004 (0.010)	-0.001 (0.008)	0.013 (0.008)	0.001 (0.007)
R squared			0.000	0.000	0.005	0.000
N			N = 446	N = 446	N = 446	N = 446

Notes: Column 1 in Panel A reports summary statistics on the sample of 446 participants in the experiment. Column 2 in Panel A reports the estimates of an OLS regression of average output (over the 10 rounds) on subject characteristics. Based on the estimate in Column 2 we form an index of predicted productivity based on demographics which we use in Panel B. In Columns 3-6 of Panels A and B we regress the assignment to different conditions (order A/B and assignment to the different gift treatments) on the subject characteristics (Panel A) and on the index of characteristics (Panel B). The standard errors are clustered at the session level.

Onl. App. T. 3. Productivity Experiment, Gift Treatments, Robustness

Specification:		OLS Regressions			
Dependent Variable:		Output in Batches 9 and 10			
Panel A. Measure of Output:		Number of Envelopes Stuffed in 20 Minutes			
Sample:		Batch 9	Batch 10	Match	No Match
		(1)	(2)	(3)	(4)
<i>Gift Treatments</i>					
Positive (monetary) gift		1.350	-0.145	0.428	0.778
Treatment		(0.636)	(0.904)	(0.801)	(0.771)
Negative (monetary) gift		0.226	-0.321	0.133	-0.227
Treatment		(0.738)	(0.949)	(0.840)	(0.859)
Positive In-kind (Thermos) gift		-1.024	-1.155	-0.924	-1.256
Treatment		(0.907)	(1.080)	(1.013)	(0.977)
<i>Control</i>					
Average Output Measure		0.833	0.797	0.834	0.796
In Rounds 5-8		(0.024)	(0.035)	(0.032)	(0.028)
Constant		4.446	5.852	4.537	5.761
		(1.022)	(1.459)	(1.313)	(1.192)
R squared		0.668	0.556	0.622	0.595
N		N = 446	N = 446	N = 446	N = 446
Panel B. Measure of Output:		Log of Number of Envelopes Stuffed in 20 Minutes			
<i>Gift Treatments</i>					
Positive (monetary) gift		0.0390	-0.008	0.008	0.023
Treatment		(0.018)	(0.027)	(0.023)	(0.023)
Negative (monetary) gift		-0.009	-0.027	-0.010	-0.026
Treatment		(0.031)	(0.035)	(0.032)	(0.035)
Positive In-kind (Thermos) gift		-0.027	-0.039	-0.030	-0.036
Treatment		(0.026)	(0.034)	(0.031)	(0.029)
<i>Control</i>					
Average Output Measure		0.8510	0.8120	0.8430	0.8200
In Rounds 5-8		(0.029)	(0.036)	(0.031)	(0.034)
Constant		0.4900	0.6310	0.5230	0.5990
		(0.108)	(0.130)	(0.112)	(0.125)
R squared		0.574	0.473	0.535	0.505
N		N = 446	N = 446	N = 446	N = 446

Notes: Estimates from an OLS regression of output (Panel A) and log output (Panel B) in the final two batches (Batches 9 and 10) on the gift treatments. The omitted category is a Control treatment with no "gift" (pay is the same as previously experienced with the same charity). The standard errors are clustered at the session level.

Online Appendix Table 4. Summary Statistics and Covariate Balance, Experiment 2

Specification:		OLS Regressions						
Dep. Var.:	Summary Statistics	Extra Stay Predictors	Checks of Randomization					
		Extra Stay	Indicator for Med Piece Rate	Indicator for High Piece Rate	Indicator for Monetary Gift	Indicator for In-Kind Gift	Indicator for Early Gift	Indicator for High Return
			Rate	Rate	Gift	Gift	Gift	High Return
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Baseline Productivity	3.598 [1.618]	-0.155 (0.821)	-0.012 (0.039)	-0.009 (0.038)	0.001 (0.039)	0.006 (0.038)	0.036 (0.038)	-0.030 (0.021)
Craigslist	0.367 [0.483]	7.366 (3.424)	-0.041 (0.150)	-0.104 (0.188)	-0.007 (0.145)	-0.085 (0.157)	0.028 (0.176)	-0.134 (0.089)
Female	0.497 [0.501]	-0.139 (2.253)	-0.063 (0.105)	0.003 (0.110)	-0.085 (0.105)	-0.005 (0.103)	-0.068 (0.106)	0.010 (0.059)
Age 25-34	0.237 [.426]	7.231 (3.106)	-0.042 (0.140)	0.001 (0.173)	-0.051 (0.136)	0.111 (0.139)	-0.022 (0.157)	0.011 (0.081)
Age 35-44	0.097 [0.296]	7.753 (4.701)	-0.160 (0.192)	0.131 (0.217)	-0.445 (0.211)	-0.311 (0.222)	0.020 (0.203)	0.088 (0.122)
Age 45-54	0.053 [0.225]	15.440 (5.834)	-0.042 (0.294)	0.079 (0.318)	-0.100 (0.287)	0.249 (0.257)	0.233 (0.266)	0.190 (0.152)
Age 55+	0.023 [0.151]	5.306 (8.018)	-0.042 (0.294)	-0.099 (0.352)	-0.600 (0.381)	-0.085 (0.330)	-0.153 (0.342)	-0.157 (0.209)
Ho: all the coeffs to jointly be equal to zero		p = 0.000	p = 0.981	p = 0.993	p = 0.326	p = 0.495	p = 0.909	p = 0.547
R squared		0.131	0.016	0.011	0.082	0.065	0.028	0.020
N	N = 300	N = 300	N = 100	N = 100	N = 100	N = 100	N = 100	N = 300

Notes: Column 1 in reports summary statistics on the sample of 300 participants in the experiment. Column 2 reports the estimates of an OLS regression of extra stay on subject characteristics. In Columns 3-8 we regress the assignment to different conditions (assignment to different piece rates and assignment to the different gift treatments) on the subject characteristics. Standard deviations in brackets. Standard errors in parentheses.

Online Appendix Table 5. Extra Work Experiments, Findings with Controls

Specification:	OLS Regressions				Tobit Regressions		Probit Regressions	
Dependent Variable:	Extent of Extra Work (0-60 Minutes in Exp. 2, 0-20 Addresses in Exp. 3)				Indicator for Extra Work >0			
Experiment:	Exp. 2		Exp. 3		Exp. 2	Exp. 3	Exp. 2	Exp. 3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
<i>Piece Rate Treatments</i>								
Low Piece Rate Treatment			4.726 (0.518)	4.726 (0.518)		29.367 (3.721)		0.254 (0.033)
Medium Piece Rate Treatment	14.011 (3.250)	14.032 (3.255)	5.895 (0.711)	5.895 (0.711)	34.494 (10.151)	35.889 (4.666)	0.161 (0.103)	0.311 (0.042)
High Piece Rate Treatment	28.010 (3.686)	27.950 (3.701)	8.867 (0.666)	8.867 (0.666)	66.721 (10.810)	51.494 (4.812)	0.392 (0.104)	0.472 (0.042)
<i>Gift Treatments</i>								
Monetary Gift Treatment	7.370 (2.522)	5.770 (2.903)	1.906 (0.483)		27.163 (9.267)	12.883 (3.459)	0.243 (0.106)	0.123 (0.033)
In-Kind Gift Treatment	4.323 (2.481)	2.710 (3.105)			14.594 (9.597)		0.074 (0.109)	
In-Kind Gift, Early Delivery Treatment	6.576 (2.492)	4.994 (3.135)			24.902 (8.652)		0.253 (0.104)	
<i>(Crossed) Employer Return Treatment</i>								
Treatment w/ High Return to the Employer	2.320 (1.946)	0.666 (3.149)	-0.712 (0.48)	-0.719 (0.447)	5.802 (5.384)	-4.237 (2.384)	0.054 (0.060)	-0.029 (0.023)
High Return x Any Gift		3.268 (4.003)		0.029 (0.852)				
Control Mean	2.52	2.52	3.711	3.711	2.52	3.711		
Controls	X	X	X	X	X	X	X	X
Hyp.: Gift Treatments = Control	p=0.001		p=0.000		p=0.003	p=0.000	p=0.028	p=0.000
R squared / Pseudo R Squared	0.328	0.330	0.114	0.114	0.068	0.039	0.097	0.07
Number of Subjects	300	300	1954	1954	300	1954	300	1954

Notes: Robust standard errors. The specifications for Experiment 2 include fixed effects for Craigslist sample, gender, and age groups (25-34, 35-44, 45-54, 55+). The specifications for Experiment 3 include fixed effects for day of experiment and for 4 hourly time blocks. Columns 7 and 8 report the marginal effects for the probit specification.

Onl. App. T. 6. Experiment 2, Output in Required 120 Minutes, Early gift vs. Other Treatments.

Lines of Work Coded in Required 120 minutes			
Variable:			
Treatment Comparison:	Early-Gift Treatment (N=50)	All Other Treatments (N=250)	Diff. of means
	Mean	Mean	
	(Std. Dev)	(Std. Dev)	(Std Err)
	(1)	(2)	(3)
<i>Measure of output</i>			
Coded lines in required 120 min	379.98 (181.371)	355.712 (157.637)	24.268 (25.075)
Log of coded lines in required 120 min	5.806 (0.562)	5.766 (0.488)	0.040 (0.078)

Notes: Standard deviation in parenthesis for column (1) and (2) and standard error in parenthesis for column (3). All other treatments include control, non-monetary gift, monetary gift, low piece-rate and high piece-rate groups, since in all these treatments there was no gift, nor a piece rate (which only applies to extra work). In the early-gift treatment the gift preceded the required work and thus we can measure if there is any impact on productivity in the required 120 minutes. Column (3) presents the difference of the mean of all other treatments and the early-gift treatment.

Online Appendix Table 7. Experiment 1, Baseline Social Preferences, Robustness

Estimation: Dependent Variable:	Non-Linear Least Squares			
	Log (Number of Envelopes in a Batch)		Number of Envelopes in a Batch	
	(1)	(2)	(3)	(4)
<i>Baseline Social Preferences</i>				
Altruism towards Charity	0.230 (0.042)		0.253 (0.040)	
Altruism towards Grocery Store	0.759 (0.088)		0.735 (0.077)	
Warm Glow towards Charity		0.443 (0.064)		0.462 (0.066)
Warm Glow towards Grocery Store		0.720 (0.073)		0.716 (0.074)
<i>Incidental Parameters</i>				
Cost Function Curvature (γ)	11.123 (1.449)	9.440 (0.747)	0.293 (0.030)	0.263 (0.018)
Cost of Effort Function:		Power	Exponential	
Std. Deviation of Error Term	0.131	0.130	3.994	3.952
Std. Dev. of Individual f.e.s * (1/γ)	0.249	0.211	8.155	8.158
R Squared	0.8346	0.8374	0.8500	0.8532
N	3568	3568	3568	3568

Notes: Specifications are from non-linear least squares regressions, with each observation being a worker-batch combination. The sample is restricted to the first 8 batches. The dependent variable is the log of the number of envelopes produced in that round in Columns 1-2 and is the the number of envelopes produced in Columns 3-4. The specifications in Columns 1 and 3 allow for pure altruism towards the employer, in which the worker puts weight alpha on the return to the employer. The specifications in Columns 2 and 4 allow for a form of warm glow, that is, the worker puts a weight on the employer, but on the *average* return (30 cents per envelope), not the actual return (which varies by round). All specifications include fixed effects for worker i as well as indicators for rounds 2, 3, 4, and 5-8. The standard deviations listed are the standard deviation of the error term and the standard deviation of the individual fixed effects divided by the curvature γ . The latter ratio indicates the variation in the individual productivity. The standard errors are clustered at the session level.

Online Appendix Table 8. Productivity Experiment, Baseline Social Preferences, Robustness II

Dependent Variable:	Log (Number of Envelopes)				Number of Envelopes in a Round			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Baseline Social Preferences:								
Altruism towards Charity	0.011 (0.047)	-0.096 (0.028)	0.095 (0.041)	0.143 (0.029)	0.003 (0.034)	-0.068 (0.026)	0.120 (0.044)	0.149 (0.031)
Warm Glow towards Charity	0.392 (0.064)	0.311 (0.060)	0.309 (0.063)	0.842 (0.097)	0.336 (0.052)	0.288 (0.051)	0.291 (0.063)	0.816 (0.100)
Warm Glow towards Grocery Store	0.587 (0.072)	0.648 (0.114)	0.701 (0.069)	1.236 (0.099)	0.543 (0.069)	0.579 (0.095)	0.690 (0.068)	1.181 (0.102)
Incidental Parameters:								
Cost Function Curvature (γ)	10.790 (0.898)	15.248 (1.869)	9.260 (0.728)	3.650 (0.250)	0.320 (0.026)	0.404 (0.042)	0.257 (0.017)	0.105 (0.006)
Cost of Effort Function:	Power Cost of Effort Function				Exponential Cost of Effort Function			
Type of timetrend	Quadratic in Rounds	Cubic in Rounds	Indicators for 2, 3, 4, 5-8 Altruism term does not include piece rate	Indicators for 2, 3, 4, 5-8 Partial Warm Glow During Training	Quadratic in Rounds	Cubic in Rounds	Indicators for 2, 3, 4, 5-8 Altruism term does not include piece rate	Indicators for 2, 3, 4, 5-8 Partial Warm Glow During Training
Specification	Benchmark				Benchmark			
Std. Deviation of Error Term	0.130	0.129	0.130	0.129	3.939	3.909	3.947	3.916
Std. Dev. of Individual f.e.s * (1/γ)	0.249	0.249	0.249	0.249	8.153	8.147	8.165	8.161
R Squared	0.8369	0.8405	0.8376	0.8401	0.8541	0.8563	0.8536	0.8558
N	3568	3568	3568	3568	3568	3568	3568	3568

Notes: Specifications are from non-linear least squares regressions as in specification in Section 4, with each observation being a worker-round combination. The sample is restricted to the first 8 rounds. The dependent variable is the log of the number of envelopes produced in that round in Columns 1-4 and is the number of envelopes produced in Columns 5-8. The specifications in Columns 1 and 5 allow for a quadratic function in the round number, while the specifications in Columns 2 and 6 allow for a cubic function in the round. The specifications in Columns 3-4 and 6-7 include indicators for rounds 2, 3, 4, and 5-8. Columns 3 and 7 assume subjects do not take into account that being paid more as piece rate lowers the return to the firm. Columns 4 and 8 assume that there is warm glow (but not altruism) even in the training rounds, assumed to be half the size as in the periods in which the envelopes are used. All specifications allow for both pure altruism towards the firm and a form of warm glow, that is, the worker puts a weight on the employer, but on the average return (30 cents per envelope), not the actual return (which varies by round). All specifications include fixed effects for worker i . The standard deviations listed are the standard deviation of the error term and the standard deviation of the individual fixed effects divided by the curvature γ . The latter ratio indicates the variation in the individual productivity. The standard errors are clustered at the session level.

Online Appendix Table 9. Productivity Experiment, Social Preferences with Gift Treatments, Robustness

Dependent Variable:	Log (No. Envelopes in a Batch)					Number of Envelopes in a Batch				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
<i>Baseline Social Preferences</i>										
Social Preferences towards Charity	0.405 (0.043)	0.343 (0.043)	0.457 (0.057)	0.444 (0.063)	na	0.337 (0.032)	0.307 (0.035)	0.447 (0.055)	0.463 (0.065)	0.187 (0.043)
Social Preferences towards Grocery Store	0.632 (0.064)	0.539 (0.062)	0.732 (0.068)	0.72 (0.072)	na	0.551 (0.058)	0.506 (0.062)	0.704 (0.065)	0.716 (0.073)	0.797 (0.108)
<i>Reciprocal Social Preferences</i>										
Social Pref. Change -- Positive Monetary Gift	0.2 (0.114)	0.086 (0.089)	0.065 (0.082)	0.374 (0.149)	na	0.098 (0.085)	0.053 (0.075)	0.041 (0.071)	0.314 (0.137)	0.092 (0.087)
Social Pref. Change -- Negative Gift	-0.016 (0.125)	-0.076 (0.093)	-0.099 (0.096)	0.032 (0.135)	na	-0.018 (0.072)	-0.047 (0.061)	-0.068 (0.067)	0.067 (0.100)	-0.001 (0.060)
Social Pref. Change -- In-Kind Gift	-0.074 (0.097)	-0.118 (0.072)	-0.144 (0.080)	-0.044 (0.099)	na	-0.103 (0.072)	-0.118 (0.060)	-0.152 (0.074)	-0.079 (0.089)	-0.062 (0.056)
Estimated Persistence of Social Preferences From Round 9 to 10				0.233 (0.251)	na				0.246 (0.248)	
<i>Incidental Parameters</i>										
Cost Function Curvature (γ)	10.637 (0.835)	11.366 (0.894)	9.039 (0.648)	9.439 (0.738)	na	0.316 (0.024)	0.329 (0.025)	0.257 (0.017)	0.263 (0.018)	0.41 (0.052)
Cost of Effort Function:	Power					Exponential				
Type of timetrend	Alternative					Alternative				
	Quadratic in Rounds	Cubic in Rounds	Round Indicators	Standard Round Indicators (rounds 2, 3, 4, 5-8, 9-10)	Estimated Altruism	Quadratic in Rounds	Cubic in Rounds	Round Indicators	Standard Round Indicators (rounds 2, 3, 4, 5-8, 9-10)	Estimated Altruism
Specification	Benchmark (Warm Glow)				Decay of Gift Effect	Benchmark (Warm Glow)				Decay of Gift Effect
Std. Deviation of Error Term	0.144	0.144	0.144		0.144	4.308	4.302	4.321		4.315
Std. Dev. of Individual f.e.s * (1/γ)	0.241	0.241	0.241		0.241	8.015	8.008	7.995		8.012
R Squared	0.7908	0.7923	0.7912		0.7918	0.8192	0.8197	0.8182		0.8187
N	4460	4460	4460		4460	4460	4460	4460		4460

Notes: Specifications are from non-linear least squares regressions, with each observation being a worker-batch combination. The sample includes all 10 batches. The dependent variable is the log of the number of envelopes produced in that round in Columns 1-5 and is the number of envelopes produced in Columns 6-10. All specifications include fixed effects for worker i . Columns 3 and 8 include indicators for batches 2, 3, 4, 5-10. The estimated coefficient on batch 2 is restricted to equal one half of the estimated coefficient in batch 3. Columns 4 and 9 allow for a decay of the warm glow gift parameter in batch 10, to equal $\delta_{\text{warm glow}}$. Thus, $\delta=1$ indicates no decay, $\delta=0$ indicates full decay. The δ does not apply to batch 9. Columns 5 and 10 estimate a model with pure altruism instead of warm glow. The model in Column 5 did not converge. The standard deviations listed are the standard deviation of the error term and the standard deviation of the individual fixed effects divided by the curvature γ . The latter ratio indicates the variation in the individual productivity. The standard errors are clustered at the session level.

Online Appendix Table 10. Experiment 2, Social Preferences, Robustness

<u>Estimation:</u>	Maximum Likelihood, Accounting for Censoring at 0 and 60 Minutes	<u>Minimum Distance Estimation</u>		Maximum Likelihood, Accounting for Censoring at 0 and 60 Minutes	<u>Minimum Distance Estimation</u>	
	Number of Extra Minutes (1)	Moments 0', 1'- 5', 6'-10', 11'- 15',..., 60' Number of Minutes Worked (2)	Moments 0', 1'-30', 60' (3)	Log (No. Extra Minutes) (4)	Moments 0', 1'- 5', 6'-10', 11'- 15',..., 60' Log (No. Minutes Worked) (5)	Moments 0', 1'-30', 60' (6)
<i>Baseline Social Preferences</i>						
Social Preference towards Employer	0.812 [0.002, 100]	100* [0.000, 100]	100* [0.000, 100]	0.400 [0.001, 100]	100* [0.000, 100]	100* [0.000, 100]
Social Preference Change - High Return for Employer	0.109 (0.093)	0.073 [-0.180, 0.361]	0.107 [-0.184, 0.965]	0.129 (0.104)	0.075 [-0.191, 0.370]	0.107 [-0.175, 0.684]
<i>Reciprocal Social Preferences</i>						
Social Preference Change -- Monetary Gift	0.303 (0.139)	0.435 [0.000, 0.735]	0.464 [-0.000, 3.483]	0.377 (0.168)	0.435 [0.001, 0.728]	0.468 [0.002, 1.399]
Social Preference Change -- In-Kind Gift	0.181 (0.135)	0.227 [-0.158, 0.561]	0.215 [-0.207, 0.585]	0.204 (0.155)	0.226 [-0.163, 0.531]	0.215 [-0.205, 0.595]
Social Preference Change -- In-Kind Gift, Early	0.360 (0.144)	0.489 [0.027, 0.853]	0.508 [0.016, 7.492]	0.427 (0.219)	0.489 [0.035, 0.931]	0.511 [0.057, 2.143]
<i>Incidental Parameters</i>						
Cost Function Curvature (γ)	0.007 [0, 0.077]	0 [0, 0.152]	0 [0, 0.312]	0.146 [0, 0.983]	0 [0, 20.30]	0 [0, 20.61]
Std. Deviation of Error Term	45.121 (4.265)	54.995 (5.220)	46.711 (5.279)	3.905 (0.312)	0.369 (0.034)	0.330 (0.035)
Cost of Effort Function:		<u>Exponential</u>			<u>Power</u>	
Log Likelihood / minimum distance	-637.99	0.39	0.35	-399.19	0.37	0.33
N	300	300	300	300	300	300

Notes: Bootstrap standard deviations are in parentheses and 95% bootstrap confidence intervals are in brackets. Columns 1 and 4 report the maximum likelihood estimates using the number of extra minutes worked, not including the required initial 120 minutes. For Column 4, since Log (0 minutes) is undefined, we left-censor the number of extra minutes worked at 1 minute. Minimum distance estimation in Columns 2-3 and 5-6 use the identity matrix as the weighting matrix. The moments used in Columns 2 and 5 are: Share stay 0; Share stay 1-5; ... ; Share stay 51-55; Share stay 60. The moments used in Columns 3 and 6 used are: Share stay 0; Share stay 1-30; Share stay 60.

Online Appendix Table 11. Experiment 3, Social Preferences, Robustness

<u>Estimation:</u>	Maximum Likelihood, Accounting for Censoring at 0	<u>Minimum Distance Estimation</u>		Maximum Likelihood, Accounting for Censoring at 0	<u>Minimum Distance Estimation</u>	
	Number of Extra	Moments 0, 1-5, 6-10, 11-15, 20	Moments 0, 1- 10, 20	Log (No. Extra	Moments 0, 1- 5, 6-10, 11-15, 20	Moments 0, 1- 10, 20
<u>Dependent Variable:</u>	Addr. (1)	Number of Extra	Addr. (3)	Addr.) (4)	Log (No. Extra	Addr.) (6)
		(2)			(5)	
<i>Baseline Social Preferences</i>						
Warm Glow towards Employer	0.103 (0.071)	0.128 (0.058)	0.130 (0.059)	0.104 (0.072)	0.128 (0.058)	0.130 (0.059)
Altruism Towards Employer	-0.006 (0.006)	-0.009 (0.005)	-0.009 (0.005)	-0.006 (0.006)	-0.009 (0.005)	-0.009 (0.005)
<i>Reciprocal Social Preferences</i>						
Warm Glow Change -- Monetary Gift	0.075 (0.028)	0.080 (0.023)	0.081 (0.023)	0.077 (0.029)	0.080 (0.023)	0.081 (0.023)
<i>Incidental Parameters</i>						
Cost Function Curvature (γ)	0.054 (0.015)	0.050 (0.011)	0.054 (0.012)	0.329 (0.092)	2.467 (0.548)	2.605 (0.575)
Std. Deviation of Error Term	41.088 (2.213)	42.203 (3.218)	38.632 (2.621)	6.779 (0.349)	0.860 (0.064)	0.806 (0.053)
Cost of Effort Function:						
		<u>Exponential</u>			<u>Power</u>	
Log Likelihood / minimum distance	-2700.25	0.023	0.023	-2149.59	0.020	0.019
N	1956	1956	1956	1956	1956	1956

Notes: Columns 1 and 4 report the maximum likelihood estimates, not including the required initial 40 addresses. For Column 4, since Log (0) is undefined, we left-censor the number of extra minutes worked at 1 address. Minimum distance estimation in Columns 2-3 and 5-6 use the identity matrix as the weighting matrix. The moments used in Columns 2 and 5 are: Share checked 0; Share checked 1-5; Share checked 6-10; Share checked 11-15; Share checked 20. The moments used in Columns 3 and 6 used are: Share checked 0; Share checked 1-10; Share checked 20.

Online Appendix Table 12. Calibration of Reciprocity in Select Gift Exchange Papers

	Gift in Treatment Condition	Task Assigned	% Effort Change With Gift	Implied Percent Warm Glow Change (Reciprocity) Due to Gift		
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Panel A. Findings from this paper:</u>						
DellaVigna, List, Malmendier, Rao (2019)	Pay Increase from \$7 to \$14	Folding	2%	34%	.	.
	Pay Decrease from \$7 to \$3	Charity Envelopes	-2%	-9%	.	.
	Gift of Thermos		-3%	-21%	.	.
Assumption about Cost Function:				Power Cost Function		
Estimated Curvature γ				9.4(0.9)***		
Implied Elasticity				0.11		
<u>Panel B. Selected Previous Findings on Gift Exchange in Field:</u>						
Gneezy and List (2006) Study 1	Pay Increase from \$12 to \$20	Library Book Coding	27% (first 90 min)	846%	230%	61%
Gneezy and List (2006) Study 2	Pay Increase from \$10 to \$20	Door-to-door Fundraising	72% (first 3 hours)	16267%	1405%	196%
Kube, Marechal, and Puppe (2012) Non-monetary gift condition	Gift of Thermos	Library Book Coding	25%	715%	205%	56%
Kube, Marechal, and Puppe (2012) Monetary gift condition	7 Euro raise (from 36 euro pay)	Library Book Coding	5%	58%	28%	10%
Kube, Marechal, and Puppe (2013)	Pay cut from 15 to 10 euro/hr	Library Book Coding	-20%	-88%	-67%	-36%
Gilchrist, Luca, and Malhotra (2016)	Pay increase from \$3 to \$4	Entering CAPTCHAs	18%	374%	129%	39%
Cohn, Fehr, and Goette (2014)	Pay increase from 22 to 27 ChF	Newspaper Distribution	3%	32%	16%	6%
Esteves-Sorenson (2018)	Pay Increase from \$12 to \$20	Enter data	2%	20%	10%	4%
Assumptions about Cost Function:				Power Cost Function		
Assumed Curvature γ				9.4	5.0	2.0
Implied Elasticity				0.11	0.20	0.50

Notes: This table revisits some of the findings in the previous gift exchange experiments in the field, with summary of the key gift treatments and findings in Columns 1-3. Panel A summarizes the effects from this paper: Column 2 reports the findings from Table 4, Column 3, Panel B (on log output). Column 3 reports the results from Table 5, Column 1, taking the ratio of the estimated warm glow change to baseline warm glow. For example, for the positive monetary gift .151/.443=34%. In Panel B we revisit some classic experiments on gift exchange in the field. In Columns 4-6 we compute the implied percent increase in altruism or warm glow implied by the effort increase (or decrease), for a calibrated value of the elasticity of effort. The calibration holds for a power cost of effort function, which is characterized by constant elasticity. Column 4 uses the elasticity estimated for our task (Table 5, Column 1). Columns 5 and 6 report the results assuming higher elasticities.

Online Appendix Table 13. Published Real-Effort Experiments and Piece-Rate Design

Paper	Topic	Experiment (Lab / Field / Online)	Type of Real Effort Task	Piece- Rate Design? (Y/N)	Number of Piece Rates	Notes
(1)	(2)	(3)	(4)	(5)	(6)	
<i>Real Effort Experiments Published in Top-5 Journals from 1999 to 2018</i>						
Gneezy, Rustichini and Niederle (2003)	Competitive Preferences	Lab	Solving mazes	N		
Gneezy and List (2006)	Gift Exchange	Field	Data Entry; Fundraising	N		
Ariely, Bracha and Meier (2009)	Image Motivation	Lab, Field	Typing; Biking	N		Participants face either no incentives or non-linear incentives, but not piece rates
Carpenter, Matthews and Schirm (2010)	Tournaments and Office Politics	Field	Stuffing Envelopes	N		
Abeler, Falk, Goette and Huffman (2011)	Expectations and Effort Provision	Lab	Count number of zeros	N		
Dohmen and Falk (2011)	Incentives and Sorting	Lab	Multiplying numbers	N		
Gill and Prowse (2012)	Disappointment Aversion	Lab	Slider task	N		Participants are stochastically rewarded, with probability of reward increasing in the difference between own effort and a partner's effort. The reward size is varied, but the incentives are not known piece rates
Kube, Marechal and Puppe (2012)	Gift Exchange	Field	Cataloguing Library Books	N		
Augenblick, Niederle and Sprenger (2015)	Time Preferences and Effort	Lab, Online	Data transcription; Tetris	Y	5	Variation in the exchange rate of work between different time periods helps identify the cost of effort
DellaVigna and Pope (2018)	Effort Motivation	Online	Typing	Y	4	

Notes: This table contains real-effort studies published in the *American Economic Review*, *Econometrica*, the *Journal of Political Economy*, the *Quarterly Journal of Economics*, and the *Review of Economic Studies* between 1999 and 2018. We search papers using a search of Google Scholar for papers in these journals and year with the word "real effort" in the text of the paper. We then exclude papers that do not have this feature. It categorizes whether the papers include randomized variation in piece-rates. Two out of ten such published papers we identified include a "piece-rate design".

A Online Appendix A - Related Literature

Online Appendix Table 1 summarizes some of the most related papers in the literature. We identify key features of related papers: (i) the piece-rate design (Column 4); (ii) the sample size (Column 5); (iii) the structural estimation of the social preference parameters (Column 8); and (iv) whether the return to the firm is made explicit and varied experimentally (Columns 6 and 7). We also indicate whether the gift exchange variation is between subjects or within subjects (Column 3) and whether the experiment takes place in a field setting or in the laboratory (Column 9). Panel A documents the most relevant real-effort experiments on gift exchange, including some executed as laboratory experiments, so long as the “work” is real effort and not stated effort.

Regarding the sample size (Column 5), our paper is the real-effort field experiment with the largest sample size thus far, though there are other studies that are well-powered (which we somewhat arbitrarily indicate with a sample size above 100). Column 8 documents the fact that there is only one other paper which attempted structural estimation of social preferences in a gift exchange set-up in the field, Bellemare and Shearer (2011). Bellemare and Shearer (2011) has a very nice estimation set-up, which we partly borrow from, such as a power cost of effort, and individual fixed effects. The table clarifies important differences of our work relative to Bellemare and Shearer (2011): (i) (*sample size*) Bellemare and Shearer (2011) estimates the gift exchange effect on a sample size of just 18 workers; (ii) (*within-subject identification*) The identification of gift exchange is based on time-series variation: all workers on a particular day were given a “gift,” with no control group on that date. Thus, the identification is based on comparing worker effort on those days versus in the days before (that is, is within subject); (iii) (*returns*) the workers do not know the explicit return to the firm of their effort.

The table also highlights another distinguishing feature of our design: whether the return to the firm was made explicit (Column 6) and varied in the experiment (Column 7). As the table makes clear, few real-effort experiment papers did so (and the list omits a few other gift exchange in the field papers which also do not do so). One of the two Gneezy-List experiments arguably made returns explicit, as the workers were raising money for charity and thus could know the return to their effort (though the return itself was not varied). Also, Englmeier and Leider (2012a) vary the return to the firm by telling people in one case that the experimenters would get “a substantial bonus” if 50% of the work was done by a deadline. Hennig-Schmidt, Sadrieh, and Rockenbach (2010) provide more information on the return to the employer in one of their treatments, and find evidence suggestive of gift exchange only when the return is made clear. Both experiments provide suggestive evidence on the effect of returns, given the relatively small sample size.

A study that both informs workers of the return to the firm, and varies returns across treatments, is Englmeier and Leider (2012b). The paper employs a real-effort task and it has a sizable sample ($N = 192$). Interestingly, as in our paper, there is no statistically significant response to a gift from the “manager,” nor does the response appear to interact with the return to the “manager.” We should point to two key differences of this very nice study relative to our work: As the authors themselves emphasize, it is a laboratory experiment, and the “managers” are laboratory subjects assigned to the “manager” role. And this paper does not attempt a structural estimation.

Panel B of the table also shows several of the design features in stated-effort laboratory experiments that our study aims to introduce in the field experiments. Most importantly, the return to the “firm” is made salient, and occasionally also varied. Indeed, a key point in our paper is to show that one can put together the pieces that allow for estimation of preferences in a field setting, as pioneered in the laboratory for stated-effort gift exchange experiments. In this way, our design aims to bridge the gap between the laboratory and field studies, as we say in the paper.