

# Incentives, Mission and Productivity\*

Oded Ravid, Miki Malul and Ro'i Zultan<sup>†</sup>

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## Abstract

Principal-agent theory largely seeks ways to provide strong material incentives to workers. In contrast, many firms that have a strong work mission—such as certain organizations in the public sector and non-profits—tend to provide weak material incentives to workers. High-power incentives increase productivity through two distinct channels: attracting high-skilled workers and incentivizing high effort. We study experimentally how work mission interacts with these two channels. We construct “private sector firms” offering low base and high piece rate wages and “public sector firms” offering high base and low piece rate wages. A multi-stage setup allows for direct estimates of the two channels as well as the moderating effect of adding public sector mission in the public firms. Mission attracts workers from the private to the public firms and leads to greater effort in the public firms, thus reducing the total productivity gap by 30 percent. Adding public mission has no effect on average productivity, work time or average ability in the private firms. These results highlight the importance of cultivating a sense of mission in organizations.

*Keywords:* incentives, mission, productivity, public sector, laboratory experiment.

*JEL classification:* C91, j24, J45.

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<sup>†</sup>Ravid: Corresponding author, Department of Economics, Ben-Gurion University of the Negev, E-mail: ravid@bgu.ac.il; Malul: Department of Public Policy, Ben-Gurion University of the Negev, E-mail: malul@bgu.ac.il; Zultan: Department of Economics, Ben-Gurion University of the Negev, E-mail: zultan@bgu.ac.il. This paper is part of the first author’s doctoral dissertation. The remaining authors are listed in alphabetical order.

# 1 Introduction

Different firms incentivize workers in different ways. Some create monetary incentives to increase productivity through performance based bonuses, while others provide relatively weak incentives—as manifested in flat wages, and, in some cases, tenure. Traditionally, economists expect high-power incentives to lead to high productivity of workers. High-power incentives work through two channels. Intuitively, workers exert more effort in order to secure greater remuneration (Groves et al., 1994; Li, 1997). However, even if productivity is not sensitive to effort exerted, high-power incentives attract workers with higher ability (Barberis et al., 1996). Estimating the respective roles of these two channels has important policy implications: If high-powered incentives increase productivity only by attracting new human capital, then global processes—such as privatization or nationalization—will only affect the allocation of workers between firms but not the total productivity in the market. Empirical studies aimed at estimating the two effects include Lach and Schankerman (2008), who found evidence for the co-existence of these two channels in the context of patent royalty rights in universities. Similarly, Lazear (2000) estimated that the observed increase in productivity following a transition to high-powered incentives can be equally attributed to incentivizing higher effort and attracting better workers.

Incentive power is often strongly related to work mission. Broadly speaking, organizations such as NGOs and public sector firms imbue a strong sense of mission in their workers (Crewson, 1997; Wright, 2001; Weisbrod, 1998; Frank and Lewis, 2004), while providing relatively weak monetary incentives (Nyborg and Zhang, 2013). This negative relation between incentive power and mission can be explained in more than one way. NGOs and Public sector firms typically provide social public goods. Public good provision is associated with a sense of mission, and at the same time is difficult to design strong incentives schemes for—as (social) outputs are often difficult to measure. Notwithstanding, Besley and Ghatak (2003, 2005) suggested that, given that workers respond to the organization mission, it is even *optimal* for firms with a strong sense of mission to offer weaker incentives.

In this paper we study experimentally the interaction of work mission and incentive power in a real-effort task. Mission orientation is related to worker willingness to voluntarily provide additional work, and sorting into mission oriented organizations (Gregg et al., 2011; Carpenter and Knowles Myers, 2010; Serra et al., 2011). It is therefore important to understand how the incentivizing and sorting effects play out in an environment

where some employers are mission-oriented, but supply weak incentives. To do so, we created a two sector economy, where workers work either in a ‘private sector’ characterized by high incentives, or in a ‘public sector’ characterized by weak incentives.<sup>1</sup> The experiment includes several stages. First, the participants work in both sectors, which provides a clean estimation of a pure incentivizing effect. In the next stage, participants can choose their sector before each period. This stage allows us to estimate the pure sorting effect by controlling for the different abilities of workers, as measured in the first stage. At the same time, a within-subject comparison provides an additional estimate for the pure incentivizing effect. In the final stage, we introduce ‘public sector mission’ by adding a donation to the participant’s preferred charity based on her output in the public sector. This design allows us to study the effect of mission on the productivity gap between public (in the broad term) and private firms, and to break down this effect by the incentivizing and sorting channels.

Previous studies using real-effort tasks largely did not find substantial effects of mission on real effort, but provided evidence suggesting that jobs that include a mission element can attract workers, even when associated with increased effort or lower personal compensation. Our experiment has several features that allow for a valid estimate of the effect of mission on both incentivizing and sorting. Firstly, effort is more likely to affect work time than productivity while doing concentrated work. During extended work periods, workers may allocate time for rest or leisure (e.g., going on social media). In contrast, real effort tasks performed in the short time spans relevant for laboratory experiments—especially those involving repeated rounds—leave little scope for variation in effort.<sup>2</sup> To circumvent this problem, we implement explicit choice of work time. Moreover, our multistage design is aimed at quantitative estimates and comparison of the two channels.

The experimental results successfully replicate the productivity gap hypothesized to exist outside the laboratory. We find that ‘private’ firms attracts higher-ability workers and that their workers exert more effort. Mission reduces this gap substantially, mitigates both the incentivizing and sorting effects. That is, the ‘public’ firms, despite providing weaker incentives to workers, are able to better attract higher-quality workers and to elicit

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<sup>1</sup>The ‘public’ sector should be taken to represent any organization with a social mission, including private non-profit organizations. We use these labels to facilitate the participants’ perceptions of the situation.

<sup>2</sup>As Araujo et al. (2016) show with the slider task used in the current experiment. Laboratory and field studies that found substantive treatment effects on real effort involved working time of one hour or more (e.g., Abeler et al., 2011; Kube et al., 2013).

higher effort, leading to higher mean productivity. The mean productivity in the ‘private’ firms remains largely unchanged.

The rest of the paper is organized as follows: Section 2 reviews the literature on incentives and mission. In Section 3 we present a simple model to illustrate the incentivizing and sorting effects and the moderation effect of public sector mission. Section 4 presents the experimental design and procedure while Section 5 presents the results. Section 6 concludes with a discussion of the results and their implications.

## **2 Related literature**

Several experimental studies looked at the relative impact of incentivizing and sorting on worker productivity. Eriksson and Villevall (2008) showed that moving from a fixed wage to a variable-pay scheme both increases the average effort level and attracts more talented workers. Cadsby et al. (2007) found that per-performance compensation achieves significantly higher firm productivity than a fixed salary scheme by means of both the sorting and incentivizing effects. In other words, more productive employees selected into the per-performance pay scheme, and employees, regardless of their preferred compensation scheme, produced more when compensation was performance-based. In Dohmen and Falk (2011), variable-payment schemes induced more output than fixed-payment scheme, mainly due to the sorting of skilled workers. Larkin and Leider (2012) demonstrated that overconfident employees are more likely to sort into a riskier incentive scheme, even though this reduces their pay and that the less risky scheme attracts demotivated, underconfident workers who perform below their ability.

Laboratory experiments designed to study the effects of mission on workers typically operationalize mission as supporting a social cause. Accordingly, several studies manipulated mission by allowing worker output to generate donations to a charity. When the worker explicitly chooses costly effort (rather than exerting real effort), effort levels are higher in a mission treatment both for per-performance remuneration (Cassar, 2019) and in a gift-exchange setting with fixed wages (Koppel and Regner, 2014). The picture is less clear when workers are required to exert real effort. Tonin and Vlassopoulos (2010) found that mission increased effort levels marginally, and only for women. Tonin and Vlassopoulos (2014) found a significant effect only for workers with low productivity. In the field experiment of Jeworrek and Mertins (2019), an advertising agency recruited

temporary workers to envelope letters. Whether the letters were for a campaign supporting local non-profits or local shops did not affect workers' output. Interestingly, however, both workers who actively chose to work for non-profits in Jeworrek and Mertins (2019) and workers who chose to allocate some of their earnings to charity in the laboratory study by Tonin and Vlassopoulos (2014) exerted significantly more effort than workers who were exogenously allocated to do so, a finding consistent with observational studies that indicate self sorting of mission oriented workers into mission oriented organizations (Gregg et al., 2011; Carpenter and Knowles Myers, 2010; Serra et al., 2011). These studies added a mission element on top of existing incentives, which may crowd out intrinsic motivation. Other studies compared mission as a social incentive by comparing situations where the same payoff is paid either to the worker or to a charity. With small payoffs, the social incentive is more effective, and vice versa with large payoffs (Imas, 2014; Charness et al., 2016).

Besley and Ghatak (2003, 2005) emphasized the importance of matching the mission to the preferences of the worker. Carpenter and Gong (2016) found that workers were more willing to work, and worked harder, for a political campaign they supported compared to one they opposed (Obama vs. Romney campaigns in 2012). To test this hypothesis when alternative missions are not diametrically opposed, Koppel and Regner (2014) conducted a gift exchange experiment, allowing both the employers and the employees to choose their preferred of five NGOs at the beginning of the experiment. In each period, the employer chooses the wages *and* whether to donate a fixed proportion of their profit to their preferred charity. Workers chose higher effort levels when their employer chose the same NGO as they did, independent of whether this effort actually generated donations to the charity. Fehrler and Kosfeld (2014) also studied mission matching by allowing participants to choose their preferred of 16 NGOs. Surprisingly, and in contrast to the results of Koppel and Regner (2014), chosen effort levels in this treatment were not significantly higher compared a control treatment, in which an equivalent amount was paid to a randomly selected student. Nonetheless, when given a choice, a substantial proportion of participants preferred to work for their preferred NGO—even if this option was more costly. In a related study, Gerhards (2015) did find that actual NGO workers chose higher effort levels in a mission treatment (where the worker chooses the project to contribute to) compared to a control treatment, in which the recipient of the donation is exogenously chosen. In a second experiment, Gerhards (2015) was able to extend this finding to a student sample. The effect disappeared, however, when participants played

repeatedly, providing a potential explanation to the discrepancy with the results of Fehrler and Kosfeld (2014).

### 3 Theoretical framework

To match the experimental setup (see Section 4), we consider a worker's decision to allocate a total time on the job  $T$  between production and leisure. The worker's productivity is increasing in the time allocated to work  $t$  with decreasing returns, and is given by the production function

$$p = 2\theta\sqrt{t},$$

where  $\theta$  denotes the worker's ability. The worker's remuneration is composed of a base wage  $b$ , and a piece rate factor  $s$ . The remaining time  $T - t$  is devoted to leisure activities (e.g., spending time on social media), and yields a personal benefit at a fixed rate of  $l$  per unit of time. The worker's utility is thus given by:

$$U = b + 2s\theta\sqrt{t} + (T - t) \cdot l. \quad (1)$$

Solving for the optimal work time we obtain:

$$t^* = \left(\frac{s\theta}{l}\right)^2, \quad (2)$$

yielding an optimal utility of:

$$U^* = b + \frac{(s\theta)^2}{l} + T \cdot l. \quad (3)$$

As expected, work time is higher for more productive workers, for higher per-production wages, and for lower utility from leisure.

### 3.1 Sorting

Assume two sectors, with remuneration schemes  $(b_1, s_1)$  and  $(b_2, s_2)$ , with  $b_1 > b_2$  and  $s_2 > s_1$ . That is, the ‘public’ sector 1 is characterized by a high base wage and low per-performance remuneration, whereas the ‘private’ sector 2 is characterized by a low base wage and high per-performance remuneration. A worker with ability  $\theta$  will prefer the private sector iff

$$\theta \geq \bar{\theta} = \sqrt{\frac{(b_1 - b_2) \cdot l}{s_2^2 - s_1^2}}. \quad (4)$$

Thus, lower-ability workers will opt for working in the public sector and exerting low effort (high consumption of leisure). Higher-ability workers will opt for working in the private sector and exerting high effort (increased work time). An increase in either the base wage or the per-performance remuneration in the public sector shifts marginal workers from the private to the public sector.

### 3.2 Mission

We model public sector mission as additional utility gained from production in the public sector. Thus, replace  $s_1$  with  $s'_1 > s_1$ . It is easy to see that this change has two implications: First, workers in the public sector increase their work time given in Equation (2). Second, the threshold  $\bar{\theta}$  given in Equation (4) increases, and marginal workers shift from the private to the public sector.

## 4 Experimental design and procedure

The experiment was conducted at the Experimental Economics Laboratory of the Department of Economics of Ben-Gurion University of the Negev using the z-Tree software package (Fischbacher, 2007). Participants were recruited from the laboratory database using ORSEE (Greiner, 2015). A total of 70 subjects participated in four sessions of 30 periods each. Each session lasted for about 70 minutes, the average payoff was 70 NIS (approximately \$20) and the average donation was 9 NIS (approximately \$2.5).<sup>3</sup>

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<sup>3</sup>The donations were made by the experiment managers rather than being subtracted from the subject’s payoff.

The experimental instructions were presented to the participants on-screen at the beginning of the experiment and before each stage (see Appendix A.1 for a translation into English). Participants could ask questions privately. The experiment started once all the participants had confirmed that they understood the instructions. The participants were asked to choose one of four possible charities to which a donation would be made on their behalf at the end of the experiment. The size of the donation was not specified other than that it depended on variables that will be explained at a later stage.<sup>4</sup>

The experimental environment simulated an economy with two sectors distinguished by their respective incentive power, following Ravid et al. (2017). Participants performed a real effort task and were paid according to their performance. In the ‘private sector’, remuneration is more sensitive to individual performance than in the ‘public sector’.<sup>5</sup> In other words, the base wage is higher and the per-performance remuneration is lower in the ‘public sector’ than in the ‘private sector’. Production is based on the Slider Task (Gill and Prowse, 2011). In each period, participants are presented with 36 sliders on screen and are allotted 90 seconds to move as many sliders as possible to the center position using only the mouse (see the appendix for the experimental instructions and screenshots). Total productivity in each period is defined as the number of sliders successfully positioned at the center position within the allotted time. Since effort in such experimental tasks has been found not to vary much with incentives (Araujo et al., 2016), we incorporate an effort investment decision by providing explicit payment for leisure. During each period of 90 seconds, the participants can switch between working mode and leisure mode by pressing a designated button. When in leisure mode, the sliders are deactivated and the participant accumulates payment at a fixed rate.<sup>6</sup>

The payoff for each period was determined by the sector type, the individual’s productivity and his consumption of leisure. The parameters were  $b_1 = 170, s_1 = 4; b_2 = 50, s_2 = 10; l = 1$ . Thus, in the public sector, the base wage is higher than in the private sector, but the per-slider payment is lower. The explicit payoff functions were therefore as follows:

$$\text{Public sector: } \pi_i = 170 + 4 \cdot P_i + L_i,$$

$$\text{Private sector: } \pi_i = 50 + 10 \cdot P_i + L_i,$$

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<sup>4</sup>In this, we assume mission matching in the sense of (Besley and Ghatak, 2005).

<sup>5</sup>We use the labels Private Sector and Public Sector rather than the more generic Sector 1 and Sector 2 in order to make the experiment more realistic.

<sup>6</sup>The leisure mode captures, for example, time spent on social media during work hours.



where  $P_i \in \{0, 1, \dots, 31, 32\}$  denotes the individual's productivity and  $L_i \in \{0, 1, \dots, 89, 90\}$  denotes leisure time in seconds. The sensitivity to changes in productivity is thus 2.5 times larger in the private sector than in the public sector (10 points vs. 4 points per slider). Note that at a productivity of 20 sliders the salaries in both sectors are equal (assuming the same amount of leisure time).

Consistent with the existing literature, we created a sense of mission in the public sector by making donations to charities chosen by the participants at the beginning of the experiment. The size of the donation was proportional to the output of the participant (only) when working in the public sector.

Each session consisted of four separate stages:

1. Practice Stage: Two unpaid periods in which the participants familiarize themselves with the experimental task.
2. Exogenous Stage: Twelve periods in which participants alternate between the public and private sector on odd and even periods (counterbalanced between participants).
3. Endogenous Stage: Eight periods in which participants choose the sector at the beginning of each period.
4. Mission Stage: Eight periods; identical to the Endogenous Stage except that each unit of output produced in the public sector generates a fixed donation to the participant's selected charity.

The design allows us to isolate and separately estimate the incentivizing, sorting and mission effects. The incentivizing effect is measured by the difference in average work time between the private and public sectors in the Exogenous Stage; the sorting effect is measured by the difference in average ability of workers between the private and public sectors in the Endogenous Stage;<sup>7</sup> and finally, the mission effect can be calculated by comparing the productivity gap, average work time and average ability between the Endogenous Stage and the Mission Stage. Note that the fixed order of the stages creates a potential confound with the treatments. This design was chosen to simplify a long and complex

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<sup>7</sup>The worker's ability is defined as the mean productivity of the worker per minute in the Exogenous Stage in the private sector.

experiment by gradually introducing additional features. We address and analyze the time and order effects in Section 5.3.

During the period, the participants have access to the following information: current sector, remaining time, leisure consumption, output, salary, and the salary of a hypothetical identical worker, i.e., one with the same performance and leisure time, in the other sector. In the Mission Stage, they also had access to their total donation. The final feedback provided at the end of the period summarized all of the data for that period for the aforementioned parameters (see Figure A.2 for an example of a feedback screen).

## 4.1 Hypotheses

The first three research hypotheses focus on the effect of differences in incentive power between the two sectors on worker productivity, such that the private sector is able to attract higher-ability workers and incentivize its workers to exert more effort (i.e., consume less leisure). Hypotheses 4–6 test whether public sector mission mitigates the effects of high-powered incentives.

**Hypothesis 1.** *High-powered incentives elicit higher productivity in the private sector.*

This hypothesis is tested by comparing the average productivity in the private and public sectors in the Endogenous Stage. The next two hypotheses separately test the two channels through which this effect operates - incentivizing and sorting:

**Hypothesis 2.** *High-powered incentives in the private sector elicit a higher level of effort.*

This hypothesis is tested by comparing effort levels—measured by the work time during the period—between the sectors in the Exogenous Stage.

**Hypothesis 3.** *High-powered incentives in the private sector attract higher-ability workers.*

We measure the basic ability of the individual worker as her mean productivity in the private sector during the Exogenous Stage. We thus test this hypothesis by comparing the difference in average ability between the two sectors in the Endogenous Stage.

**Hypothesis 4.** *Public sector mission reduces the productivity gap.*

This hypothesis states that public sector mission tends to compensate for the lack of high-powered incentives in the public sector and should reduce the productivity gap. The hypothesis is tested by comparing the productivity gap between the Mission Stage and the Endogenous Stage.

**Hypothesis 5.** *Public sector mission mitigates the incentivizing effect.*

This hypothesis states that workers choose to consume less leisure in the public sector when their work generates a public good. The effect of public sector mission on the incentivizing effect is tested by comparing the work time between the Mission Stage and the Endogenous Stage while controlling for a subject-specific fixed effect.

**Hypothesis 6.** *Public sector mission reduces the sorting effect.*

This hypothesis is tested by comparing the average ability gap between the Mission Stage and the Endogenous stage.

## **5 Results**

### **5.1 Incentivizing and sorting**

Table 1 shows the percentage of periods that workers chose to spend in each sector in each stage. Recall that in the Exogenous Stage, workers work in the two sectors for an equal number of periods by design. In the Endogenous Stage, during which workers can freely sort into sectors, workers chose, on average, to spend more periods in the public sector than in the private sector. This tendency was substantially reinforced in the Mission Stage, in which a public sector mission was introduced. Thus, it can be concluded that public sector mission attracts workers to the public sector. Note that in a labor market with a fixed number of jobs, public sector mission can be expected to result in greater competition for jobs in the public sector and consequently to increase the average ability of workers in the public sector to an even greater extent.

Table 1: Percentage of time spent in each sector

Sector	Exogenous stage	Endogenous stage	Mission stage
Public	50%	61%	83%
Private	50%	39%	17%
Total	100%	100%	100%

Table 2 presents the results for a set of linear regressions that estimate productivity, work time and average ability as a function of sector, stage and period. To facilitate the interpretation of the regressions, Figures 1–3 show the regression predictions by productivity, work time and ability for each sector in each stage.

Table 2: Regressions

	(1) Productivity	(2) Work Time	(3) Ability
Endogenous	-5.519*** (0.872)	-19.39*** (3.940)	-0.994*** (0.298)
Mission	1.797 (1.348)	17.16*** (5.897)	-0.356** (0.175)
Private	6.847*** (0.919)	29.17*** (3.935)	0.00076 (0.00099)
Endogenous x Private	9.537*** (0.969)	33.33*** (3.859)	2.643*** (0.684)
Mission x Private	4.657*** (1.313)	7.695 (5.061)	2.550*** (0.844)
Period	-0.0806* (0.048)	-1.282*** (0.206)	-0.0044 (0.0049)
Constant	11.86*** (0.841)	69.58*** (3.889)	18.05*** (0.467)
Observations	1960	1960	1960
Number of subjects	70	70	70

Note: Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ .

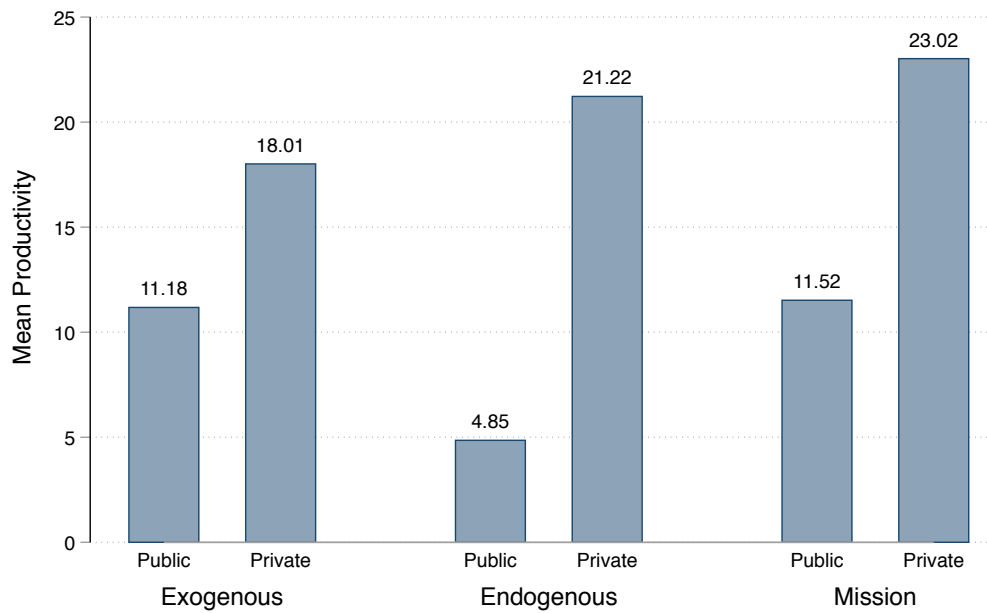


Figure 1: Predicted productivity by stage and sector

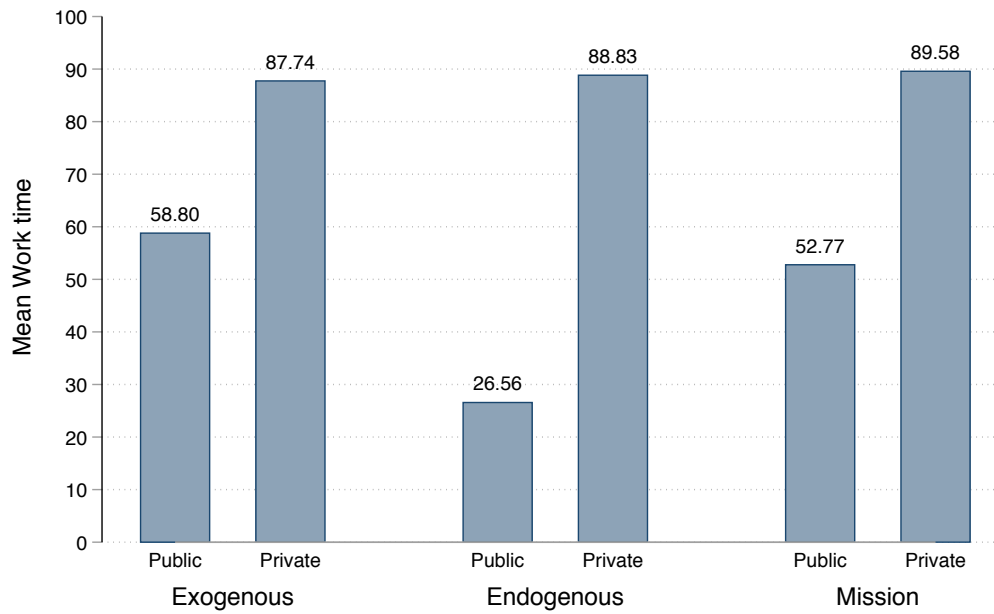


Figure 2: Predicted work time by stage and sector

We start with the analysis of the average productivity gap between the sectors in the Endogenous Stage. Figure 1 shows that average productivity in the Endogenous Stage was more than 5 times higher in the private sector than in the public sector (21.5 versus

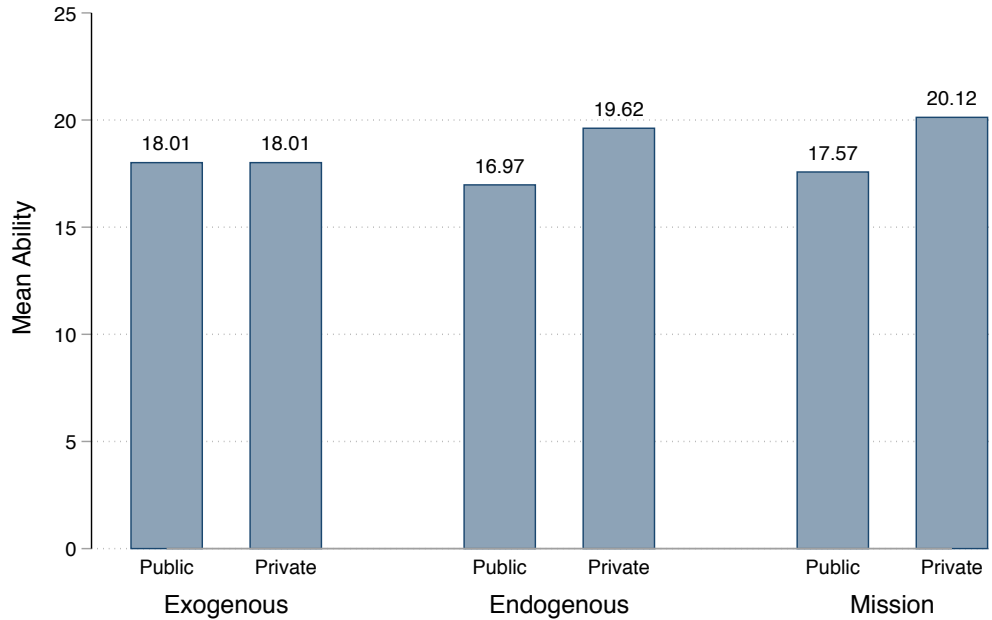


Figure 3: Predicted ability by stage and sector

4.85 completed sliders). Thus, the experiment successfully reproduces the productivity gap observed outside the laboratory and confirms Hypothesis 1. Recall that in this stage the productivity gap is due to both the incentivizing effect and the sorting effect.

Figure 2 shows that the work time in the private sector during the Exogenous Stage was 50 percent higher than in the public sector (87 seconds versus 58). When placed in the private sector, workers allocated nearly all of their time to work. When working in the public sector, in contrast, the same workers spent as much as one third of their time in leisure mode . Since in this stage workers were exogenously allocated to the sectors, the observed differences in work time can be safely attributed to the incentivizing effect, supporting Hypothesis 2.

Figure 3 tests the sorting effect, by comparing the mean ability of workers who choose to work in the public and private sectors in the Endogenous Stage. Since the ability of an individual worker is measured independent of her choice of sectors in the stage, differences in mean ability reflect a sorting effect. The mean worker ability was 15 percent higher in the private sector than in the public sector, confirming Hypothesis 3, which states that higher-ability workers tend to choose the private sector, in line with the theoretical prediction and recent empirical studies Mazar (2018).

The results indicate that both effects—incentivizing and sorting—contribute to the productivity gap rising from the different in the incentive structure in the two sectors. In order to estimate the relative contribution of each effect, we shut down the sorting effect using subject fixed effects and estimate the resulting reduction in the productivity gap.<sup>8</sup> The results are presented in Table 3. The coefficient for the private sector in column 1 represents the productivity gap generated by both effects, while the corresponding coefficient in column 2 reflects the productivity gap due only to the incentivizing effect. Therefore, the incentivizing effect is estimated to account for 55 percent of the productivity gap (9.13/16.44) while the remaining 45 percent is due to the sorting effect. Similarly, with respect to work time, the incentivizing effect explains 64 percent of the work time gap (40.26/62.69) while the remaining 36 percent is due to the sorting effect.

Table 3: Regressions with Individual Fixed Effects

	Productivity				Work time			
	(1) Endogenous	(2) Endogenous	(3) Mission	(4) Mission	(5) Endogenous	(6) Endogenous	(7) Mission	(8) Mission
Private sector	16.44*** (1.117)	9.13*** (1.616)	11.50*** (1.193)	6.35*** (1.725)	62.69*** (4.438)	40.26*** (6.202)	36.82*** (4.571)	23.31*** (6.232)
Period	-0.397*** (0.093)	-0.337*** (0.082)	0.0435 (0.128)	0.0488 (0.129)	-2.361*** (0.417)	-2.178*** (0.383)	-0.134 (0.512)	-0.120 (0.511)
Constant	12.17*** (2.115)	13.94*** (1.637)	10.37*** (3.492)	11.11*** (3.507)	70.08*** (9.310)	75.50*** (7.405)	56.31*** (13.88)	58.26*** (13.68)
Subject fixed effects	No	Yes	No	Yes	No	Yes	No	Yes
Observations	560	560	560	560	560	560	560	560
Number of subjects	70	70	70	70	70	70	70	70

Note: Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

## 5.2 Public sector mission

We next consider how incorporating a sense of mission in the public sector affects the productivity gap in our laboratory settings. It is expected that the introduction of an intrinsic reward will compensate for the lack of high-powered incentives in the public sector and therefore should moderate the incentivizing and sorting effects and decrease

<sup>8</sup>Alternatively, we could compare the productivity gap between the Exogenous and Endogenous stages. This comparison, however, is confounded by learning effects that are apparent throughout the experiment, as we discuss below.

the productivity gap. Figure 1 shows that the productivity gap declines by 33 percent in the Mission Stage relative to the Endogenous Stage, thus confirming Hypothesis 4. Note that while the increased productivity in the public sector was expected, there was also an increase—though not statistically significant—in the private sector. This is consistent with our theoretical analysis, as the workers attracted from the private to the public sector with the introduction of public sector mission tend to be those with marginal ability, raising the *average* productivity in the private sector.

Hypothesis 5, which states that public sector mission mitigates the incentivizing effect, is tested by comparing the work time gap between the sectors in the Endogenous Stage and the Mission Stage, as illustrated in Figure 2. Similarly, a comparison of Columns (6) and (8) in Table 3 shows that public sector mission decreases the work time gap between the sectors attributable to the incentivizing effect by 41 percent.<sup>9</sup>

Figure 3 supports Hypothesis 6, which states that public sector mission mitigates the sorting effect. The mean worker ability increased from the Exogenous Stage to the Mission Stage in both the public sector ( $t=2.66$ ,  $p=0.010$ ) and the private sector ( $t=0.97$ ,  $p=0.337$ ) but only in the public sector was it statistically significant. Overall, there is no significant change in the average ability gap ( $t=0.14$ ,  $p=0.885$ ). This is the same pattern observed in the cases of productivity and the incentivizing effect: the introduction of public sector mission attracts less talented workers from the private to the public sector due to their lower alternative cost. Because the transition of the workers is at the margin, this shift increases the average ability in both the private and public sectors. In situations outside the laboratory, in which firms can enter freely and low-ability workers do not get hired, this effect is likely to cause a decrease in the average ability of workers in the private sector.

The results in Table 3 make it possible to measure the relative contribution of each effect after the introduction of public sector mission. As noted previously, the coefficient in Column (3) represents both effects on the productivity gap while the coefficient in Column (4) represents only the incentivizing effect. Thus, the incentivizing effect accounted for 55 percent of the productivity gap ( $6.35/11.5$ ) in the Endogenous Stage, while the sorting effect accounted for the remaining 45 percent. Similarly, the incentivizing effect estimated in Column (8) accounted for 64 percent of the work time gap ( $36.82/23.31$ ) while the remaining 37 percent was due to the sorting effect. Combined with the previous

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<sup>9</sup>The subject fixed effects control for the sorting effect.



results, it is possible to conclude that public sector mission moderates both the incentivizing and sorting effects to essentially the same extent.

While we find that much of the increased productivity in the private sector is due to reallocation of workers, which does not necessarily affect the aggregate productivity in the economy, the results imply that processes such as privatization and nationalization also affect effort decisions, and are thus predicted to increase the total labor productivity to some extent. However, the greater the sense of mission among workers in the public sector, the less impact these processes will have.

### **5.3 Time trends**

Table~2 reveals a decreasing time trend in work time and productivity,. The analysis of the trend by stage and sector is illuminating. Figure 4 shows that work time in the private sector is stable at close to 90 seconds (the total time allotted in each period) across all stages. In the public sector, in contrast, work time steadily decreases during the Exogenous and Endogenous stages (from 80 to 20 seconds) and then rebounds in the Mission Stage (to almost 60 seconds). The decline in work time during the first two stages can be interpreted as resulting from a learning process, in which workers gradually adjust their level of effort according to the relative payoff function. Thus, the average work time in the public sector during the first two stages is higher than would be expected in natural work settings that allow for a longer adjustment period. A similar pattern can be seen in productivity over time in Figure 5, whereby productivity increases over time in the private sector and decreases in the public sector. However, in the Mission Stage productivity in the public sector rebounds and remains stable throughout the stage. This again can be explained by the learning process of workers in both sectors.

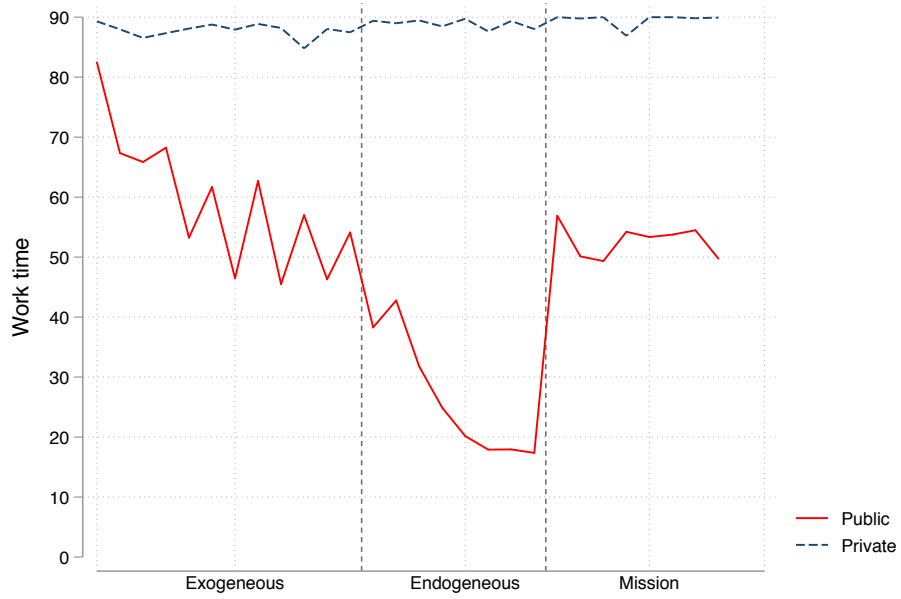


Figure 4: Work time across stages

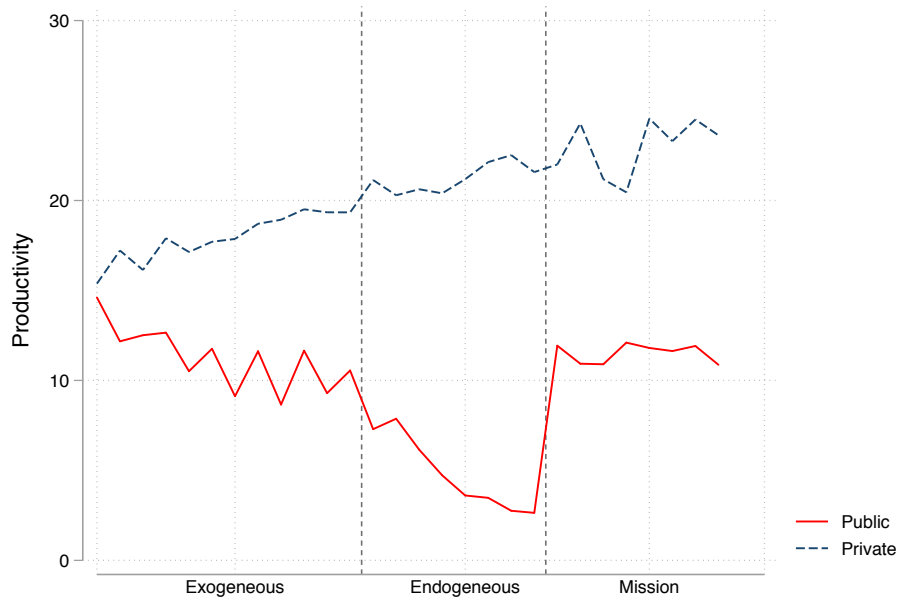


Figure 5: Productivity across stages

To summarize the results, the introduction of public sector mission has a significant impact in a two-sector economy. It mitigates the sorting effect by attracting high-ability

workers from the private sector to the public sector and mitigates the incentivizing effect by increasing work time in the public sector (while having no effect on the private sector). Thus, it acts by means of both effects to reduce the productivity gap.

## 6 Conclusion

The experimental setting was successful at capturing and measuring separately the incentivizing and sorting effects of high-power incentives on productivity. The results show that public mission mitigates both effects, thus reducing the productivity gap between high-power ‘private’ firms and mission oriented ‘public’ firms. Thus, intrinsic rewards in the mission oriented firms play a similar role to that of material rewards in profit oriented organizations by increasing worker motivation and attracting higher-skilled workers. These results underline the benefits of a sense of mission among workers providing a public good and reinforce the findings reported in the literature (Wright, 2007).

While the findings apply mainly to firms that produce a public good, recent studies suggest that it is also profitable for companies in the private sector if their employees feel that their work is meaningful (Gartenberg et al., 2016). Furthermore, studies consistently show that intrinsic rewards, such as a feeling of accomplishment, are crucial factors in job satisfaction (Steger et al., 2012) and are often more important than extrinsic rewards (Mottaz, 1985; Judge et al., 2010). Gneezy et al. (2011) further argue that high extrinsic rewards over time may potentially crowd out intrinsic motivation. The experimental results obtained in this study reinforce the insight that any organization will benefit if its employees view their job as more meaningful (Carton, 2017), which leads to higher levels of motivation, effort and productivity and will attract higher-ability workers.

Our results contribute to the broader debate on the productivity gap between the public and the private sectors. Many economists believe that public firms are less productive and less efficient than private firms, largely due to the high-powered incentives offered to private firms workers (Shleifer, 1998; Sheshinski and López-Calva, 2003).<sup>10</sup> However, empirical attempts to evaluate the contribution to overall productivity of processes such as privatization or nationalization have yielded mixed results (see Megginson and Netter, 2001, for a survey of 22 countries). Similarly, empirical comparisons of performance between public and private firms have not reached unequivocal conclusions (e.g.,

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<sup>10</sup>While our experiment reflects, to some degree, existing differences in incentive schemes between the public and private sector, it abstracts from many other relevant differences.

Atkinson and Halvorsen, 1986). Even when privatization—which leads to a transition to high-powered incentives—increases productivity, it is difficult to identify the channel. Our results suggest that, to the extent that privatization increases a targeted firm’s productivity, a substantial share of the effect is due to reallocation of workers to firms in the market and not an overall increase in productivity. Future work extending the design to free entry of firms and unemployment of low-ability workers would further illuminate the interplay between the mission and incentives in a two-sector economy.

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# A Appendix

## A.1 Experimental instructions

*<Presented on-screen>*

You are participating in an experiment under the auspices of the Department of Economics. Participation is voluntary, and you will receive a payoff according to the outcome of the experiment. During the experiment, you will accumulate points and on completion the points will be converted into money at a rate of 100 points = 1 NIS. The experiment consists of 30 rounds and is approximately 60 minutes long.

At the end of the experiment, you will receive payment according to the number of points you have accumulated and in addition a donation will be made to the charity you select. The exact amount depends on variables that will be explained later. The donation will be made online immediately after the experiment. All the participants will receive an email with a copy of the receipt.

Please choose one of the following organizations for your donation:

1. Elem: a non-profit Israeli organization helping youth in distress.
2. Educating for Excellence: a non-profit Israeli organization that aims to reduce social gaps by creating equal opportunity for children and youth in the periphery.
3. Anonymous: a non-profit Israeli organization for the humane treatment of animals and increasing awareness of their suffering.
4. Ofanim: A nonprofit Israeli organization that promotes educational activities for disadvantaged children and youth.

The first stage is for practice in order for you to get acquainted with the task. It will consist of 2 rounds of 1 minute each. A screen with 36 sliders will be presented. The position of the slider on the bar ranges from 0 to 100. The task is to move as many sliders as possible with the mouse exactly to the midpoint, i.e. to 50, within 90 seconds. The task remains the same in all the stages

During the round, participants will be able to switch between working on the task or leisure and vice versa by pressing on the leisure-work button that will appear on the left side of the screen. At the end of the round, a feedback screen will be displayed summarizing the number of sliders completed and leisure time in seconds.

The next stage will consist of 12 rounds of 1.5 minutes each. This stage simulates an economy with two sectors: a public sector and a private sector. Each participant will be assigned to a sector, which will alternate in each round.

The salary of each participant will be determined by two factors: the number of sliders completed and the sector. Note that in the private sector the base salary is lower but the payment for each slider completed is higher. In other words, salaries in the private sector are more sensitive to output than in the public sector. The base wage is 50 in the private sector and 170 in the public sector. Ten points are earned for every slider completed in the private sector and 4 points in the public sector. Note that points are earned even for leisure: one point for each second in leisure mode.

After each round, a feedback screen will be displayed summarizing the results of that round. The results include: number of sliders completed, salary earned by the participant, and the salary that the participant would have earned for the same effort in the other sector.

The next stage will consist of 8 rounds. This stage is identical to the previous one except the participant can choose the sector to work in before each round.

The last stage will consist of 8 rounds and is identical to the previous one except that for each Slider completed in the public sector, 0.1 shekels will be donated to the organization selected at the beginning of the experiment. Note that a donation will be made only for output in the public sector.

Good luck!

## A.2 Screens

Salary in other sector	Your salary	Seconds in rest mode	Your output	Seconds left in this round	Your sector
104	110	0	4	9	private

Figure A.1: An example of an effort task screen

Round summary
You worked in the public sector
Your base salary was 170
Your output in this round: 4
The payment for your output: 16
The payment for seconds in rest mode: 15
Your total salary in this round: 201
The salary in the other sector with the same output: 105

Figure A.2: An example of a feedback screen