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IN A TWO-SECTOR ECONOMY**

Oded Ravid, Miki Malul and
Ro'i Zultan

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Monaster Center for
Economic Research
Ben-Gurion University of the Negev
P.O. Box 653
Beer Sheva, Israel

Fax: 972-8-6472941
Tel: 972-8-6472286

The Effect of Economic Cycles on Job Satisfaction in a Two-Sector Economy*

Oded Ravid, Miki Malul and Ro'i Zultan[†]

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Abstract

Economic growth improves the material well-being of all workers. However, when remuneration in the public sector is less sensitive to economic cycles than in the private sector, as is typically the case, economic growth will worsen the position of workers in the public sector relative to workers in the private sector, even though their income improves in absolute terms. As a result, job satisfaction may be countercyclical in the public sector. We test this counterintuitive hypothesis in a real-effort laboratory experiment that simulates an economy with two sectors differing only in their remuneration scheme. Economic cycles are introduced in order to test for their effect on job satisfaction and productivity in each sector. We find that job satisfaction in the "public" sector is negatively correlated with the state of the economy. This effect, however, does not carry over to productivity: Even though an increase in a worker's productivity in the public sector reduces his relative income, in comparison to a similar private sector worker, we find that this does not have a negative effect on job satisfaction.

Keywords: public sector, incentives, subjective well being, job satisfaction, laboratory experiment.

JEL classification: C91, J28, J45.

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[†]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 dissertation. The remaining authors are listed in alphabetical order.

1 Introduction

Economists have become increasingly interested in the study of happiness in recent years. Well-being is now acknowledged to be a primary measure of an economy's success (Frey and Stutzer, 2002), and many national leaders are now calling for the use of well-being indices to complement the more traditional measures of policy success, such as GDP.¹ Job satisfaction is known to be a major component of subjective well-being (Benjamin et al., 2012; Clark and Oswald, 1996). Therefore, in order to improve the quality of life and well-being of the public, it is necessary to address labor market factors that influence job satisfaction. Moreover, high job satisfaction has a positive impact on the economy in that it correlates negatively with job separation and positively with productivity (Akerlof et al., 1988; Clark and Oswald, 1996; Clark, 2001; Freeman, 1977). Improving job satisfaction can be expected to produce benefits in the form of increased productivity, lower dismissal rates and decreased attempts at sabotage (such as embezzlement).

Subjective well-being depends to a large degree on relative comparisons (Clark et al., 2008; Easterlin, 1974, 2001, 1995; Ferrer-i Carbonell, 2005; Heffetz and Frank, 2011; Luttmer, 2004; McBride, 2010; Carlsson et al., 2007). Job satisfaction, in particular, is sensitive to relative income (Clark and Oswald, 1996; Hamermesh, 1999; Card et al., 2012). In this paper, we focus on this relationship and its implications for the effect of economic cycles on job satisfaction. A common assumption among economists is that economic growth leads to higher subjective well-being across all sectors, which follows from the intuitive assumption that an increase in income from labor in all sectors naturally leads to a monotonic increase in subjective well-being. Nonetheless, whenever economic growth varies across sectors, some workers will experience a decrease in *relative* income despite the increase in their *absolute* income. Given the sensitivity of subjective well-being (and job satisfaction) to relative comparisons, economic growth may therefore have a negative effect on the well-being (and job satisfaction) of some workers.

We examine this question using a two-sector economy that experiences economic cycles, where the sectors differ only in their remuneration scheme and job security level. Such situations exist, for example, in industries that are comprised of both a public and a private sector. The public and private sectors typically differ in job security, incentives structure, and remuneration mechanisms (Buchanan, 1974; Rainey et al., 1976; Paine et al., 1966; Porter and Mitchell, 1967; Rawls et al., 1975). While the private sector is typically characterized by performance-based incentive schemes and low job security, the public sector is typically characterized by low-powered incentives and high job security (see, for example, Roomkin and Weisbrod, 1999).

¹Examples include German Chancellor Angela Merkel, South Korean President Park Geun-hye, British Prime Minister David Cameron, and His Highness Sheikh Mohammed bin Rashid Al Maktoum, Vice President and Prime Minister of the United Arab Emirates (UAE), and Ruler of Dubai.

The characteristics of the public sector can potentially lead to countercyclical effects over the course of a business cycle. Thus, during periods of growth, the absolute situation of public sector employees improves, but their relative standing worsens in comparison to employees in the private sector—where cyclical effects are more pronounced due to bonuses and other more flexible remuneration schemes. The opposite holds true in times of recession, when private sector employees are more exposed to pay cuts and redundancies (Mazar, 2011). This leads to the following non-trivial conjecture: Subjective well-being—and in particular job satisfaction—in the public sector is negatively correlated with economic cycles. In other words, during periods of growth, the job satisfaction of a public sector employee will decrease, although his absolute earnings have increased.

We test this conjecture in a controlled laboratory experiment that simulates a real-world economy composed of a private and public sector subject to economic cycles.² We examine the interaction of the incentive structure and economic cycles in their effect on job satisfaction by incorporating productivity and overall state of the economy into the payoff function.

The controlled conditions allow us to study the effect of economic cycles on a two-sector economy while controlling for possible confounds that exist in the field. These include self-selection of individuals into a particular sector and macroeconomic processes that correlate with economic cycles and may independently affect job satisfaction. Furthermore, even within an industry, sectors may differ in the particular tasks performed by workers and in working conditions, and worker productivity may be difficult to measure. In contrast, sector affiliation, incentive structure, and state of the economy are all set exogenously in our setting, and worker productivity is fully observable.³

The most closely related study is that of Luechinger et al. (2010) who found that subjective well-being in the private sector is highly sensitive to fluctuations in the unemployment rate, whereas no such relation is apparent in the public sector due to high job security. Their results provide some support for our conjecture, which we test in a controlled environment. The current study is also related to the laboratory experiment carried out by McBride (2010) who found that satisfaction with lottery outcomes was higher when the outcome compared favorably to those of comparable others.

The results support the conjecture that job satisfaction in the public sector is negatively correlated with the state of the economy. During recessions, public sector workers, whose salaries decrease, are nonetheless more satisfied overall than in periods of growth, during which their salaries increase, but they are aware that salaries have increased even more in the

²We use the terms *private* and *public* sectors throughout to indicate the sectors with high-power and low-power incentives, respectively. It is important to keep in mind that there are instances in which this classification is imperfect. NGOs, for example, may be characterized as having low-power incentives in many cases, while high-power incentives are often employed in parts of the public sector. The generalization of our conclusions to the private and public sectors should therefore be carried out on a case-to-case basis.

³In that we abstract from many admittedly important characteristics of the labor environment in order to obtain a clearly identified incentive structure. We explore elsewhere some of those characteristics, such as sorting into sectors.

private sector. This result, however, does not carry over to productivity. In periods of high productivity, the salaries of public sector workers increase in absolute terms but decrease in relative terms. Although public sector workers express low satisfaction with being employed in the public sector in such periods, their overall satisfaction is positively correlated with their own performance. These results suggest that subjective well-being and job satisfaction depend on relative comparisons to others in the case of exogenous variation in outcomes (such as economic cycles), but depend on self-comparisons in the case of endogenous variation in outcomes (such as performance).

The rest of the paper is organized as follows: the experimental design is presented in section 2, followed by the experimental results in section 3. Section 4 concludes with the discussion of the results and their implications.

2 Experimental design and procedure

2.1 The environment

The experiment simulates an economy with two sectors that are subject to economic fluctuations: the “private” sector, which has high-power incentives and low job security and is more sensitive to the business cycle, and the “public” sector, which has low-power incentives and high job security and is less subject to the business cycle.⁴ We capture these differences by means of a coefficient that determines payoff sensitivity to the state of the economy and the worker’s productivity. To capture disparities in job security, workers in the private sector, though not in the public sector, can become unemployed for one period in a period of economic downturn and low productivity.

The state of the economy is expressed on a scale from -5 (worst) to $+5$ (best) and is announced at the beginning of each period. The task of the participant is to count the number of zeros in a 9×9 matrix consisting of zeros and ones (as in, for example, Abeler et al., 2011).⁵ Each period has a duration of 90 seconds, during which participants can solve up to six matrices. Productivity depends on the accuracy of the answers. Each correct answer produces a full point, and an answer that is 1 more or 1 less than the correct answer produces half a point. Thus, in each period a participant is able to produce from 0 to 6 points in steps of 0.5.

The payoff for each round is determined by the sector coefficient, the state of the economy and the individual’s productivity according to the following formula:

$$\pi_{it} = 50 + (M_t + P_{it}) \cdot S_i,$$

⁴We use the labels *Private Sector* and *Public Sector* rather than the abstract *Sector 1* and *Sector 2* to bring the experiment closer to the natural domain.

⁵Each cell in the matrix contained a zero with probability p , which was randomly drawn from a uniform distribution on $[0.3, 0.7]$ independently for each table. The randomization was carried out once to determine the same set of matrices for all participants.

where $M_t \in \{-5, -4, \dots, 4, 5\}$ denotes the state of the economy, individual productivity is given by $P_{it} \in \{-3, -2.5, \dots, 2.5, 3\}$, and $S_i \in \{1, 4\}$ denotes the sector coefficient (public and private, respectively). Thus, the sensitivity to changes in the state of the economy and productivity are four times larger in the private sector than in the public sector. The salary of a worker in the public sector ranges from 42–58 as compared to 18–82 in the private sector. Participants who earn a salary of less than 40 become unemployed in the subsequent period.⁶ During the unemployment period, they do not work and receive an unemployment payment of 5 points. Note that the unemployment payment is substantially lower than the minimum feasible salary of employed workers. The instructions did not inform participants of the exact payoff function, but did indicate that wages increase with the state of the economy and with individual productivity, and are more sensitive to both in the private sector.

2.2 Experimental procedure

The experiment was conducted at the Experimental Economics Laboratory at the Department of Economics of Ben-Gurion University of the Negev. Participants were recruited from the laboratory database using ORSEE (Greiner, 2015). A total of 59 subjects participated in two sessions of 30 periods each. Each session lasted for about 70 minutes and the average payoff was NIS 56 (approximately \$15).

The experiment’s instructions (see the appendix for a translation into English) were presented to the participants on-screen and read aloud by the experimenters. Participants could ask questions privately. The experiment started once all the participants confirmed having read and understood the instructions.

Participants were randomly allocated to either the public or private sector, with sector affiliation remaining fixed throughout the session. Each period consisted of four stages. First, the state of the economy was announced. The states of the economy were predetermined arbitrarily and were identical for all participants. Next, participants had 90 seconds to count the zeros in up to six matrices. After the completion of the task, participants received feedback for the period which included the state of the economy, the participant’s earnings, whether the participant would be unemployed in the subsequent period, and the salary of a hypothetical identical worker (i.e., with the same performance) in the other sector and whether that worker would have become unemployed in the next period. Finally, the participants (except of course the unemployed ones) stated their satisfaction with the period on a scale of 1 to 7 in four dimensions: general satisfaction, satisfaction with salary, satisfaction with their performance, and satisfaction with their sector affiliation.

⁶Therefore only private sector workers can become unemployed.

2.3 Hypotheses

In periods of economic growth, the salaries of participants in the public sector are high in absolute terms, but low relative to those in the private sector. The main hypothesis to be tested is whether the relative comparison leads to countercyclical effects on job satisfaction:

Hypothesis 1. *General satisfaction in the public (private) sector decreases (increases) with the state of the economy.*

The other three specific measures of satisfaction, namely satisfaction with sector affiliation, performance, and salary, complete the picture. While satisfaction with sector affiliation is expected to be countercyclical, this may not be the case for satisfaction with one’s performance. Meanwhile, salary serves as a mediator between sector affiliation and performance. Thus, the three additional measures can shed light on the factors behind the countercyclical effects.

A similar argument can be made for productivity. A public sector worker with high productivity in a given period receives a high salary, but suffers from an unfavorable comparison to a similar worker in the private sector. We can thus state our second hypothesis as follows:

Hypothesis 2. *Satisfaction in the public (private) sector will decrease (increase) with productivity.*

Note that even if the second hypothesis holds in our controlled and artificial environment, it is confounded in the real world, where high-ability workers can self-sort into the sector with high-power incentives. Nonetheless, this hypothesis can complement and further illuminate the first hypothesis. Together with the specific dimensions of job satisfaction, it serves to present a more complete picture, and can answer the concern that potential countercyclical effects are driven by demand characteristics, since they would appear regardless of the satisfaction dimension or the source of salary variance.

3 Experimental Results

Before moving to the main analyses of the satisfaction measures, we present in Figure 1 an overview of productivity, salaries, and private sector unemployment throughout the experiment. The figure shows that salaries were substantially more volatile in the private sector, with high unemployment rates during the three periods of low market state. Productivity is not significantly different between the two sectors, despite the stronger incentives in the private sector.⁷ Overall unemployment rate in the private sector was 18.7%.

⁷A mixed-effects linear regression of productivity on sector and period showed a negative and non-significant effect for employment in the private sector: $\beta = -0.378, p = 0.188$. Real-effort experimental tasks typically exhibit low sensitivity to incentives (Araujo et al., 2016).

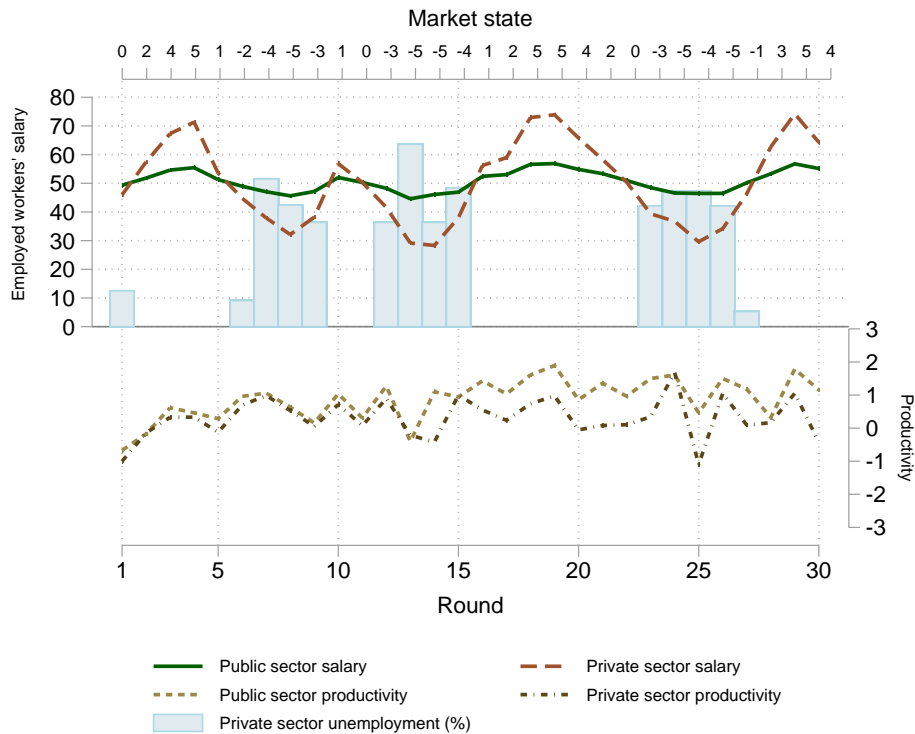


Figure 1: Productivity and salary by sector and period

Table 1 presents the results for a set of mixed-effects linear regressions for each of the four satisfaction dimensions (general, salary, sector and performance) with state of the economy, sector, productivity, and period as the independent variables.⁸ Even columns include the state of the economy and productivity as continuous variables; odd columns include dummy variables for the state of the economy and productivity. To facilitate the interpretation of the regressions, figures 2–5 plot the predictions of the odd-column regressions by state of the economy and by productivity.

⁸We use individual random effects because of the between-subjects design. Specifying individual fixed effects yields identical conclusions.

Table 1: Regressions.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|------------------------------------|---------------------|----------------------|----------------------|----------------------|--------------------|----------------------|----------------------|----------------------|
| | General | General | Salary | Salary | Performance | Performance | Sector | Sector |
| Private | -1.336** (0.673) | -0.983*** (0.347) | -3.565*** (0.679) | -2.443*** (0.344) | 0.018 (0.699) | 0.451 (0.381) | -4.372*** (0.715) | -3.003*** (0.375) |
| Market | | -0.054*** (0.013) | | -0.080*** (0.013) | | -0.023* (0.014) | | -0.201*** (0.013) |
| Private × Market | | 0.189*** (0.022) | | 0.351*** (0.022) | | 0.060*** (0.023) | | 0.416*** (0.023) |
| Employed | | 1.220*** (0.147) | | 0.626*** (0.147) | | 1.052*** (0.157) | | 0.851*** (0.153) |
| Period | 0.006 (0.005) | 0.009** (0.004) | 0.015*** (0.005) | 0.015*** (0.004) | 0.010** (0.005) | 0.010** (0.004) | -0.010** (0.005) | -0.009** (0.004) |
| Productivity | | 0.226*** (0.022) | | 0.038* (0.022) | | 0.462*** (0.024) | | -0.109*** (0.023) |
| Private × Productivity | | 0.024 (0.030) | | 0.127*** (0.030) | | -0.119*** (0.032) | | 0.206*** (0.031) |
| Constant | 1.683*** (0.520) | 0.951*** (0.287) | 3.528*** (0.524) | 2.752*** (0.285) | 0.620 (0.540) | -0.274 (0.313) | 5.358*** (0.551) | 4.578*** (0.308) |
| Market and productivity indicators | | Yes No | Yes No | Yes No | Yes No | Yes No | Yes No | Yes No |
| Observations | 1,234 | 1,234 | 1,234 | 1,234 | 1,234 | 1,234 | 1,234 | 1,234 |
| N subjects | 59 | 59 | 59 | 59 | 59 | 59 | 59 | 59 |

Notes: Mixed-effects linear regressions with random effects for subjects. Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

We start the analysis of job satisfaction by looking at worker satisfaction with sector affiliation. Recall that salaries are higher in the private sector when the state of the economy is positive and in periods of high productivity. Figure 2 indeed reveals that satisfaction in the private sector increases with both the state of the economy and productivity. The opposite holds for satisfaction with being employed in the public sector, which decreases with both the state of the economy and productivity. The regression reported in Column 8 of Table 1, which treats the state of the economy and productivity as continuous variables, confirms this conclusion.

We next consider the reported satisfaction with one's performance in the current period. As expected, Figure 3 and the regression results reveal that satisfaction with one's performance increases with performance and is unaffected by the state of the economy.

Satisfaction with one's salary is determined by both sector affiliation and individual performance. Since satisfaction with one's performance is not sensitive to the state of the economy, satisfaction with one's salary tracks the state of the economy in a similar way to satisfaction with one's sector affiliation (compare Figure 2a and 4a). In the private sector, a positive state of the economy leads to higher salaries in both absolute and relative terms and consequently salary satisfaction increases with the state of the economy. In contrast, in the public sector, a positive state of the economy leads to higher absolute but lower relative salaries. Figure 4a and Column 4 in table 1 show that satisfaction is driven mostly by the relative comparison, leading to a countercyclical effect on salary satisfaction. In contrast, we do not observe a similar effect with respect to productivity (see Figure 4b), although the relative comparison appears to still play a role, as seen in the significant interaction in Column 4 of Table 1. Nonetheless, people are weakly happier with a higher salary—despite the unfavorable relative comparison—when it is due to their own performance rather than the

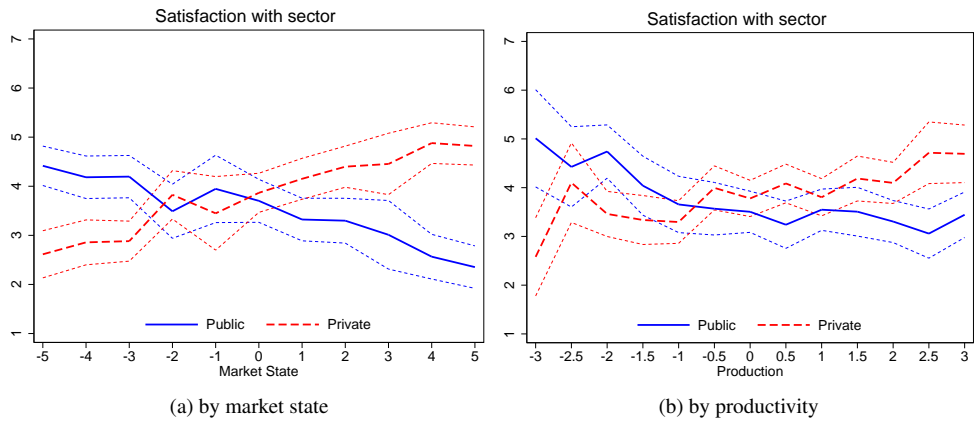


Figure 2: satisfaction with sector affiliation

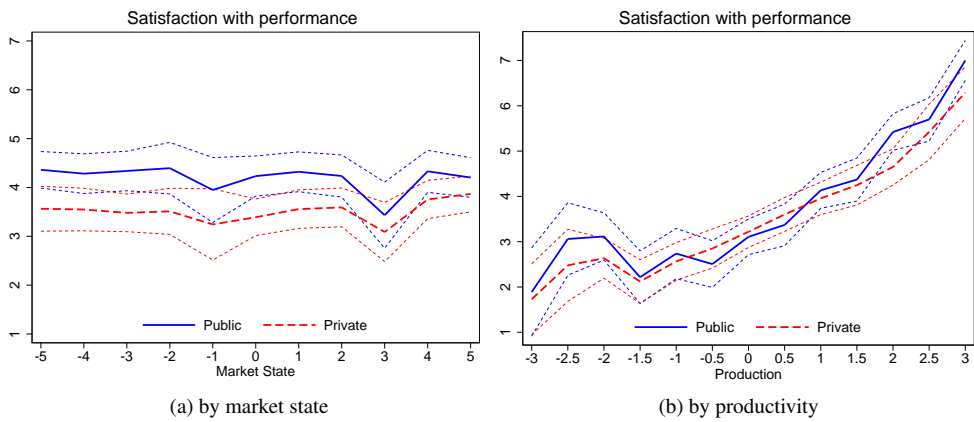


Figure 3: satisfaction with performance

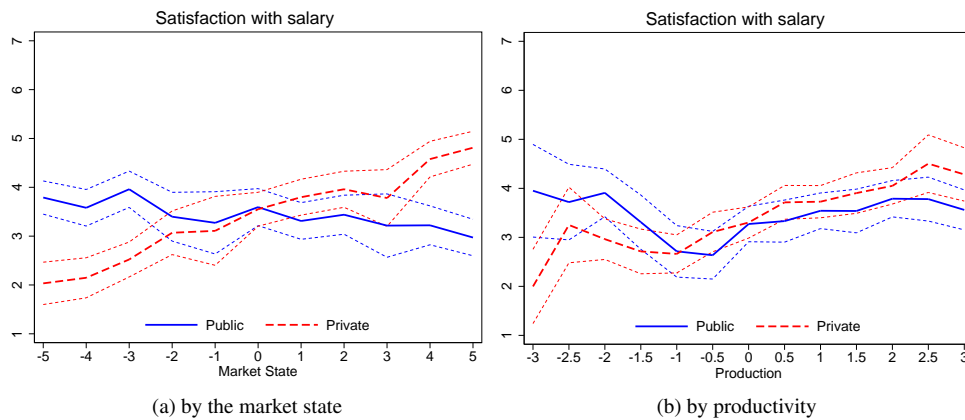


Figure 4: Satisfaction with salary

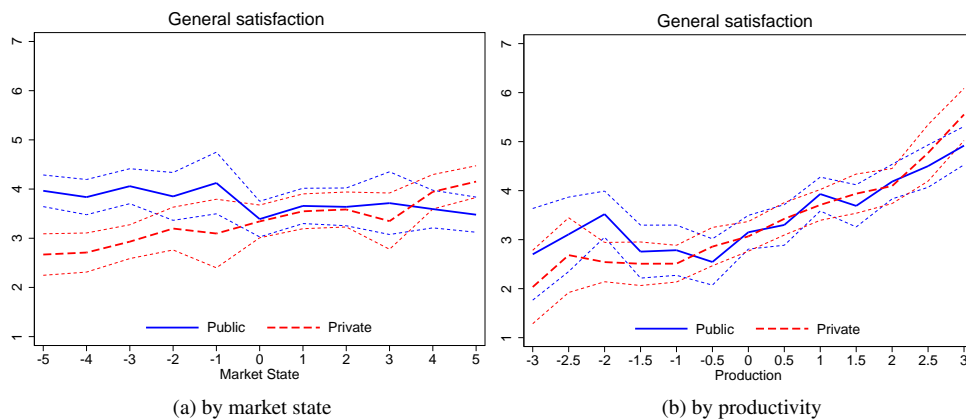


Figure 5: General satisfaction

exogenous state of the economy.

This effect carries over to general job satisfaction as illustrated in figure 5. Figure 5a shows that, in line with Hypothesis 1, public sector workers are less satisfied when their payoff increases exogenously due to the state of the economy. This phenomenon, however, does not carry over to productivity, as can be seen in figure 5b. These results are confirmed by Column 2 of Table 1 (second and sixth rows). Although both the state of the economy and productivity increase earnings, we find that, in the public sector, a positive state of the economy is associated with lower job satisfaction, whereas higher productivity is associated with higher job satisfaction.

4 Conclusion

The experimental results lead to the acceptance of Hypothesis 1, yet to the rejection of Hypothesis 2. The nuanced responses in the four dimensions of job satisfaction and the differential effect of the mechanically equivalent state of the economy and level of productivity confirm that the participants responded truthfully to the (non-incentivized) satisfaction questions. We find that relative comparisons across sectors lead to counter-cyclicity of job satisfaction. Nonetheless, relative comparisons do not undermine intrinsic satisfaction with personal performance. We conclude that while exogenous variance of outcomes (such as the state of the economy) affects subjective well-being and job satisfaction through comparisons to others, endogenous variance of outcomes (such as performance) affects satisfaction through comparison to oneself. Intrinsically-driven job satisfaction is plausibly expected to be even more pronounced in the public sector, where intrinsic motivations are known to play a major role in work motivation (Besley and Ghatak, 2001, 2005; Wright, 2001).

The globalization of the world economy in recent decades has led to economic and financial integration among countries. As a result, economic fluctuations in one country have more impact than previously on other countries. As a result, economic cycles have become more frequent around the world (Ductor and Leiva-Leon, 2016). These economic fluctuations affect job security, psychological stability and happiness in all the sectors of an economy. It is natural to assume that these economic cycles are positively correlated with workers' subjective well-being and job satisfaction. However, our results suggest that in the sectors where remuneration is less sensitive to the state of the economy—as is typically the case in the public sector—job satisfaction is paradoxically negatively correlated with the state of the economy. This finding has several implications for our understanding of labor markets.

The findings imply that a large public sector share of employment should decrease the volatility of worker satisfaction due to the business cycle. T

hus, we can cautiously conclude that there is a positive correlation between public sector share of employment and job satisfaction volatility. In countries with large public sectors, such as China, job satisfaction will be less sensitive to economic cycles relative to countries with small public sectors, such as the United States. Our experimental results also suggest that during the extreme stages of the business cycle (recessions and economic booms) the satisfaction gaps between employees in the two sectors will widen while during periods of economic stability they will narrow. Second, given that labor markets in the real world are imperfect, a worker's salary does not always reflect his productivity. Thus, a productive worker may earn less than a non-productive one, a phenomenon that is particularly characteristic of the public sector. Therefore, our framework can also be used to examine how inadequate payoff affects job satisfaction within the same sector or reference group.

This novel experimental paradigm can be used to test the incentive mechanisms in the public and private sectors. While the results of studies in the field are sometimes perceived

as having greater validity than those of laboratory experiments, they necessarily treat some variables as fixed. The experimental framework presented here is thus unique in its ability to generate new questions with regard to moderating variables. The experimental analysis reveals fundamental processes underlying differences between the sectors, free of the sorting effects apparent in the real world. Future work will extend the paradigm to allow for free transition between sectors and to test how other variables affect the interplay of the incentive mechanisms in the two-sector economy.

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Appendix

A.1 Experimental instructions

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 30 points = 1 NIS.

The experiment simulates an economy with two sectors: a public sector and a private sector. You will be assigned to one of the two sectors. The experiment consists of 30 rounds. In each round, you will be asked to perform a task and you will accumulate points according to your performance and the condition of the economy. At the end of the experiment, you will receive payment according to the number of points you have accumulated.

At the beginning of each round, the state of the economy will be announced according to a scale of -5 to $+5$. The more positive is the state of the economy, the more points you will receive for your performance. You will then be presented with six tables consisting of zeros and ones. You are asked to count the number of zeros in each table and note it in the marked space. Stating the correct number of zeros will earn you one point. An answer that deviates by one unit from the correct number earns half a point. Thus, in each round, you can earn between 0 and 6 points. Each round will last 90 seconds.

At the end of the round, a summary of the results will appear on the screen. The summary will include:

- A. The state of the economy in that round (between -5 and $+5$).
- B. Your performance (the number of correctly solved tables, between 0 and 6).
- C. The payment you will receive for that round and the payment to be received by a participant in the other sector with the same level of performance.
- D. Whether you will be continuing on to the next round or become unemployed for one round.

Finally, you will be asked to complete a questionnaire regarding your level of satisfaction with the outcome of the round.

Your payoff is determined by performance, the state of the economy, and the sector you are assigned to. The calculation of payment in the private sector is more sensitive to performance and the state of the economy than in the public sector. A participant who achieves less than 40 points in a round will become unemployed during the next round and will receive a payment of only 5 points for that round.

Good luck!

A.2 Screens

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |

Figure A.1: The Real Effort Task Screen

The market state was -2.
Your output in this round is 1.5.
Your salary in this round is 46.5.
An employee in the private sector with the same productivity would get a salary of 36 and would become unemployed in the next round.
You will not become unemployed in the next round.

Figure A.2: An example Feedback screen

How satisfied are you with the results of this round?
Not at all 1 2 3 4 5 6 7

How satisfied are you with your salary in this round?
Not at all 1 2 3 4 5 6 7

How satisfied are you with your performance in this round?
Not at all 1 2 3 4 5 6 7

How satisfied are you with belonging to your sector?
Not at all 1 2 3 4 5 6 7

Figure A.3: The questionnaire screen