Individual labor supply by an employee: an experimental study

Marina Vyacheslavovna Ryzhkova [1,2], Yulia Andreevna Varlamova [3]

[1] *Tomsk State University*

[2] *Tomsk Polytechnic University*

[3] *Kazan Federal University*

Economic theory predicts the behavior of a worker with an increase in wages in accordance with the individual labor supply function[12]. Employers seek to maximize profits by increasing labor productivity. The flip side of ensuring high labor productivity is an increase in the psychological and cognitive load on the employee, blurring of the boundaries of working and leisure time, increased stress, and a decrease in subjective well-being[34]. In this context, the **research question** is: at what volume of work the employee will refuse to work overload.

The **research hypotheses** are that: (i) when work overload increases, workers tend to switch to a minimum wage contract, thereby reducing their level of remuneration; (ii) work overload provokes a higher level of stress compared to work in a rationed workload.

Theoretical model. The employee, being the maximizer of his or her own benefit, will strive to perform all types of tasks to maximize his or her well-being:

$$w = p * q_m - f_{ad} * q_{ad} - f_{hw} * q_{hw} \rightarrow max_{q_m, q_{hw}, q_{ad}}$$

где w is the reward for the round, q_m is the number of completed main tasks, q_{ad} is the number of additional tasks which are not completed; q_{hw} is the number of housework tasks which are not completed; p is the "conditional cost of tasks" (it is not announced during the experiment, since a reward for the amount of work is announced); f_{ad} is a penalty for not completing additional tasks; f_{hw} is a penalty for not completing housework tasks. Therefore, the maximum is reached when q_m = max, q_{ad} = 0, q_{hw} = 0.

Experiment design.

During the experiment, participants perform tasks on a computer in a specially designed program (see Fig. 1). All calculations in the experiment are carried out in conventional

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[3] De Quidt, J. (2018). Your loss is my gain: a recruitment experiment with framed incentives. *Journal of the European Economic Association*, 16(2), 522-559.

[4] DellaVigna, S., & Pope, D. (2018). What motivates effort? Evidence and expert forecasts. *The Review of Economic Studies*, 85(2), 1029-1069.

Experimental Currency Units (ECU, conventional monetary units of the experiment). The participant's task is to collect as many ECUs as possible by the end of all rounds on the current account.

During the experiment, participants perform a pre-experimental test to check the level of situational and personal anxiety (State-Trait Anxiety Inventory) a week before the laboratory experiment. Then they play 2 trial rounds to get acquainted with the interface of the program, and 5 main rounds.

The hypothetical situation that is modeled in the experiment is as follows: participants are hired at a conditional enterprise and work at it for 5 days (rounds). Each round lasts 6 minutes and consists of 3 minutes working time at the beginning of the round and 3 minutes leisure time at the end of the round.

During working time, participants are offered tasks. One task is a set of a certain number of examples for adding numbers. In the example, the participant adds two-digit numbers. The numbers were chosen so that their sum was less than 100. Participants are not allowed to use calculators during the experiment. 3 minutes of working time is allotted to complete the tasks. Throughout the round (6 minutes), a folder with short videos is available to participants. They can view this folder while on leisure time, or if they prefer, at other times. In addition, participants must complete homework tasks, otherwise they will receive a smaller reward at the end of the round.

In the control group, participants choose between Contract 1 (intensive - more tasks with the opportunity to earn more rewards) and Contract 2 (minimalist - the number of tasks is minimal and fixed). In the experimental group, the number of tasks in Contract 1 is increased in the form of unpaid overtime work.

At the end of the experiment, participants take a post-experimental test.

Results. The study was conducted in two stages: a pilot experiment was conducted on June 20, 2022 on the basis of Tomsk State University. It was attended by 60 1st year students of the Faculty of Information Technology (Higher IT School, Program Engineering) for the points of the current rating in the discipline of Economics. During the pilot experiment, the cognitive load on the participants was tested, therefore the participants were divided into three groups: group 1 (light load - 2 mathematical examples per task), group 2 (medium load - 4 mathematical examples per task), group 3 (high load - 6 mathematical examples in the task). The results of the pilot study made it possible to determine the optimal level of load necessary to create a stressful situation for the participants in the experiment, the direction for adjusting the design of the experiment.

Fig. 1. Experiment window (the experiment was implemented locally in the oTree)

The second stage of the study - a laboratory experiment - was carried out on November 08-12, 2022 on the basis of Kazan Federal University. It was attended by 146 full-time students studying in the direction of "Economics".

The preliminary results of the experiment showed the following regularities:

– participants in the control group tend to choose an intensive contract more often than a minimalist contract;

– participants in the experimental group more often, compared with the control group, chose the minimalist contract;

– participants in the experimental group experienced stress on average one standard deviation higher than participants in the control group;

– participants in the experimental group rated the comfort of doing work 2.1 points lower compared to the control group;

– when performing tasks by participants in the experimental group under an intensive contract, the effect of specialization was observed: the speed of completing tasks in the last rounds increased compared to the first rounds;

Higher levels of stress from work overload lead to lower productivity and, as a result, lower remuneration. The obtained results are consistent with the findings of the study on the impact of such a non-cognitive skill of employees as stress resistance on the level of remuneration[5].

[5] Vishnevskaya N. T., Zudina A. A., Kapelyushnikov R. I., Luk'yanova A. L., Oshchepkov A. YU., Sharunina A. V. Neravenstvo v oplate truda: dinamika, osnovnye faktory, regional'nye razlichiya, vliyanie institutov rynka truda / S. V. Mareeva, O. V. Voron (ed.); L. N. Ovcharova (sc.ed.). M. : NRU HSE, 2021. (in Rus.)

A feature of the experiment is the participation in it of students who came from China - 42 participants, who can be separated into a separate group to compare the cultural characteristics of the choice of work regime dictated by the country of origin.

Conclusions. The results of the study indicate the non-linear nature of the volume of individual labor supply with a decrease in the level of wages in the case of the introduction of additional work. Based on experimental data, it has been confirmed that when using work overload, there is an increase in situational stress and a decrease in labor productivity.

The **novelty** of the study lies in the study of the employee's behavior when unpaid work overload is introduced. The theoretical significance of the study contributes to the empirical confirmation of the characteristics of the individual labor supply by the employee with a decrease in wages due to the introduction of work overload. The practical results of the study are of interest to a wide range of people involved in the investigation of relationship between the employee and the employer, labor economics.

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