

Emotional Arousal Effects in Participatory Budgeting Decisions*

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Abstract

Participatory budgeting is applied by an increasing number of municipalities and organizations. Citizens can decide over an institutional budget. The allocation mechanism can affect emotional arousal, which influences the choice evaluation in the decision-making process. Building on the endowment effect, we conduct an experiment testing a novel participatory budgeting approach that includes an element of crowdfunding. We measure participants' heart rate to determine emotional arousal. This is one of the first studies to investigate the arousal of participants in participatory budgeting procedures. Our findings suggest that institutions can engage their citizens in such a process without having to expect an endowment effect.

1 Introduction

Participatory budgeting is ever increasing in popularity and a powerful instrument to increase participation of citizens. Participatory budgeting uses an institutional budget that is allocated by citizens. Questions that often arise are: Do citizens take that responsibility seriously? Do they feel engaged with the decision? In this work we want to address the research question: *Does investing one's own budget instead of an institutional budget correlate with a higher emotional arousal?* Thus, we seek to establish a link between different mechanisms and endowments with emotional

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arousal as well as how arousal affects decision-making processes. We address this question in a laboratory experiment that is based on suggestions by Niemeyer et al. (2015). First results on investment behaviour were already analysed (Niemeyer et al., 2016).

2 Literature

The research question addresses two fields of research: On one hand, investment decision-making behaviour in the context of participatory budgeting and, on the other hand, emotions.

2.1 Participatory Budgeting

Participatory budgeting constitutes processes in which governments (or other public agencies) involve their citizens and relevant stakeholders in an iterative and deliberative participation process over budget decision-making (cf. Sintomer et al., 2010). There are several municipalities which adopted the approach in practise. For instance, 53 German municipalities implemented participatory budgeting in 2014 (Ermert et al., 2015). Niemeyer and colleagues (2015) extended the idea of participatory budgeting with the element of crowdfunding. They proposed a mechanism whereby institutions allocate financial resources to the participants of a crowdfunding platform. Just as in participatory budgeting, citizens and stakeholders can then decide to invest money into certain projects. In such settings, the design of the investment mechanism is crucial (cf. Wash and Solomon, 2014).

2.2 Emotions and Investments

Research suggests that when people take investment decisions, they do not always act as rational agents. People are often framed within perceived domains of gains or losses (Wilkinson, 2008; Chang, Yen & Duh, 2002). These framing effects shape people's responses in terms of values, attitudes and, most notably, preferences (Slovic & Lichtenstein, 1983; Tversky et al., 1990). For instance, through the endowment effect people attach more value to things simply because they own them

(Kahneman et al., 1990). This leads them to perceive gains and losses differently, in effect changing the decision-making process. In a review of nine studies examining the endowment effect, Shu and Peck (2011) find that the concept of emotional attachment explains many of the findings, particularly psychological ownership and affective reaction. Hence, emotional attachment might influence investment decision making.

In this work we experimentally investigate emotions in an economic context of investment decision-making. Adam et al. (2011) introduce this extension of the methodology of experimental economics by “physiological measurements of participants as proxies for their individual emotional processing” as *Physioeconomics*, which is now commonly referred to as NeuroIS. Since decision-making is a cognitive as well as an affective process and not only the homo economicus’ maximisation of utility, the measurement of physiological data can help to better understand decision behaviour (Thaler, 2000; Adam et al. 2011). Arousal is mainly measured in two ways: Skin conductance is used to measure general arousal and short sympathetic activities; Electrocardiogram (ECG) measures the electric activity of the heart. For the latter, the time between successive R-waves in the ECG is necessary for the analysis of arousal (Jennings et al., 1981).

In neuro science and NeuroIS, there is initial evidence that supports the notion of emotional influences and the endowment effect in the decision-making process. Adam and colleagues (2015) were also able to show that people were emotionally aroused in auctions. They increased social competition and demonstrated that so-called auction fever leads to higher bids. Moreover, emotional arousal also depends on whether participants face human or computer agents in a competition (Teubner et al., 2015).

3 Experiment and Results

3.1 Hypothesis

Our study seeks to investigate whether different forms of endowment in a participatory budgeting setting affect emotional arousals. With regards to the endowment

effect, we assume that participants will react differently when they own (parts of) the budget as opposed to when they can only invest the money provided by an institution into projects in a participatory budgeting setting. Emotional engagement/arousal is measured by ECG in heart rate. Therefore, we propose

H1: Participants are more emotionally engaged with a decision if they invest their own budget than if they decide on an institutional budget.

3.2 *Experimental Design*

The hypothesis was tested in a novel approach by Niemeyer et al. (2015) combining crowdfunding with participatory budgeting. In a threshold public goods game with four goods and groups of six, participants faced the decision of allocating a budget of 150 MU (monetary units) to four projects with heterogeneous costs (100, 200, 300 and 400 MU respectively). This is based on the experimental design of Wash and Solomon (2014). If the threshold of a project was met, each participant profited with a certain (heterogeneous) utility, independent of what the participant had invested. In the experiment we distinguish between two treatments. In the *S100 treatment*, participants can keep the budget if they do not want to invest in the projects. This corresponds to a private budget. In the *S0 treatment*, they can only invest the budget. Not invested money will go back to the institution. This corresponds to an institutional budget.

In each session, 12 participants were connected to an electrocardiogram device that recorded the heart rate over the course of the experiment. Instructions were then handed out and read out aloud to all participants. After participants had answered 10 control questions and a three minute period of rest, 24 periods of project funding were played, followed by a final questionnaire. In each of the 24 periods, two new groups of six participants were formed, each of them investing in four different projects. The pilot study experiment was conducted in June 2015 with 24 students of a large German university. Participants were invited via ORSEE (Greiner, 2004) and were on average 21 years old. Each student participated only in one treatment. The sessions took 70-80 minutes and participants earned on average 13.87 EUR. The experiment was implemented using Brownie (Müller et al., 2014).

3.3 Results

Heart rates (HR) were derived from the ECG data and normalised by taking the ratio of the individual HR during three minutes in the middle of the period of rest. Physiological data of 5 of 24 participants could not be used due to technical problems during the recording.

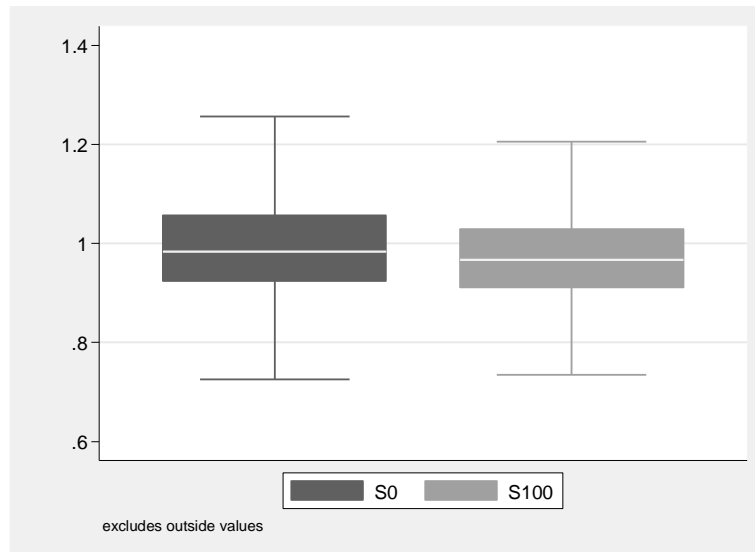


Figure 1: Average normalized HR by treatment.

The average normalised HR in the *S0* treatment, where participants invest institutional budget is 0.994, in the *S100* treatment, where participants can also keep the money, 0.966 (see Figure 1). A paired sample t-test reveals that there was no significant difference in arousal between the treatments ($p = 0.203$). Also we do not find a correlation between the average normalised HR and investments.

However, a closer look reveals additional interesting results. Over the course of the experiment, participants' HR (and therefore average normalised HR) decreased in both treatments as can be seen in Figure 2.

In a linear regression we controlled for participants and used the average normalised HR as dependent variable, a treatment dummy (which is 1 if the participant was in treatment S100) as independent variable and a period variable (1-24). The regression ($R^2 = 0.043$) shows no significant treatment effect (coef. = -0.0246, $p = 0.461$). However we can observe a significant period effect (coef. = -0.0018, $p = 0.014$),

participants' HR significantly decreases over the course of the experiment. This is in line with the literature (cf. Wilson, 1992; Bradley et al., 1993).

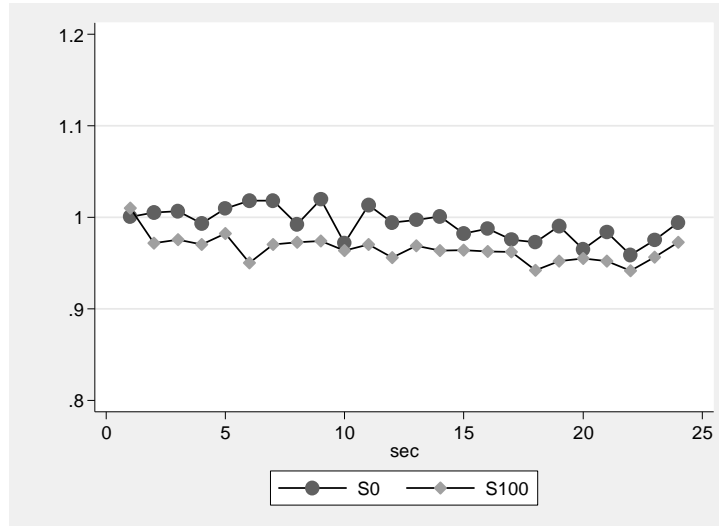


Figure 2: Average normalized HR by treatment per period.

4 Conclusion

With our work we presented to first attempt to investigate emotions in participatory budgeting in a controlled experimental setting. There is no measurable evidence for an endowment effect in terms of emotion when investing money that could or could not be kept as an outside option. This implies that institutions who offer participatory budgeting as budget allocation, without giving citizens the opportunity to keep the money, do not have to worry that citizens are less engaged. There even is an insignificant tendency that they are more aroused without the possibility to keep the money. As our sample size of 24 participants was quiet small and the data set did not allow for a period-related decision phase analysis, an upcoming conduction of more sessions with more than 200 participants will further investigate our conjectures.

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