

# Effectiveness of Charitable lottery design: Experimental evidence from the Czech Republic and Russia

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## Abstract:

The paper presents results of multicultural economic experiment that took part in two central and eastern European countries: the Czech Republic and Russia. The experiment was focused on studying behaviour of eastern European university students in the situation simulating a charitable lottery.

The experiment was, to a great extent, inspired by experimental design of Dale (2004). In accordance with Dale's study we examined the effectiveness of various lottery structures. From Dale's experimental design we adopted the fixed prize lottery (raffle) structure where tickets are sold for chances of winning a prize. We introduced a new scheme (lottery structure) – modified fixed prize lottery - within which the chance of winning was equal for all contributing individuals (and hence independent of the amount of their actual non-zero contribution). Our results show that such scheme is not efficient, i.e. that individuals contribute considerably less under the modified fixed prize lottery than under the classic raffle. Comparison of results acquired in three different countries (CR, Ru and USA) enabled us to find certain differences in individuals' behaviour that could be qualified as "country effects". Particularly, under the fixed prize lottery we observed considerably lower amounts of contributions by the Czech and Russian participants compared to their American colleagues. As far as the behaviour of the Czech and Russian students concerns, the differences were significant only in the modified fixed prize lottery where the Russian students contributed considerably more than the Czech ones.

## 1 Introduction

One of the classic arguments emphasizing the need of state intervention in economy arises from the concept of *market failure*. The most typical examples of market failures are externalities and public goods

In addition to national defence, legal system, or street lamps charity is ranked among goods fulfilling two classic characteristics of public goods – non-rivalry and non-excludability.

The attractiveness of studying charity or charitable contributions<sup>1</sup> is related to its special characteristics. Charity is usually considered as good and lively example of privately provided public good. If individuals are altruistic and donors wish to support people in need, then the recipients' well being enters utility functions of donors in a non-rival way (Robledo, 1999). Samuelsonian approach to public goods presumes that in large economies (groups) the existence of a public good will result in massive free riding. People do not voluntarily contribute to public goods because of the possibility to consume it without paying for it. The overall amount of contributions collected is therefore very small (or at least smaller than Pareto effective level) and the public good is not provided.

The opposite behaviour is, however, observed for charities. There is a large variety of charitable organisations that raise their funds from people on voluntary (i.e. private) basis.<sup>2</sup> The empirical data have also impugned the assumption that only rich people contribute to charity. Hall *et al*, 2009 presents the results of Canadian data and shows that in 2007 81 per cent of unemployed people contributed to charity. Such contributions – again impugning the traditional model – are not (or are to a very little extent) crowded-out by state or government funding (Robledo, 1999).

Studying charity and motivations of people to contribute to charity can be, in this respect, very informative for public policy making. Raising funds on private principle without (or with very little) need for state intervention could help to solve increasing gap between demand for public services and budget possibilities.

Our paper attempts to contribute to the huge amount of literature studying motivations of individuals and trying to help non-for-profit organisations to derive the most effective way to raise their money by voluntary contributions. Our experiment was to a great extent inspired by Dale (2004). In accordance with Dale's study, we examined the effectiveness of various lottery structures.

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<sup>1</sup>The contribution could take various forms – besides money contribution (within charitable collection), people donate their free time while preparing or realizing charitable activity, volunteer in not-for-profit organisation, take care of elderly people. Private firms support research activities (provide rooms, appliances, finance). People also contribute to international public goods (peacekeeping efforts and disaster relief). For more examples see Batina, Ihori (2005).

<sup>2</sup> The famous example is charitable sector in the U.S.A. For example, Independent Sector (2001) show, that 89 per cent of American households donate to charity (in any form like money, property, stocks and bonds) in 2000. The average contribution of the household was 1 620 USD, (3.1 % of the household return). Similar results can be found in Canadian data (see Hall *et al*, 2009). In 2007 84 % individuals contribute to the charity with average contribution as high as 437 CAD in Canada.

Lottery and gambling can be used as charitable tools in two ways. The first way, which is traditional in the Czech Republic, is treating gambling as a *bad thing*, and forcing the providers of such games to pay a share of profit to not-for-profit (or charitable) organization.<sup>3</sup> In this case, the relationship between gambling and charity is not so clear to people. The support of charitable projects, by paying a share of profit, could be seen rather as a taxation than as a provision of public good. We argue that people (gamblers) in this case do not take into account the charitable aspect of their gambling activity and do not derive any utility from it.

The second type of the relationship between charity and lottery is more traditional in western countries (mainly in the U.S.A) and is more related to our research. In this case, a lottery is treated as a fundraising tool encouraging people to voluntarily contribute to a charity by offering them possibility to win a prize. According to the Cornes and Sandler (1994) model, lottery serves as private good that is provided complementarily with public good (charity).

An important question is which design a charitable organization should use to make the charity the most effective, i.e. to increase its funds as much as possible. In our paper we discuss two charity designs, which are then compared to the (traditional) voluntary contribution mechanism (VCM). This mechanism represents ordinary design of the charitable giving – collecting money from contributors without any reward (*collecting money in a hat*).

From Dale's experimental design we adopted FPL - fixed prize lottery (raffle) structure where tickets are sold for a chance to win a prize. In his study this structure appeared to be the most effective one, this conclusion being confirmed by both the theoretical model and by the experiment's results.

Our second lottery structure is a modification of this design. We call this structure *modified fixed prize lottery* (MFPL). It differs from the classical raffle in the way the individual's chance of winning the prize is not affected by the amount of his/her contribution, (as it is in the Dale's FPL model). The winner of the MFPL raffle is simply one of the contributors regardless of the amount he/she contributed. Our proposed modification might seem more comfortable to a subject who is trying to increase its resources by charitable lottery. The fundraiser simply selects one subject from the set of contributors regardless of the amount he or she contributed. The question is what the effectiveness of such modification would be.

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<sup>3</sup> According to the Czech Lottery Act every provider of lottery (or other gambling activity) should pay 6-20 per cent of the lottery revenue for public benefit purposes. The largest lottery company in the Czech Republic – SAZKA, a.s. paid more than 400 mil. CZK (14 mil €) to (mainly) not-for-profit sport clubs and associations.

In this respect we formulated our main hypothesis as follows:

**H1:** Using *Modified fixed prize lottery* is ineffective modification of classical raffle. People do contribute less than in a classical raffle (FPL).

Beside the main hypothesis we tested two more facts: Do central and eastern European university students behave differently than their western colleagues? Is there any country effect on the results i.e. do the results for Czech students differ from the Russian ones? In relation to our first question we state the following hypothesis:

**H2:** In case of voluntary providing a public good, the American students behave differently than their central and eastern European colleagues.

In respect to this hypothesis we compared our results to the up to date published results on this topic. The vast majority of results usually stems from experiments carried out at western European or American universities. There is not much evidence of behaviour of students from the Central and Eastern Europe in these experiments. We argue that due to different historical experience, there should be some difference found; students from former communist countries might contribute less to public good due to their experience with collectivism.

The choice of participating universities also enables us to test another hypothesis – whether there could be any difference observed in the behaviour of Czech and Russian participants respectively:

**H3:** In case of voluntary providing a public good the Czech students behave in a different way than their Russian colleagues.

## **2 The model**

As our experiment replicates, to a great extent, the one published by Dale (2004), we used the same model. The model combines the voluntary contribution mechanism model (first published by Isaac, Walker (1988)) and the model of fixed prize (charitable) lottery presented by Morgan (2000). We adopted the notation used in the model presented by Dale (2004). More detailed and complex model of charitable lottery can be found in Lange et al (2007). Maeda (2008) discusses optimal lottery design under the assumption that people find lottery only as a source of entertainment.

The model is based on the assumption of linear utility functions of individuals (both in wealth and quantity of public good provided). We further assumed a linear one-for-one technique for transforming wealth into the public good. The utility function  $U_i$  of individual  $i$  take the form:

$$U_i = w_i + \beta_i G \quad (1)$$

where  $w_i$  is wealth of an individual  $i$ ,  $G_i$  is quantity of public good provided and  $\beta_i$  is the marginal benefit of the public good to individual  $i$ . Assuming  $\beta_i < 1$  for all individuals we get  $\beta_i - 1 < 0$  standing for individual's marginal utility from investing a unit of wealth in the public good.<sup>4</sup>

Using these assumptions we can derive a model of three lottery structures we employed in our experimental design.

#### a) Standard voluntary contribution mechanism (VCM)

As stated above, the VCM model was first employed by Isaac, Walker (1988). Using the assumptions above, Issac and Walker identified the formula based on which an individual can make a decision what amount he or she allocates to the public good. An individual solves following maximization problem:

$$\max_{g_i} U_i = w_i - g_i + \beta_i \left[ \sum_i g_i \right] \quad (2)$$

The fact that  $\beta_i < 1$  for all individuals  $i$  results in total free riding as all individuals contribute  $g_i = 0$ . Free riding is present even though  $\sum_i \beta_i > 1$  means that public good is socially desirable. *The equilibrium is at the corner solution due to the linear nature of the technology and utility functions* (Dale, 2004).

#### b) Fixed prize lottery (FPL)

The second mechanism we employed simulates a lottery (raffle) with fixed prize (F). This fixed prize is awarded to one randomly chosen individual. The total amount of public good provided equals the sum of contributions collected minus the prize  $F$ . This means, that negative revenue from the lottery is possible.

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<sup>4</sup> This risk-neutral assumption enables us to concentrate only on the influence of lottery structure on the rate of contribution to the public good.

The formal design of the FPL model is based on Morgan (2000).

First, we assume that the organizer of the lottery (fundraiser) is endowed with small amount of money<sup>5</sup>  $\varepsilon$ . The organizer then holds the lottery if, and only if, the amount collected is greater than  $F-\varepsilon$ . If the sum of contributions is less than  $F-\varepsilon$ , the lottery is cancelled and the contributions are (usually) given back to contributors. As we assume the positive amount  $\varepsilon$  and money-back mechanism, such equilibrium where nobody contributes doesn't happen.<sup>6</sup>

The general form of charitable lottery (according to Morgan, 2000) is:

$$U_i = w_i - g_i + \pi(g_i, g_{-i})F + \beta_i \left( \sum_{i=1}^N g_i - F \right) \quad (3)$$

where the expression  $\pi(g_i, g_{-i})$  is the probability of winning by individual  $i$ , given that contributions of other economic agents are fixed. For FPL the probability  $\pi$  equals the share of individual's  $i$  contribution in group total contribution. Specifically

$$\pi^{FPL}(g_i, g_{-i}) = \frac{g_i}{\sum_{i=1}^N g_i} \quad (4)$$

Individual hence maximizes the following utility function:

$$\max_{g_i} U_i = w_i - g_i + \frac{g_i}{\sum_i g_i} \cdot F + \beta_i \left[ \sum_i g_i - F \right] \quad (5)$$

As Dale states: "The value  $g_i$ , which maximizes the function as a function of  $F$ ,  $\beta_i$ , and the

sum of other's contributions  $\sum_{j \neq i} \beta_j$  is the potential contributor's Nash best response function." The best response function takes form:

$$g_i^* \left( F, \beta_i, \sum_{j \neq i} g_j \right) = \left( \frac{F \sum_{j \neq i} g_j}{1 - \beta_i} \right)^{0.5} - \sum_{j \neq i} g_j \quad (6)$$

Assuming homogenous preferences (meaning  $\beta_i = \beta$  for every individual  $i$ ) the individual's contribution  $g_i$  satisfying Nash condition is

<sup>5</sup> This means that the organizer has budget of such amount coming from external sources.

<sup>6</sup> When there is the initial capital  $\varepsilon$ , zero contribution cannot provide an equilibrium as one can profit from being the only one contributor. If he or she contributes  $F-\varepsilon$ , he or she is selected and wins the prize (his or her utility increases).

$$g_i^{**} = \frac{(N-1)F}{N^2(1-\beta)} \quad (7)$$

For every  $\beta > 0$  we obtain  $g_i^{**} > 0$  meaning that that fixed prize lottery results in equilibrium with total contribution greater than zero. Compared to VCM equilibrium, FPL design leads to less massive free riding. On the other hand, even for FPL design, the problem of public good under provision remains.

Improvement in the effectiveness of the FPL design is connected to a particular characteristic of charitable lottery. The model of lottery as voluntary provision of public goods presented above can be regarded as a parallel to Cornes and Sandler (1999) model of impure public good. These authors showed that increase in voluntary contributions to public good can be achieved by joint production of public and private good.<sup>7</sup>

### c) Modified fixed prize lottery (MFPL)

Lottery where the winner is selected from the group of contributors regardless of the amount he or she contributed is called modified fixed prize lottery. The motivation for using such modification of classic raffle could be a practical point of view. It could be easier for a fundraiser in some cases to randomly choose a winner from the list of contributors without the necessity of monitoring the precise amounts of individual contributions. The MPFL doesn't simulate classic raffle, it can be treated rather as a simulation of one-time (for instance annual) reward to supporters (i.e. contributors).

The MPFL model uses the same equation (3) we adopted from Morgan (2000). The probability of winning the prize is now related only to the number of individuals, who contributed to the public good. If a person is the only contributor in the group, his or her probability of winning is equal to one.

$$\text{Formally } \pi^{MFPL}(g_i, g_{-i}) = \frac{A_i}{\sum_{i=1}^N A_i}, \quad (8)$$

$$\text{where } A_i = 1 \text{ for } g_i \neq 0 \quad (9)$$

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<sup>7</sup> The truth is that Cornes and Sandler (1996: 268) apply model of impure public good also for voluntary contribution mechanism. For VCM the private good is represented by warm-glow experienced by an individual for having done the right thing (contributing to a charity). But the private nature of warm-glow can be decreased by publishing the names of donors to a charity. The lottery prize, on the other hand, is a private good. Moreover, as showed in Maeda (2008), when asked, people confirm that they play the lottery (including the charity ones) mostly because they expect to win the prize (60,4% of the surveyed Japanese, or for their fun (41,6 %).

$$A_i = 0 \text{ for } g_i = 0 \quad (10)$$

Individual  $i$  then seeks to maximize his/her utility function

$$\max_{g_i} U_i = w_i - g_i + \frac{A_i}{\sum_{i=1}^N A_i} F + \beta_i \left[ \sum_i g_i - F \right]$$

In MPFL model we obtained single Nash equilibrium equal to contribution of the least non-zero amount  $g_i$ . This means that equilibrium contribution for every individual in MFPL model will be equal to one:

$$g_i^* = 1$$

Contributing more does not increase the probability of winning, contributing less (i.e. zero) leads to the zero probability of winning.

Overall, comparing the three models we argue (following Morgan, 2000 and Dale, 2004) that the highest contribution level to a public good will be attained in the FPL model. According to the equilibrium contribution level, one can expect that individuals will contribute more under the MFPL model than in the VCM model.

### 3 The experiment

We reported the results of a set of experimental sessions conducted using Czech and Russian students during the academic year 2009/2010. Our experiment consisted of three experimental designs: classic Voluntary Contribution Mechanism (VCM), Fixed Prize Lottery (FPL) and Modified Fixed Prize Lottery (MFPL). In the Czech Republic the experiments were held at Masaryk University in Brno. Subjects were recruited via an advertisement published on the University's Information System website. The Russian part of experiments was carried out by our colleagues at N.I. Lobachevsky State University of Nizhni Novgorod. Russian students were informed during classes and via notice board at the faculty building. Students in both countries were informed that they are going to participate in an economic experiment regarding their decision-making "*in certain modelled situation*" and that they could earn a considerable amount of money for their participation.<sup>8</sup> In total,

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<sup>8</sup> The earnings were set to follow a conventional rule – participants should earn roughly the equivalent of average hourly wage in the country. Due to this rule and due to the different wage levels in the Czech Republic and in Russia, we set different exchange rates for deriving money reward from tokens. In the Czech Republic it was 4 CZK for 1000 tokens (points), in Russia only 2 RUR for 1000 tokens (points).

nine sessions were conducted, three for each model (VCM, FPL, MFPL). Each session was carried out with 12 participants, in all, 108 subjects participated in our experiment.

All treatments consisted of 17 rounds: 2 practice rounds that served participants to understand the process and during which they couldn't increase their total earnings; and 15 game rounds during which participants played for money. At the beginning of experiments, instructions were distributed among participants. (Instructions for each treatment are in Appendix.) Subjects studied instructions themselves at first, then the instructions were recapitulated by experimenters and discussed with the participants. After the experimenters made sure that participants understood the game rules and mechanics, and the decision-making stage started. However, participants were allowed to ask questions even during the first two (practice) rounds. In the course of following 15 rounds they were forbidden to discuss and coordinate their behaviour in any way. Participants revealed their decisions via computer terminals<sup>9</sup> that informed them continuously about their payoffs. At the end of the experiment, participants were given the amount of money they had earned during the game. No session took longer than one hour (60 minutes).

Average earnings were different for Czech and Russian students. Average Czech participant earned 205 CZK (8€), average Russian student earned 95 RUR (4€). The difference partially reflects different exchange rates used for exchanging tokens (points)<sup>10</sup> for money. The second factor was different behaviour of Czech and Russian participants during a session that is reported in the following section.

All 17 rounds of a particular session were identical. In the beginning of each round subjects were randomly divided into groups of 4 players. As the composition of a group changed in each round, they weren't able to know or guess which subjects they were playing with.

Each subject was given 20 tokens and asked to decide whether and what amount of his/her income he/she would contribute to the group account. Subjects could contribute 0, 1, 2,...,20 tokens to the group account or keep them in a private account. Once all subjects in a session made his/her decisions, the computer calculated payoffs and subsequently displayed to each player 1) the amount contributed to the group account (recapitulated information); 2) the total amount of contributions collected within his/her group (by him/her and his/her 3 co-players); 3) the gain from the group account to every group member and 4) individual profit at the end

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<sup>9</sup> All experimental designs were programmed and conducted using the z-Tree software (Fischbacher 2007).

<sup>10</sup> Token (point) is an experimental unit. In our experiments each token had value of CZK or Ruble - see above.

of a period. Subjects had the possibility to record their earnings (in a table on the other side of paper sheet with instructions) in course of experiment.

The three different treatments varied in the calculation of individual payoffs. The first two (VCM and FPL) were adopted from Dale (2004). In the **VCM** model, each token kept in a private account yielded 100 points to its owner, while each token allocated to a group account yielded 75 points to each subject in a given group (which represents MPCR of 0,75).

In the **FPL** model participants had a chance to win supplementary 2000 points if selected. A lottery took part after each round in which at least 19 tokens have been collected in a group account. In this case the computer chose randomly a winner who received a prize of 2000 points. At the same time, each member of the group (including “the winner”) was given 75 points for each token allocated in the group account in excess of 20 tokens. An individual’s chance of winning the lottery was equal to his/her contribution to the group account divided by the total amount of contributions of a given group. If the minimum amount of contributions in a group account wasn’t reached by the players, the lottery didn’t took place and each individual received 2000 points in total, as if he/she had kept all tokens in his/her private account. As stated in Dale (2004), the “public goodness” of the public good in this model is the same as in the VCM model above.

The only difference between the FPL and the **MFPL** models is in the drawing mechanism. In the FPL model, individual’s chance of winning the lottery rose with amount he/she contributed to a group account. In the modified fixed prize lottery, chances of all subjects who contributed to the public good were equal, without regard to the amount contributed to the group account by each of them. So, once total amount of contributions to a group account reached at least 19 tokens, each individual, who contributed at least one token, received 75 points for each token collected in the group account in excess of 20 tokens. In addition, he/she had a possibility of being selected and getting an additional award of 2000 points. If the subject didn’t contribute anything to the group account, his/her probability of winning the drawing was equal to zero. If the total amount of contributions to a group account didn’t reach 19 tokens, the lottery didn’t take place and each individual in the group was given 2000 points as his/her total earnings in the period. Again, we can state that the “public goodness”<sup>11</sup> of the public good within this setting is the same as in two preceding models.

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<sup>11</sup> Dale (2004).

## 4 Results

As three sessions of each treatment took place, we obtained nine independent observations for each of them. Table 1 reports average contributions to a group account by subjects within different treatments.

We can state that the results under VCM are in accordance with those of our foreign colleagues<sup>12</sup>. Average contributions in such structure oscillated around 50% of disposable income and decreased considerably in the final rounds. Average contributions in the FPL treatment, on the other hand, demonstrated moderately increasing trend during all rounds.

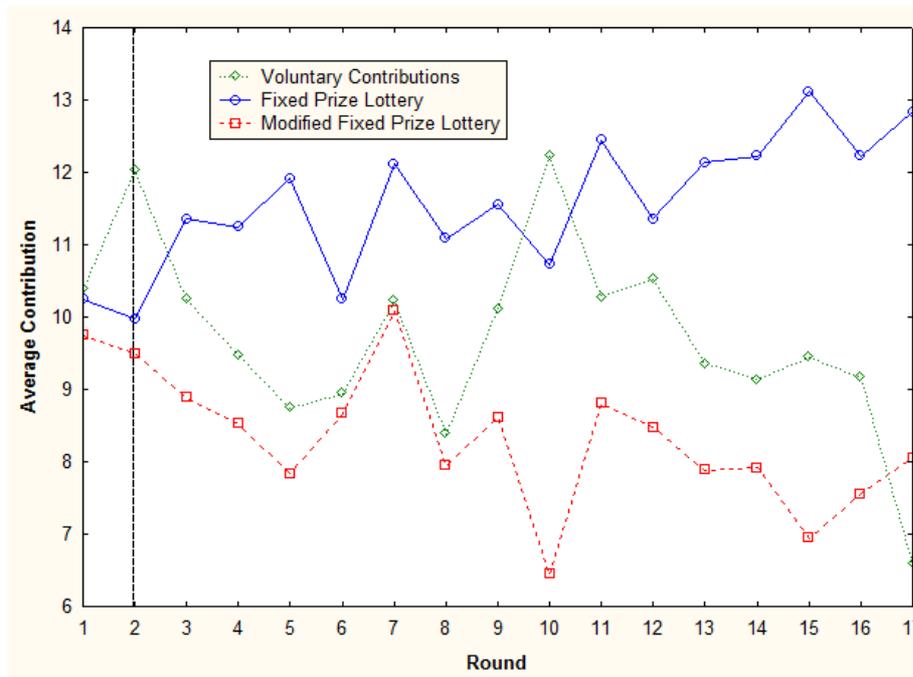
*Table 1: Average contributions by treatment*

Round	VCM		FPL		MFPL	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
1	10,39	6,79	10,25	4,51	9,75	4,56
2	12,03	6,50	9,97	5,61	9,50	5,62
3	10,25	6,67	11,36	5,54	8,89	6,14
4	9,47	6,82	11,25	5,49	8,53	5,71
5	8,75	6,18	11,92	6,43	7,83	6,34
6	8,94	7,23	10,25	6,36	8,67	5,80
7	10,22	7,40	12,11	5,77	10,08	5,58
8	8,39	6,63	11,08	6,16	7,94	5,39
9	10,11	7,20	11,56	6,64	8,61	5,94
10	12,22	7,78	10,72	6,17	6,44	4,02
11	10,28	8,03	12,44	6,51	8,81	5,35
12	10,53	7,13	11,36	6,57	8,47	5,31
13	9,36	7,74	12,14	6,33	7,89	4,82
14	9,14	7,18	12,22	6,72	7,92	5,06
15	9,44	6,69	13,11	6,01	6,94	5,79
16	9,17	7,24	12,22	6,61	7,56	5,63
17	6,58	6,98	12,83	6,61	8,06	5,66

At the first sight we can notice that average contributions in the modified fixed prize lottery were considerably lower than in the other two treatments. The degree of differences in average contributions can be observed in Graph 1.

<sup>12</sup> For instance Dale (2004), Ledyard (1995).

Graph 1: Average contributions to group account by treatment



### FPL vs. MFPL

Graph 1 clearly shows that the most efficient structure according to level of contributions to a public good is the fixed prize lottery. Average contributions within this treatment were above those collected in the modified fixed prize lottery during all rounds of a game. (Except in one case (round 10) they were above average contributions of VCM during all non-practice rounds.) The modified fixed prize lottery structure is then the least efficient one which is in accordance with our main hypothesis. Mann-Whitney rank-sum test confirms that average contributions to a group account during non-practice periods under modified fixed prize lottery were significantly lower (at the 95% and even the 99% confidence level) than under classical raffle. According to these results we can formulate recommendation concerning the system of drawing: if the aim of a lottery is to collect a maximum amount of money (which we suppose it is) the chance of being drawn should depend on actual level of contribution by individuals.

### Western vs. eastern students

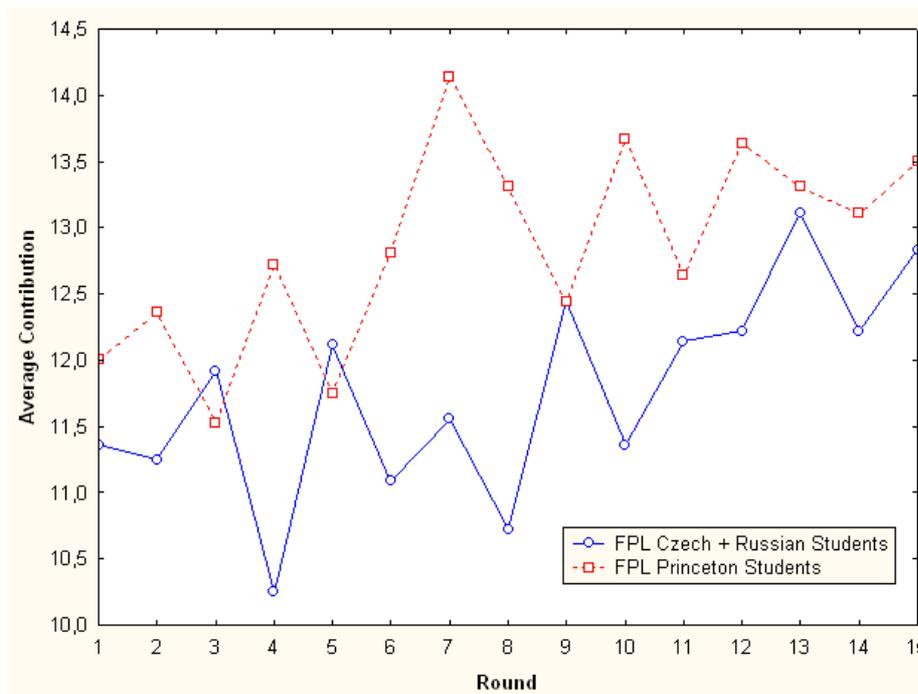
Besides testing our main hypothesis we were also interested in possible difference in the behaviour of our (central and eastern European) participants and their western colleagues. To

detect such diversity we compared data of our set of experiments to the results published by Dale (2004). This comparison provided us with interesting findings.

As stated above, our results under the VCM structure didn't differ from conclusions of other experiments with this design published to this date. Minor observed differences weren't statistically significant (at the 95% level). As far as the classical voluntary contributing is concerned, we cannot accept our hypothesis saying that students from former communist countries would contribute less than their western colleagues.

The other results we compared were those of the fixed prize lottery. In this case the situation was quite different which one can observe in Graph 2.

Graph 2: Average contribution under FPL "by continent"



Graph 2 shows average contributions under the FPL treatment during 15 non-practice rounds. At the first sight we can observe considerably smaller amounts of contributions of the Czech and Russian participants; only in two rounds they were above Dale's results. This finding is confirmed by Mann-Whitney rank-sum test (at the 95% confidence level and, again, even at the 99% level). If we reformulated our hypothesis, for example in following way: *Students from former communist countries contribute considerably less to a public good under the*

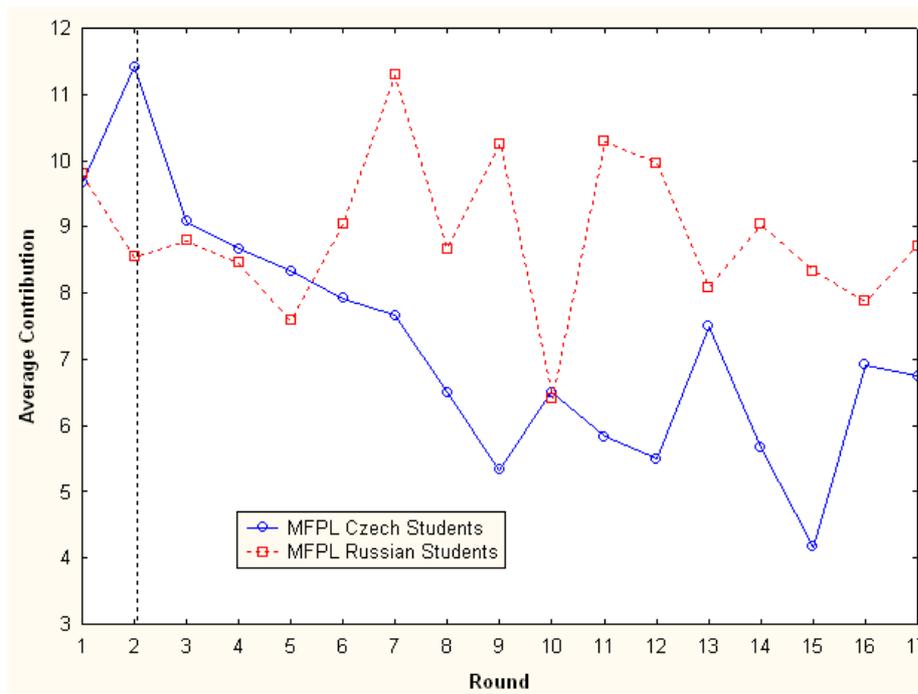
*fixed prize lottery design than their western colleagues*; we could state that our results confirmed the hypothesis with 99% probability.

What is the conclusion of these two different results? Czech and Russian students contribute more or less the same level of their disposable income to a public good under classical VCM, however, if voluntary contributing is completed by possibility of winning additional “money”, they contribute considerably less than Princeton students. Should this mean that participants from post-communist countries are more “gambling averse”?

### Czech vs. Russian students

Our third object of interest was a possible disparity in behaviour of the Czech and Russian students. Czech and Russian students played three identical designs: VCM, FPL and MFPL we can thus compare their behaviour within each of them. The results from the first two treatments (VCM and FPL) don’t demonstrate any statistically significant difference. In the MFPL treatment, on the other hand, Russian students contributed considerably higher amounts to a public account than the Czech ones (see Graph 3).

*Graph 3: Average contribution to a group account under MFPL by Czech/Russian students*



As we have already shown, the modified fixed prize lottery was the least efficient structure. We could thus conclude that Russian students were “less sensitive” to change of the drawing

system; they contributed significantly larger amounts (at the 95% level) of their dispositive income than Czech students. However, with regard to the results of the VCM and FPL we cannot accept *per se* our original hypothesis about differences in behaviour of these two groups.

## 5 Conclusions

Although the classic model of free riding in voluntary contributing to public goods predicts no participation of any subject (i.e. complete free riding), the reality is different. People do contribute in these situations even though this behavior contradicts their pure rationality in economic sense.

Economic experiments dealing with public goods traditionally aim to answer the question why do individuals voluntary contribute and to identify which factors or designs of contribution mechanism could increase the contribution rate. Our analysis focused on the effectiveness of one of the typical fundraising alternative to simple voluntary contribution mechanism (VCM) – charitable lottery. We adopted the research question of Dale (2004) and tested Morgan's (2000) model of lottery (raffle). In agreement with Dale's results we found that using lottery has great and positive impact on contribution rate. As our results show, this behavior is quite universal – we can observe the same behavior in subjects from Princeton (according to the results published by Dale), in Czech students and in Russian ones.

In addition to the classic raffle (FPL) we tested its alternative (modified FPL). In modified fixed prize lottery (MFPL) each contributor has equal chance of winning the prize regardless of the amount he or she contributed. This kind of rewarding the contributors might be easier for fundraiser.

We found that under MFPL – in accordance with theory predictions – there is a strong and significant fall in contribution rate compared to fixed prize lottery. Our results show that this lottery design yields even worse contribution rate than VCM. This finding is contrary to the results published by Dale (2004) as well as theoretical assumptions. In contrast to what we expected, Czech and Russian students contributed considerably less to a public good when there was a possibility of additional reward (independent of actual level of their contribution). Should we interpret this as a country effect, for example by concluding that Czech and Russian students are more gambling averse than their western colleagues? This could be an

interesting conclusion; however we should be cautious about such statement. This hypothesis may be subject of further experimental testing.

Our results of classic VCM demonstrated no country or cultural effect; the Czech and Russian students that have grown up in post-communist system with very small (Czech Republic) or practically none (Russia) not-for-profit sector contributed comparable amounts to a public good as American students living in the country with one of the largest not-for-profit sector. In the FPL model, the Czech and Russians students contributed significantly less than their American colleagues (which would again be in accordance to our new hypothesis concerning different level of gambling aversion); however they contributed still considerably more than in the classic VCM. From this finding we can derive one simple but important recommendation. Using lottery can bring considerably higher amounts of money to organization's fund than collecting money in a hat as it is usual in Czech Republic. But the design of a lottery should make people care about the amount of money they contribute. Otherwise they will not be motivated to increase their contribution.

Furthermore, by adopting a concept of producing complementary private and public goods, the public sector could easily overcome the problem of ineffective free-riding without forcing individuals to contribute through taxes or without the need of any kind of punishment of non-contributors. Such conclusion could be inspiring not only for fundraisers, but for all policy makers.

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## **Appendix – Instruction for the treatments (VCM, FPL, MFPL)**

### **INSTRUCTIONS (VCM)**

Thank you for following these general rules:

- It is not permitted to communicate with other participants during the game. Do not show in any way your decision even to your nearest neighbor. Do not discuss your strategy with other participants.
- If you have any question, please raise your hand and an experimenter (one of us) will come over to where you are sitting and answer your question in private (do not ask aloud).

#### **RULES OF THE PLAY**

This is an experiment in the economics of decision making. If you follow the instructions carefully and make good decisions you can earn a considerable amount of money. You will be paid in cash at the end of the session.

The experiment will consist of 17 rounds. In each round you will be assigned to one of three groups. Each group will consist of four people. The assignments will change from round to round. You will not know which of the other people in the room are assigned to your group; similarly, the other people in the room will not know which of the other people in the room are assigned to their group.

In each round you will have an opportunity to earn points. At the end of the session you will receive 2 rubles in cash for every 1000 points you earn in total. Rounds one and two are practice rounds: what you do in these rounds will not affect your earnings.

#### **DESCRIPTION OF EACH ROUND**

At the beginning of each round you will have 20 tokens. You will choose how many of these tokens to place in a private account and how many to place in a group account.

You will make your decision by indicating how many tokens you wish to place in the group account. You can enter any whole number between zero and twenty, inclusive. Any tokens you do not place in the group account are placed in your private account. If you are not satisfied with your choice you can use the backspace key to change it. When you have made your decision you will enter the decision on the "Record Sheet" which you will find on the other side of the Instructions.

You will record your decision in column (B), under the heading "Tokens I place in the Group Account". At this time you will also record the number of tokens you place in the private account in column (A) under the heading "Tokens I Place in Private Account".

When everyone has made their decision, you will be informed of the total number of tokens placed in your group account. You will record this number on your "Record Sheet" in column (C) under the heading "Tokens in Group Account".

Next the computer will calculate and inform you of your point earnings for the round according to the rules we will discuss below. You will record this information on your record sheet and press the enter key when you are ready to continue. When everyone is ready the next round will begin.

#### **HOW YOUR EARNINGS ARE DETERMINED**

The number of points you earn in the round will depend on (i) points you earn from your private account and (ii) points you earn from your group account. These will be determined as follows.

(i) For each token in your private account you will earn 100 points. You will record these earnings in column (D) of your record sheet, under the heading "My Points from Private Account". This will be the number in column (A) multiplied by 100.

(ii) For each token placed in the group account by ANY member of the group, ALL group members earn 75 points. You will record these earnings in column (E) under the heading "My Points from Group Account". This will be the number in column (C) multiplied by 75.

**RECORD SHEET (VCM)**

		A	B	C	D	E	F
	Round	Tokens I place in private account (20 - B)	Tokens I place in group account	Tokens in group account	My points from private account (100xA)	My points from group account	My total earnings D+E
<i>Example</i>	0a	9	11	38	900	1350	2250
	0b	12	8	18	1200	800	2000
<i>Practice rounds</i>	1.						
	2.						
<i>From these rounds your earnings will be derived</i>	3.						
	4.						
	5.						
	6.						
	7.						
	8.						
	9.						
	10.						
	11.						
	12.						
	13.						
	14.						
	15.						
	16.						
	17.						

## INSTRUCTIONS (FPL)

Thank you for following these general rules:

- It is not permitted to communicate with other participants during the game. Do not show in any way your decision even to your nearest neighbor. Do not discuss your strategy with other participants.
- If you have any question, please raise your hand and a experimenter (one of us) will come over to where you are sitting and answer your question in private (do not ask aloud).

### RULES OF THE PLAY

This is an experiment in the economics of decision making. If you follow the instructions carefully and make good decisions you can earn a considerable amount of money. You will be paid in cash at the end of the session.

The experiment will consist of 17 rounds. In each round you will be assigned to one of three groups. Each group will consist of four people. The assignments will change from round to round. You will not know which of the other people in the room are assigned to your group; similarly, the other people in the room will not know which of the other people in the room are assigned to their group.

In each round you will have an opportunity to earn points. At the end of the session you will receive 2 rubles in cash for every 1000 points you earn in total. Rounds one and two are practice rounds: what you do in these rounds will not affect your earnings.

### DESCRIPTION OF EACH ROUND

At the beginning of each round you will have 20 tokens. You will choose how many of these tokens to place in a private account and how many to place in a group account.

You will make your decision by indicating how many tokens you wish to place in the group account. You can enter any whole number between zero and twenty, inclusive. Any tokens you do not place in the group account are placed in your private account. If you are not satisfied with your choice you can use the backspace key to change it. When you have made your decision you will enter the decision on the "Record Sheet" which you will find on the other side of the Instructions.

You will record your decision in column (B), under the heading "Tokens I place in the Group Account". At this time you will also record the number of tokens you place in the private account in column (A) under the heading "Tokens I Place in Private Account".

When everyone has made their decision, you will be informed of the total number of tokens placed in your group account. You will record this number on your "Record Sheet" in column (C) under the heading "Tokens in Group Account".

Next the computer will calculate and inform you of your point earnings for the round according to the rules we will discuss below. You will record this information on your record sheet and press the enter key when you are ready to continue. When everyone is ready the next round will begin.

### HOW YOUR EARNINGS ARE DETERMINED

The number of points you earn in the round will depend on (i) points you earn from your private account, (ii) points you earn from your group account, and (iii) the outcome of a random drawing, which may award you bonus points. These will be determined as follows.

(i) For each token in your private account you will earn 100 points. You will record these earnings in column (d) of your record sheet, under the heading "My Points from Private Account". This will be the number in column (a) multiplied by 100.

(ii) For each token in excess of 20 tokens placed in the group account, you will receive 75 points. If a total of 19 or more tokens are placed in the group account, then 2000 bonus points will be awarded by a random drawing. Each token you place in the group account earns you one chance in the drawing; thus, your chance of winning the drawing is the number of tokens you contribute to the group account, divided by the total number of tokens placed in the group account by all members of your

group. If you win the drawing, enter the number of bonus points you receive in column (F). If you do not win, enter a zero in this column.

(iii) If a total of fewer than 19 tokens are placed the group account, then no bonus points are awarded, and you will receive 100 points for each token YOU and only you contributed to the group account.

**RECORD SHEET (FPL, MFPL)**

		A	B	C	D	E	F	G
	round	Tokens I place in private account (20 - B)	Tokens I place in group account	Tokens in group account	My points from private account (100xA)	My points from group account	My bonus points	My total earnings D+E+F
<i>Example</i>	0a	9	11	38	900	1350	0	2250
	0b	12	8	18	1200	800	0	2000
	0c	9	11	38	900	1350	2000	4250
<i>Practice rounds</i>	18.							
	19.							
<i>From these rounds your earnings will be derived</i>	20.							
	21.							
	22.							
	23.							
	24.							
	25.							
	26.							
	27.							
	28.							
	29.							
	30.							
	31.							
32.								
33.								
34.								

## INSTRUCTIONS (MFPL)

Thank you for following these general rules :

- It is not permitted to communicate with other participants during the game. Do not show in any way your decision even to your nearest neighbor. Do not discuss your strategy with other participants.
- If you have any question, please raise your hand and a experimenter (one of us) will come over to where you are sitting and answer your question in private (do not ask aloud).

### RULES OF THE PLAY

This is an experiment in the economics of decision making. If you follow the instructions carefully and make good decisions you can earn a considerable amount of money. You will be paid in cash at the end of the session.

The experiment will consist of 17 rounds. In each round you will be assigned to one of three groups. Each group will consist of four people. The assignments will change from round to round. You will not know which of the other people in the room are assigned to your group; similarly, the other people in the room will not know which of the other people in the room are assigned to their group.

In each round you will have an opportunity to earn points. At the end of the session you will receive 2 rubles in cash for every 1000 points you earn in total. Rounds one and two are practice rounds: what you do in these rounds will not affect your earnings.

### DESCRIPTION OF EACH ROUND

At the beginning of each round you will have 20 tokens. You will choose how many of these tokens to place in a private account and how many to place in a group account.

You will make your decision by indicating how many tokens you wish to place in the group account. You can enter any whole number between zero and twenty, inclusive. Any tokens you do not place in the group account are placed in your private account. If you are not satisfied with your choice you can use the backspace key to change it. When you have made your decision you will enter the decision on the "Record Sheet" which you will find on the other side of the Instructions.

You will record your decision in column (B), under the heading "Tokens I place in the Group Account". At this time you will also record the number of tokens you place in the private account in column (A) under the heading "Tokens I Place in Private Account".

When everyone has made their decision, you will be informed of the total number of tokens placed in your group account. You will record this number on your "Record Sheet" in column (C) under the heading "Tokens in Group Account".

Next the computer will calculate and inform you of your point earnings for the round according to the rules we will discuss below. You will record this information on your record sheet and press the enter key when you are ready to continue. When everyone is ready the next round will begin.

### HOW YOUR EARNINGS ARE DETERMINED

The number of points you earn in the round will depend on (i) points you earn from your private account, (ii) points you earn from your group account, and (iii) the outcome of a random drawing, which may award you bonus points. These will be determined as follows.

(i) For each token in your private account you will earn 100 points. You will record these earnings in column (D) of your record sheet, under the heading "My Points from Private Account". This will be the number in column (A) multiplied by 100.

(ii) For each token in excess of 20 tokens placed in the group account, you will receive 75 points. If a total of 19 or more tokens are placed in the group account, then 2000 bonus points will be awarded by a random drawing. You can enter the drawing if and only if you place at least one point in the group account. If you win the drawing, enter the number of bonus points you receive in column (F). If you do not win, enter a zero in this column.

(iii) If a total of fewer than 19 tokens are placed the group account, then no bonus points are awarded, and you will receive 100 points for each token YOU and only you contributed to the group account.