Is it my money or not? An experiment on risk aversion and the house-money effect

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Abstract The house-money effect, understood as people’s tendency to be more daring with easily-gotten money, is a behavioral pattern that poses questions about the external validity of experiments in economics: to what extent do people behave in experiments like they would have in a real-life situation, given that they play with easily-gotten house money? We ran an economic experiment with 122 students to measure the house-money effect on their risk preferences. They received an amount of money with which they made risky decisions involving losses and gains; a randomly selected treatment group received the money 21 days in advance and a control group got it the day of the experiment. From a simple calculation we found that participants in the treatment group only spent on average approximately 35 % of their cash in advance. The data confirms the well documented results that men are more tolerant to risk than women, and that individuals in general are more risk tolerant towards losses than towards gains. With our preferred specification, we find a mean

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CRRA risk aversion coefficient of 0.34, with a standard deviation of 0.09. Furthermore, if subjects in the treatment group spent 35 % of the endowment their CRRA risk aversion coefficient is higher than that of the control group by approximately 0.3 standard deviations. We interpret this result as evidence of a small and indirect house money effect operating though the amount of the cash in advance that was actually spent. We conclude that the house money effect may play a small role in decisions under uncertainty, especially when involving losses. Our novel design, however, could be used for other domains of decision making both in the lab and for calibration of economic models used in micro and macroeconomics.

**Keywords** House-money effect · Risk aversion · Prospect theory · Economic experiment · External validity

**JEL Classification** C910 · D120 · D810

1 Introduction

The house-money effect, understood as people’s tendency to be more daring with easily-gotten money, is a behavioral pattern which finds support in incentivized experiments using real money by Thaler and Johnson (1990). Since experiments in economics usually start by handing out money to the subjects so that they never stand to suffer any net monetary losses, the participants’ behavior could be modified as a result of the house-money effect. This poses questions about the external validity of experiments in economics (Guala 2005, p. 231; Guala and Mittone 2005), and particular questions about the incentives used: to what extent do people behave in the experiment like they would have in a real-life situation, given that they play with easily-gotten house money? (Levitt and List 2007)

The experimental literature has addressed this question in the context of altruism (Cherry et al. 2002), public goods (Clark 2002), auctions (Ackert et al. 2006) and capital expenditure (Keasey and Moon 1996). The general idea of windfall gains has been also explored in the psychology and economics literature (Arkes et al. 1994; Keeler et al. 1985). Most of these papers deal with the issues arising from having people play with their own money by having participants earn money in an initial stage and then making choices with their earnings.

This paper studies the effect of house money on the risk preferences of a group of 122 undergraduate students within an age range of 16 to 28. The students were randomly assigned to a control or a treatment group and given money to participate in the experiment, which they were told involved risky choices and possibly losses. As usual, the money handed out for participating was enough to cover the potential losses. However, while the control group received this initial money just before they made their choices, the treatment group received the money three weeks in advance so that they had time to spend it before making their choices. (A back-of-the-envelope calculation suggests that on average 35 % of the cash in advance was spent.) This experimental design, inspired by Bosch-Domènech and Silvestre (2010), is as close as we can get to having them gamble with their own money.
We find evidence of an indirect house money effect operating through the money that participants had with them at the time of choosing between lotteries. More specifically, we find that for the treatment group, each additional thousand Colombian pesos (COP) spent (∼USD$0.50) leads to an increase of 0.0019 in their CRRA risk aversion coefficient. We interpret this finding as evidence of a house money effect on those subjects of the treatment group who actually spent some of the cash provided to them in advance. In our preferred specification, the mean relative risk aversion coefficient equals 0.34 with a standard deviation of 0.09. Therefore, our estimated 35% expenditure of the endowment would lead to a reduction of 0.3 standard deviations in the risk aversion coefficient. This interpretation rests on two assumptions. First, that the money participants had with them at the time of the experiment is a good proxy for endowment not spent, if compared to the same measure in the control group. Second, and more importantly, we assume that the house money effect only operates for those people who actually spent some of their endowment. We will have more to say about this assumption below.

The results that we report here add to a vast literature documenting risk aversion\(^1\) and suggest that it would be advisable to include credible controls for the house-money effect in experimental work in economics.

2 The experiment

Our experimental design is based on dividing the subject pool randomly in half and giving the treatment group an endowment of cash three weeks in advance of the actual decision-making experiment. The control group receives the same amount of money but on the day of the experiment as is usually done in lab experiments that involve potential losses. With that time period in between we expect to balance between giving sufficient time for them to incorporate the cash as part of their pocket money and not allowing for some discounting of the endowment between the treatment and control groups. (In the appendix we have included the translated version of the instructions to the subjects.)

The subjects were volunteers from an undergraduate psychology course at the Universidad de los Andes in Bogotá (Colombia), recruited in two different semesters of the same course (one in 2009 and another in 2012). The students in the class were randomly assigned to a treatment (cash in advance) or control group (cash experiment day) and then asked to consent to participate in an economic experiment that involved risky choices. Of a total of 122 students who accepted to participate in the two sessions, 61 were assigned to the control group and 61 to the treatment group.

\(^1\)Although only partially comparable, empirical evidence from survey work from a developing country suggests risk aversion coefficients between 0 and 5 (Azam et al. 2002). Meanwhile, a survey on experimental studies in developed and developing countries reports estimated coefficients for the CRRA that range from the lowest estimate of 0.05 in Ethiopia to 2.57 in Paraguay (Cardenas and Carpenter 2008); Harrison et al. (2010) also report coefficients of these magnitudes. However, Harrison and Rutström (2008) use a method quite similar to ours on the data of Hey and Orme (1994) and find a CRRA of 0.66 with a standard error of 0.04. In general, the estimated ranges found show also a non-negligible sensitivity to the type of experimental procedure used.
Table 1  Demographic characteristics of treatment and control groups

| Variable                  | Mean Value or Percentage | P-value | Rank-Sum test | T-test |
|---------------------------|--------------------------|---------|---------------|--------|
|                           | Control | Treatment |             |        |
| Gender ( % female)        | 36.1 %  | 57.4 %    | 0.019        | 0.018  |
| Age                       | 19.6    | 18.8      | 0.170        | 0.034  |
| Single(1)                 | 96.7 %  | 100 %     | 0.156        | 0.156  |
| Siblings                  | 1.4     | 1.5       | 0.405        | 0.291  |
| Semester                  | 3.3     | 3.0       | 0.261        | 0.371  |
| Monthly expenses(2) (COP) | 445 080 | 443 440   | 0.840        | 0.968  |
| Housing stratum(3)        | 4.72    | 4.8       | 0.898        | 0.671  |
| Money in pocket (COP)     | 41 132  | 67 098    | 0.000        | 0.001  |
| Adjusted Money in pocket(4) (COP) | 81 132 | 67 098    | 0.014        | 0.057  |

Notes:
(1) Only two participants (both in the control group) reported “other” as marital status
(2) Using midpoint of reported range
(3) Housing strata in Colombia range from 1 (lowest) to 6 (highest).
(4) Amount of money at time of making decisions (pocket + 40 000 for participants in control group)

Within each session the random splits between treatment and controls were 51/49 and 48/52. Students in the sessions belonged to more than 20 different minors and majors from social, medical, natural sciences, medicine and engineering (no more than 14 % of the participants in any of the groups belonged to any particular major). Table 1 shows the average characteristics of each group.

Treatment subjects were then given COP 40 000 in small change (roughly USD 20 given an exchange rate of COP 1 971 on the initial day of the first round. The minimum monthly wage in Colombia at the time was COP 497 000). Three weeks later, again in class, the decision-making session took place. The control group was given their respective COP 40,000 and everybody proceeded then to make their choices under uncertainty.

Notice in particular the averages for the available pocket money of the subjects in the treatment and control groups. We asked everyone at the entrance to the room and before the control group received their endowment, how much money they had in their pockets. Our treatment group had significantly more cash in their pockets than the control, as expected, but the difference was smaller than the endowment of 40 000 COP (67 000 COP − 41 000 COP ≈ 26 000 COP). If we assume that the money brought to the session by the control group is representative of what members of this student community carry in their pockets, we can think that the treatment

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A word of caution is due at this point. As suggested by an anonymous referee, in societies where students pay much of their expenses using debit or credit cards, the question “how much money did you have in your pocket when you entered the class room” might be blurred. We are confident, however, that this should not be of concern as Colombian students rarely use electronic payments for their daily expenses in food, transportation or entertainment, among others because most establishments have a minimum amount for allowing such transactions, and the access to banking in general is more limited than in industrialized countries; also, not all establishments take electronic payments around and on campus.
group spent on average 14,000 COP (or 35%) of their cash in advance. For those in the control group, we added the 40,000 COP to their pocket money and therefore we have now a comparable variable, Adjusted pocket money, which will turn out to be an important part of our analysis.  

Following Binswanger’s (1980) and Attanasio et al. (2012) Ordered Lottery Selection (OLS) design (Harrison and Rutström 2008, pp. 52–56), all participants were handed a piece of paper with six different uniform-probability lotteries involving possible losses (left panel, Fig. 1) depending on a coin toss. They were then asked to choose one lottery to play. All 122 made their choice at once. At that point they did not know they would have further choices to make.

After collecting their choices, they were handed a second set of six lotteries (right panel, Fig. 2). None of these involved losses and they were told that the outcome would depend on another coin toss and that their payments would be computed using the sum of results of both lotteries. After collecting their new choices, they were asked to fill out a brief socioeconomic survey. Only then did both coin tosses take place. The first coin toss determined the outcome in the first game (possible losses) and the second coin toss determined the outcome for the gains only lottery.

3 Results

Figure 2 shows the distribution of choices in two different ways. In Panels (a) and (b) we show the distributions of choices for Game 1 and Game 2 respectively. In panels (c) and (d) we compare the same data but splitting in control and treatment

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Fig. 1 Games and payoffs

In each game, both risk and expected return increase clockwise from the top. However, lotteries E and F have the same expected return.

Notes: Payoffs in thousands of Colombian Pesos (COP) (Exchange rate: COP 1 971).

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3 We thank two reviewers for this suggestion.
Fig. 2 Decisions in Game 1 and Game 2

respectively. From a first look at the distributions one can infer that prospect theory (Kahneman and Tversky 1979) is alive and well and that in general people made riskier choices in Game 1 where losses were possible. However, there seems to be no major difference between the treatment and control groups and therefore a more rigorous statistical analysis is needed.

These results can be compared to data from a more comprehensive study (Cárdenas and Carpenter 2013) that included more than 3 000 subjects representative of several Latin American cities using this same design of the potential losses and gains with these six lotteries. In the case of the lottery with potential losses, the variation found in that large sample is higher with more people choosing the more conservative lotteries than here and a smaller fraction (17.2 %) of subjects in that sample choosing the riskiest lottery E than in our students sample (23.8 %). In the case of the second game with gains only, again our students showed a slightly higher level of risk tolerance with more students choosing lottery E than in the adults sample and fewer students choosing the safe ones.

Table 2 shows the means of choices in each game for the treatment (cash in advance) and control (cash experiment day) groups. Game 1 and Game 2 indicate the choice in each game. In both games, lotteries A through F of Fig. 1 are coded 1 through 6: Game 1 = 1 means the subject chose lottery A in Game 1, and a larger value indicates the choice of a riskier lottery. As expected through prospect theory, the average player moved from riskier lotteries in Game 1 to safer ones in Game 2 creating two different distributions of choices when comparing within subjects (Wilcoxon signed-rank test, p-value = 0.0001). However, this result seems driven mostly by the control group and rather minor for the treatment group both for men and women. This could mean that, if there was a house money effect operating, it could be leading to
Is it my money or not? An experiment on risk aversion

| Lottery (1–6) | All            | Male            | Female          |
|--------------|----------------|-----------------|-----------------|
|              | Treatment      | Control         | P-Value         | Treatment      | Control         | P-Value         |
| GAME1        |                 |                 |                 |                 |                 |                 |
|              | 3.6393         | 4.0328          | 0.2061          | 3.6154         | 4.3077          | 0.0946<sup>a</sup> | 3.6571         | 3.5455         | 0.6594         |
| (possible losses) |               |                 |                 |                 |                 |                 |
| GAME2        |                 |                 |                 |                 |                 |                 |
|              | 3.2951         | 3.1967          | 0.9559          | 3.2692         | 3.3077          | 0.9285          | 3.3143         | 3.0000         | 0.8862         |
| (gains only) |                 |                 |                 |                 |                 |                 |
| P-Value      | 0.1300         | 0.0001<sup>c</sup> | 0.3595         | 0.004<sup>b</sup> | 0.2418         | 0.0591<sup>a</sup> |

P-Values for testing the difference in distributions Rank Sum (Mann-Whitney) test:

<sup>a</sup><i>p</i> < 0.10, <sup>b</sup><i>p</i> < 0.05, <sup>c</sup><i>p</i> < 0.01

attenuation in loss aversion. Within games we only find a significant difference between treatment and control groups when comparing the choices of men in Game 1 (see Table 2). That difference vanishes for Game 2, suggesting that the effect is exacerbated when involving the possibility of losses.

These differences however open up more questions than answers. To assess in more detail the effect of being treated on risk aversion, we estimate for each game a series of structural models of choice under uncertainty, using the survey data as explanatory variables and following closely Harrison and Rutström (2008, pp. 69–74).

In these exercises, each subject <i>i</i> is assumed to have a CRRA utility function

\[ u_i(I) = \frac{I^{1-\gamma_i}}{1-\gamma_i} \]  

(1)

where <i>I</i> denotes total wealth<sup>4</sup> and <i>\gamma_i</i> is the relative risk aversion parameter of that individual—a higher <i>\gamma_i</i> is associated with a lower level of risk tolerance, <i>\gamma_i</i> < 0 corresponds to risk loving, <i>\gamma_i</i> > 0 to risk aversion and <i>\gamma_i</i> = 0 to risk neutrality.

For both games 1 and 2, let <i>EU_{i,j}</i> denote the expected utility for subject <i>i</i> of choosing lottery <i>j</i> in that game, where <i>j</i> ∈ {A, B, C, D, E, F} according to Fig. 1. Let <i>L_j</i> and <i>R_j</i> denote the payoff if the left or right outcomes of lottery <i>j</i> are realized. The expected utility of choosing this lottery, with the CRRA utility function and a probability 1/2 for each outcome, is given by:

\[ EU_{i,j} = \frac{1}{2} \frac{(L_j + w)^{1-\gamma_i}}{1-\gamma_i} + \frac{1}{2} \frac{(R_j + w)^{1-\gamma_i}}{1-\gamma_i} \]  

(2)

Using this formula for the expected utility, for each individual we compute a probability of observing the choice the individual actually made. In order to do so and

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<sup>4</sup>Total wealth <i>I</i> is defined as initial wealth (<i>w</i>) plus the payoff of the realized outcome of the game. For Game 1 we set <i>w</i> = 40 000 so that there is no negative total wealth <i>I</i> in any of the outcomes (note that the utility function is well defined for non negative values of <i>I</i>). This assumption is grounded on the fact that all individuals were given an initial endowment of 40 000, the only difference being one of timing. For Game 2, we set <i>w</i> = 0.
following Harrison and Rutström (2008), we assume a multinomial logit probability specification. Let \( h \in \{A, B, C, D, E, F\} \) denote the lottery the individual actually chose. The probability of individual \( i \) choosing lottery \( h \) is given by:

\[
P(i, h) = \frac{e^{EU_{i,h}}}{\sum_j e^{EU_{i,j}}}
\]  

(3)

where again \( j \in \{A, B, C, D, E, F\} \).

We further assume that the risk aversion coefficient \( \gamma_i \) is a linear function of observed characteristics \( X_i \), i.e.

\[ \gamma_i = \alpha + X_i \cdot \beta, \]

where \( \alpha \) is a constant and \( \beta \) is a vector of size \( k \times 1 \), \( k \) being the number of variables included in the model. Our objective is to estimate the values of \( \alpha \) and \( \beta \). The maximum likelihood (MLE) routine that we implement finds the values of \( \alpha \) and \( \beta \) that maximize the following log likelihood function (i.e. that maximize the probability of observing our sample of choices assuming a multinomial logit probability specification):

\[
\ln L = \sum_i \ln \left( P(i, h_i) \right)
\]  

(4)

Note that once the estimated values \( \hat{\alpha} \) and \( \hat{\beta} \) are obtained, we can use the characteristics of the individual \( i \), namely \( X_i \), to obtain a linear prediction of \( \gamma_i \), \( \hat{\gamma}_i = \hat{\alpha} + X_i \cdot \hat{\beta} \). The value of \( \hat{\gamma}_i \) will depend on the model being estimated (i.e. on the individual characteristics that we include in the linear function of \( \gamma_i \)).

We estimate four different specifications of the structural model for each one of the games. Tables 3 and 4 report the results for Game 1 and Game 2 respectively. Each column corresponds to one specification. We report the estimated coefficients and their respective standard errors. For example, column (1) of Table 3 corresponds to a linear specification of \( \gamma_i \) given by \( \gamma_i = \alpha + \beta_1 \ast \text{Treatment} + \beta_2 \ast \text{Session} \), where Session is a dummy that takes a value of 0 if the experimental session is the one conducted in 2009, and a value of 1 if it is the one conducted in 2012.

Consider Game 1 which involves the possibility of losses (Table 3). We confirm our previous finding that males are more tolerant to taking risks than females, and find that people of higher socio-economic status measured by the variable Stratum also choose riskier lotteries.

We do not find that the treatment in itself has an effect on the risk coefficient of the subjects (across columns the coefficient of Treatment is not statistically significant). However, as illustrated by column (4) the interaction between the available pocket money at the start of the experiment and the treatment does tell a story: the less

\footnote{This statistical assumption implies a possibility of decision error, since an individual may not choose with certainty a lottery that has a higher expected utility than all the others. For example, among lotteries with expected payoffs \([1, 1, 1, 1, 1, 10]\), a risk neutral person will choose the one with expected payoff equal to 10 only with probability \(2/3\), even though the expected utility of this lottery is higher than that of all others. We thank an anonymous referee for pointing this out and suggesting the above example.}

\footnote{All the monetary variables enter the estimations in thousands of COP.}
Table 3  γ-maximum likelihood estimation (Game 1)

|                          | Game 1 (Possible Losses) |
|--------------------------|--------------------------|
|                          | (1)                      |
| Treatment (cash in advance) | 0.070                    |
|                          | [0.045]                  |
| Session                  | 0.019                    |
|                          | [0.044]                  |
| Gender (= 1 if male)     | −0.13c                   |
|                          | [0.07]                   |
| Gender * Treatment       | 0.164                    |
|                          | [0.107]                  |
| Expenses                 | −0.0003                  |
|                          | [0.009]                  |
| Stratum                  | −0.051c                  |
|                          | [0.026]                  |
| Pocket Money (adj)       | 0.0012                   |
|                          | [0.0009]                 |
| Pocket Money (adj) * Treatment | −0.0019c               |
|                          | [0.0011]                 |
| Constant                 | 0.29a                    |
|                          | [0.034]                  |
| Observations             | 122                      |

Notes: Standard Errors in brackets.  

\( ^a \) Significant at the 1 %,  \( ^b \) significant at the 5 %,  \( ^c \) significant at the 10 %

money an individual in the treatment group had in her pocket, the more conservative her decision was. No such effect is found for the controls.\(^7\)

Our interpretation of this result rests on the following assumption: it is necessary that subjects in the treatment group actually spent part of the endowment for them to consider that they are actually playing with their own money. In other words, receiving money in advance is not a sufficient condition for the house money effect to operate. It could be the case that the treatment subjects who kept their money over this time felt an obligation to bring the money to the decision stage session, that is, they did not feel the money was theirs yet, but as a reviewer noted, we would need to ask directly the participants about their reasons for spending or keeping their money over the period of time. This assumption implies that in the extreme case of a participant in the treatment group who did not spend any of his endowment before the

\(^7\)To see this, denote by \( \pi_1 \) the estimated coefficient of Pocket Money (adj) and by \( \pi_2 \) that of Pocket Money (adj) * Treatment. For the cash-in-advance treatment, an increase of one thousand COP in Pocket Money (adj) implies a change in \( \gamma \) of \( \pi_1 + \pi_2 \). For the control group, it implies a change in \( \gamma \) of \( \pi_1 \) (recall that the Treatment dummy takes a value of 1 for the cash-in-advance treatment). Nevertheless, since \( \pi_1 \) is not statistically different from 0, the effect of Pocket money (adj) for the control group is \( \pi_1 = 0 \), and that of the cash-in-advance treatment is \( \pi_1 + \pi_2 = \pi_2 = -0.0019 \).
Table 4  $\gamma$-maximum likelihood estimation (Game 2)

|                          | (1)         | (2)         | (3)         | (4)         |
|--------------------------|-------------|-------------|-------------|-------------|
| Treatment (Cash in advance) | $-0.038$    | $-0.129$    | $-0.223^{c}$ | $0.194$     |
|                          | $[0.075]$   | $[0.125]$   | $[0.121]$   | $[0.223]$   |
| Session                  | $0.090$     | $0.104$     | $0.118$     | $0.106$     |
|                          | $[0.077]$   | $[0.079]$   | $[0.076]$   | $[0.086]$   |
| Gender (= 1 if male)    | $-0.097$    | $-0.104$    | $-0.098$    | $[0.125]$   |
|                          | $[0.125]$   | $[0.125]$   | $[0.128]$   |             |
| Gender * Treatment       | $0.159$     | $0.213$     | $0.168$     | $[0.164]$   |
|                          | $[0.164]$   | $[0.161]$   | $[0.177]$   |             |
| Expenses                 | $-0.057^{a}$| $-0.069^{a}$|             |             |
|                          | $[0.0164]$  | $[0.018]$   |             |             |
| Stratum                  | $-0.027$    | $-0.037$    | $[0.0446]$  | $[0.041]$   |
| Pocket Money (adj)       | $0.003^{c}$ |             |             |             |
|                          |             |             |             | $[0.002]$   |
| Pocket Money (adj) * Treatment | $-0.005^{b}$ |             |             |             |
|                          |             |             |             | $[0.002]$   |
| Constant                 | $0.41^{a}$  | $0.47^{a}$  | $0.94^{a}$  | $0.824^{a}$ |
|                          | $[0.063]$   | $[0.111]$   | $[0.251]$   | $[0.254]$   |
| Observations             | 122         | 122         | 122         | 122         |

Notes: Standard Errors in brackets.  
$^{a}$Significant at the 1 %,  
$^{b}$significant at the 5 %,  
$^{c}$significant at the 10 %

decision-making session, we should not observe any difference in his behaviour relative to the control group. Other assumptions could equally be made (e.g. after having the money for a long enough time they start treating it like their own). However we think that ours is a reasonable assumption since, intuitively, it is not enough to keep money in your pocket for a couple of weeks for you to consider it as your own. If we additionally assume that the money that the controls brought into the room is a good proxy for the average pocket money in the population, then the difference in means of Table 1 of the variable Money in Pocket ($67 000$ COP $- 41 000$ COP $= 26 000$ COP) gives us an idea of how much the treatment subjects actually spent on average of their cash in advance (approximately $40 000$ COP $- 26 000$ COP $= 14 000$ COP, which is 35 % of the cash in advance). This already suggests that any house money effect found should not be large. Under the assumptions just mentioned, the coefficient of the interaction between Treatment and Pocket money (adj) can be seen as the effect of cash in advance that is actually spent. The higher the amount of the endowment spent by the subjects in the treatment (i.e. the more they are “playing with their own money”), the lower the adjusted pocket money will be. Since the coefficient is negative, this implies a higher estimated value of $\gamma$, or in other words, a higher level of risk aversion as participants in the treatment group played with more of their own money.
Phrased differently, we can think of the cash in advance actually spent as having some distribution across individuals in the treatment group, where some of them spent all the endowment, some of them did not spend at all and on average they spent 14,000 COP. For those that spent all the money we would expect more risk averse behavior during the decision stage of the experiment when compared to the controls. For those that did not spend any amount we would expect no difference with the controls. To put numbers to this interpretation, the linear prediction of $\gamma_i$ using the model of column (4) in Table 3 implies an average estimated $\gamma_i$ of 0.34 with a standard deviation of 0.09. If the participants in the cash-in-advance treatment had spent all the endowment they would have values of $\gamma$ larger on average than those of the controls by an amount of $(-0.0019) \times (-40) = 0.076$ which is almost one standard deviation. From our rough approximation of the average money that was actually spent by participants in the cash-in-advance treatment, i.e. 14,000 COP, we can infer that their $\gamma$ is on average greater by an amount of only $(-0.0019) \times (-14) = 0.026$ which is approximately 0.3 standard deviations. We can summarize our finding by saying that the evidence suggests a small house money effect driven by the fact that members of the treatment group spent less than half of the cash in advance provided. Further, the fact that the effect does not happen among the control group rules out the explanation of more risk aversion caused by diminishing marginal utility of money.

Let us now turn to the analysis of the second game, our control for risk under uncertainty but with no potential losses involved. Although we already reported that most individuals did switch from riskier to more conservative choices, here we find again the same patterns as in Game 1. Males, although not significant now, show less risk aversion, those who with higher socio-economic levels (expenses) also show more tolerance to risk and once again the available pocket money makes a difference but only for the treatment group and in the same direction as before.

A few notes are worth mentioning here. Recall that Game 2 took place after the students had made their choice for Game 1 but before the toss of the coin for Game 1 was made. Also, they were not told in Game 1 that a second game was going to be played later on. One could argue that the choice made for the second game involved some kind of risk hedging between games since they did not know the outcome of the coin toss. To control for this possibility we ran a separate regression not reported here where the choice in Game 1 was used as a control for the choice in Game 2 and no effect was found.

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8Harrison and Rutström (2008, pp. 69–71) assume the same utility function and apply a similar version of the MLE procedure described in our paper to the data of Hey and Orme (1994). In one of the versions of this exercise they find a pooled value of $\gamma$ of 0.66 with a standard error of 0.04.

9As mentioned in Table 1, Pocket money (adj) is defined as money at time of play (i.e. the money brought in plus 40,000 COP for the control group). If subjects in the treatment group spent all their cash in advance, money brought in would have been equal for the two groups and the adjustment would leave the treatments at $-40,000$ COP.

10We thank Reviewer 2 for highlighting this.
4 Conclusions

The use of monetary incentives is central to the experimental methods in economics. The code of ethics among experimentalists continues to suggest that we refrain from using the disposable income of our experimental subjects, that is, from having participants walk out of the lab with negative earnings and instead it requires that we provide them with an endowment they can use to allow for decisions involving losses. This has caused concern among skeptics of experiments because of the so called house-money effect and the implications it would have for external validity of laboratory or field lab experiments.

To get at this debate, some labs have introduced the notion that the endowment is earned during a task performed at the experiment, partially correcting for the problem of subjects thinking of the endowment as a windfall gain. We have, however, taken a different approach, by giving the endowment well in advance (21 days) to half of our sample and the endowment to the other half at the day of the experiment. Further, they had to make decisions about risk involving losses and gains. We asked everyone at the day of the experiment what cash they had available in their pockets and confirmed that the treatment group had in fact spent part of the endowment they had received and kept another part, suggesting the money was incorporated as part of their disposable income. On average there is no major statistical difference in the distributions of the observed coefficient of risk behavior across the two groups. However, when controlling for the available cash they had in their pockets at the time of the experiment, we find that those in the treatment group who had more money with them on the day of the experiment tended to be more risk tolerant while those who had less were more risk averse during the experiment. If we interpret the spending of the endowed money as a signal of considering it as one’s own, our findings suggest a small house money effect.

By providing the endowment in advance we have both complied with the ethical code of experimental economics but also introduced more realism and external validity as the subjects seem to have incorporated some of the mental accounting processes of their daily life into the experiment. In other words, the more I spent part of my endowment the more it felt like “it’s my money”. The data suggest that those who spent more of their endowment arrived facing the experiment much like a risky decision involving losses but constrained by their pocket money whereas those with more cash—provided by the experimenter, felt like taking riskier decisions, in other words “it’s not my money”.

Experiments that involve studying strategic behavior with possible losses should take into account that when subjects receive an endowment they might not treat it as part of their real income. Our results would suggest that experimenters could control for available cash in the pockets of the subjects at the time of the experiment, even if the experiment provides an endowment to cover for losses as this would help explain variation in behavior. These factors should be tested, using a similar design of giving an endowment to subjects well in advance, but for other domains of interactions such as fairness and bargaining games (ultimatum, dictator, Coase bargaining), cooperation games (trust an public goods) or la-
bor relations (effort, gift exchange) where a subject must decide over the allocation of her own resources and test for robustness and potential house-money effects.

Our research opens other new questions for further experimental tests on decisions under uncertainty.¹¹ We are well aware that this design is based on the same probability of 0.50 over all possible lotteries and this might impose a strong assumption about the application of expected utility theory, although it minimizes the potential problems of humans handling probabilities (Kahneman et al. 1982). Nevertheless, further tests with variable probabilities would enrich this finding, using other risk experiments available. On the one hand we could estimate this effect in other samples with different demographics including age, education level, financial literacy or income. On the other hand one could explore how the magnitude of the house-money bias changes with the time delay between the transfer of the endowment and the experimental decision. These could all deepen our understanding of how incentives work in the laboratory and of how income shocks may interact with behavior under uncertainty.

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¹¹A natural test of our findings could be conducted with occasional tourist casino players. Imagine a random group of tourists that receive a voucher-like gift in cash well in advance before their visit to the casino and another group that receives the voucher in the day of the visit. If our hypothesis holds, the latter group would make riskier decisions in the casino.
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