

# Time Is Not Money

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## Abstract

Casual observation suggests that people are more generous with their time than with their money. In this paper we present experimental evidence supporting the hypothesis. A third of our subjects demand no compensation for non-monetary investments, whereas almost all subjects demand compensation for equally costly monetary investments. The finding supports the contention that generosity to some extent is symbolic and context dependent, and that social norms encourage generosity in the time domain.

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# 1 Introduction

Except for donations to charities and other gifts from the relatively rich to the relatively poor, generosity is largely expressed by non-monetary means. People often help their neighbors and friends, but rarely give them money. Within organizations, some workers regularly sacrifice large amounts of time for the benefit of their colleagues, but would not even consider giving them cash.<sup>1</sup>

Economists have proposed at least three sets of explanations for non-monetary generosity. First, it may simply be *more efficient* to give time than to give money.<sup>2</sup> Second, time gifts may constitute *better signals* of altruism than money does (Camerer, 1988, Prendergast and Stole, 2001, Ellingsen and Johannesson, 2004b). Third, the donor is paternalistic and fears that a cash gift will be spent inappropriately (Pollak, 1988). While we believe that there is something to all of these explanations, our own sense is that powerful social norms mandate greater generosity in the time domain than in the money domain, and that these norms are at best indirectly linked to the economists' explanations. We are supposed to share our time more willingly than our cash, much as social norms make us vote and give blood.<sup>3</sup>

It is hard to think of any field evidence which might admit a clean and direct test of our hypothesis. In most cases it is difficult to measure both the costs and the benefits of time. Maybe the apparent generosity in the time domain stems from a very high benefit/cost ratio? For example, helping friends or neighbors could be done for fun. Also, one observed favor could be part of a reciprocal exchange over a longer time period, possibly involving other individuals.

Since field evidence is so hard to interpret, we have chosen instead to conduct a laboratory experiment. The experiment is designed to eliminate all factors that otherwise distort the comparison between monetary and non-monetary generosity. Roughly, the experiment runs as follows. A seller can make an investment that yields a potential monetary gain from trade with a buyer. Some sellers can make a monetary investment, others invest time.

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<sup>1</sup>A related phenomenon, which we shall not discuss further here, is the non-monetary nature of holiday and birthday gifts. See for example Waldfogel (1993), Prendergast and Stole (2001), and the references therein.

<sup>2</sup>The main problem with this theory is that it does not explain why the recipient keeps the whole efficiency gain; why does the recipient not pay? See Prendergast and Stole, 1999, for a possible resolution and further references.

<sup>3</sup>The notion that peoples' behavior is "domain-specific" is quite common in other social sciences. See for example Waltzer (1983) and Tetlock et al. (2000). For a sociological discussion of the meaning of money along similar lines, see Zelitzer (1994).

Upon investment, the seller makes a bargaining proposal. The buyer, whose gain from trade is known, either accepts or rejects the seller's proposal. The primary question is whether the seller's proposal is more generous under time investment than under monetary investment. If sellers make more generous proposals in the non-monetary treatment, and if the change in offers are not driven by a change in buyer behavior, it is difficult to interpret the change as anything but differential generosity in the two domains.

For the comparison to be valid, costs and benefits must be as similar as possible across the two treatments. Since the opportunity cost of a seller's time is not observed by the buyer, the opportunity cost of monetary investments should also not be observed by buyers – preferably, the two investment cost distributions should be identical. To achieve comparability, we elicit a distribution of time costs from a separate group of subjects, with the same characteristics. In the monetary treatment, both sellers and buyers know that the investment costs are drawn from the elicited distribution, but only sellers learn the realization. Using the elicited distribution of investment costs, it is straightforward to keep the two treatments comparable. In the non-monetary treatment, the investment is to perform a task for 20 minutes. In the monetary treatment, the monetary investment cost is drawn from an elicited distribution of time costs. The seller's investment always generates a potential gain from trade of SEK 100.

If agents are selfish, theory predicts that sellers should always invest and propose a price of SEK 99 (as long as the investment cost is below SEK 100). However, a large body of work in experimental economics suggests that a substantial fraction of individuals have strong preferences for fairness in bargaining situations, and that sellers often propose an equal split (see Camerer (2003) and Fehr and Schmidt (1999) for overviews). It has also been shown that, with monetary investment costs, subjects often propose an equal split of the net surplus. That is, they split evenly the surplus remaining after compensating sellers for the sunk investment cost (Ellingsen and Johannesson 2004a, 2005a).<sup>4</sup> With a non-zero investment cost even sellers that care strongly about fairness are therefore predicted to propose a price above SEK 50.

All the models referred to above as well as the various recent models of social preferences and reciprocity (Rabin, 1993; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002) predict that behavior should be independent of whether the seller invests time or money. Contrary to this

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<sup>4</sup>Ellingsen and Johannesson 2005b conducted a similar study with a non-monetary investment cost. However, the monetary equivalent of the investment cost was elicited without giving incentives for truthful reporting, and the paper did not consider a comparison between monetary and non-monetary investments.

prediction, but in support of our hypothesis, we find that behavior differs markedly between the two experimental treatments. In the monetary treatment almost all sellers claim more than half the gross gain from trade. In the non-monetary treatment, about a third of the sellers divide the gross gain from trade equally, despite having incurred a positive investment cost.

## 2 Experiment

Our subjects were recently enrolled undergraduate business and economics students at the Stockholm School of Economics. They were paid a participation fee of SEK 100, and they could earn between SEK 0 and SEK 100 in the experiment (SEK is Swedish Kronor; SEK 10 was approximately USD 1 at the time of the experiment). A total of 276 subjects participated in the experiment (i.e. 138 bargaining pairs). Five sessions were carried out with between 26 and 29 bargaining pairs in each session (one session with Treatment I and two sessions each with Treatment II and Treatment III). Each subject participated in one treatment only. The three experimental treatments, referred to as the “control group”, the “time investment group”, and the “money investment group” in the text, are described in more detail below. The full instructions can be downloaded from [www.hhs.se/personal/ellingsen](http://www.hhs.se/personal/ellingsen).

An important problem in experimental work is that the framing of the experiment matters. If the frame strongly suggests that the experiment is concerned with gift giving, that by itself can trigger gift giving behavior. Since we wanted to focus on generous behavior in situations where generosity is not obviously called for, we framed the experiment as a bargaining problem.

In the experiment two individuals, form a pair. In our instructions, the individuals are referred to neutrally as individuals A and B, but for convenience we shall here call them respectively sellers and buyers. Sellers and buyers are located in different rooms, room A and room B, and pairing is anonymous and random.<sup>5</sup> The seller first decides whether to carry out an investment or not. If the investment is carried out a SEK 100 potential gain from trade is created for the pair, and the seller and the buyer bargain over how to divide the SEK 100 between them in an ultimatum game . The seller proposes a price and the buyer accepts or rejects this price. If the price is accepted the SEK 100 is divided according to the proposal, and if the price is rejected both get nothing. To compare monetary and non-monetary investment costs,

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<sup>5</sup>According to both our theory and the experiments by Andreoni and Petrie (2004) anonymity will entail reduced generosity, but it should not affect the comparison between time and money donations.

we implement three experimental treatments that vary with respect to the investment cost. In the first (“control”) treatment the investment cost is zero, which imply that subjects essentially play the standard ultimatum game. In the second (“time”) treatment the investment is for the seller to stay for 20 minutes after the end of the experiment. The subjects are told that investing sellers will be given questionnaires to complete during these 20 minutes. The investment cost in the third (“monetary”) treatment consists of a monetary cost that is equivalent to the cost of staying 20 minutes after the end of the experiment to complete questionnaires. Because the time cost of 20 minutes will vary between sellers, and the cost is private information to the seller, we separately elicit a distribution for the time cost and randomly draw a monetary cost from this distribution for each seller in the third treatment. The monetary investment cost is private information to the seller, and the buyer only knows the procedure for determining it.

The distribution of time costs is elicited from the subjects in the control treatment after they have completed the ultimatum game, using the Becker-DeGroot-Marschak (BDM) mechanism (Becker, DeGroot, and Marschak, 1964). That is, each subject is asked to state a reservation price for staying 20 minutes. Then a random number  $x$  is drawn. If the subject’s reservation price is below  $x$ , the subject is paid  $x$  and must stay. Otherwise, the subject leaves.

We now describe the three treatments in more detail.

## 2.1 Treatment I: Costless investment (control)

In each of the two rooms subjects are given a number between 1 and  $N$ , where  $N$  is the number of students in the room. Subjects with identical numbers form a pair. Matching is random, and anonymity is maintained throughout. The subjects are given the instructions and are asked to read them. Subjects are allowed to ask clarifying questions to the experimenter, but not publicly. At the beginning of the instructions the subjects are told whether they are in room A or room B.

After the subjects have read the instructions the subject in room A (the seller) decides whether he/she will carry out an investment or not, at a zero investment cost. If the investment is carried out, a SEK 100 revenue is created for the pair, and the seller proposes how to split it. If the subject in room B (the buyer) accepts the proposal, both individuals are paid according to the proposal. If the buyer rejects the proposal, both get nothing, except their participation fees.

## 2.2 Treatment II: Time investment

Treatment II is identical to Treatment I with the exception that the investment for the seller now consists of staying for 20 minutes after the end of the experiment. After the subjects have been paid, all buyers leave. The sellers that decided not to invest also leave at this point, whereas the investors stay for 20 minutes and are given a questionnaire to complete. After 20 minutes the experimenter collect the questionnaires and the investors leave.

## 2.3 Treatment III: Money investment

Treatment III is identical to Treatment II with the exception that the investment is now monetary. All subjects are told that the investment cost varies between the sellers and that the size of the investment cost is communicated only to the respective seller. All subjects are also given the following information about how the investment cost has been determined: “In a separate group in the experiment 50 individuals have valued their cost of staying after the end of the experiment for 20 minutes (and they were informed that they would complete a questionnaire during these 20 minutes to pass the time). The valuation was done in a way so that every person had an incentive to reveal his/her true cost. For every person in room A we have randomly chosen the cost of giving up 20 minutes for one of these 50 individuals and used this cost as the investment cost.”

## 2.4 Eliciting time costs

The subjects that participated in Treatment I also valued the cost of staying for 20 minutes. Before the experiment started they were told that they would participate in two experiments. When they had completed the first experiment, Treatment I, they were given the instructions for the second experiment, valuing the cost of 20 minutes. We used this procedure because we wanted the valuation of the time cost to resemble as closely as possible the situation in the time investment group (Treatment II). In both groups the 20 minutes of filling in questionnaires occur after participating in an experiment of about the same nature and duration.

The BDM mechanism, developed by Becker, DeGroot, and Marschak (1964), provides incentives for subjects to truthfully reveal the value they assign to a private good, in this case 20 minutes of the subjects' time. Each subject states his/her minimum compensation (price) for staying 20 minutes after the end of the experiment (and they are told that they will complete a questionnaire during these 20 minutes to pass the time). We draw a buying price randomly from a uniform distribution between SEK 0 and SEK 100 (with SEK 5 increments).

If the buying price exceeds or equals the reservation price, the subject receives the buying price and stay for 20 minutes. If the buying price is below the reservation price the subject leaves. As in previous applications of the BDM mechanism (e.g. Grether and Plott 1979; Bohm, Lindén, and Sonnegård 1997) the subjects were informed about the incentive compatibility properties of the BDM mechanism. As recommended by Bohm, Lindén, and Sonnegård (1997), we did not communicate the upper bound of the buying price. Instead, we told the subjects that the upper bound is set at a level corresponding to the maximum reasonable valuation of the cost of giving up 20 minutes.<sup>6</sup>

## 2.5 Hypotheses and tests

Our null hypothesis is that bargaining behavior is the same in the three treatments. Because bargaining experiments usually lead to skewed distributions, we employ bootstrapped standard errors when comparing mean proposals across treatments.<sup>7</sup> The significance levels for the comparisons of proposals have all been obtained by generating 2,099 bootstrap replications. To compare proportions (e.g., the proportion of investors and the proportion of accepted proposals) between treatments, we use a contingency table Pearson chi-square test (D'Agostino, Chase, and Belanger 1988). All reported p-values are two-sided. Finally, we use logistic regression analysis to test whether the buyers' acceptance probability differs across treatments, controlling for the bargaining proposal.

## 3 Results

Figure 1 displays the distribution of elicited time costs. The time cost varies between SEK 0 and SEK 100 for the 56 subjects.<sup>8</sup> The mean value is SEK 28 and the median value is SEK 25, which is also the most common time cost – about 20% of the subjects had a time cost of SEK 25. The distribution of time costs in Treatment III is virtually identical to that in Figure 1.<sup>9</sup>

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<sup>6</sup>Incidentally, our upper bound turned out to coincide exactly with the highest reported valuation.

<sup>7</sup>See e.g. Efron and Tibshirani (1993) and Davidson and MacKinnon (1999).

<sup>8</sup>All time costs except two were given in even SEK 5 increments. The two time costs that were not in even SEK 5 increments (SEK 39 and SEK 49) are included in the closest categories in Figure 1.

<sup>9</sup>All the estimated time costs in Figure 1 is used except one estimate, because the number of estimates (n=56) is one more than the bargaining pairs (n=55). The (randomly chosen) estimate that is not used is SEK 80.

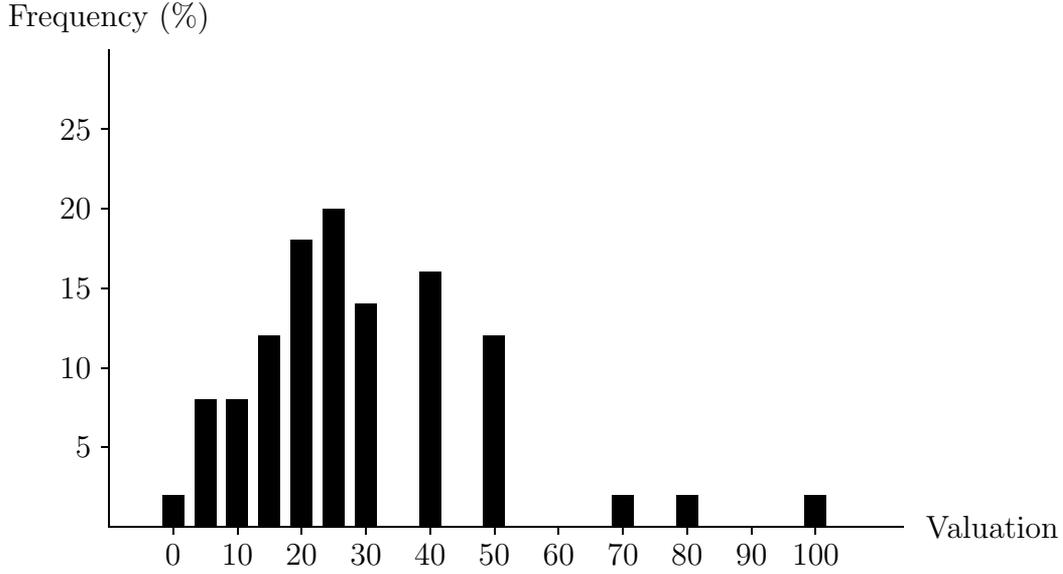


FIGURE 1: Valuations of time

### 3.1 Seller behavior

Table 1 reports the “average” behavior of sellers and buyers. Sellers in the money investment group on average propose prices that are about SEK 5 higher than the proposals in the time investment group ( $p=0.056$ ), and SEK 9 higher than the proposals in the control group ( $p=0.001$ ). Although the average proposal is somewhat higher in the time investment group than in the control group, we cannot reject the null hypothesis of no difference ( $p = 0.213$ ). There is also a tendency that fewer sellers are willing to make monetary invest-

	Treatment			$p$ -value of difference		
	Control	Time	Money	1 vs 2	1 vs 3	2 vs 3
Number of pairs	28	55	55			
Proportion investors	1.00	0.98	0.93	0.473	0.144	0.170
Average proposal	59.43	63.24	68.34	0.213	0.001	0.056
Share of proposals $\leq 50$	0.32	0.30	0.06	0.815	0.002	0.002
Share of proposals $\geq 80$	0.07	0.28	0.18	0.029	0.197	0.217
Acceptance rate	0.89	0.89	0.90	0.957	0.898	0.827

Table 1: Aggregate results

ments. In the time investment group only one seller abstained from making the investment, whereas four sellers abstained from making the investment in the

money investment group. Again the difference is not statistically significant ( $p = 0.170$ ). As might be expected, the four sellers that abstain from investing have relatively high investment costs (SEK 100, SEK 70, SEK 50 and SEK 25). This is consistent with Ellingsen and Johannesson (2005a), who showed that asymmetric information about investment costs reduces investment compared to various complete information benchmarks.

There is a tendency for sellers with higher investment costs to demand a larger share of the SEK 100. An increase in the investment cost by SEK 1 in the money investment group on average increases the proposal by SEK 0.16 ( $p = 0.096$ ).<sup>10</sup>

Figure 2 displays the full distribution of proposals by sellers in the control group (the ultimatum game).<sup>11</sup> The most common proposals are SEK 50 and SEK 60, which is well in line with other studies; see Fehr and Schmidt (1999) and Camerer (2003, Chapter 2).

Figure 3 compares the distribution of proposals between the money and time investment groups.<sup>12</sup> Comparing behavior in the time treatment to that in the money treatment using a Two-Sample Kolmogorov-Smirnov test, we find that the two distributions are significantly different ( $p = 0.038$ ). The most striking difference is the proportion of 50/50 proposals. The proportion of equal splits of the gross surplus is 30% in the time investment group, but only 6% in the money investment group. This difference is highly significant ( $p = 0.002$ ). Interestingly, two subjects in the time investment group propose SEK 0, i.e. they give away all the gains from trade. At the same time, there appears to be a countervailing tendency towards high proposals in the time investment group. The fraction of proposals at SEK 80 or above is 28% in the time investment group and 18% in the money investment group, but the difference is not statistically significant ( $p = 0.217$ ).

We may also compare the distribution of proposals between the time investment group and the control group. The fraction of proposals of SEK 50 is almost identical in these two groups (about 30% in each group). However, the fraction of high proposals is higher in the time investment group. The

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<sup>10</sup>In Ellingsen and Johannesson (2005a) 75% of sellers had zero investment cost and 25% had an investment cost of SEK 60. Despite this difference in the investment cost distribution, the relationship between the size of the investment cost and the bargaining proposal is quite similar across the two studies. There, an increase in the investment cost by SEK 1 in the money investment group on average increased the proposal by SEK 0.12.

<sup>11</sup>One seller made a proposal of SEK 49, and for convenience this proposal is included in the SEK 50 category in Figure 2.

<sup>12</sup>One seller in the monetary cost group made a proposal of SEK 63.5 and one seller made a proposal of SEK 79. In Figure 3, these proposals are included in the SEK 65 and SEK 80 categories respectively.

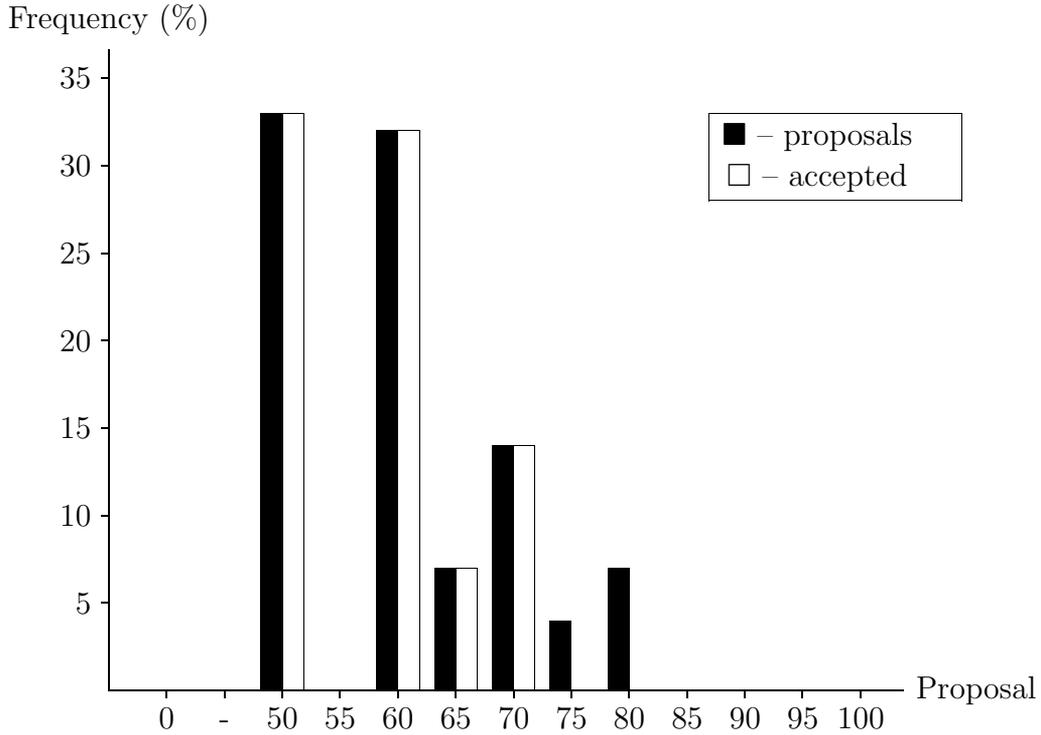


FIGURE 2: Proposals in the ultimatum game (control).

fraction of proposals at or above SEK 80 is 28% in the time investment group versus 7% in the control group ( $p = 0.029$ ). It seems as if the sellers in the time investment group can roughly be divided into two categories. One category ignores the time cost when they make the bargaining proposal; the other category acts as if investment is monetary. The group that ignores the time cost is the same size as the group that propose an even split in the standard ultimatum game. It seems reasonable to guess that people who are fairminded in the ultimatum game are also generous with their time, but the only way to determine the overlap between the two groups is to have subjects participate in multiple treatments.

### 3.2 Buyer behavior

The buyers' average acceptance rate is about 90% in all three treatments (see Table 1). In Table 2 we report the results of a logistic regression testing whether the acceptance probability differs across treatments when we control for the proposal.

As expected, the acceptance probability decreases for higher proposals, and this effect is strongly significant ( $p < 0.001$ ). The acceptance probability at

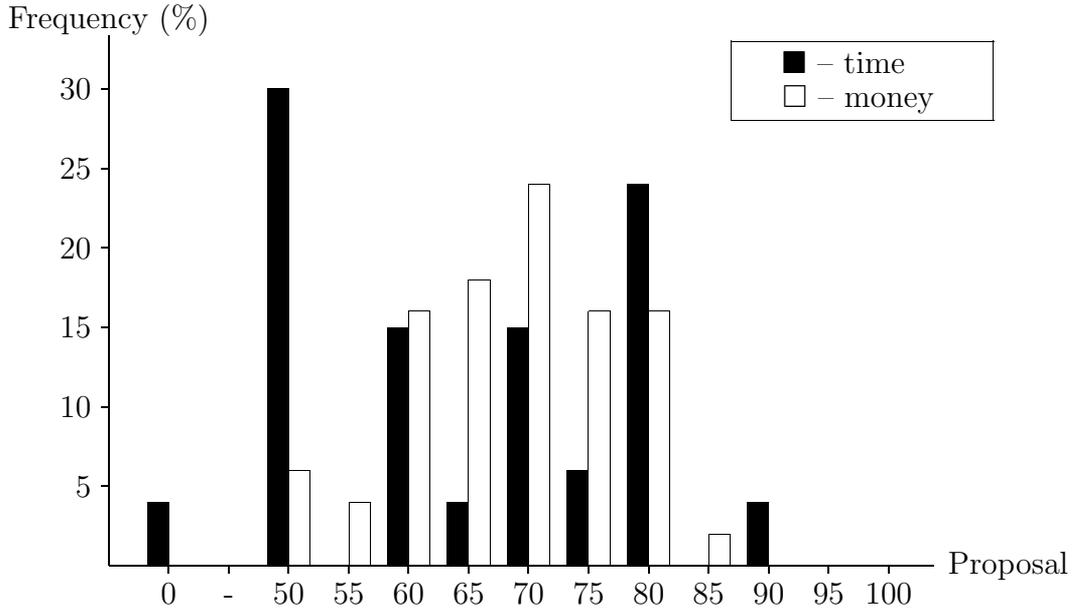


FIGURE 3: Distribution of proposals in the two main treatments.

a specific proposal is also significantly higher in the time investment group ( $p = 0.068$ ) and the money investment group ( $p = 0.095$ ) compared to the control group. The difference between the time investment group and the money investment group is small and not statistically significant ( $p = 0.710$ ). We thus find no evidence that buyer behavior differs between the money and time investment treatments.<sup>13</sup>

## 4 Discussion

The most interesting observation from our experiment is that a sizeable fraction of sellers require no compensation for their time investment, whereas almost all sellers require compensation for monetary investment. Our preferred explanation is that subjects are generally more prone to make non-monetary sacrifices than to make equivalent monetary sacrifices. Indeed, any alternative explanation would seem to involve some bias in our time cost elicitation procedure.

An interesting avenue for further research is to identify the source of the money-time asymmetry that we have identified. In a survey of donor attitudes Lee, Piliavin, and Call (1999) find that volunteering of time is more strongly

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<sup>13</sup>As we only observe an accept/reject decision of each buyer, the statistical power to detect differences in buyer behavior is also limited.

Variable	Coefficient	<i>p</i> -value
Constant	19.695	< 0.001
Proposal	-0.260	< 0.001
Time investment*	2.040	0.068
Symm. info; high cost*	1.752	0.095
Number of pairs	133	
$\chi^2$	34.72	
Log-likelihood	-27.39	
McFadden pseudo $R^2$	0.39	
Individual prediction (%)	91.73	

\*Baseline category is costless investment (control).

Table 2: Logistic regression of acceptance probability.

affected by others' expectations than are gifts of blood and money. The authors speculate that the greater visibility of time donations make people behave more prosocially on this domain. Another hypothesis is that generous donors who care about social esteem can signal their type at lower cost in the time domain, because this form of generosity is harder for more selfish donors to mimic; see Ellingsen and Johannesson (2004b).

At a broader level, our study contributes to the literature on framing effects. It is by now well known that pure labelling can have a massive impact on behavior. For example, behavior in Prisoners' dilemma experiments is highly sensitive to whether the game is called the Wall Street game or the Community game; see for example Liberman, Samuels and Ross (2004) and the references therein. Our experiments suggest that people would be more generous if asked to "give time" than if asked to "give money".<sup>14</sup>

## 5 Conclusion

Human capital theory, as developed by Becker (1964,1965) and others, has been tremendously successful at explaining many features of social interaction. However, by focussing on the exchange of labor services for money, and

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<sup>14</sup>As far as we know, there is no established theory of framing effects. However, Ellingsen and Johannesson (2006) may have the seed of such a theory. They propose a model in which people with multi-dimensional characteristics care about social esteem, and where the context may determine which characteristic is salient.

assuming perfect convertibility between the two, human capital theory takes for granted Benjamin Franklin's dictum that "time is money." By contrast, anthropologists have long insisted that the convertibility between time and money is heavily circumscribed. Many societies place extremely strict restrictions on exchange, several of the most striking examples being recounted by Bohannan (1963, Part 4). However, since many of the anthropologists' favorite examples are "exotic," their impact on mainstream economics has been modest.

Our experiment offers a clean piece of evidence that many Swedish business students do not treat their time in the same way as they treat their money.

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