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For love or reward? Characterising preferences for giving to parents in an experimental setting

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For Love or Reward?

Characterising Preferences for Giving to Parents in an Experimental Setting

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Abstract

This paper examines the motivation for intergenerational transfers between adult children and their parents, and the nature of preferences for such giving behaviour, in an experimental setting. Participants in our experiment play a series of dictator games with parents and strangers, in which we vary endowments and prices for giving to each recipient. We find that preferences for giving are typically rational. When parents are recipients as opposed to strangers, participants display greater sensitivity to the price of giving, and a higher relative proclivity for giving. Our findings also provide evidence of reciprocal motivations for giving, as players give more to parents who have full information regarding the context in which giving occurs.

Keywords: transfer motives, intergenerational, dictator games, lab experiments, altruism, reciprocity

JEL: C91, D12, D64

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1 Introduction

Understanding the motivations behind intergenerational transfers is an important and active research area in economics. The existence and responsiveness of familial transfers has consequences for the design of intra- and intergenerational redistributive programmes, particularly as such programmes may crowd out private transfers amongst altruistic family members. Yet, despite theoretical and empirical advances in this area, significant gaps in our knowledge remain. In this paper, we advance the current literature by shedding light on both the motivation for providing intergenerational transfers, and on the nature of preferences for such giving behaviour, by using experimental techniques and revealed preference methods.

In this paper, we are specifically concerned with transfers made by adult children to their parents. It is clear that parents may invest in their children because they love them, but also because of an expectation that their children will reciprocate to provide support for them in old age. However, there is no commitment mechanism available to parents to enforce that their children provide the care that they may expect. So why do adult children provide support and resources to their parents in old age? This question is particularly salient in countries where parents have lower incomes than their children and rely on their adult children for financial support. However, it is also important for understanding what motivates grown children to devote time and other resources to ensure that parents in ill health receive the required care and support. More broadly, what motivates individuals to share scarce resources with family members? Early work addressing these questions determined that even selfish children could be incentivized to behave in the interest of the family by an altruistic patriarch (Becker, 1974).

Determining the primary motivation for familial transfers, specifically whether they are altruistically or strategically motivated, has long been a central question in the literature (see, for example, Bernheim *et al.*, 1985; Cox 1987) with consequences for a number of diverse areas in economics. For example, Ricardian equivalence is hard to obtain when children are altruistically motivated towards their parents (Bilbiie and Monacelli, 2013). However, it is difficult to disentangle the various motivations for intergenerational transfers in survey data. For example, while private transfers may decline when a recipient's income increases, this does not necessarily mean that transfers are altruistically motivated because other motives such as co-insurance cannot be ruled out (Kotlikoff and Spivak, 1981). Distinguishing between altruistic and strategic motives for giving is further complicated by the fact that there are many other reasons for why people give: an aversion to unfairness or inequality (Fehr and Schmidt 1999); the warm-glow of giving (Andreoni, 1989, 1990); reciprocity - rewarding friendly actions or punishing hostile actions at a cost (Rabin, 1993; Camerer and Fehr, 2004); and reciprocal altruism - giving to generate or relieve an obligation (Camerer and Fehr, 2004; Cox *et al.*, 2004; Leider *et al.,* 2009; Ligon and Schechter, 2012).

Our main contribution to this broad literature is to uncover the characteristics of, and motivations for, giving between adult children and their parents, by using a carefully designed experiment. Subjects play a series of dictator

games in the lab, once with parents and once with strangers as recipients, where the amount to divide and the relative price of giving vary across games. To our knowledge, Peters *et al.* (2004) is the only prior study to have examined behaviour between parents and children in the lab, although their study differs significantly from ours as they studied interactions between young children (aged 8 to 16) and their parents in a very different experimental setting.

Our experimental design enables us to explore the salience of reciprocal motivations for transfers between adult children and parents. The dictator game is generally used in experimental settings because reciprocation, either in the form of reward or punishment is not possible when the recipient is an anonymous stranger. However, we cannot maintain control of any subsequent interactions between subjects and parents outside the lab, and these interactions influence the behaviour we observe in the lab. Our experiments were designed with this in mind, and provide an example of how the line between "lab" and "field" can be blurred to gain some understanding of behaviour outside of the lab in a novel way.

To explore adult childrens' motivations for giving, we vary the amount of information that parents receive about the games their children play in the lab in order to vary the likelihood of parental reciprocity. We find evidence of reciprocal motivations for sharing with parents, which differs from prior work using survey data that found evidence of altruistically linked family members (e.g. Altonji *et al.*, 1997). In our experiments, when participants were told that their parents would be receiving information about their choices, they gave more to their parents than those who were told their parents would not be informed of how payments were determined. If subjects had given to parents for purely altruistic reasons, then this information treatment would not have influenced the amount shared with them.

This novel experimental design also contributes to a strand of literature in experimental economics, which has shown evidence of reciprocal behaviour on the part of dictators in several different contexts (Hoffman *et al.,* 1996; Bohnet and Frey, 1999; Ben-Ner *et al.*, 2004; Cox *et al.*, 2004). In experiments in which recipients are friends, dictators share more with those to whom they are more closely connected (Goeree *et al.*, 2010). Similarly, dictators give more to close friends than to strangers, and these differences are strongest when the giving is not anonymous (Leider *et al.*, 2009). Our paper differs from these two studies in three different dimensions.

First, in contrast to the latter two experimental studies, we show evidence for reciprocal motives for familial transfers without the confounding influence of selection effects. These past experimental studies on prosocial behaviour in social networks have found strong homophilous tendencies in choosing friends (Leider *et al.*, 2009; Goeree *et al.*, 2010). For example, people's friends often exhibit similar levels of kindness, so that it is not possible to differentiate between the selection effect in choosing one's friends from the social interaction effect (Leider *et al.*, 2009). We purposely designed our experiments to ensure that such a selection effect would not be possible. This is one reason why we required parents to be recipients, rather than a chosen family member. In order to ensure this, we asked

participants to send payments to their mothers if both parents were alive but living separately from one another.

Second, these prior studies have not directly addressed the nature of preferences for giving within families, a setting in which further questions arise. In our paper, we address these wider intrahousehold-specific questions to help inform, for example, recent work on the consequences of relaxing the assumption of perfectly transferable utility for explanations of the formation and dissolution of families (Giuliano, 2007; Chiappori *et al.*, 2012*a, b*).

Third, we conduct a more ambitious preference recovery exercise than Leider *et al.* (2009), which is in the spirit of Andreoni and Miller (2002), by collecting sufficient information on the choice behaviours of each subject. Using revealed preference and structural techniques, we use our experimental data to examine the rationality of intergenerational transfers, to recover how preferences for giving vary depending on the recipient of a gift and to examine the motivation for transfers from adult children to their parents. We find that the vast majority of subjects have consistent and well-behaved preferences for giving to strangers and parents when these transfers are treated as separate goods. We identify a series of preference 'types' in our subject pool and estimate the parameters of a Constant Elasticity of Substitution utility function. This allows us to examine the nature of preferences for giving and to explore how they vary by the recipient of a gift in great detail.

In doing so, we contribute to a second strand of literature in experimental economics. Our findings support the results of prior lab experiments with a similar experimental design in several different contexts: among young children (Harbaugh *et al.*, 2001; List and Millimet, 2008); among economics students and other adults (Sippel, 1997; Mattei, 2000; Andreoni and Miller, 2002); and with a broader set of budget constraints (Fisman *et al.*, 2007). In a further application of revealed preference methods, we go on to find that preferences for giving are conditional upon the recipient of a transfer. We also find that when we pool the choices from the games with parents with those played with strangers, the choices of the majority of players violate axioms of revealed preferences. This indicates that most players view giving to parents and strangers as distinct goods, and they have different preferences for each one.

In summary, we find greater proclivity for giving and greater price sensitivity of transfers when parents rather than strangers are recipients of transfers. However, we uncover significant heterogeneity in preferences for giving to parents, which, to our knowledge, has not been explored in any previous work. Further, this is the first paper to provide estimates of preference parameters for giving to parents on the part of adult children, and such parameter estimates might be used to calibrate future macroeconomic multi-generation models. Finally, we find that many adult children do not share resources with parents in order to maximize social efficiency gains within the family. That is, a number of subjects do not exhibit preferences of perfect substitutes for giving to parents. For these subjects, the oft used assumption of transferable utility in modeling family behaviour may not be relevant.

The rest of this paper is structured as follows. In Section 2, we describe our experimental design. In Section 3, we assess the rationality of subjects' choices (to ensure that a consistent preference ordering can be found that rationalises their choices) and test whether giving to parents and giving to strangers can be treated as the same good

in a subject's utility function. In Section 4, we formally characterise the nature of preferences for giving to parents and strangers. In Section 5, we examine our subjects' motives for giving to parents using the results of our controlled information experiment. Section 6 concludes.

2 Experimental Design

This section describes our sample selection criteria and the design of our modified dictator games and information treatment.

2.1 Sample selection

In recruiting subjects for our experiments, we focused upon adults who largely live independently from their parents. Further, we chose to deliberately exclude undergraduate students and those with a university qualification in economics from our study. Though undergraduate students live apart from parents, they often visit them, typically consider the parents' address to be their permanent address, and they often rely on parents financially. Furthermore, student and non-student subjects, especially those with a background in economics, often show very different patterns of behaviour in lab experiments (Harrison and List, 2004).

As our experiments took place in Oxford, England, the majority of our sample resided in the southeast region of the UK. In comparing our sample to those in the British Household Panel Survey (BHPS) who reside in the southeast region of the UK, we over-sample women and those with a college degree. The extent to which our findings may be generalized to a wider population may reflect the extent to which gender and education may influence behavior in this particular context, although our findings are robust to controlling for such characteristics. We refer the reader to the Online Appendix 2 for further details of our recruitment procedures and subject pool.

2.2 Modified dictator game

We designed our experiment to test the rationality and characteristics of preferences for giving to parents and strangers. Each subject played a series of dictator games separately with a parent and with an unknown stranger, who was another subject chosen at random from those participating in the same session, and whose identity remained anonymous. Rather than give a single amount to the subject to be divided up between herself and the recipient (as is usual in dictator games), each subject was tasked with allocating "tokens" under a series of different budgets. Decision problems differed by the number of tokens to be divided and the amount of money that each token was worth. Tokens were worth 10, 20, or 30 pence. The total number of tokens varied between 40 and 100. Table 1

provides the details of the eleven budgets that the subjects faced.[1] The order of the decision problems was randomised across subjects, and they were told that the experimenter would randomly choose one of the decision problems and carry it out.

Table 1

Budget Characteristics and Allocation Decisions

Budget	Total Tokens	Hold Value	Pass Value	Price of Giving	Average "Give" Budget Share			
					All	Stranger	Parents	Difference
1	40	10	40	0.25	0.50	0.29	0.70	-0.31***
2	40	10	30	0.33	0.50	0.29	0.71	-0.42***
3	60	10	20	0.50	0.51	0.30	0.72	-0.42***
4	75	10	20	0.50	0.51	0.29	0.72	-0.43***
5	60	10	10	1.00	0.36	0.26	0.45	-0.19***
6	80	10	10	1.00	0.36	0.26	0.45	-0.18***
7	100	10	10	1.00	0.36	0.27	0.45	-0.18***
8	60	20	10	2.00	0.29	0.28	0.31	-0.03
9	75	20	10	2.00	0.29	0.28	0.31	-0.03
10	40	30	10	3.00	0.31	0.30	0.32	-0.02
11	40	40	10	4.00	0.31	0.30	0.32	-0.02

Notes. *** denotes statistical significance at the 1% level.

Table 1 also details the average amount that our subjects chose to share from each of the budgets. In comparison to subjects in Andreoni and Miller (2002), our subjects were more sensitive to the relative price of giving, sharing 50% when the price of giving was less than one, 36% when the price was one, and 30% when the price was greater than one. When we distinguish between games played with parents and strangers, we see that this sensitivity to price only holds for games played with parents. In games with strangers, our subjects were slightly more generous than those in Andreoni and Miller's sample, giving 30% on average irrespective of price. However, in their games with parents, our subjects gave about 70% of their share to parents when the relative price of giving was less than one, 45% when the price was one, and 30% when the price was greater than one. These differences are statistically significant.

[1] As the framing and particular wording used in dictator games influences behaviour (*Hoffman et al.*, 1996), the wording used in outlining the games was as close as possible to that of Andreoni and Miller (2002). Online Appendix 3 provides all instructions given to subjects.

2.3 Information Experiment

As a further dimension to our experimental design, we randomised the amount of information parents received about the games played in the lab. This randomisation allows us to explore whether subjects are altruistically or strategically motivated to share with parents. Note that this randomisation occurred at the session level rather than the subject level to avoid confusion and potential spillovers. Subjects were not aware of these differences across sessions. All subjects in a session were assigned to one of three treatment groups:

1. Subject's parent was notified that her child participated in a study, but no additional information was provided.

2. Subject's parent was given full information regarding the dictator games that her child played with her, including complete instructions on the games, how the child played each game, and how much was allocated to the parent and to the child.

3. Same as (2) above, but the subject was also given an opportunity to write a note to the parent that was included with the letter and payment mailed to the parent.

The third treatment group was implemented to give participants an opportunity to send their parents a message in case they were deterred from, for example, exhibiting perfect substitutes preferences out of concern that their parents might view this as selfish behaviour.[2] If this were true, subjects could have been more likely to exhibit selfless or Leontief preferences in Treatments 2 or 3 because of concerns about their parents' reaction to a small payment amount and a concern for being perceived of as fair (Andreoni and Bernheim, 2009).

Of the 64 subjects in Treatment 3, 41 wrote their parents a message. However, only four explained perfect substitutes behaviour. Four other subjects explained that they had tried their best to divide tokens so that total payouts were split equally. One subject explained selfish behaviour. The majority of those who wrote notes (32 subjects) did not send any message explaining their decisions in the game. For example, messages included: "Hi!" and "Enjoy, Mum X." All notes can be found in Online Appendix 1. The majority of subjects did not use the opportunity to write a note to their parents to explain behaviour, and we find there is little difference between Treatments 2 and 3 in affecting the amount shared with parents.

We also randomised whether subjects played first with their parents or with stangers, and this randomisation was done across individual lab sessions. It is important to note that subjects were not provided with any details of the experiment in advance of their participation. Thus, if they played dictator games with strangers initially, they did not know that they would repeat the same games with parents. Likewise, if they played games with parents first, they did not know this would be followed by another set of games played with strangers. This has important

[2] Communication has been shown to generate cooperative behaviour, particularly when players are averse to guilt, that is, "decision makers experience guilt if they believe they let others down" (Charness and Dufwenberg, 2006).

implications for how subjects would play, particularly with parents, and how they could have been influenced by the information treatment, which is discussed below.

Our 190 subjects were evenly distributed across the three treatment groups, with 66 subjects in Treatment 1, 60 in Treatment 2, and 64 in Treatment 3 (see Table 2). For those in Treatment 1, 37 subjects played with a stranger first and 29 played first with a parent. Of the 60 subjects in Treatment 2, 19 played with a stranger first, and of the 64 subjects in Treatment 3, 33 played with a stranger first.

Table 2

Number of Observations By Treatment Group

Treatment	Play Strangers 1st	Play Parents 1st	Total
T1. No Information	37	29	66
T2. Full Information, No Notes	19	41	60
T3. Full Information, with Notes	33	31	64
Full Information (T2 and T3)	52	72	124
Total	89	101	190

3 Are preferences for giving rational?

We begin by examining whether choices are rational, that is whether there exists some well-behaved preference ordering consistent with each individual's choices in the lab. We do so by checking for violations of the Generalised Axiom of Revealed Preference, GARP (Varian, 1982).[3]

We find that we can rationalise the behaviour of the overwhelming majority of our subjects using the standard utility maximisation model (see Table 3). 91% of our sample satisfy GARP when playing with parents, while 89% of subjects satisfy GARP when playing with strangers. This difference is not statistically significant. These high pass rates are not the product of a weak test of rationality, as indicated by the measure of 'predictive success', $s \in [-1, 1]$ for our tests (Beatty and Crawford, 2011). This measure allows us to correct observed pass rates for the demandingness of a revealed preference test, which is measured by the so-called 'relative area' a. An s in the neighborhood of 1 indicates that the choice behaviour data satisfy strict restrictions (the ideal situation), whilst an s in the neighborhood of -1, denotes the opposite; choice behaviour violating very weak restrictions.[4]

[3] We here refer to Crawford and De Rock (2014) who provide a comprehensive review of the literature on revealed preference methods and how GARP can be tested empirically.

[4] A Monte Carlo simulation was used to estimate the relative area numerically. Relative areas were calculated by randomly drawing 50,000 choices from each budget using a uniform distribution across the entire budget and testing for whether each random choice set satisfies GARP. a is the proportion of these random choices that satisfy rationality. We estimate $a = 0.051$ for our budget environment.

Table 3

GARP Pass Rates

Giving to Parents and Strangers treated as Separate Goods			
	Pass Rate	Num.Obs.	Predictive Success (s)
Giving to Parents:	0.905	172	0.854
	(0.022)		(0.022)
Giving to Strangers:	0.884	168	0.833
	(0.024)		(0.024)
Difference	0.021	4	0.021
	(0.016)		(0.016)
Giving to Parents and Strangers treated as the Same Good			
Giving:	0.268	51	0.266
	(0.023)		(0.023)

Notes. Standard errors in parentheses.

Age and education do not impact the likelihood of passing GARP. However, men are more likely than women to satisfy GARP, other things equal. Whereas 97% of men pass GARP in games with strangers, 87% of women do so. Similarly, 94% of men pass GARP with parents, and 86% of women pass GARP in games with parents. We refer the reader to Online Appendix 2 for further details.

Are preferences for giving conditional on the recipient? To determine whether preferences for giving depend on the recipient, we pool an individual's choices from the games played with strangers with the games played with parents and check whether a well-behaved preference ordering exists that can rationalise this full choice set.[5] We find that giving to parents and strangers *cannot* be rationalised by the same preference ordering for 73% of subjects (66% of men and 77% of women). For these individuals, giving to parents and strangers cannot be treated as a single good and preferences for giving are conditional upon the recipient. The greater demandingness of the revealed preference test does not explain the significantly lower pass rate on the pooled choice set, as the predictive success measure is 0.266.

3.1 How significant are the deviations from rationality?

We compute the severity of the GARP violations to check whether behaviour is essentially rational and fails our test due to small random errors. We do so by computing the 'Money Pump Index' (MPI) proposed by Echenique *et*

[5]This test is more demanding than one that treats giving to parents and strangers as separate goods as now 22 choices must be consistent with one another. We estimate $a = 0.0026$ when giving to the two recipients are treated as the same good.

al. (2011) for each subject. The MPI can be interpreted as the monetary value of tokens that could be extracted from a subject who behaves inconsistently. The severity of a GARP violation is then measured by the amount of money that a 'devious arbitrager' could have extracted from our subject. Money pump cost violations are relatively small when giving to parents and strangers are treated as separate goods, suggesting that choices are effectively rational (see Figure 1). However, when choice sets are pooled, GARP violations are much more severe, suggesting that preferences for giving are indeed conditional on the intended recipient.[6]

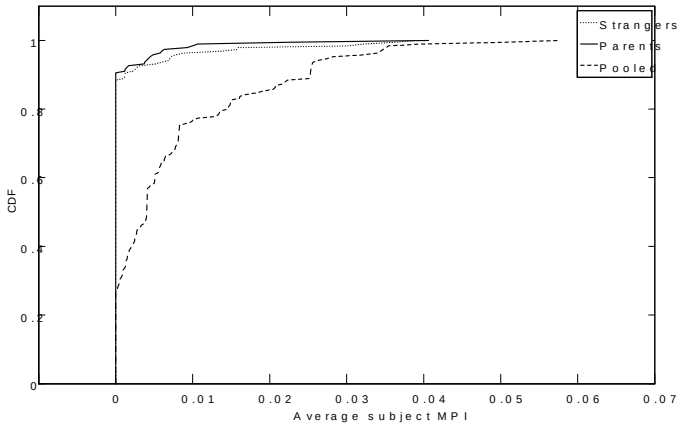

Fig. 1. *Empirical Cumulative Distribution Function of MPI*

We also examined the number of budgets that had to be dropped for GARP violators to attain rationality. For most, only one budget had to be dropped. We did not find any patterns concerning the particular budget, or timing of budget, that had to be dropped. Further details are in Online Appendix 2.

4 Estimating preferences for giving

In this section, we examine how preferences for giving differ by recipient. We do so by estimating preference parameters for giving to parents and strangers for those who satisfy GARP.

4.1 Preference types

To characterise preferences for giving to parents and strangers, let π_s represent payment to one's self and π_o represent the payment amount to the recipient, so that one's utility is $u(\pi_s, \pi_o)$. We group subjects into preference types depending on the similarity of their revealed preferences to four "extreme" preference classes:

i Perfectly Selfish, $u(\pi_s, \pi_o) = u(\pi_s)$;

[6] Due to the limited size of our choice set and the fact that checking WARP is sufficient for checking GARP in our two-good setting, it was not necessary to implement the procedure of Smeulders *et al.* (2012) for computational reasons.

ii Perfect Substitutes or Utilitarian, $u(\pi_s, \pi_o) = \pi_s + \pi_o$;

iii Leontief or Rawlsian, $u(\pi_s, \pi_o) = \min\{\pi_s, \pi_o\}$;

iv Perfectly Selfless, $u(\pi_s, \pi_o) = u(\pi_o)$.

Many subjects' choice behaviour can be perfectly rationalised by one of these 'pure' preference types: 59% with regard to their preferences over giving to strangers and 73% for parents. The distribution of preference types is significantly different across recipients ($\chi^2 = 83.42$) and displayed in Figure 2. Unsurprisingly, many more subjects played selfishly with strangers than with parents and pure selflessness occurred only with parents. In games with parents, the majority of subjects with strongly defined preferences exhibited a preference type of perfect substitutes, and thus acted to maximise joint payoffs. This finding of a higher proportion of perfect substitute types when giving to parents (which is statistically significant at the 1% level with a t-stat of 16.8) also implies that giving to parents is more price sensitive than giving to strangers among those with strongly defined preferences. It is also interesting to note that an assumption of transferable utility between parents and children may be reasonable for those who play perfect substitutes with parents. However, as roughly half our sample, and over 30% of those with strong preferences, did not play perfect substitutes with their parents, our results cast some doubt on whether transferable utility is a valid assumption in general.

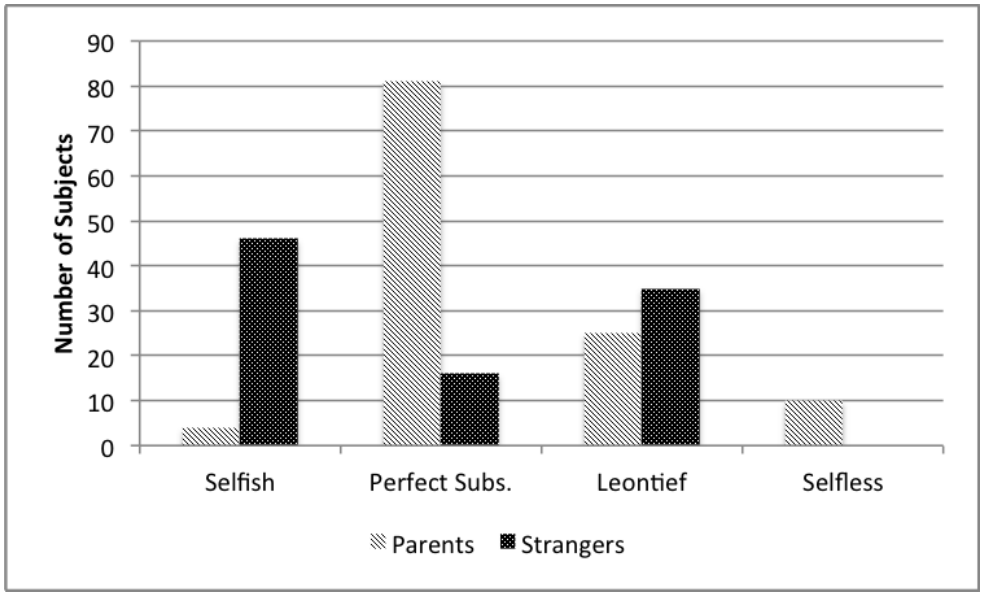

Fig. 2. *Distribution of Strong Preference Types*

There are 85 subjects whose preferences for both giving to parents and strangers are perfectly rationalised by one of the four preference categories. Table 4 gives the number of subjects with strong preferences that fall into each 'parent - stranger preference' cell. The three largest groups are: (i) Maximise family payoffs - 32 subjects

played selfishly with strangers but revealed perfect substitute preferences when playing with parents; (ii) Equality in dictator-recipient payoffs - 15 subjects split endowments equally, unconditional of recipient; (iii) Maximise social payoffs - 16 subjects revealed perfect substitute preferences irrespective of the identity of the recipient. All subjects who played perfect substitutes with strangers, also did so with their parents, and thus comprise the latter. There are an additional 8 subjects who played perfect substitutes with parents and Leontief with strangers, and this group may have similar preferences to those who play Leontief with both recipients. The differences in games with parents may arise from differences in the extent to which players believe they can "undo" the unequal shares in subsequent interactions with parents.[7]

Table 4

Preference Types (Number of Subjects)

		Stranger as recipient			
		Selfish	Perfect sub.	Leontief	Selfless
Parent as recipient	Selfish	3	0	0	0
	Perfect sub.	32	16	8	0
	Leontief	4	0	15	0
	Selfless	0	0	7	0

4.2 Estimating Preferences

We classified subjects whose choices could not be perfectly rationalised by one of the four preference types into "weak" versions of these preference classes by assigning subjects the preference type that was "closest" to their revealed preference. Specifically, we placed subjects into the preference type with the minimal Euclidean distance between their actual choices and the choices dictated by the pure preference type.[8] To get a more detailed picture of preferences within these weak types, we estimate preference parameters for a Constant Elasticity of Substitution (CES) utility function within each weak preference type (with the exception of the "weakly selfless" category due to limited observations).[9] The functional form of the CES utility function is:

$$u(\pi_s, \pi_o) = (a\pi_s^\rho + (1-a)\pi_o^\rho)^{1/\rho}$$

The parameters have clear interpretations: a gives the weight on "own" consumption, indicating the degree of selfishness ($a = 1$ when perfectly selfish and $a = 0$ when perfectly selfless), while ρ determines the elasticity of

[7] A limitation of this study is that we do not observe behaviour outside the lab. We did not follow up with subjects in order to ensure them that their decisions were made privately and would remain anonymous. For complete details on experimental procedures, see Online Appendix 2.

[8] Results were not sensitive to other distance measures, for example, squared deviation and absolute deviation.

[9] Additional analysis in Online Appendix 2 suggests that the assumption of homothetic or Gorman Polar Form preferences cannot be rejected for the majority of these subjects, which provides good grounds for our choice of CES utility function.

substitution, $\sigma = 1/(\rho - 1)$, between one's own payoff and that of the recipient. As ρ approaches -∞, preferences are Leontief. When $\rho = 1$, preferences are perfect substitutes. With the budget constraint $\pi_s + p\pi_o = m$, the CES demand function is:

$$\begin{aligned} \pi_s(p,m) &= \frac{[a/(1-a)]^{1/(1-\rho)}}{p^{-\rho/(\rho-1)} + [a/(1-a)]^{1/(1-\rho)}} m \\ &= \frac{A}{p^r + A} m \end{aligned}$$

where $A = [a/(1-a)]^{1/(1-\rho)}$ and $r = -\rho/(\rho - 1)$.

A and r are estimated using a two-limit nonlinear tobit by maximum-likelihood to take into account the fact that subjects' choices are censored at both ends of the budget constraint. To remove heteroskedasticity in the error term in levels, demands are estimated as budget shares with an i.i.d error term. The estimated demand function is then:

$$\frac{\pi_s(p,m)}{m} = \frac{A}{p^r + A} + \varepsilon$$

where $\varepsilon \tilde{} N(0, \sigma^2)$.

Table 5 gives our results. We find a greater proclivity to give to parents and some evidence that giving to parents is more price responsive. a is highest amongst those with weakly selfish preferences and, as we might expect, a is higher when strangers as opposed to parents are recipients.[10] There is considerable variation in estimated ρ within our sample. For those with weakly Leontief preferences, the estimated ρ is statistically significant, negative, and relatively high in magnitude (in line with what we would expect). For those in the weakly perfect substitutes category, we find that the marginal rate of substitution between own and recipient payoff is greater when playing with parents, and that this difference is statistically significant, suggesting greater price responsiveness when giving to parents for this group.

[10] The estimates for a from games with strangers are quite similar to estimates in Andreoni and Miller (2002) (AM), where $a = 0.76$ for the weakly selfish; $a = 0.58$ for those with weakly perfect substitutes preferences; and $a = 0.65$ for those with weakly Leontief preferences.

Table 5

CES Weak Preference Parameters

	Selfish			Perfect Substitutes			Leontief		
	Parents	Strangers	Diff.	Parents	Strangers	Diff.	Parents	Strangers	Diff.
A	5.937	7.542***	-1.515***	0.978***	1.630***	-0.652***	0.988***	1.485***	-0.497***
	(0.155)	(0.097)	(0.183)	(0.048)	(0.083)	(0.096)	(0.021)	(0.021)	(0.030)
r	0.198*	0.173	0.026	-0.898***	-0.563***	-0.335***	0.523***	0.507***	0.016
	(0.185)	(0.114)	(0.217)	(0.083)	(0.107)	(0.135)	(0.025)	(0.024)	(0.035)
a	0.902***	0.919***	-0.170	0.500***	0.562***	-0.062***	0.493***	0.692***	-0.199***
$\boldsymbol{\rho}$	-0.248*	-0.209	-0.039	0.474***	0.342***	0.132***	-3.560***	-3.415***	-0.145
σ	0.801*	0.827	-0.025	1.901***	1.520***	0.381***	0.219***	0.226***	-0.007
ln(**L**)	-44.80	-45.11		-104.80	-36.82		21.78	32.50	
n	44	165		165	187		220	330	

Notes. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

5 Information Experiment

In this section, we explore the motivations for transfers to parents. We differentiate between whether subjects give to parents because of altruism - either pure altruism or altruistic reciprocity (reciprocating kindness shown previously by their parents), or because of some reciprocal or strategic motive. If adult children are altruistically motivated, their preferences over payments to parents relative to payments to themselves should not differ by treatment group. But if adult children are strategically motivated to share with parents, then they would value giving to parents quite differently depending on the degree to which parents are informed of their decisions in the lab. Parents who receive full information may be inclined to either reward generosity and perhaps sharing the winnings of the experiment, or to punish a child's selfishness and perhaps reduce subsequent transfers to the grown child.

An alternative to the latter explanation of strategic motives for giving is that parents may derive a 'signal value' from a child's gift, which is stronger when they have more information. For example, parents may feel more loved if they see that their grown child has sacrificed tokens in order to share more with them. However, we do not believe that signalling is a compelling interpretation of our results. Subjects in Treatment 3 had an opportunity to write a note to their parents in which they could have provided some signal of love and explained that any possible zero payments were due to the fact that they maximised joint payoffs. Yet, a very small number of subjects indicated the latter, and none provided a signal of love. Rather, those who played perfect substitutes indicated the possibility of undoing the experiment later on. In addition, we find no differences in preferences or payments between Treatments 2 and 3. We also observe interesting differences in behaviour by treatment group depending on whether a subject played first with strangers or first with parents that is difficult to nest within a signalling narrative.[11]

Finally, we note that we assume that it would have been prohibitively costly for participants in Treatment 1 to fully and credibly explain the details of the study to parents given that the study is relatively complicated to explain and would have required a long conversation with a parent. We made no contact with subjects or parents after the experiment to determine if this was the case. This was to assure participants' privacy in their decisions in the lab.[12]

5.1 How information to parents affects preference type

We find that the information treatment affects preferences towards giving to parents depending on one's preferences towards giving to strangers. Table 6 records the differences between the 'full information' and 'no information' treatment groups in the proportion who have strong preferences of type j when giving to strangers, who then have

[11] Further, we believe it unlikely that giving a positive amount in such lab experiments to parents would be a desirable way to signal love to one's parents. In fact, past research on gift giving has generally found that "familial gift giving is more like primitive premarket exchange... where gifts provide social insurance- than like signaling during courtship, so the inefficiencies that are important for signaling purposes need not be present in gift giving in the family" (Camerer, 1988).

[12] For details on the experimental procedure, see Online Appendix 2.

strong preferences of type i when giving to parents. This change is calculated as follows:

$$p_{ij} = \left(\frac{n_{ij}^{FullInfo}}{\sum_i {n_{ij}}^{FullInfo}} \right) - \left(\frac{n_{ij}^{NoInfo}}{\sum_i {n_{ij}}^{NoInfo}} \right)$$

where n_{ij} is the number of subjects with preferences to parents in category i and preferences to strangers in category j.

Players who are perfectly selfish towards strangers are significantly less likely to behave selfishly towards parents who are informed about details of the game, and they are more likely to share payoffs equally with them. This is strong evidence that players with generally selfish preferences for giving may be strategically motivated when giving to parents. It is only when parents are informed about the game that they may want to appear equitable to parents who may reciprocate after the game.

Table 6

Preference Switching Across Information Treatments (p_{ij})

		Stranger as recipient		
		Selfish	Perfect sub.	Leontief
Parent as recipient	Selfish	-13.33*	0.00	0.00
	Perfect sub.	0.00	0.00	4.89
	Leontief	13.33*	0.00	-4.51
	Selfless	0.00	0.00	-0.38

Notes. * indicates statistical significance at the 10% level.

Interestingly, among those who reveal a preference for equity with strangers, subjects in the information treatment are less likely to play Leontief with parents and more likely to play perfect substitutes. Thus, subjects with a preference for sharing equally are more likely to maximise payoffs when parents are more likely to share their winnings post-game. However, this difference is not statistically significant, perhaps due to the small sample size.

5.2 The effect of information to parents on CES parameters and gift amounts

For those with weakly categorised preferences, we estimate the parameters of a CES utility function as previously. However, due to sample size limitations, we estimate parameters within each treatment cell, pooling the observations of subjects with weakly categorised preferences within these groups. We find the weight on own consumption is statistically significantly lower amongst those in the full information treatment group, which is again suggestive of strategic motives for giving to parents amongst those with weak preferences.

Table 7

CES Parameters by Information Type

	No Information	Full Information	Difference
A	1.299***	0.748***	0.551***
	(0.076)	(0.078)	(0.109)
r	0.109	0.085	0.0248
	(0.095)	(0.093)	(0.133)
a	0.573***	0.421***	0.152***
ρ	-0.123	-0.092	-0.030
lnL	-64.96	-124.15	
n	242	330	

Notes. *** indicates statistical significance at the 1% level.

We use regression analysis to examine the marginal effect of the information treatment on payments to parents, where the dependent variable is the payment amount to the recipient in each game, and the unit of observation is the game rather than the subject. Standard errors are clustered by respondent. Table 8 summarises the results. We find that subjects exposed to Treatments 2 and 3 give larger payments to parents, all else equal. These coefficient estimates indicate an average increase in giving to parents of about 50%, as the average value of tokens passed to parents was 5 GBP.[13] In addition, the relative price of giving is a significant factor in determining payment amounts to both recipients, and gifts to both recipients are normal goods.[14] These results are also robust to controlling for individual characteristics: gender; age; education; student status; number of children of one's own; number of biological children; and parents' living arrangements, to control for whether the payment recipient is both parents, father only, or mother only.

[13] Results are very similar to those presented here when Treatments 2 and 3 are included separately in the regressions.

[14] We also ran the same regressions on payment amounts to strangers, and the information treatment had no effect on this outcome. Though there were similar income and price effects, they were not as strong as in games with parents.

Table 8

Effect of Information Treatment on Payments to Parents

	All	Play Strangers 1st	Play Parents 1st
Full Information (T2 & T3)	1.084**	2.313***	0.454
	(0.515)	(0.640)	(0.872)
Price of Giving < 1	4.154***	4.347***	3.963***
	(0.387)	(0.482)	(0.620)
Price of Giving > 1	-1.077***	-1.200***	-0.954***
	(0.220)	(0.318)	(0.312)
Total tokens = 60	-0.394	-0.133	-0.655
	(0.188)	(0.185)	(0.325)
Total tokens = 75	0.763***	1.135***	0.391*
	(0.230)	(0.276)	(0.363)
Total tokens = 80	0.443***	0.875***	0.011
	(0.217)	(0.244)	(0.345)
Total tokens = 100	1.825***	2.371***	1.280***
	(0.244)	(0.341)	(0.325)
Number of Observations	572	286	286
R-squared	0.4075	0.5357	0.3651

Notes. *** p<0.01, ** p<0.05, * p<0.1 Robust standard errors in parentheses, clustered by respondent. The unit of observation is the particular dictator game. The sample is restricted to respondents with weak preferences. The dependent variable is the amount given to parents in each game (pounds sterling). These results are robust to controlling for player characteristics (gender, age, education, student status, marital status, whether player has children), and identity of parent recipient.

Interestingly, when we separate the sample by those who played with strangers first and those who played with parents first, the treatment effect only holds for the sample of players who initially played with strangers. Note that subjects did not know any details of the experiments in advance. Thus, when playing with strangers initially, subjects did not know they would then play the same games with parents and vice versa. In addition, when subjects in the full information treatment had played with strangers first, a large proportion of their endowment of tokens was given to parents; in 89% of budgets played with parents after playing with strangers, subjects gave away at least 75% of their tokens to parents; and for 17% of such budgets, subjects gave everything to their parents. However, among

subjects who played the dictator games with parents first, there was no difference across information treatments in the likelihood to give all, or nearly all, of one's endowment to one's parents at any particular budget (see Figure 3).

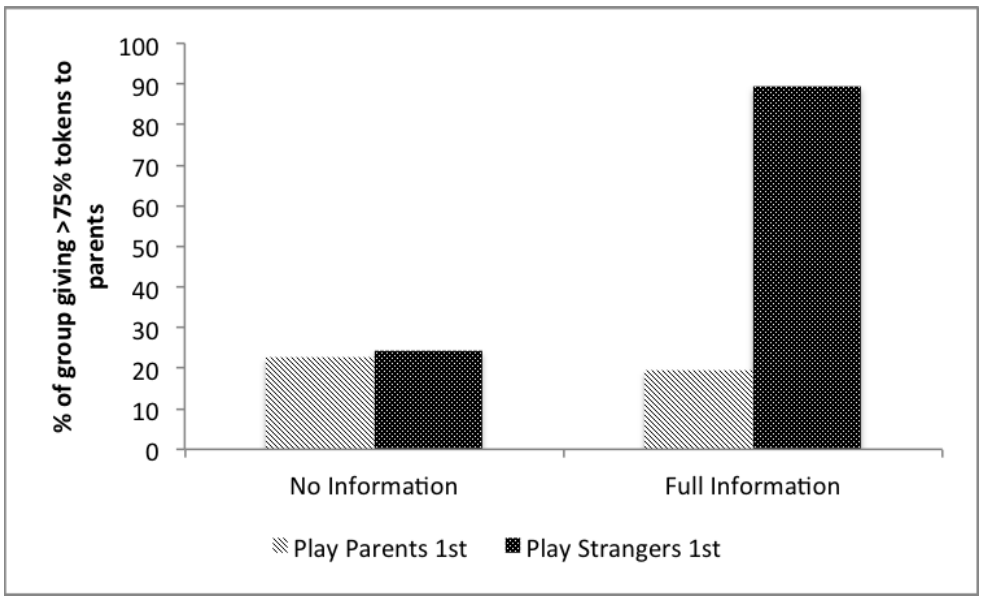

Fig. 3. *Percent of Budgets at which Players Shared Over 75% of Tokens with Their Parents*

5.3 Theoretical rationalisation of the effect of recipient order

The above results are suggestive of strategic motives for transfers between adult children and their parents. However, we have found that the effect of the information treatment is much stronger when subjects with weak preferences have played with a stranger before playing with one's parent.[15]

One might think that the differences found in playing with strangers initially might be explained by a learning effect. However, if there was a learning effect, then we would see a similar pattern for those who play with strangers first, regardless of the information treatment. Yet, subjects give more to parents only in the case of full information to parents and when playing with strangers first.

Alternatively, one might consider that games with strangers provide a reference point for subsequent games with parents, the idea being that if a player plays with strangers before playing with parents, then that player may give more to parents than the amount given to strangers, where the latter would serve as a reference point in games with parents. However, again, if such differences were to influence subsequent games with parents in the latter case, then we would not observe such large differences across information treatments.

Rather, we explain this empirical finding as an income effect in the presence of strategic motives. When a subject

[15] We also note that players are significantly less likely to give zero to parents in the full information treatment group only in the case when they first play games with strangers. The information treatment has no effect on this outcome when players first play with parents. If giving behavior was due to signalling, then the information treatment would not differentially impact the likelihood of giving parents zero for those who played with strangers first or those who played with parents first.

first plays with strangers, they come to the round of dictator games with parents with some extra amount of lump-sum income from their winnings in the first set of games.[16] We would expect this additional income to boost gifts to parents given that our regression results indicate that gifts to parents are a normal good for those with weak preferences (see Table 8).

We could have avoided this income effect if we had chosen to pay subjects for one decision from all 22 budgets, rather than paying them for one in each of the 11 decisions with the different recipients. We chose to pay subjects as we did because we did not want subjects to be aware of the second game when playing the first game. Subjects received no advance information regarding the experiment, so that those who played with parents or strangers first had no reason to expect that they would subsequently play the same set of games with strangers or parents. If we had not done this, we would not have had a clean way to determine how the two games impacted each other. Future work might explore the impact of alternative payment mechanisms.

We hypothesise that the positive income effect combined with the presence of strategic motives for giving to parents provides a compelling explanation for our results. The CES estimates suggest that subjects in the full information group place higher weight on their parents' payoff, which is what we would expect from those with strategic motives for giving to their parents. The additional payoffs from games with strangers then act to magnify the impact of this variation in preferences.

To illustrate this argument, consider Figure 4 that depicts a hypothetical dictator game with parents. When a subject plays initially with parents rather than with strangers, she faces budget constraint SP. A subject playing with parents can keep all of the tokens, earning a payoff of S, can give all of the tokens to parents, earning them a payoff of P, or can choose any allocation along the budget constraint SP. As those in the full information group place greater weight on parents' payments than those in the no information group, the latter will choose allocation A, whereas the former will choose allocation B. Since our participants did not play selflessly with strangers, subjects who initially played with strangers played subsequent games with parents with some positive amount expected from these prior rounds. This causes a parallel outward shift of this budget constraint by some positive amount X.[17] A subject would then be faced with budget constraint $S'P'$. However, not all points on this budget constraint are possible; any allocation along the budget constraint $S'P'$ that is above P (e.g., C) is not directly available as the subject does not have a mechanism by which she can trade-off her additional payment X for increased payment to parents in the experimental setting (this region is indicated by a dashed line). For simplicity, imagine that subjects are endowed with homothetic preferences (in line with our choice of CES utility function). We can see that those in the full information group, who place higher weight on their parents' consumption, will choose a point B' over

[16] No subjects played selflessly with strangers. However, the precise amount of individual winnings from games with strangers was unknown to players during the experiment, as they were only paid for one of the 11 budgets, chosen at random. This was not revealed until the end of the entire experiment, when games had been played with both recipients.

[17] Note that all subjects receive a show-up fee of 4 GBP. As we are interested in differences across treatments, we do not take this into account in our analysis.

A', sharing very generously with parents. The monetary divergence in payoffs between treatment groups is also larger between A' and B' than between A and B. In addition, subjects who play strangers first and are in the full information group are more likely to be rationed over the total amount of tokens that they can pass to their parents (choosing C' as C is unavailable). Allocations B' and C' would explain the bunching of very large transfers to parents shown in Figure 3.

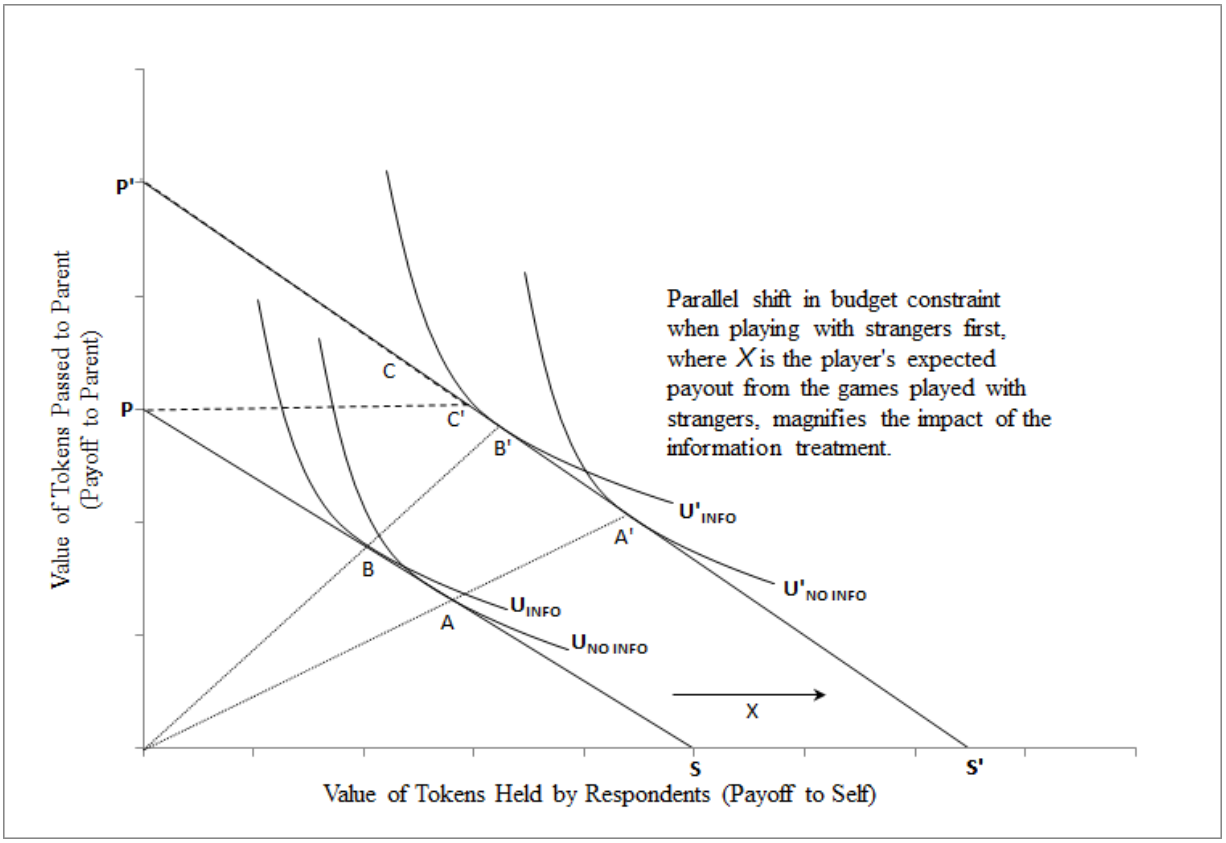

Fig. 4. *Strategic Motives and the Income Effect*

6 Conclusion

In this paper, we have made use of a novel experimental design to recover the characteristics of, and motivations for, giving to parents by adult children. We have found that when parents rather than strangers are recipients of transfers, respondents have a greater proclivity for giving and greater price sensitivity for transfers. The latter would suggest that there may be social efficiency gains when reducing the transaction costs of giving to parents. However, it is important to note that we uncover significant heterogeneity in preferences for giving to parents, which, to our knowledge, has not been explored in any previous work. Such heterogeneity in preference parameters for sharing resources across generations may need to be considered in multi-generational models of consumption and investment,

which typically assume either perfectly altruistic or perfectly selfish overlapping generations.

Further, we have found evidence of adult children being strategically motivated to share with parents. For those with strongly defined preferences, those who played selfishly with strangers also did so with parents who had no information, but they shared equally with fully informed parents. In addition, for those with weakly defined preferences, we estimated a lower weight on own payoff and a greater likelihood of sharing a large proportion of one's budget when parents received information about the experiment. This evidence suggests that our subjects are strategically motivated when sharing with parents, as they share more with parents who are more likely to reciprocate in subsequent interactions. However, it is the subjects who initially play dictator games with strangers who are particularly affected by this change in information to parents. We hypothesise that this is because of an income effect influencing those who initially play with strangers.

These findings provide an important contribution to the literature on intergenerational transfer motives, as it is the first experimental study to examine motives for giving between parents and adult children. By having adult children play dictator games with a designated family member, we show evidence of reciprocal behaviour that is not due to a selection effect. We also show that while our subjects pass GARP, many of them do not behave in a way that would be consistent with the assumption of transferable utility that is often critical to many household models.

It would be interesting to use these methods to explore such motivations in developing countries, where elderly parents rely more on children than on public transfers for financial support, and where financial transfers generally flow from adult children to parents (whereas in the UK and other industrialised countries, financial transfers flow from parents to children, and elderly parents rely on own savings or public support). China may be one particularly interesting and relevant case, as the one child policy has meant that many adults are responsible for supporting four parents without any siblings to help them. There has been some evidence of crowding out of public transfers in developing countries (e.g., Cox *et al.*, 2004), but by less than what would be predicted under a model of altruism (Cox and Jimenez, 1992). Experimental work with migrants has found that remittances may be strategically motivated (Ambler, 2012), though the majority of recipients in this study were not close family members (spouses, parents, children), and it would be interesting to examine whether migrants behave similarly in this case.

Future work using a combination of laboratory experiments and survey data may shed more light on these areas. While the lab is restricted to monetary exchange, preferences for giving to parents can also be exhibited in other ways outside the lab. For example, adult children may provide time rather than money to parents (Levitt and List, 2007). Future studies using these methods might also employ additional variations within subjects. For example, giving to parents could be compared to giving to charities. Finally, as there is a great degree of heterogeneity in sharing in the lab, it would be interesting to explore what individual characteristics or factors outside the lab (e.g., number of siblings, gender, frequency of contact with parents) might influence such variation.

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8 Online Appendix 1 {FOR ONLINE PUBLICATION}

8.1 Subjects' Notes:[18]

Explaining Perfect Substitutes Behaviour to Parents:

1. Wow, carbon copy paper! I feel like a 1950s secretary. If you get nothing in this study, it is because I got lots. Well, a minimum of 6 GBP. Similarl, if I get nothing, it is because you get at least 12 GBP. It seemed wise to maximise our mutual profit...

2. See attached letter XD sorry if theres no cash on the card, chose the path that equaled most cash (for a randomly selected one of us) from ___, maybe with money):P)(well, on a giftcard) ___ has new sunglasses 1337 Huh? Um... ___

3. Dear Parents, all will be revealed by telephone. I used maths to get the most utility for either parties

4. Hi Mama, might be something or nothing but between us we've won a bottle of wine I hope! Xxx ___.

Explaining Leontief Behaviour to Parents:

1. Word up! I did this experiment thing - they said you guys might get a voucher. I hope you get something good! I didn't give you zero for anything! But it's all up to chance & which option they randomly pick. LOVE YE ALL! ___ xxx

2. To Mum, Dad and ___, Thought I'd earn us a little treat ___. The experiment reminded me of a dividing Mars Bars

3. Split it to get the same amount as we would do on holiday! Xx (P.S. You can't convert a giftcard into Euros....:))

4. Hi Mum! I tried tot do them equally. They choose 1 of 11 choices I made. My maths as you know is shoddy! We should get the same amount or roughly. Thanks for childcare xxxxx

Explaining Selfish Behaviour to Parents:

1. Dear Mummy, I would have allocated you more money but then I remembered you're probably sitting at home eating cake while I share in this experimental lab for 1 1/2 hours and now I don't feel so bad. See you in November, ___ xxx

[18] Proper names and initials were replaced by the authors with ___ in order to protect subjects' privacy and identity.

Other Notes to Parents:

1. Enjoy, Mum X
2. Hi!
3. To market, to market to buy a ...
4. Hi Mum. Hopefully her is a gift card for Sainsburys for you to spend. See you soon. ___ xx
5. Hi. I thought a few Sainsburies vouchers would come in handy! See you soon. Love ___ x
6. Hopefully you'll be able to get yourself a free bottle of hot lemon!
7. I have an aid here to your housing keeping. Wait until the date shown on the giftcard to avoid embaressment
8. Hope whatever in here comes in useful. Love ___
9. Mum, Hopefully you'll get a £4 or £5 Sainsbury's voucher. Nothing serious! Love ___.
10. Hello, Hopefully you will get some spending money "Buy yourself and ICECREAM" ___ X :)
11. Hi Mum. Hopefully a little something I've won to share with you. Love ___ X
12. A present for you!
13. Dear Mum, Here is the gift card for shopping I explained to you. Love ___
14. Enjoy! :)
15. [Foreign Language]
16. Good Luck. ___ X
17. To Mum+Dad with love from ___ xx
18. I'll explain. Nothing to worry about Love you ___
19. Dear Mum, Buy yourself some proper brand pop and chocolate biscuits(i.e. Not Asda Smart Price) with generous gift. Your daughter
20. How to explain in such a very small space?! Love, ___
21. Hi Mum, This is from the experiment I told you about-I was a guinea pig! ___ xx
22. Mum, Hope this helps!

23. NA THEN.....EYUP. Courtesy of your little gift from Heaven

24. Guess which child this is...! X (I'll explain)

25. Hey mum and dad, Just thought I would be a lab mousey for the evening! Love ___ xx

26. Hi Guys, Have fun at Sainsburys! Love ___ xxxxx

27. As promised! ___

28. Hope you enjoy Love ___ xx

29. Hi Folks, hope you enjoy whatever's on here ___ xxx

30. Hello Mum! Hopefully you have a Sainsburys and this will be useful-I got it as a price taking part in co-operative experiment. Enjoy!P.S.if not useful for you then maybe ___? xxx___

31. Hope you did well out of this! Love ___ xxx

32. Hello, will call about this if it doesn't make sense-don't worry ___

9 Online Appendix 2 {FOR ONLINE PUBLICATION}

9.1 Recruitment Process and Study Sample

During the recruitment process, subjects had been told that this was a research study about adults' relationships with their parents; they were not told that this experiment was being conducted by economists. Throughout our recruitment process, we indicated that eligible participants required a non-coresiding biological parent living in the U.K.[19] Participants were informed in advance of their sessions that all payments would be mailed in the form of gift cards to Sainsbury's, a popular supermarket chain in the UK, and that their parents would also potentially receive a gift card to Sainsbury's. At the end of the experiment, each subject also received 4 GBP in cash as a show-up fee.

Subjects were initially recruited from the pool of experiment volunteers compiled by the Nuffield College Centre for Experimental Social Sciences (CESS). The centre's database included information on student status, concentrations of study, and experience in past experiments. The database allowed us to exclude undergraduate students and economics majors from our sample.

We chose to depart from the usual subject pool of economics majors and undergraduate students, as we were interested in capturing aspects of relationships between adult children and their parents. Economics students may be familiar with the dictator game, and undergraduate students generally rely on their parents for financial support. We wanted to ensure that there were subjects in our sample who were financially independent of their parents.

In order to recruit additional participants, we employed a number of other methods: fliers were handed out in front of Sainsbury's in central Oxford and Headington, with follow-up emails sent out to interested participants; fliers were posted in coffee shops, colleges, and Sainsbury's staff lounges throughout Oxford; advertisements were posted in local and online listings; and emails were sent to staff in all departments and colleges at the University of Oxford and Oxford Brookes University. Any participants recruited through these methods registered with CESS, which facilitated scheduling sessions and ensured that participants did not participate in our experiments more than once.

As our experiments took place in Oxford, England, the majority of our study sample resides in the southeast region of the UK (94%). We compare our study sample to the subsample of respondents in the British Household Panel Survey (BHPS), a nationally representative survey in the UK, who reside in the southeast region of the UK. These descriptive statistics are summarized in Appendix Table A1. While the average age for this subsample is 30, the average age of our sample is slightly higher at 33. Approximately two-thirds of our sample are women. Finally, individuals in our study sample have higher education levels than those in the comparison sample of the BHPS. While 16% of the BHPS sample have a graduate or higher degree, 36% of our study sample have a graduate degree.

[19] Nonetheless, two subjects had in fact been adopted. All other subjects but one had two biological parents (one subject had a biological mother only).

Nearly 85% of our sample is college-educated, while only 24% of the BHPS subsample are college-educated. The extent to which our findings may be generalized to a wider population may reflect the extent to which gender and education may influence behavior in this particular context. Note that our findings are robust to controlling for gender, education, and age.

Appendix Table A1

Descriptive Statistics and Comparison to British Household Panel Survey

	British Household Panel Survey	Subjects in Lab Experiments
Southeast Region	14.4%	94.2%
Age	30.0	33.0
Female	53.4%	66.3%
	Education:	
Higher degree (MSc, PhD)	16.5%	36.4%
First degree (BA, BEd, BSc)	7.3%	48.4%
Other degree	51.30%	15.30%
None of the above	21.1%	0.0%

Notes. Data from British Household Panel Survey includes subsample of those from southeast region of the UK, except for region variable. Sample weights are included in BHPS averages.

However, we do find that men are more likely to pass GARP than women, and this difference is statistically significant. Other individual characteristics do not predict the likelihood of passing GARP. These regression results are summarized below in Appendix Table A2.

Appendix Table A2

Determinants of the Likelihood of Passing GARP (Logit Regressions)

	Pass GARP with Strangers				Pass GARP with Parents			
Play strangers 1st	-1.072**	-1.148**	-1.127**	-1.104**	-0.434	-0.530	-0.513	-0.540
	(0.499)	(0.507)	(0.504)	(0.542)	(0.513)	(0.522)	(0.521)	(0.549)
Male	0.966	1.008	0.995	1.314*	1.705**	1.808**	1.764**	1.971**
	(0.611)	(0.624)	(0.618)	(0.741)	(0.809)	(0.835)	(0.823)	(0.912)
Age<25	1.169	1.572	1.421	1.220	0.494	0.988	0.823	1.111
	(0.903)	(0.975)	(0.960)	(1.097)	(0.832)	(0.921)	(0.902)	(1.034)
Age 25-34	0.115	0.413	0.279	0.051	0.023	0.387	0.247	0.414
	(0.612)	(0.679)	(0.660)	(0.810)	(0.679)	(0.743)	(0.726)	(0.858)
Age 35-44	0.063	0.145	0.077	0.809	0.288	0.456	0.350	0.977
	(0.764)	(0.775)	(0.769)	(1.021)	(0.854)	(0.876)	(0.862)	(1.058)
College or higher	-0.249	-0.065	-0.112	-0.393	0.627	0.911	0.825	0.545
	(0.714)	(0.742)	(0.737)	(0.963)	(0.785)	(0.833)	(0.817)	(0.957)
First degree	0.261	0.300	0.271	-0.108	0.609	0.723	0.659	0.513
	(0.712)	(0.721)	(0.716)	(0.925)	(0.727)	(0.748)	(0.737)	(0.861)
No children		-0.735		-0.690		-0.916		0.290
		(0.707)		(0.921)		(0.795)		(0.978)
No bio children			-0.516				-0.690	
			(0.701)				(0.780)	
Only mother alive				-1.038				-0.226
				(0.739)				(0.827)
Parents separated,				-0.432				-0.933
mother is recipient				(0.670)				(0.653)
No. Obs.	190	189	189	177[a]	190	189	189	177[a]

Notes. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

[a] Additional controls include parents' marital status.

9.2 Experimental Procedures

The first experimental session was a paper and pencil pilot, which was held in May 2011. All subsequent sessions were played on the computer. There were 19 sessions in all, which were held through October 2011. All but one session

were held at 5:30 pm in order to facilitate participation of those working full-time. Due to multiple requests on the part of potential participants, one session was held on a Friday afternoon. As this session time proved inconvenient for too many potential subjects, all remaining sessions were held in the evening.

Prior studies have found that subjects' decisions may be influenced by a lack of anonymity and confidentiality in their choices, particularly towards what might be considered pro-social behaviour (Hoffman *et al.*, 1994; Levitt and List, 2007).[20] We designed our experiment in order to ensure that subjects' anonymity and confidentiality was maintained to the greatest extent possible, so that the experimenter would not be aware of any specific decisions, and so that subjects would not be influenced by any expectations on the part of the experimenter.[21] When a subject arrived in the lab at the Nuffield College Centre for Experimental Social Sciences (CESS), he was asked to address a brown envelope to himself and a white envelope to his parents. If his parents lived at separate addresses, he was instructed to address the parent envelope to his mother. Subjects held onto these envelopes throughout the session. Before entering the lab, the experimenter examined both envelopes to ensure that the brown envelope was addressed to the respondent to a local address, that the white envelope was addressed to a different parent address, and that both addresses were in the UK (gift cards were only valid in the UK). Each subject then picked up a claim ticket from those laid out on a table facing downward by the entrance to the lab. On the other side of the square was a number, and subjects were instructed to sit at the computer station with this number. They were instructed not to speak to one another and to await further instructions from the experimenter.

Subjects were informed that all allocation decisions would be kept strictly confidential. The person who conducted the experiment was not involved in doling out payments, and subjects were told this at the start of the experiment. In addition, the experimenter asked for one subject to volunteer to accompany the experimenter at the conclusion of the session to verify that all payments were being mailed out that day. This was done in order to assure the participants that the transfers would indeed be made, as any doubts regarding this would also potentially influence behaviour (Bolton *et al.*, 1998). Payment allocations were recorded by each respondent's claim ticket number. In a room separate from the lab, research assistants inputted payment amounts onto gift cards and placed them in numbered payment envelopes corresponding to each ticket number. Brown numbered payment envelopes included cards to subjects and white numbered payment envelopes included cards to parents. Letters and any additional information being sent to parents were also included in these white envelopes. The contents of these envelopes did not include the subject's name or ticket number, and subjects were informed of this in order to assure them that their parents would not have any information that we could later use to match to their responses. At the end of the experiment, subjects were called individually by their claim ticket number. A research assistant gave the subject his brown payment envelope, and asked that he examine the gift card and then place it in the brown envelope he

[20] Relatedly, social pressure has been found to be another explanation for charitable giving (DellaVigna *et al.*, 2012).
[21] See below for instructions and other materials provided to subjects.

addressed to himself. A second research assistant gave the subject the white payment envelope, and asked the subject to examine the contents and place them in the white envelope he addressed to his parents. If the subject was also given an opportunity to write a note, the subject placed the top copy of his note, which indicated his claim ticket number, in a large envelope marked "NOTES," and the bottom copy which did not have a claim ticket number, was to be placed in the white envelope addressed to the parent. The subject was asked to seal both envelopes and place them in a larger envelope marked "MAIL." All of these measures were taken to assure the subject of his anonymity.

9.3 Deviations from Rationality

In this section, we compute the significance of rationality violations in our sample to check for patterns in violations that may be linked to our experimental design. For example, did violations occur for "early" budgets if people were confused about the game or for "late" budgets due to fatigue?

1. Afriat efficiency Firstly, we compute the "Afriat Efficiency Index", e, for individuals who fail GARP, which returns the extent to which we would have to relax each budget constraint for the restrictions associated with GARP to be satisfied.[22] Thus, $e \in (0, 1]$, with e further from 1 indicative of more significant violations of rationality (Afriat, 1967).

Appendix Table A4

Afriat Efficiency Index

Recipient	Pass Rate	e
Stranger:	0.884	0.917
Parent:	0.905	0.945
Pooled:	0.268	0.835

Appendix Table A4 shows that e reflects the differences in pass rates between the two recipients, and the low pass rate for the test of the recipients pooled together. The set of games in which parents are the recipients achieves the highest pass rate of 90.5%, with $e = 0.945$. When strangers are the recipients, the pass rate and e are slightly lower, 88.4% and $e = 0.917$. Our subjects treat giving to the two recipients as distinct goods. When we pool all dictator games together, only 26.8% of subjects pass GARP and $e = 0.835$. This is a relatively low Afriat Efficiency Index, so that the low GARP pass rates when all games are pooled is not simply a reflection of a more difficult test; rather, preferences for giving to parents and strangers are distinctly different for most subjects.

2. Size of largest rational choice set Calculating the largest number of choices over which GARP is satisfied is an alternative way to assess the severity of deviations from rationality. Behaviour can be thought of as "*more*

[22] On power indices for revealed preference tests, see Bronars (1986) and Andreoni and Harbaugh (2006).

rational" the fewer the number of choices that must be dropped for the remaining set to satisfy GARP. However, there are some subtle complications to contend with when calculating this metric. The set of choices that must be dropped for the remaining set to satisfy GARP is not necessarily unique. We adapt the partitioning algorithm defined in Crawford and Pendakur (2013) to calculate the largest number of choices over which GARP is satisfied when considering giving to parents and strangers as different goods.

Appendix Table A5

Rational Choice Sets

Recipient	Pass Rate	No. Failing	Minimum Budgets Dropped				
			1	2	3	4	5
Stranger:	0.884	22	9	6	4	1	2
Parent:	0.905	18	9	5	3	1	0

We also examined whether subjects were more likely to make "mistakes" in the budgets they saw early on when they were learning the game, or perhaps later on when they got tired. In games with strangers, people were more likely to make "mistakes" in the first or last three budgets seen. For 17 subjects, one of the first three budgets seen caused them to fail GARP and for 14 subjects, one of the last three budgets seen did so, whereas one of the middle three budgets caused an issue for 8 subjects. But in games with parents, 11 subjects made errors in the last three budgets seen, whereas 8 subjects made errors in both the first three budgets and middle three budgets. Note the order of the budgets was randomised across subjects, so that these differences are not due to any particular budget. But each subject saw the budgets in the same order in both sets of games. So differences between games with parents and strangers cannot be explained by any particular budgets.

9.4 Testing HARP and Gorman Polar Form

In Footnote 9, we note that tests of the Homothetic Axiom of Revealed Preference and Gorman Polar Form preferences suggest that the majority of subjects with weak preferences can have their choices rationalised by preferences with linear Engel curves. We here note the tests that we performed and also how we computed the necessary optimisation error to rationalise the behaviour of those failing both tests. To establish whether a subject's choices satisfy HARP, we check for the existence of a non-empty feasible set, $\{u_i\}_{i=1,\ldots,T,}$ to the following linear programme:

$$u_i - u_j \leq u_j \mathbf{p}_j'(\mathbf{q}_i - \mathbf{q}_j)$$

The existence of a solution to this programme is necessary and sufficient for choices to be rationalised by a homothetic utility function (see Varian, 1983).

To compute the optimisation error necessary to rationalise choices, we found the minimal e (to 2 decimal places) such that the following set of inequalities are satisfied:

$$u_i - u_j \leq u_j \mathbf{p}_j'(\mathbf{q}_i - e\mathbf{q}_j)$$

This is a modification of Varian's (1990) 'Goodness of fit' approach for the standard utility maximisation model. As the programme is non-linear, we performed a grid search on e at the implementation stage. If choices perfectly satisfy HARP and no optimisation error is required then $e = 1$. If choices violate HARP, then choices cannot be perfectly rationalised by a homothetic utility function and $e < 1$.

To establish whether a subject's choices can be rationalised by Gorman Polar Form preferences (this weakens above to allow a non-zero intercept for the linear Engel curves), we check for the existence of a non-empty feasible set, $\{u_i\}_{i=1,\ldots,T,}$ to the following linear programme:

$$\begin{aligned} w_s - w_t &\leq \beta_t \mathbf{p}_t'(\mathbf{q}_s - \mathbf{q}_t) \\ w_t &= \alpha_t + \beta_t \mathbf{p}_t' \mathbf{q}_t \end{aligned}$$

and $\alpha_t = \alpha_t$ and $\beta_t = \beta_t/\delta$, when $\mathbf{p}_t = \delta \mathbf{p}_s$. The existence of a solution to this programme is necessary and sufficient for choices to be rationalised by a Gorman Polar Form preference (Cherchye et al, 2011).

To compute the optimisation error necessary to rationalise choices, we found the minimal e (to 2 decimal places) such that the following set of inequalities are satisfied:

$$\begin{aligned} w_s - w_t &\leq \beta_t \mathbf{p}_t'(\mathbf{q}_s - e\mathbf{q}_t) \\ w_t &= \alpha_t + \beta_t \mathbf{p}_t' \mathbf{q}_t \end{aligned}$$

This is again a modification of Varian's (1990) 'Goodness of fit' approach for the standard utility maximisation model. As the programme is non-linear, we performed a grid search on e at the implementation stage.

Interestingly, we find that many weak preference subjects could have their choices rationalised by a homothetic utility function. We find that 34% of subjects with weak preferences have perfectly homothetic preferences when giving to parents compared to 23% of those when giving to strangers. This implies that 80% of those who pass GARP when playing with parents, and 71% of subjects when playing with strangers, can have their choices rationalised by a homothetic utility function (as all of the strong preferences types examined are homothetic). Typically, only minimal optimisation error is required to rationalise the choices of weak preference types by a homothetic utility function

(see Table A6). Thus, homotheticty of social preferences is well supported for our sample.[23] Once one allows for a non-zero intercept of the Engel curve, as with Gorman Polar Form, the behaviour of the majority of those with weak preferences is perfectly rationalisable and those requiring some optimisation error, typically required only a 0.01-0.03 level of inefficiency.

Appendix Table A6

Proportion of Homothetic Preferences amongst Weak Preference Types

	HARP		Gorman Polar	
	Parent	Stranger	Parent	Stranger
Pass ($e = 1$)	0.34	0.32	0.71	0.69
	(0.066)	(0.056)	(0.063)	(0.058)
Proportion passing with optimisation error, e:				
$e \geq 0.90$	0.82	0.87	1.00	1.00
$e \geq 0.80$	0.95	0.97	1.00	1.00
$e \geq 0.60$	1.00	1.00	1.00	1.00

Notes. Standard errors in parentheses.

9.5 References (For Online Appendix 2)

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[23] We did not compute the MPI here as adjusting the MPI for homothetic preferences was beyond the scope of this paper.

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9.6 Online Appendix 3 {FOR ONLINE PUBLICATION} Lab Materials: Instructions to Subjects and Letters to Parents (see next page)

Claim Ticket Number _____

INSTRUCTIONS

Welcome

Thank you for agreeing to participate in this experiment at the Nuffield Centre for Experimental Social Sciences (CESS). The entire experiment will have two parts and should take approximately one hour. A brief survey will follow the experiment.

This is an experiment about how people make decisions. You will be paid for participating, and the amount of money you will earn depends on the decisions you make. At the end of the experiment, you will be paid privately for your decisions.

A research foundation has provided the funds for this experiment.

Your Identity

You will never be asked to reveal your identity to anyone during the course of the experiment. Your name will never be recorded by anyone. The experimenters will not be able to link you to any of your decisions. In order to keep your decisions private, *please do not reveal your choices to any other participant*.

Payment Envelopes

Before entering the lab, you received two addressed envelopes: a brown envelope addressed to you and a white envelope addressed to your parent(s). Please place these at the top of your desk. You will be asked to present them at the end of the experiment.

Claim Ticket

When you entered the lab, you received a ticket with a number on it. This is your Claim Ticket. Each participant has a different number. You may want to verify that the number on your Claim Ticket is the same as the number on the top of this page.

You will present your Claim Ticket to an assistant at the end of the experiment to receive your payment.

***Please remove your Claim Ticket now and put it in a safe place with your payment envelopes*.**

Claim Ticket Number _____

EXPERIMENT – PART A

You are asked to make a series of choices about how to divide a set of tokens between yourself and one other subject in the room. You and the other subject will be paired randomly and you **will not** be told each other's identity.

As you divide the tokens, you and the other subject will each earn money. Each choice you make is similar to the following:

Example: Divide **50** tokens:
Hold _____ tokens at 10 pence each, and *Pass* _____ tokens at 20 pence each.

In this choice you must divide 50 tokens. You can keep all the tokens, keep some and pass some, or pass all the tokens. In this example, you will receive 10 pence for every token you hold, and the other player will receive 20 pence for every token you pass.

For example, if you hold 50 and pass 0 tokens, you will receive 50 points, or 50 x £0.10 = £5.00, and the other player will receive no points and £0. If you hold 0 tokens and pass 50, you will receive £0 and the other player will receive 50 x £0.20 = £10.00. However, you could choose any number between 0 and 50 to hold. For instance, you could choose to hold 29 tokens and pass 21. In this case you would earn 29 x £0.10 = £2.90, and the other subject would receive 21 x £0.20 = £4.20.

Here is another example:
Example: Divide **40** tokens:
Hold _____ tokens at 30 pence each, and *Pass* _____ at 10 pence each.

In this example every token you hold earns you £0.30, and every token you pass earns the other subject £0.10.

Important Note: In all cases you can choose any number to hold and any number to pass, but the number of tokens you hold plus the number of tokens you pass *must* equal the total number of tokens to divide.

Please feel free to use the scrap paper and calculator provided by the experimenter. On the screen, please click on the calculator button beside each decision question to see payment amounts based on your decisions and to assure that all of the tokens have been allocated as you would like.

Claim Ticket Number _____

EARNING MONEY IN THIS EXPERIMENT

You will be asked to make 11 allocation decisions like the examples we discussed above. We will calculate your payment as follows:

After all your decisions have been made in this part, the computer will randomly pair you with another subject in this experiment, and will select one of your decisions from this part to carry out. From this part, you will then get the tokens you allocated in the 'hold' portion of your decision at the indicated value, and the other subject will get the tokens you allocated on the 'pass' portion of your decision at the indicated value. The earnings from your decision in this part will be recorded.

Next you will be paired again with a different subject in the experiment. This time, the computer will randomly choose one of the other subject's decisions from this part to carry out. You will earn the tokens allocated in the 'pass' portion from this part at the indicated values. Your earnings from this pairing will also be recorded.

The payment amounts calculated from Parts A and B will be summed up. We will send you a Sainsbury's gift card with this total amount on the card in the envelope addressed to you. As it takes time to process payments to Sainsbury's, please note that you will receive your card before it becomes active. Please note the activation date indicated in the card wallet. You will also receive an additional £4 show-up fee in cash.

After all the calculations have been made in Parts A and B, another experimenter who was not involved in the experiment until this time will ask you to bring up your claim ticket and will hand you your earnings envelope. This will again help to guarantee your privacy. You will present your addressed brown envelope with the opening facing upwards so that the assistant cannot see your name and address on it. You will verify that the correct payment amount has been recorded beside the number on the gift card being mailed to you, and sign a receipt for this payment. You will place your gift card in the brown payment envelope and seal it, placing it in a larger envelope with all envelopes to be mailed out that day.

A monitor chosen at the beginning of this experiment will verify that all of these payments are mailed out at the end of the session.

On the following pages are the choices we would like you to make for Part A. Please complete the form, taking the time you need to be accurate. When all subjects are done, we will instruct you on how to move on to Part B.

Thank you very much for your participation.

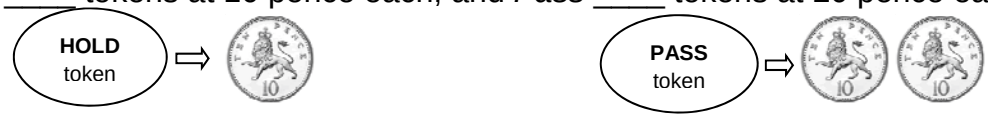
Claim Ticket Number _____

DECISION SHEET – PART A

Directions: Please fill in all the blanks below. Click on the calculator button to see how much you and the recipient will each be paid as a result of your decision. Feel free to make changes to your decisions until you are pleased with the payment allocations. By clicking on the calculator button, you will also be told if you have allocated more tokens than are available. Please answer all questions. Please note that once you click on the Finish button below, you will not be able to change your answers.

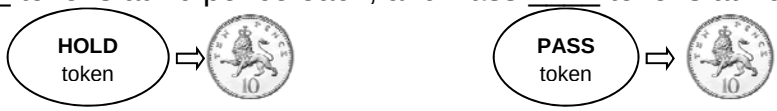
1. Divide **40** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 40 pence each.

2. Divide **60** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 20 pence each.



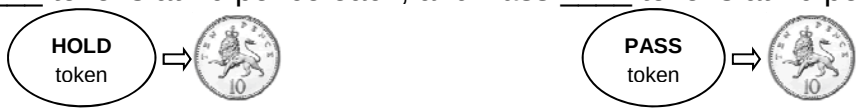
3. Divide **75** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 20 pence each.

4. Divide **80** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 10 pence each.



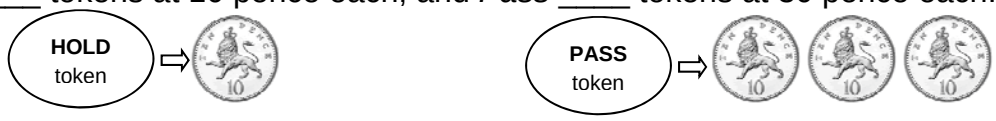
5. Divide **60** tokens:
   Hold ____ tokens at 20 pence each, and *Pass* ____ tokens at 10 pence each.

6. Divide **60** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 10 pence each.



Claim Ticket Number _____

7. Divide **40** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 30 pence each.

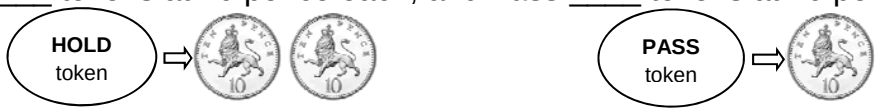


8. Divide **40** tokens:
   Hold ____ tokens at 30 pence each, and *Pass* ____ tokens at 10 pence each.

9. Divide **100** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 10 pence each.

10. Divide **40** tokens:
    Hold ____ tokens at 40 pence each, and *Pass* ____ tokens at 10 pence each.

11. Divide **75** tokens:
    Hold ____ tokens at 20 pence each, and *Pass* ____ tokens at 10 pence each.



Claim Ticket Number _____

EXPERIMENT – PART B

You are asked to make a series of choices about how to divide a set of tokens between yourself and your parent(s). Please note that if both of your parents are living and live at separate addresses, we ask that you divide these tokens with your mother.

As you divide the tokens, you and your parent(s) will each earn money. Each choice you make is similar to the following:

Example: Divide **50** tokens:
Hold _____ tokens at 10 pence each, and *Pass* _____ tokens at 20 pence each.

In this choice you must divide 50 tokens. You can keep all the tokens, keep some and pass some, or pass all the tokens. In this example, you will receive 10 pence for every token you hold, and your parent(s) will receive 20 pence for every token you pass.

For example, if you hold 50 and pass 0 tokens, you will receive 50 points, or 50 x £0.10 = £5.00, and your parent(s) will receive no points and £0. If you hold 0 tokens and pass 50, you will receive £0 and your parent(s) will receive 50 x £0.20 = £10.00. However, you could choose any number between 0 and 50 to hold. For instance, you could choose to hold 29 tokens and pass 21. In this case you would earn 29 x £0.10 = £2.90, and your parent(s) would receive 21 x £0.20 = £4.20.

Here is another example:
Example: Divide **40** tokens:
Hold _____ tokens at 30 pence each, and *Pass* _____ at 10 pence each.

In this example every token you hold earns you £0.30, and every token you pass earns your parent(s) £0.10.

Important Note: In all cases you can choose any number to hold and any number to pass, but the number of tokens you hold plus the number of tokens you pass *must* equal the total number of tokens to divide.

Please feel free to use the scrap paper and calculator provided by the experimenter. On the screen, please click on the calculator beside each decision question to see payment amounts based on your decisions and to assure that all of the tokens have been allocated as you would like.

Claim Ticket Number _____

EARNING MONEY IN THIS EXPERIMENT

You will be asked to make 11 allocation decisions like the examples we have just discussed. We will calculate your payment as follows:

The computer will select one of your decisions to carry out. You will then get the tokens you allocated in the 'hold' portion of your decision at the indicated value, and your parent(s) will get the tokens you allocated on the 'pass' portion of your decision at the indicated value. The earnings from your decision in this part will be recorded.

The payment amounts calculated from Parts A and B will be summed up. We will send you a Sainsbury's gift card with this total amount on the card in the envelope addressed to you. As it takes time to process payments to Sainsbury's, please note that you will receive your card before it becomes active. Please note the activation date indicated in the card wallet. You will also receive an additional £4 show-up fee in cash.

The payment amount to your parents that is calculated in this part will be inputted onto the Sainsbury's gift card that will be mailed in the envelope addressed to them.

After all the calculations have been made in Parts A and B, another experimenter who was not involved in the experiment until this time will ask you to bring up your claim ticket and will hand you your earnings envelope. This will again help to guarantee your privacy. You will present your addressed brown envelope with the opening facing upwards so that the assistant cannot see your name and address on it. You will verify that the correct payment amount has been recorded beside the number on the gift card being mailed to you, and sign a receipt for this payment. You will place your gift card in the envelope and seal it, placing it in a larger envelope with all envelopes to be mailed out that day.

The payment to your parent(s) will be sent in the white envelope. You will place the gift card to your parent(s) in the white envelope addressed to them, seal it and place it in the larger envelope with all envelopes to be mailed out that day.

A monitor chosen at the beginning of this experiment will verify that all of these payments are mailed out at the end of the session.

Please note that if your parent(s) did not receive a payment, a gift card will be enclosed, but it will have no value. The card wallet will indicate that they did not receive an amount. All participants' parents will receive a letter regardless of whether or not a payment is made.

Claim Ticket Number _____

{ADDITIONAL INSTRUCTIONS FOR TREATMENTS 2 AND 3}

{The letter that will be mailed to your parent(s) is enclosed here. Please read this letter and return it to the experimenter when instructed to do so. Your parent(s) will also receive a printed copy of all of the decisions you have made in this part. This will be placed in an envelope to be collected with your payment to ensure your privacy. You may review this before placing the letter and decision sheet in the white envelope addressed to your parent(s).

For some parents, receiving this letter and payment may cause confusion and concerns. You may want to discuss this with them to alleviate their concerns. However, you do not need to tell them anything more than what has been communicated in the letter. That is entirely up to you. We have also provided information in case they would like to contact us. However, we will not divulge any more information than what has been provided here. The decision to divulge any other information is entirely and wholly left up to you. Moreover, as we will not have information to identify you, we will have no way to connect any parent who contacts us with any participant.}

{ADDITIONAL INSTRUCTIONS FOR TREATMENT 3}

{Finally, we would also like to give you an opportunity to write a personal note to your parent(s). If you wish to write a note to your parent(s), please do so on the enclosed carbon copy paper. Please keep this with your claim ticket and addressed envelopes. When you present your claim ticket, we will ask you to place the top copy in an envelope to ensure your privacy, and to place the other copy in the envelope addressed to your parents.}

On the following pages are the choices we would like you to make for Part B. Please complete the form, taking the time you need to be accurate. When all subjects are done, we will instruct you on the final part of this experiment.

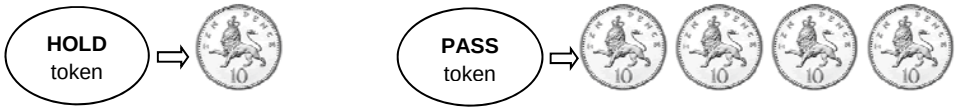
Thank you very much for your participation.

Claim Ticket Number _____

DECISION SHEET – PART B

Directions: Please fill in all the blanks below. Click on the calculator button to see how much you and the recipient will each be paid as a result of your decision. Feel free to make changes to your decisions until you are pleased with the payment allocations. By clicking on the calculator button, you will also be told if you have allocated more tokens than are available. Please answer all questions. Please note that once you click on the Finish button below, you will not be able to change your answers.

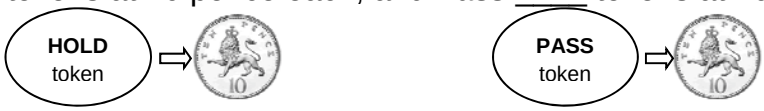
1. Divide **40** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 40 pence each.



2. Divide **60** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 20 pence each.

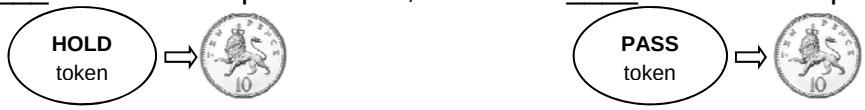
3. Divide **75** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 20 pence each.

4. Divide **80** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 10 pence each.



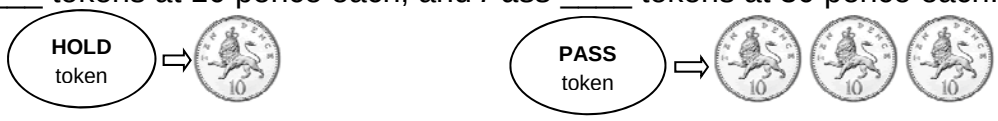
5. Divide **60** tokens:
   Hold ____ tokens at 20 pence each, and *Pass* ____ tokens at 10 pence each.

6. Divide **60** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 10 pence each.



Claim Ticket Number _____

7. Divide **40** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 30 pence each.

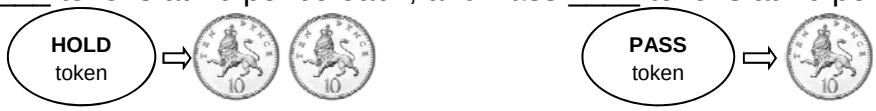


8. Divide **40** tokens:
   Hold ____ tokens at 30 pence each, and *Pass* ____ tokens at 10 pence each.

9. Divide **100** tokens:
   Hold ____ tokens at 10 pence each, and *Pass* ____ tokens at 10 pence each.

10. Divide **40** tokens:
    Hold ____ tokens at 40 pence each, and *Pass* ____ tokens at 10 pence each.

11. Divide **75** tokens:
    Hold ____ tokens at 20 pence each, and *Pass* ____ tokens at 10 pence each.



{TREATMENT 1}

Letter to Your Parent(s)

The letter that will be mailed to your parent(s) is enclosed here. Please read this letter and return it to the experimenter when instructed to do so. This will be placed in an envelope to be collected with your payment to ensure your privacy. You may review this letter again before placing it in the white envelope addressed to your parent(s).

For some parents, receiving this letter and payment may cause confusion and concerns. You may want to discuss this with them to alleviate their concerns. However, you do not need to tell them anything more than what has been communicated in the letter. That is entirely up to you. We have also provided information in case they would like to contact us. However, we will not divulge any more information than what has been provided here. The decision to divulge any other information is entirely and wholly left up to you. Moreover, as we will not have information to identify you, we will have no way to connect any parent who contacts us with any participant.

{TREATMENT 1}

Dr Maria Porter
Research Fellow
maria.porter@nuffield.ox.ac.uk
Tel. 01865 612813

Nuffield College
New Road
Oxford
OX1 1NF

5 September 2011

Dear Parent of Study Participant,

Your child has participated in a research study at the University of Oxford. The purpose of this study is to learn about how people make decisions.

As a result of his/her participation in this study, you may or may not receive a small gift. Please note that not all parents receive a gift. In order to adhere to the guidelines of this study, we must notify parents of all participants, whether or not they receive a gift.

Enclosed is a Sainsbury's gift card valued at the amount you have been allocated. If you have not been allocated a gift, the value of the enclosed gift card is zero. The value of your gift card is indicated along with the date it will be activated and available for use. Please note that you may not be able to use this card prior to this date.

In order to ensure your privacy, we have not recorded your name and address, and we will not contact you any further.

If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Dr. Maria Porter

{TREATMENT 2}

Letter to Your Parent(s)

The letter that will be mailed to your parent(s) is enclosed here. Please read this letter and return it to the experimenter when instructed to do so. Your parent(s) will also receive a printed copy of all of the decisions you have made in this part. This will be placed in an envelope to be collected with your payment to ensure your privacy. You may review this before placing the letter and decision sheet in the white envelope addressed to your parent(s).

For some parents, receiving this letter and payment may cause confusion and concerns. You may want to discuss this with them to alleviate their concerns. However, you do not need to tell them anything more than what has been communicated in the letter. That is entirely up to you. We have also provided information in case they would like to contact us. However, we will not divulge any more information than what has been provided here. The decision to divulge any other information is entirely and wholly left up to you. Moreover, as we will not have information to identify you, we will have no way to connect any parent who contacts us with any participant.

{TREATMENT 2}

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Dear Parent of Study Participant,

Your child has participated in a research study at the University of Oxford. As a result of his/her participation in this study, you may or may not receive a small gift.

The purpose of this study is to learn about how people make decisions. All participants were asked to play a series of games in which they allocated a set of tokens between themselves and a parent. As they divided the tokens between themselves and you, they earned money for themselves and for you. We have enclosed instructions for these games and the decisions your child made in these games. We chose at random one of the 11 games played by your child and carried out your child's decision for that game. In the attached, we let you know how your child played this game and the outcomes of it. This determined how much money was to be paid to you and to your child.

Please note that not all parents receive a gift. In order to adhere to the guidelines of this study, we must notify parents of all participants, whether or not they receive a gift.

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Sincerely,

Dr. Maria Porter

HOW THE GAME WAS PLAYED

All participants were asked to play a series of games in which they allocated a set of tokens between themselves and a parent. As they divided the tokens between themselves and you, they earned money for themselves and for you.

Your child played 11 different games and allocated between 40 and 100 tokens each time. In some games, each token your child held for him or her self was worth 10 pence each. But in some games it was worth 20, 30, or 40 pence. Similarly, each token passed on to you was worth either 10, 20, 30, or 40 pence, depending on the game.

In every game, your child could choose any number to hold and any number to pass, but the number of tokens held plus the number of tokens passed *must* have equalled the total number of tokens to divide.

We have enclosed the decisions your child made for these 11 different games.

After your child played the 11 different games, we randomly chose one of these games to carry out. In the game that was chosen at random:

Your child divided _____ tokens:

Holding _____ tokens at ____ pence each, and *Passing* at _____ tokens at ____ pence each.

As a result, your child received £_____ and you receive £_____ .

Your payment is enclosed. Thank you for your time.

{TREATMENT 3}

Letter to Your Parent(s)

The letter that will be mailed to your parent(s) is enclosed here. Please read this letter and return it to the experimenter when instructed to do so. Your parent(s) will also receive a printed copy of all of the decisions you have made in this part. This will be placed in an envelope to be collected with your payment to ensure your privacy. You may review this before placing the letter and decision sheet in the white envelope addressed to your parent(s).

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{TREATMENT 3}

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Your child was also given the option of writing you a note. If your child chose to do so, we have enclosed it here along with your gift card.

In order to ensure your privacy, we have not recorded your name and address, and we will not contact you any further.

If you have any questions or concerns, please do not hesitate to contact me.

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