Preferences over Wealth: Experimental Evidence

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Abstract. We run an intentionally simple lab experiment on intertemporal spending and saving decisions under borrowing constraints with 180 students of various disciplines. Due to a positive discount factor and linear utility, the payout-maximizing behavior would be to spend any periodical income or initial wealth instantaneously. While about half of the participants behave optimal, we find a robust pattern where participants on average tend to form and maintain a stock of wealth of about 2 standard deviations of the uncertain periodical income or about 2.5% of the expected lifetime income. We rationalize this pattern with a simple model where wealth enters the utility function directly.

Keywords. consumption; saving motives; wealth; experiment

JEL classification. D12, E21, E62, H23

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1 Extended Abstract

Keynes (1936) developed a comprehensive list of saving motives that has been reconsidered and amended by Browning and Lusardi (1996): (1) the precautionary motive, (2) the life-cycle motive, (3) the intertemporal substitution motive, (4) the improvement motive, (5) the independence motive, (6) the enterprise motive, (7) the bequest motive, (8) the avarice motive, and (9) the downpayment motive.

The standard life-cycle model has a strong focus on the life-cycle and intertemporal substitution motives, where saving serves to maximize lifetime utility via smoothing and increasing lifetime consumption. Dynastic models have rationalized the bequest motive, again focussing on (multi-generational) utility maximization from consumption. These models however do not square well with some empirical and experimental evidence of over-saving where agents hold a stock of wealth that is higher than optimal under the assumptions of these models (Duffy 2016). Such behavior could be rationalized by models where agents have preferences over wealth such that wealth enters directly into the utility function. Carroll (1998) has formulated a "Capitalist Spirit" model where direct utility from wealth is used to explain the saving behavior of the very rich via the avarice motive. At the same time, preferences over wealth could be a reduced form for the precautionary motive, improvement, independence and enterprise motives. The empirical literature has found it quite challenging to distinguish the single saving motives and other influences like credit constraints (Jappelli and Pistaferri 2014). However, knowledge about the relevance of single saving motives can be useful for macroeconomic policymakers that for example want to predict the demand effects of fiscal or monetary policy or design suitable social insurance and tax schemes.

This paper attempts to identify preferences over wealth in a lab experiment among 180

students of various disciplines. Experimental evidence on over-saving has been called into question because of the complicated nature of the optimal consumption path such that observed over-saving could be well-explained by simple error instead of preferences over wealth. Therefore, we construct a simple environment in the spirit of Carbone and Hey (2004). Participants have to make periodical spending and saving decisions under a given expected stationary lifetime income of 2,000 units which is subject to i.i.d. shocks; a well-known lifetime of 20 periods; a risk-free, non-interest bearing and fully liquid asset (bank account) and without any borrowing facilities. The underlying utility function for spending that determines the reward structure of the experiment is most simple: it is linearly increasing in spending, there is no utility from smoothing and the linear transformation rate is decreasing by a constant factor each period (costs of saving; CoS_i).

$$U = \sum_{t=1}^{20} c_t \rho * (1 - CoS)^t \tag{1}$$

where c_t is spending in period t and ρ transforms spending into utility U represented by money rewards after the experiment. The optimal decision would be to spend any periodical income or initial wealth instantaneously. Keeping any savings would be sub-optimal for a rational agent. The utility function does not promote any of the saving motives (1) trough (9) as laid out above. Of course, agents are free to deviate from optimizing behavior and could practice excess saving at the cost of a lower payoff. We consider six different treatments: agents are randomly assigned one of three different costs of saving $CoS = [1\%, 5\%, 20\%]$; agents are randomly assigned an initial wealth stock $w_0 = [0; 1000]$. Participants have to answer a couple of questions prior to the

experiment in order to make sure they understand the payout structure. Moreover, they play a 20-period lasting test-round in order to get familiar with the experimental design.

Nevertheless, while about half of the participants are optimizers, we find a robust pattern where participants on average tend to form and maintain a stock of wealth of about 2 standard deviations of the uncertain periodical income or about 2.5% of the expected lifetime income, very close to estimates from some of the empirical literature (Lusardi 1998). The impression that these findings are not pure noise but do imply some structure is particularly strengthened by three further patterns: first, both "rich" and "poor" subjects starting from very different initial wealth conditions tend to approach the same stock after a smooth trajectory phase; second, agents that face higher costs of saving plausibly approach a smaller stock of wealth, pointing to optimizing behavior at the margin, yet some additional utility from holding savings; third, participants (except for four outliers) tend to run down their stock in the final period. Figure 1 shows these patterns for the full sample and subsamples with different costs of saving.

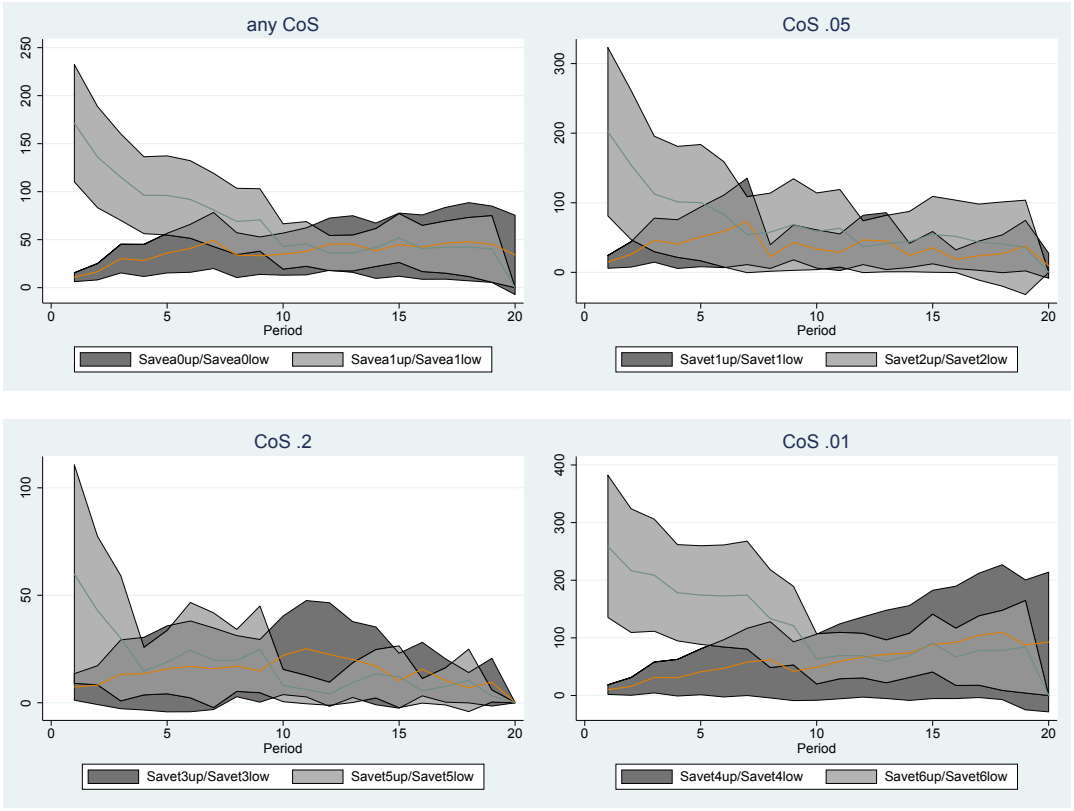
How can we rationalize the observed behavior? Obviously, a substantial share of agents does not follow equation (1) in their decision making. Alternatively, a model where average end-of-period wealth is a direct ingredient of the utility function seems to be a more plausible fit to the data:

$$U^* = \sum_{t=1}^{20} c_t \rho * (1 - CoS)^t + \sum_{t=1}^{20} w_{t+1} \alpha \tag{2}$$

$$\text{s.t. } w_{t+1} = w_t + y_t - c_t \tag{3}$$

Agents then maximize utility by allocating lifetime income between consumption and wealth, both yielding direct utility. In the optimum, marginal utilities from consumption

Figure 1: Mean wealth stock at end-of-period of "poor" vs. "rich" agents for varying costs of saving CoS



and wealth should be equal.

We interpret our experimental findings as a strong indication of preferences over wealth. A model including preferences over wealth is consistent with several of the saving motives mentioned at the outset (1,4-9). Given the structure of our experiment and the observed pattern, we can exclude the improvement, enterprise, bequest and downpayment motive. The observed pattern is consistent with precautionary buffer stock saving (even though there is no extrinsic reward for smoothing consumption), independence and avarice motive. How can we discriminate between them? A relevant difference between these motives is their prediction of the marginal propensity to save (MPS) out of additional income depending on the level of wealth. Both the precautionary and the avarice motive would predict the MPS to be increasing in the level of wealth, while independence would imply the opposite. Since the path of income y_t is stationary and has a known mean, but is subject to i.i.d. shocks, we can exploit the variation in income, consumption and wealth in order to estimate the marginal propensity to save out of changes in income:

$$\Delta s_t = \Delta y_t - \Delta c_t = \beta_0 + \beta_1 \Delta y_t + \varepsilon_t \tag{4}$$

where β_1 is the MPS. In order to estimate the impact of the level of wealth on the MPS, we append (4) by an interaction term featuring the wealth level at the beginning of the period w_t:

$$\Delta s_t = \beta_0 + \beta_1 \Delta y_t + \beta_2 w_t + \gamma \Delta y_t * w_t + \varepsilon_t \tag{5}$$

where γ indicates the impact of the wealth level on the MPS. Results (referring to the sample means of income and wealth) are shown in Table 1. The MPS is in a plausible range and significantly increases with an additional unit of wealth by about 0.15%. These

Table 1: Marginal Propensity to Save and the Level of Wealth

	Dep. Var. Δs_t	
	(1)	(2)
Δy_t	0.164***	0.302***
	(0.0369)	(0.0365)
w_t		-0.184***
		(0.0108)
$\Delta y_t * w_t$		0.00146***
		(0.000239)
Const	-0.659	-6.366***
	(1.704)	(1.661)
Observations	3,240	3,240
R-squared	0.006	0.097

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

findings are consistent with precautionary and avarice motives.

As an additional exercise, we relate the mean end-of-period wealth to the respective treatment categories and self-reported characteristics of agents that we collected from a questionnaire prior to the experiment. Note that we can only exploit cross-sectional variation of the 180 participants here. Results are shown in Table 2. Columns (1)-(4) cover more parsimonious to more comprehensive specifications of the full sample; column (5) excludes all optimizing agents; column (6) covers information from period 9 to 19 only, which is the phase where end-of-period wealth is quite stable (see again Figure

1). The coefficient of Costs of Saving (CoS) is highly statistically and economically significant for mean wealth. The wealth endowment dummy ($wtreat$) is only weakly significant, driven by the first periods where the different wealth endowments still play a role. Being a student of natural sciences (NS) vs. humanities does not seem to be influencing the wealth holdings.

Concerning psychological characteristics, participants who describe themselves as more patient tend to hold more wealth, likely because they weigh the costs of saving lower than less patient agents. More impulsive participants also tend to hold higher savings. Interestingly, the coefficient is insignificant for the subsample excluding optimizers, likely because impulsiveness is a good predictor of non-optimizing behavior.[2] Being more risk-prone does not seem to have a significant impact on wealth holdings in our sample. The same holds for concerns about the general and own economic situation as well as the health situation. Finally, participants do not seem to bring their habits to the experiment since there is no significant effect of their real-life average monthly disposable income or saving on wealth holdings in the lab.

The results do not provide strong evidence in favor of precautionary or avarice motives of saving. While a precautionary buffer stock comes to mind when looking at the patterns in Figure 1, risk perceptions and concerns, which would be candidate variables, do not seem to shape participants wealth holdings in the experiment. Avarice, on the other hand, does not fit well to the fact, that agents with endowments do not retain more wealth than those with zero initial wealth, except for the early transitional periods.

As a general conclusion, our experiment indicates that there are preferences over wealth.

[2] A probit regression shows that a one-step increase on the scale of impulsiveness (0-10) makes it 10% less likely (and highly significantly so) to be an optimizer (results available on request).

Table 2: Wealth Holdings and Personal Characteristics

	Dep. Var. w_{t+1}[1]					
	(1)	(2)	(3)	(4)	(5)	(6)
	plain	pir	con	full	noopt	p9-19
CoS	-3.486***	-3.654***	-3.416***	-3.571***	-6.449***	-2.961**
	(1.084)	(1.061)	(1.097)	(1.069)	(2.242)	(1.137)
wtreat	29.06	25.23	30.13*	26.42	23.70	0.835
	(17.85)	(17.58)	(17.87)	(17.48)	(37.23)	(18.61)
NS	-19.86	-12.41	-22.00	-14.56	-0.350	-16.51
	(17.74)	(17.49)	(17.83)	(17.45)	(34.67)	(18.57)
patience		9.053***		9.767***	18.27***	7.824**
		(3.431)		(3.445)	(6.887)	(3.667)
impulse		10.51***		10.65***	12.17	7.971*
		(3.835)		(3.827)	(8.317)	(4.073)
risk		2.083		2.991	7.003	4.015
		(3.869)		(3.913)	(8.717)	(4.165)
conc_econ			-17.09	-21.89	-33.33	-20.61
			(14.77)	(14.30)	(29.02)	(15.22)
conc_own_fin			-16.63	-22.50	-22.77	-19.51
			(15.16)	(14.83)	(32.82)	(15.78)
conc_health			17.63	17.93	34.63	19.26
			(14.84)	(14.33)	(27.19)	(15.25)
increal	2.433	5.213	0.181	2.937	2.439	-3.550
	(14.44)	(14.09)	(14.51)	(14.07)	(30.80)	(14.97)
savreal	-5.252	-6.892	-4.463	-6.013	-15.74	-6.012
	(5.920)	(5.855)	(6.090)	(5.954)	(12.26)	(6.337)
Constant	89.98***	-12.74	124.1**	34.12	55.46	49.54
	(29.08)	(39.57)	(53.83)	(56.32)	(110.3)	(59.95)
Observations	180	180	180	180	78	180
R-squared	0.084	0.156	0.101	0.182	0.300	0.120

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

Moving to a closer examination of saving motives, however, gives mixed results. In any way "[...]the implications for saving behavior are [...] virtually indistinguishable from the idea that wealth enters the utility function directly" (Carroll 1998).

References

Browning, M. and A. Lusardi (1996). Household saving: Micro theories and micro facts. *Journal of Economic Literature 34*(4), 1797–1855.

Carbone, E. and J. D. Hey (2004). The effect of unemployment on consumption: An experimental analysis. *The Economic Journal 114*(497), 660–683.

Carroll, C. D. (1998). Why do the rich save so much? *NBER Working Paper* (6549).

Duffy, J. (2016). Macroeconomics: A survey of laboratory research. In J. H. Kagel and A. E. Roth (Eds.), *The Handbook of Experimental Economics*, pp. 1–90. Princeton: Princeton University Press.

Jappelli, T. and L. Pistaferri (2014). Fiscal policy and mpc heterogeneity. *American Economic Journal: Macroeconomics 6*(4), 107–136.

Keynes, J. M. (1936). *The General Theory of Employment Interest and Money*. London: Macmillan.

Lusardi, A. (1998). On the importance of the precautionary saving motive. *The American Economic Review 88*(2), 449–453.