Locus of Control, Saving and Propensity to Save

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July 27, 2020

Abstract

We study the relationship between saving choices and a key psychological characteristic such as locus of control using data from a longitudinal survey representative of the Dutch population. Locus of control measures the extent to which individuals perceive their life outcomes to be determined by their own actions, as opposed to external factors. Our findings show that those who believe to be in control of future outcomes save more, both at the extensive (probability to save) and intensive margins (amount of savings). We also investigate the mechanisms behind the relationship. Locus of control may affect both the propensity to save for general purposes and savings to achieve a specific purchase goal (e.g. buying a house). We find that both channels are significant, the latter being more sizeable.

JEL-codes: D14; D91.
Keywords: Locus of Control; Saving decisions; Propensity to save; Mediation analysis.

1 Introduction

Population ageing and pension reforms implemented in many countries over the last decades make the accumulation of savings increasingly important for individuals and households (Van Rooij et al., 2011, 2012; van Schie et al., 2012). As a consequence, researchers and policymakers have been devoting growing attention to the determinants of saving choices. Analysing why people save may help to understand individual economic behaviour and to address policy interventions aimed to influence household savings.

This paper aims to investigate the role of psychological traits on saving choices by focusing on *locus of control*. Locus of control can be described as "a generalised attitude, belief, or expectancy regarding the nature of the causal relationship between one's own behaviour and its consequences" which "might affect a variety of behavioural choices in a broad band of life situations" (Rotter, 1966). Individuals with an *internal locus of control* perceive life events to be contingent upon their behaviour. In contrast, those with an *external locus of control* view them as the result of external factors, such as luck, chance, or fate.

Why may locus of control be related to savings? On the one hand, individuals with internal rather than external locus of control – namely those who believe that their life's outcomes stem from their own actions – may save more to build up resources to achieve their goals. These can be either specific targets (e.g. buying a house or a car) or general, non-specific purposes (e.g. being financially independent, or covering unexpected expenses). On the other hand, individuals with an internal locus of control believe to be in control of future outcomes and, thus, to be less exposed to future adverse events. As a result, they may save less for precautionary reasons.[1] The direction of the relationship between locus of control and savings is, therefore, *a priori* ambiguous and is an empirical question.

The contribution of this paper is twofold. First, we empirically examine the linkage between locus of control and savings. We use the DNB Household Survey (DHS), which is a survey rich of information on a representative sample of the Dutch population. In addition to having information on several socio-economic variables, the survey repeatedly measures locus of control. We develop our analysis exploiting the longitudinal dimension of our dataset and applying the Mundlak approach to relax the assumption of zero correlation between the

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[1] This is in line with findings showing a positive association between internal locus of control and risky exposure in the financial domain (Kesavayuth et al., 2018; Salamanca et al., 2016).

observed and the unobserved variables. In our data, locus of control is represented by two factors: internal and external locus of control. Our results show that individuals with an internal rather than external locus of control save more, both at the extensive (probability to save) and the intensive margin (amount of savings). The response of savings to locus of control is quantitatively relevant, also in comparison to other factors, such as income.

The second contribution of this paper is to investigate, for the first time, the mechanisms linking individuals' locus of control and their saving behaviour. More precisely, we distinguish between a direct and an indirect channel which, in a sense, can be seen, respectively, as "specific" and "non-specific" saving motives. Individuals who believe that their actions can determine their future outcome, namely those with an internal locus of control, may save more to achieve specific goals, such as buying a house or other goods. This is what we label as the *direct* (specific) channel. In addition, locus of control may be *indirectly* related to savings through the propensity to save for general purposes (non-specific motive).[2] It is not obvious to assess *a priori* how locus of control correlates with the propensity to save. On the one hand, individuals with an internal locus may save more for general goals. Since they believe their current actions determine their future outcome, they may accumulate resources to deal with unexpected events or to sustain their retirement. This is in line with psychological literature showing that internal locus of control is positively linked with problem-focused coping strategies (Anderson, 1977) and with the ability to cope with change (Judge et al., 1999). On the other hand, they may be less concerned about bad luck in the future and, in turn, they may save less for precautionary reasons. Descriptive analysis of the distribution of saving purposes among respondents with a different locus of control supports the potential relevance of the indirect non-specific channel in our data. It suggests a positive correlation between internal locus of control and savings for general purposes.

We perform a mediation analysis (Baron and Kenny, 1986) to examine the link between locus of control and savings. This allows us to disentangle the

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[2]The positive relationship between the propensity to save and general saving goals is in line with previous studies showing a positive association between cognitive abstraction and propensity to save. "Any action can be construed at varying levels of cognitive abstraction. Events and objects can be represented at either a higher, more abstract level, involving consideration of superordinate goals [...] or a lower, more concrete level, involving consideration of subordinate goals" (Rudzinska-Wojciechowska, 2017, p. 2). The experiments run by Rudzinska-Wojciechowska (2017) exploit changes in participants' levels of construal in the actual decision-making moment to evaluate their impact on the propensity to save. Her findings show that individuals with an abstract mindset turn out to be more prone to save than those with a concrete mindset.

direct component of locus of control from the indirect one, which in our view is mediated by the propensity to save. Results from the mediation analysis show that both direct and indirect channels are significant, the indirect channel being less sizeable than the direct one. For internal (external) locus about 40% (22%) of the total effect passes through a higher propensity to save.

Our paper contributes to the literature focused on the relevance of locus of control on several dimensions of individual behaviour. The first aspect is the human capital investment. Those who believe that what happens in life stems mainly from their own actions expect higher returns of human capital investment, which reflects into youths' educational choices (Coleman and DeLeire, 2003) and parental investment on their children's early skill formation (Lekfuangfu et al., 2018). Similarly, the extent to which individuals believe that their actions determine their outcome fosters their health investment and engagement in health-promoting activities (Kesavayuth et al., 2020; Cobb-Clark et al., 2014; Steptoe and Wardle, 2001). Locus of control affects job search strategies, inasmuch it determines subjective belief about the impact of job search effort on the likelihood of receiving a job offer (Caliendo et al., 2015). Locus of control influences financial decisions. An internal locus of control is positively associated with willingness to take financial risks (Kesavayuth et al., 2018), investment in risky assets (Salamanca et al., 2016), and asset accumulation (Cobb-Clark et al., 2016). Finally, it turns out to affect housing and mortgage decisions (Wang et al., 2008).

Locus of control is related to other non-cognitive attitudes, which have been shown to affect economic outcomes. First, the so-called "big-five" personality traits seem to affect risky decision making (Almlund et al., 2011; Rustichini et al., 2012) and stock market participation (Conlin et al., 2015; Bucciol and Zarri, 2017). Personality is also significantly related to wealth accumulation. Nyhus and Webley (2001) and Brown and Taylor (2014) found, on survey data representative of the Dutch and British population respectively, that savings are lower with lower levels of extraversion and agreeableness; Mosca and McCrory (2016) show that savings correlate positively with extraversion and negatively with neuroticism in a sample of older Irish couples. Even if locus of control does not belong to the "big-five" personality traits, it turns out to be associated with neuroticism (Almlund et al., 2011). Locus of control is also related to the literature analysing how perceptions about the determinants of a specific outcome – luck as opposed to merit – may affect preferences and behaviour (Cappelen et al., 2013; Cetre et al., 2019).

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The remainder of the paper is organised as follows. Section 2 illustrates the dataset and the main variables of interest. Section 3 describes the empirical strategy and summarises the results. Section 4 concludes.

2 Data

The empirical analysis is based on data from the DNB Household Survey (DHS), a longitudinal survey representative of the Dutch population. Data are collected annually, but our dataset includes only the eight waves in the period 2005-2017 (about one wave every two years) that gathered information on locus of control.[3] Since savings are collected at the household level, we restrict the sample to household heads (defined in DHS as the main income earners). The final dataset includes 6,652 observations (2,406 respondents; on average 2.76 observations per respondent). Descriptive statistics are reported in Table 1; all monetary values are converted in 2015 levels, after correcting for inflation using the Dutch CPI index.

<center>TABLE 1 ABOUT HERE</center>

Our two outcome variables are the extensive and intensive margins of savings. The first indicator is a dummy variable capturing whether the household put any money aside in the twelve months prior the interview.[4] Table 1 shows that more than 70% of respondents in our sample have positive savings. The second outcome variable is the (inverse hyperbolic sine of) the amount saved in the calendar year before the interview.

The key regressor in our analysis is the locus of control. DHS respondents are asked to indicate on a Likert-scale (from 1 to 7) whether they agree on 13 statements, aimed to measure internal and external locus of control in economic decisions. The statements are based on the scale from Furnham (1986). To construct the locus of control variable, we perform a factor analysis with polychoric correlation on those 13 responses. We identify two factors representing 99% of the total variance. Factor 1 turns out to be positively correlated with statements measuring internal locus, while it is negatively correlated with the others (see Appendix A for details). Thus, we interpret this factor as "internal

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[3]More precisely, the sample includes waves 2005, 2006, 2007, 2009, 2011, 2013, 2015, and 2017.

[4]Wording and details about the construction of the variables are illustrated in Appendix A.

locus of control". Similarly, Factor 2 is more highly correlated with statements measuring external locus of control. We then interpret this factor as "external locus of control".

The amount of savings exhibits a clear correlation with locus of control (internal locus: 0.17; external locus: -0.088). In this paper, we argue that locus of control not only affects savings in general, but it does so also by changing the motivation to save. This is supported by descriptive evidence on the relationship between locus of control and saving motives. DHS asks respondents to evaluate the importance of 16 possible reasons to save money. Individuals with an internal locus of control above the median more frequently report that it is important to save to avoid asking for financial help from others, and to increase the freedom to do what they want (non-specific motives for saving).[5] This evidence points out a correlation between locus of control and the propensity to save for general purposes. Based on this, our analysis aims to split the total effect of locus of control in two components: a direct one, where locus of control directly affects savings for specific reasons, and an indirect one, where locus of control affects the propensity to save, which in turn influences savings. The propensity to save should then act as "mediator" between locus of control and savings. To measure the propensity to save, we construct an indicator capturing whether the respondent thinks that saving makes sense in the current economic situation. About 45% of respondents in our sample have high propensity to save (see Table 1). In our sample, those with a high propensity to save have a higher internal locus of control[6], are more likely to save and save more.[7]

A set of control variables is included in our specifications to capture the impact of other relevant factors on saving decisions. First, we include individual characteristics, namely gender, education, job status and a second-order polynomial in age, which proxies the life-cycle path of savings. We control for family composition (whether the respondent lives with a partner, the household size excluding the respondent and the number of children), and for the financial situation of the household (homeownership status, inverse hyperbolic sine of family income and financial assets). The average respondent is 57 years old, male, lives with a partner, but without other people, has high school education, is employee

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[5]Pearson Chi-squared test: 47.689; p-value <0.01.

[6]On average, 0.191 (-0.096) as opposed to -0.159 (0.080) for internal (external) locus. The difference is statistically significant. t-test: respectively 14.434 and -7.171; p-value<0.01.

[7]They save in 85.15% of the cases, as opposed to 57.23% for those with a low propensity to save. The difference is statistically significant. T-test: 25.919; p-value<0.01. We also find that the amount saved is significantly higher among those with high propensity to save. T-test: 14.563; p-value<0.01.

and homeowner. The set of regressors includes some further variables: health status, which could affect household expenditure, and sources of advice consulted to make financial decisions; two dummies indicating whether household income in the year of the interview was unusually high or low with respect to a "regular" year, to capture whether the household experienced an income shock. Finally, we add two measures for individual preferences, namely risk aversion and orientation to the future, which would affect savings and portfolio choices and could be correlated with the locus of control measure. Appendix A provides details on how these variables are measured.

3   Analysis

We study the relationship between the extensive and intensive margins of savings and locus of control, also taking into account a number of socio-demographic and other control variables. Specifically, our models for individual i at time t estimate the β parameters from this equation:

$$S_{it} = f\left(\beta_0 + \beta_1 L_{it} + \beta_2 P_{it} + \beta_3 D_{it} + \beta_4 C_{it} + \beta_5 T_{it}\right) + \epsilon_{it}. \tag{1}$$

Here S_{it} is savings (decision to save or savings amount), L_{it} is locus of control (two factors for internal and external locus), P_{it} describes preferences (risk aversion and orientation to future), D_{it} denotes socio-demographic variables (age, gender, family composition, education, occupation, income and wealth), C_{it} collects further control variables (health status, use of financial advisors, whether the last income was unusually low or high) and T_{it} is a set of year dummy variables. Finally, ϵ_{it} is the error term. The link f between dependent and explanatory variables changes with the dependent variable, and is a non-linear normal function for the extensive margin (saving decision) and a simple linear function for the intensive margin (savings amount). We choose the normal function for the saving decision as it is better suited to deal with binary variables. In particular, by construction, it generates predictions in the 0-1 range that are appropriate to measure probabilities. Since we have multiple observations per individual, we run random-effect panel regression models. We use random rather than fixed effects because fixed-effect models exploit for identification only the changes across observations of the same individuals, while our key variables of interest – on locus of control – are relatively stable over time,

in line with common evidence, e.g. Cebi (2007).[8]

However, we follow common practice and incorporate in the specification Mundlak effects (Mundlak, 1978), namely, the individual-specific average of the explanatory variables as a proxy for fixed effects. This allows us to relax the assumption of zero correlation between the observed and the unobserved variables, which is required by the random-effect model. This approach mitigates the endogeneity issue in (Cobb-Clark et al., 2016). However, causal interpretation of our findings requires caution, since more general sources of endogeneity can be at work beyond Mundlak effects. In the end, we implement a random-effect probit model with Mundlak effects for saving decisions and a random-effect GLS model with Mundlak effects for the savings amount.

We think that locus of control has both direct and indirect correlations with savings, with the direct one mediated by the propensity to save. Psychological literature shows that the perception of control is strictly intertwined with other control aspects, and it is a key driver of motivation and self-control (Kapteyn and Teppa, 2011). Therefore, individuals with an internal locus of control may be able to better cope with contingencies, avoiding individual temptation and compulsive spending. This translates into a positive link between internal locus of control and actual savings. This is the direct channel. In contrast, the direction of the indirect channel is not clear. On the one hand, individuals who perceive their future to be determined by their own actions may be more prone to save to increase financial means, and this way tackle unforeseen shocks and sustain their retirement. On the other, they may be less concerned by future negative events and, in turn, reduce their savings for precautionary reasons. Either way, locus of control may influence the saving attitude, which reflects into a variation of actual savings and capacity to support future consumption. This is the indirect channel. Notice that this type of savings is not linked to a specific goal (e.g. buying a house or a car), as opposed to the direct channel. To assess the relevance of both the direct and indirect component, we run a mediation analysis. More precisely, we compare the coefficients β_1 associated to locus of control in Equation (1) with the corresponding coefficients from the same equation enriched with the inclusion of a dummy variable PS_{it} on the propensity to save:

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[8]The within-individual variability is about 27.7 and 34.9% of the total variability, respectively for the first and second factors of locus of control.

$$S_{it} = f\left(\beta_0 + \beta_1 L_{it} + \beta_2 PS_{it} + \beta_3 P_{it} + \beta_4 D_{it} + \beta_5 C_{it} + \beta_6 T_{it}\right) + \epsilon_{it} \qquad (2)$$

While the coefficients β_1 from Equation (1), or β_1^1, measure the total (direct and indirect) effect of locus of control, the coefficients β_1 from Equation (2), or β_1^2, measure its direct effect only. The indirect effect, that is, the effect of locus of control on savings mediated by the propensity to save, in general, is the difference $\beta_1^1 - \beta_1^2$.

In the context of non-linear models, the approach behind mediation analysis does not work because it is not possible to disentangle the true parameters from the variance of the error term, and what is estimated is actually the ratio between the two. Standard mediation analysis would then measure the indirect component as

$$\frac{\beta_1^1}{\sigma_1^2} - \frac{\beta_1^2}{\sigma_2^2} \qquad (3)$$

where σ_1^2 and σ_2^2 are the variance of the error term in the models of Equations (1) and (2), respectively. The problem is that in general $\sigma_2^2 \leq \sigma_1^2$ because the model of Equation (1) is nested in the model of Equation (2), which inflates the indirect channel. Kohler et al. (2011) and Karlson et al. (2012) propose to measure the indirect effect from a mediation analysis where the specification in Equation (1) is augmented to include the residual of the dependent variable on the mediating factor (in our case, savings and propensity to save, respectively). This new model generates the same variance of the error term as Equation (2), which is ininfluent for linear models but allows to remove the problem of inflating the indirect channel in non-linear models. Monte Carlo studies show that this approach, that we label KHB method, is efficient and performs better than alternative approaches when applied to non-linear models (Kohler et al., 2011).

3.1 Results

Table 2 reports average marginal effects from our regression output. Columns (1) and (2) estimate Equation (1) while Columns (3) and (4) estimate Equation (2). All the columns highlight a significant correlation between locus of control and saving decisions, both at the extensive and intensive margins.

We first pay attention to Columns (1) and (2) measuring the total effect of

locus of control. We learn that respondents with an internal locus of control are more likely to save (Column (1)), and they save more (Column (2)). One standard deviation rise in the internal locus of control increases the probability to save by 3.2%, while one standard deviation increase in the external locus of control decreases the probability by 1.7%. Similarly, one standard deviation increase in the internal locus of control boosts the amount of savings by 26.6% and one standard deviation increase in the external locus of control reduces the amount by 12.7%. These findings are in line with previous results in Cobb-Clark et al. (2016), who show a positive correlation between internal locus of control and wealth accumulation.

The significant correlation of locus of control with saving behaviour we find in Columns (1) and (2) is robust to the inclusion in the specification of several control variables, along with the Mundlak fixed effect. Among these variables, those showing effects significant at the 5% level are income and financial assets, and the use of a professional advisor (all positively). Importantly, the impact of locus of control is quantitatively larger than all these effects. As a reference, one standard deviation increase of income raises the probability to save by 0.562*0.04 =2.2% and the savings amount by 0.562*0.427 =24%. Both effects are smaller than those of the internal locus of control. Interestingly we also find significant effects of deviations from typical income: unusually high (low) income is positively (negatively) correlated with saving decisions and savings amounts. This evidence is consistent with a consumption smoothing motive: positive and negative income shocks will, respectively, foster and hamper savings. The impact is symmetric: unusually high income increases the probability to save by 13.4%, while extraordinarily low income decreases the likelihood by 13.9%. We find similar evidence regarding the savings amount.

To shed light on the mechanisms behind the relationship between locus of control and savings, we aim to disentangle the effect of locus of control in its direct and indirect components. In particular, we examine the mediating role of the propensity to save. We, therefore, estimate Equation (2), which includes the propensity to save as an additional control variable. Results are reported in Columns (3) and (4) of Table 2. As expected, higher propensity to save is associated with both a higher likelihood of putting money aside and a higher amount of savings. The propensity to save boosts the savings dummy by 19.7% and the amount of savings by 155.7%. Our previous evidence is qualitatively confirmed in these new regressions. In particular, the effect of internal (external) locus of control remains significantly positive (negative). Still, its magnitude

falls, indicating that part of its effect is mediated by the propensity to save.

<div align="center">TABLE 2 ABOUT HERE</div>

We use the KHB method illustrated above to decompose the overall total impact of locus of control into its direct and indirect components. Coefficient estimates are reported in Table 3.[9] The first two columns illustrate the effects of, respectively, the internal and external locus of control on the decision to save. Similarly, their effect on the amount saved is reported in Columns (3) and (4). The first line shows the total effect of locus of control, estimated by the reduced form equation. The direct effect, obtained through the full model, and the indirect one are reported below. A relevant part of the response of savings to locus of control is mediated by the propensity to save. For the extensive margin it is 0.066/0.157=42.04% (internal locus) and -0.020/-0.091=21.98% (external locus), while for the intensive margin it is 0.115/0.293=39.25% (internal locus) and 0.035/0.155=22.58% (external locus). In particular, we then learn that savings increase in the presence of the internal locus of control. The indirect component is larger for internal than for external locus but, in both cases, it is lower than the direct one. We conclude that both direct and indirect channels are significant, although direct channel prevails.

<div align="center">TABLE 3 ABOUT HERE</div>

Appendix Table B.1 examines whether the response of savings to income shocks varies with locus of control. More precisely, we estimate Equation (2) augmented with the interaction between the two factors for locus of control and the dummies capturing whether income was exceptionally high or low in the year of the interview. We find no significant difference in the locus of control effect conditional on income shocks.

4   Conclusion

Saving decisions have relevant implications on individual welfare inasmuch they determine the ability to cope with income and health shocks and prompt adequacy of resources to sustain consumption during retirement. For this reason,

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[9]Notice that coefficients for the total effect are different from those estimated in Table 2 because they are based on the specification augmented with the residuals of savings on the propensity to save.

understanding the determinants of saving behaviour attracted the interest of researchers and policy-makers.

This paper contributes to the literature investigating the role of psychological factors in shaping saving behaviour. We analyse the link between savings and internal and external locus of control, and we examine the role of propensity to save in driving this relationship. Our results point out a significant role of (both internal and external) locus of control on savings, which is robust to the existence of time-invariant unobserved heterogeneity. Respondents with an internal (external) locus of control save more (less), both at the extensive and at the intensive margin. These channels are generally sizeable, and especially the role of the internal locus is larger than that of comparable income variations. More broadly, our findings corroborate the importance of psychological aspects, in particular of locus of control, to understand the determinants of consumption and saving decisions.

To examine one of the channels which can explain this result, we perform a mediation analysis to test the extent to which propensity to save mediates the overall role of locus of control. This way, we aim to disentangle two channels: a direct channel, where locus of control affects savings through the capacity to follow saving goals, and an indirect channel, where locus of control affects the propensity to save, which in turn impacts savings for general purposes. We find that both direct and indirect components play a role in explaining the link between savings and locus of control, although the direct one prevails.

This work has at least two limitations that can also be seen as avenues for future research. First, it studies the propensity to save as the only channel to explain the indirect effect of locus of control on savings. However, locus of control could influence other psychological dimensions (such as self-control) that, in turn, are likely to affect savings. Second, locus of control is measured through self-assessed responses to survey questions. Although we are confident that responses reflect actual personality (Van Daalen et al., 2008), it would be interesting to compare our current results with those coming from an analysis where locus of control is inferred from actual behaviour through a lab experiment.

All in all, these findings have relevant policy implications. First, policy interventions aimed to prompt savings may have a heterogeneous effect across individuals, depending not only on their socio-economic conditions and on their cognitive abilities but also their psychological traits, including locus of control. Individuals with a more external locus of control may represent a sensible target group for interventions promoting savings, such as the "*SMarT - Save More*

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Tomorrow" program implemented by Thaler and Benartzi (2004). Moreover, our findings show that people with an external locus of control save less both because they are less prone to save and because they are less able to deal with contingencies and temptation. Therefore, policies addressing both aspects, that is, policies which foster long-run propensity to save and provide tools to deal with contingencies and temptation, will be more effective in promoting savings, particularly on individuals with an external locus of control. Saving accounts and other financial products that schedule automatic transfers on a regular basis may help in this respect.

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Tables and Figures

Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	Min.	Max.
Saving	0.699	0.459	0	1
Amount saved (IHS)	6.378	4.237	0	12.082
Internal Locus of Control	0	1	-4.275	3.626
External Locus of Control	0	1	-4.222	4.832
Propensity to save	0.453	0.498	0	1
Risk aversion	0	1	-3.795	1.761
Orientation to future	0	1	-3.574	3.027
Age/10	5.740	1.473	2	9.4
$(\text{Age}/10)^2$	35.113	16.754	4	85.360
Female	0.235	0.424	0	1
Living with partner	0.657	0.475	0	1
Household size	1.175	1.161	0	7
Children in household	0.254	0.435	0	1
High school education	0.594	0.491	0	1
College education	0.152	0.359	0	1
Employee	0.489	0.5	0	1
Self-employed	0.041	0.199	0	1
Retired	0.358	0.479	0	1
Income (IHS)	10.979	0.562	6.747	15.449
Financial assets (IHS)	9.286	4.031	-12.327	15.882
Homeowner	0.698	0.459	0	1
Good health	0.235	0.424	0	1
Financial advise: professionals	0.229	0.42	0	1
Financial advise: media	0.403	0.491	0	1
Income unusually low	0.058	0.234	0	1
Income unusually high	0.016	0.125	0	1
Wave 2006	0.095	0.293	0	1
Wave 2007	0.097	0.296	0	1
Wave 2009	0.089	0.285	0	1
Wave 2011	0.085	0.279	0	1
Wave 2013	0.147	0.354	0	1
Wave 2015	0.190	0.392	0	1
Wave 2017	0.194	0.396	0	1

Notes: 6,652 observations. Amount saved, income and financial assets are transformed into inverse hyperbolic sine (IHS).

Table 2: Locus of control and saving choices

VARIABLES	(1) Saving	(2) Amount saved (IHS)	(3) Saving	(4) Amount saved (IHS)
Internal Locus of Control	0.032***	0.266***	0.020***	0.178***
	(0.008)	(0.060)	(0.008)	(0.058)
External Locus of Control	-0.017**	-0.127**	-0.016**	-0.120**
	(0.007)	(0.053)	(0.007)	(0.052)
Propensity to save			0.197***	1.557***
			(0.013)	(0.098)
Risk aversion	0.005	0.047	-0.002	-0.006
	(0.007)	(0.056)	(0.007)	(0.055)
Orientation to future	0.013*	0.101*	0.004	0.030
	(0.007)	(0.056)	(0.007)	(0.055)
Age/10	-0.018	-0.053	-0.037	-0.255
	(0.181)	(1.380)	(0.173)	(1.328)
$(Age/10)^2$	0.003	-0.011	0.003	-0.007
	(0.006)	(0.050)	(0.006)	(0.050)
Female	0.022	0.121	0.012	0.025
	(0.024)	(0.178)	(0.022)	(0.170)
Living with partner	0.040	0.442*	0.024	0.334
	(0.031)	(0.246)	(0.031)	(0.242)
Household size	0.000	-0.021	0.003	0.002
	(0.020)	(0.156)	(0.020)	(0.154)
Children in household	-0.022	-0.178	-0.022	-0.163
	(0.040)	(0.308)	(0.039)	(0.303)
High school education	-0.053	-0.359	-0.049	-0.341
	(0.075)	(0.541)	(0.073)	(0.528)
College education	0.072	0.905	0.056	0.865
	(0.142)	(1.123)	(0.138)	(1.098)
Employee	0.063*	0.532*	0.063*	0.497*
	(0.035)	(0.279)	(0.035)	(0.276)
Self-employed	0.108	1.151**	0.133**	1.295**
	(0.067)	(0.538)	(0.067)	(0.533)
Retired	-0.022	-0.133	-0.010	-0.104
	(0.039)	(0.307)	(0.038)	(0.303)
Income (IHS)	0.040***	0.427***	0.039***	0.415***
	(0.014)	(0.110)	(0.014)	(0.109)
Financial assets (IHS)	0.004**	0.035***	0.004**	0.031**
	(0.002)	(0.013)	(0.002)	(0.013)
Homeowner	-0.035	-0.326	-0.028	-0.248
	(0.027)	(0.208)	(0.026)	(0.204)
Good health	0.002	0.050	0.004	0.068
	(0.020)	(0.160)	(0.020)	(0.158)
Financial advise: professionals	0.042**	0.344**	0.040**	0.347**
	(0.019)	(0.146)	(0.019)	(0.145)
Financial advise: media	0.021	0.201	0.017	0.189
	(0.017)	(0.131)	(0.017)	(0.130)
Income unusually low	-0.139***	-1.364***	-0.138***	-1.333***
	(0.027)	(0.220)	(0.026)	(0.219)
Income unusually high	0.134**	1.248***	0.122**	1.140***
	(0.053)	(0.361)	(0.053)	(0.359)
Constant		-5.105**		-5.789***
		(2.300)		(2.204)
Year effects	Yes	Yes	Yes	Yes
Mundlak effects	Yes	Yes	Yes	Yes
Individuals	2,406	2,406	2,406	2,406
Observations	6,652	6,652	6,652	6,652

Notes: Standard errors in parentheses. Column 1 reports average marginal effects. Amount saved, income and financial assets are transformed into inverse hyperbolic sine (IHS). Locus of control, risk aversion, and orientation to future are standardized values. $***p < 0.01, **p < 0.05, *p < 0.1$.

Table 3: Mediation analysis

Locus of Control	(1) Saving Internal	(2) Saving External	(3) Amount saved (IHS) Internal	(4) Amount saved (IHS) External
Total (reduced)	0.157***	-0.091***	0.293***	-0.155***
	(0.035)	(0.030)	(0.058)	(0.052)
Direct (full)	0.091**	-0.071**	0.178**	-0.120**
	(0.035)	(0.030)	(0.058)	(0.052)
Indirect (diff)	0.066***	-0.020**	0.115**	-0.035**
	(0.009)	(0.008)	(0.016)	(0.014)
Individuals	2,406	2,406	2,406	2,406
Observations	6,652	6,652	6,652	6,652

Notes: Standard errors in parentheses. Mediation analysis is based on the KHB method from the models in Columns (3)-(4) of Table 2. $***p < 0.01, **p < 0.05, *p < 0.1$.

A   Survey questions and variables construction

Savings variables.
Savings: "Did your household put any money aside in the past 12 months?"
Possible answers are yes and no. We construct an indicator which takes value one if the answer is "yes".
Amount saved: "About how much money has your household put aside in the past 12 months?"
The respondent can choose among alternative value brackets: less than 1500 euros; 1500-5000 euros; 5000-12,500 euros; 12,500-20,000 euros; 20,000-37,500 euros; 37,500-75,000 euros; more than 75,000 euros. We impute the central value for each bracket and the boundary for the extreme brackets.

Locus of control.

DHS asks a set of thirteen questions taken from the validated scale in Furnham (1986). The scale was originally designed to study locus of control in economic decisions.
"Please indicate for the following statements in which extent you agree or disagree, where 1 means 'totally disagree and 7 means 'totally agree'.

1. Saving and careful investing is a key factor in becoming rich;

2. Whether or not I get to become wealthy depends mostly on my ability;

3. In the long-run, people who take very good care of their finances stay wealthy;

4. If I become poor, it's usually my own fault;

5. I am usually able to protect my personal interests;

6. When I get what I want, it's usually because I worked hard for it;

7. My life is determined by my own actions;

8. There is little one can do to prevent poverty;

9. Becoming rich has nothing to do with luck;

10. Regarding money, there isn't much you can do for yourself when you are poor;

11. It's not always wise for me to save because many things turn out to be a matter of good or bad fortune;

12. It is chiefly a matter of fate whether I become rich or poor;

13. Only those who inherit or win money can possible become rich."

Five out of the 13 items (items number 8, 10, 11, 12 and 13) regard external locus of control, while the remaining ones regard internal locus of control. To construct the locus of control variables, we perform a factor analysis with polychoric correlation on those thirteen items. We identify two factors capturing 99% of the total variance. In the analysis, we use their standardised value. Table A.1 illustrates the correlation between the two factors and the answer to the thirteen questions outlined above.

Table A.1: Factors for locus of control: Correlation with raw items

	Factor 1 Internal	Factor 2 External
Item 1	0.414	0.333
Item 2	0.492	0.372
Item 3	0.508	0.393
Item 4	0.436	0.211
Item 5	0.439	0.098
Item 6	0.531	0.314
Item 7	0.523	0.256
Item 8	-0.497	0.325
Item 9	0.108	0.056
Item 10	-0.414	0.446
Item 11	-0.392	0.502
Item 12	-0.518	0.612
Item 13	-0.449	0.571

 Notes: Correlation between Factor 1 and Factor 2 and the 13 items measuring locus of control.

Propensity to save.

"Do you think it makes sense to save money, considering the current general economic situation?"

Possible answers are: yes, certainly/ yes, perhaps/ probably not/ certainly not.

We construct an indicator which takes value one if the answer is "yes, certainly".

Orientation to future.

DHS ask a set of twelve questions taken from the "Consideration of Future consequences" scale developed by Strathman et al. (1994), whose goal is to measure how people consider distant versus immediate consequences of possible behaviours.

"Now follow some statements about the future.

Please indicate for each statement to what extent you agree or disagree. Please indicate on a scale from 1 to 7 to what extent you agree with the following statements, where 1 indicates 'totally disagree' and 7 indicates 'totally agree' (extremely uncharacteristic / extremely characteristic).

1. I think about how things can change in the future, and try to influence those things in my everyday life.

2. I often work on things that will only pay off in a couple of years.

3. I am only concerned about the present, because I trust that things will work themselves out in the future.

4. With everything I do, I am only concerned about the immediate consequences (say a period of a couple of days or weeks).

5. Whether something is convenient for me or not, to a large extent determines the decisions that I take or the actions that I undertake.

6. I am ready to sacrifice my well-being in the present to achieve certain results in the future.

7. I think it is important to take warnings about negative consequences of my acts seriously, even if these negative consequences would only occur in the distant future.

8. I think it is more important to work on things that have important consequences in the future, than to work on things that have immediate but less important consequences.

9. In general, I ignore warnings about future problems because I think these problems will be solved before they get critical.

10. I think there is no need to sacrifice things now for problems that lie in the future, because it will always be possible to solve these future problems later.

11. I only respond to urgent problems, trusting that problems that come up later can be solved in a later stage.

12. I get clear results in my daily work, this is more important to me than getting vague results."

We perform a factor analysis with polychoric correlation on those twelve items. We identify one factor for orientation to future, capturing 66% of the total variance. In the analysis we use this factor after standardisation.

Risk Aversion.
DHS asks a set of six questions covering different facets of the propensity to bear financial risk. These variables have been already used in Kapteyn and Teppa (2011) and Bucciol and Miniaci (2018).
"The following statements concern saving and taking risks.
Please indicate for each statement to what extent you agree or disagree. Please indicate on a scale from 1 to 7 to what extent you agree with the following statements, where 1 indicates 'totally disagree' and 7 indicates 'totally agree'.

1. I think it is more important to have safe investments and guaranteed returns, than to take a risk to have a chance to get the highest possible returns.

2. I would never consider investments in shares because I find this too risky.

3. If I think an investment will be profitable, I am prepared to borrow money to make this investment

4. I want to be certain that my investments are safe.

5. I get more and more convinced that I should take greater financial risks to improve my financial position.

6. I am prepared to take the risk to lose money, when there is also a chance to gain money."

We perform a factor analysis with polychoric correlation on those six items. We identify one factor for risk aversion, capturing 83% of the total variance. In the analysis we use this factor after standardisation.

B   Additional tables

Table B.1: Locus of control and saving choices, with interactions

	(1) Saving	(2) Amount saved (IHS)
Internal Locus of Control (ILoC)	0.021***	0.191***
	(0.008)	(0.060)
External Locus of Control (ELoC)	-0.018**	-0.137**
	(0.007)	(0.054)
ILoC*Income low	-0.021	-0.310*
	(0.022)	(0.174)
ELoC*Income low	0.018	0.164
	(0.020)	(0.158)
ILoC*Income high	0.052	0.477
	(0.058)	(0.364)
ELoC*Income high	0.029	0.237
	(0.053)	(0.363)
Propensity to save	0.196***	1.554***
	(0.013)	(0.098)
Risk aversion	-0.002	-0.007
	(0.007)	(0.055)
Orientation to future	0.004	0.031
	(0.007)	(0.055)
Age/10	-0.038	-0.253
	(0.173)	(1.328)
$(Age/10)^2$	0.003	-0.010
	(0.006)	(0.050)
Female	0.013	0.032
	(0.022)	(0.170)
Living with partner	0.023	0.322
	(0.031)	(0.242)
Household size	0.003	0.005
	(0.020)	(0.154)
Children in household	-0.023	-0.171
	(0.039)	(0.303)
High school education	-0.047	-0.314
	(0.074)	(0.529)
College education	0.059	0.874
	(0.139)	(1.099)
Employee	0.063*	0.494*
	(0.035)	(0.276)
Self-employed	0.133**	1.305**
	(0.068)	(0.533)
Retired	-0.010	-0.101
	(0.038)	(0.303)
Income (IHS)	0.039***	0.406***
	(0.014)	(0.109)
Financial assets (IHS)	0.003**	0.031**
	(0.002)	(0.013)
Homeowner	-0.028	-0.245
	(0.026)	(0.204)
Good health	0.004	0.063
	(0.020)	(0.158)
Financial advise: professionals	0.039**	0.348**
	(0.019)	(0.145)
Financial advise: media	0.017	0.186
	(0.017)	(0.130)
Income unusually low	-0.142***	-1.401***
	(0.027)	(0.221)
Income unusually high	0.115**	1.038***
	(0.054)	(0.365)
Constant		-5.644**
		(2.205)
Year effects	Yes	Yes
Mundlak effects	Yes	Yes
Individuals	2,406	2,406
Observations	6,652	6,652

Notes: Standard errors in parentheses. Column 1 reports average marginal effects. Amount saved, income and financial assets are transformed into inverse hyperbolic sine (IHS). Locus of control, risk aversion, and orientation to future are standardized values. $***p < 0.01, **p < 0.05, *p < 0.1$.