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Risk Attitudes as an Independent Predictor of Debt

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SUMMARY
Increasingly, economists have tried to directly integrate measures of risk attitude into econometric models of behaviour. This paper examines a) how attitudes to risk relate to other psychological constructs of personality and consideration of future consequences (a proxy for time preferences); and b) how risk attitudes relate to credit behaviour and debt holdings. Using data from a national probability sample of almost 2,000 students, we find that there is a small correlation between risk attitudes and consideration of future consequences. As regards personality, risk attitudes are most positively related to extraversion and openness to experience and are negatively related to neuroticism. Risk willingness is a robust predictor of debt holdings even controlling for demographics, personality, consideration of future consequences and other covariates. This is strong evidence that the risk willingness construct and measure is a useful independent predictor of economic behaviour.

JEL ABSTRACT
This paper examines how attitudes to risk relate to other psychological constructs of personality and consideration of future consequences (a proxy for time preferences) and how risk attitudes relate to credit behaviour and debt holdings. There is a small correlation between risk attitudes and consideration of future consequences. As regards personality, risk attitudes are most positively related to extraversion and openness to experience and are negatively related to neuroticism. Risk willingness is a robust predictor of debt holdings even controlling for demographics, personality, consideration of future consequences and other covariates.

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I. INTRODUCTION

People differ substantially in how they respond to decisions involving risk and uncertainty. Risk attitude measures capture individual differences in how people evaluate risk predict a wide-range of important economic decisions. Bonin, Dohmen, Falk, Huffman & Sunde (2007) show that people more willing to take risks are more likely to work in occupations with higher cross-sectional earnings risk, independent of gender, experience and occupational category. Jaeger, Dohmen, Falk, Huffman, Sunde and Bonin (2010) demonstrate that risk attitudes are significant and substantial predictors of geographic migration between labour markets. Several papers have also demonstrated that risk attitudes predict alcohol consumption and other health risk behaviours: Using structural equation modelling Hampson, Severson, Burns, Slovic & Fisher (2001) showed that perceived risks & benefits were strongly related to alcohol-related risk-taking in high-schoolers (e.g. binge drinking, driving while intoxicated).

Recent research examining the nature and determinants of risk attitudes has yielded several useful insights. For example, Dohmen, Falk, Huffman, Sunde, Schupp & Wagner (2009) show that a question inquiring into participants' willingness to take risks "in general" predicts paid lottery choices as well as participants' stock holdings, choice of occupation, and cigarette smoking. Whilst the authors note that domain-specific risk attitude questions (e.g. risk taking in the health domain) provide an improvement in prediction above the general risk question, they also find that the single general measure of risk taking can explain substantial variation across all domains of risk-taking examined. Thus, it appears that risk willingness can be captured using experimentally validated non-costly survey questions and that the risk willingness can be considered to be a stable trait that demonstrates a considerable degree of cross-situational stability.

In addition to establishing the nature and predictive utility of risk attitudes, economists have begun to consider the extent to which risk attitudes are related to psychological constructs such as consideration of future consequences and broad dimensions of personality (Borghans, Duckworth, Heckman & ter Weel, 2008). It is important to test if the conceptual distinction between preferences for time and uncertainty translates into an empirical distinction in data derived from psychometric scales designed to assess how people typically react to risk and weigh up potential outcomes across different time horizons. Furthermore, it is currently unclear if risk attitudes simply gauge aspects of variation in higher-order personality traits or if risk attitudes represent a distinct trait which can influence behaviour over and above traditional personality measures.

This paper isolates the independent predictive power of the basic risk attitudes measure using data from a novel web-survey of Irish university students. This survey is representative of the Irish university student population on observable characteristics such as age, gender and course choice. We firstly examine the extent to which risk willingness, as measured in the current literature, relates to the 'Big Five' personality traits and a proxy for time preference, the consideration of future consequences, a measure which assesses the tendency to generate and take into account the future

outcomes of behaviour. We then examine the extent to which risk attitudes independently predict debt levels among a sample of students in Ireland.

This paper is structured as follows. Section 2 outlines, in more detail, the literature on risk attitudes, the potential connection to consideration of future consequences and personality, and the determinants of student debt. Section 3 describes the data and main measures used in the study. Section 4 gives the results of a number of analyses that examined the relationship between risk attitudes, personality and future orientation. We model the determinants of student debt and examine whether risk attitudes play an independent role. Section 5 provides brief discussion and concludes.

II. RISK ATTITUDES, PERSONALITY, CONSIDERATION OF FUTURE CONSEQUENCES AND DEBT

II.1. Risk Willingness

Previous research has shown that risk attitudes are associated with important individual decisions and characteristics. Hartog, Ferrer-i-Carbonell & Jonker (2002) showed empirically that risk aversion is falling in education and income, is higher for women and civil servants, and is lower for the self-employed. Dohmen, Falk, Huffman, Sunde, Schupp, & Wagner (2005) also report clear age and gender differences in risk attitudes with men, younger adults, and those with parents from a low-socioeconomic background showing high levels of risk seeking. Guiso & Paiella (2005) modeled risk aversion by measuring participants' willingness to pay for a risky asset. Elicited risk aversion was shown to predict important decisions such as occupation choice (e.g. probability of being an entrepreneur) and migration.

Weber, Blais & Betz (2002) have shown that risk-taking behaviour is highly domain-specific (e.g. financial risk vs. health risk), but make a distinction between differences in the *perception* of risk, versus one's *attitude* to risk. For example, John may believe that heavy smoking is a big health risk, but may not perceive his own smoking habit as heavy, and therefore as non-risky. Dohmen *et al.* (2009) find similar domain-specificity, but with highly significant correlations across domains in the region of 0.5, suggesting an underlying stable risk trait which is influenced by perception or subjective beliefs. Moreover, the finding that risk attitudes may be transmitted, at least partially, from parent to child indicates the presence of a discrete and relatively stable trait (Dohmen, Falk, Huffman & Sunde, 2008).

II.2. Big-Five Personality Theory and Risk Willingness

It is plausible that risk attitude is a compound trait representing the expression of elemental personality traits (e.g. Mowen's 3M model; Mowen, 2000). Previous research examining the relationship between individual differences in personality and propensity to take risks has identified personality qualities that account for variance in both risk attitudes and behaviours. Several papers have examined the role of the 'Big Five' broad

personality traits (extraversion, openness to experience, neuroticism, agreeableness, and conscientiousness; McCrae & Costa, 1990) in understanding risk propensity.

Extraversion is characterised by sensation seeking, dominance, sociability, and greater reward sensitivity, and has emerged as a consistent predictor of the propensity of adults to take risks in several domains (e.g. recreation, health, finance, safety) (Borghans et al., 2008; Nicholson, Soane, Fenton-O'Creevy & Willman, 2005). Extraversion has also been associated with thrill seeking in adolescents and risk behaviours in boys (Markey, Markey, Ericksen, & Tinsley, 2006; Gullone & Moore, 2000). Openness to experience is associated with a need for variety, change, and intellectual stimulation, and has also been positively related to a tendency to take risks in adults, but research in adolescents and children has not yielded a consistent pattern of results (Deck, Lee & Reyes, 2008; Markey, Markey, & Tinsley, 2003). Neuroticism (emotional instability, nervousness) has been negatively related to willingness of adults to take risks in domains such as finance and safety but has demonstrated a positive association with risk taking in the area of health. Neuroticism has shown little association with risk behaviours in adolescents and a positive relationship to risk taking in girls.

Agreeableness (pleasantness, straightforwardness, trustworthiness) appears to depress risk taking in adults and children but a positive relationship to thrill seeking and rebelliousness has been identified in adolescents (Gullone & Moore, 2000). Conscientiousness (dutifulness, compliance, orderliness) has been shown to negatively relate to the propensity of adults and adolescents to take risks particularly in the areas of health and safety and in the social domain (Nicholson *et al.*, 2005). Overall the literature suggests that the big five traits that are thought to contribute to personal growth and plasticity (Extraversion, Openness) are likely to be positively linked to risk attitudes (Digman, 1997). Conversely, traits linked to stability and socialization (Conscientiousness, Emotional Stability, and Agreeableness) are likely to be negatively related to risk attitudes.

II.3. Consideration of Future Consequences and Risk Willingness

Individual differences in the extent to which people consider and are influenced by the distant outcomes of their current behaviour have been shown to relate closely to personality constructs such as trait self-control, delay of gratification, and conscientiousness (Strathman, Gleicher, Boninger & Edwards, 1994) . Individuals who score high on consideration of future consequences (CFC) engage more frequently in health protective behaviours (e.g. exercise, regular sleep), pro-social behaviour (e.g. citizenship behaviours, knowledge sharing), and pro-environmental behaviours (e.g. use of public transport, recycling) (Joireman, Kamdar, Daniels & Duell, 2006).

Low levels of CFC have been related to hostility, anger, aggression, and aspects of sensation seeking such as disinhibition and susceptibility to boredom (Joireman *et al.*, 2006). Those low in CFC are also more likely to engage in risky behaviours such as smoking, heavy alcohol consumption, unprotected sexual intercourse, reckless driving and impulsive purchasing (Moore & Dahlen, 2008; Joireman, Balliet, Sprott,

Spangenberg & Schultz, 2008). However, whilst there are clear linkages between consideration of the future and behaviours indicative of risk aversion it is also possible that those better able to envision the future will be more willing to take risks to achieve their goals. Economic theory states that preferences for the temporal allocation of goods should be distinct from preferences relating to uncertain outcomes thus suggesting that risk attitudes may be orthogonal to the CFC.

II.4. Determinants of Student Debt

Prior studies have related student debt to demographic characteristics as well as several personality traits. The most consistent relationship identified in the existing literature is the link between age and student debt which is largely due to debt accumulation over the course of time in college (Davies & Lea, 1995). However, age has also been shown to predict both attitudes towards debt and the number of credit cards held by students over and above college year, which may indicate an increase in debt tolerance with age (Norvilitis, Merwin, Osberg, Roehling, Young & Kamas, 2006). The role of gender in student debt is less clear. For instance, female students have been found to report sound financial practices such as saving, planning spending and preparing a budget (Hayhoe, Leach, Turner, Bruin & Lawrence, 2000). However, others have found male college students to have greater financial knowledge, and female college students to spend more on clothes and hold more credit cards (Armstrong & Craven, 1993). Male students have been shown to spend more than female students on eating outside of the home, entertainment, and electronic goods (Davies & Lea, 1995). Some studies have found student debt to be greater in males (Davies & Lea, 1995), whilst others have found no gender differences (Norvilitis *et al.*, 2006).

Evidence for the role of personality characteristics in student debt accumulation has also not yielded a consistent pattern of results. Traits such as locus of control and impulsivity have shown an association with attitude towards money, but have been found to be unpredictive of student debt levels (Boddington & Kemp, 1999; Norvilitis, Szablicki & Wilson, 2003). Similarly, sensation seeking and materialism appear to be unrelated to student debt (Norvilitis *et al.*, 2006). More recent analyses have attempted to identify factors the relationship between personality and factors which may lead to student debt, with some success. For instance, evidence from non-student samples points to the importance of the big five personality traits in explaining individual differences in financial literacy (e.g. Noon & Fogarty, 2007). Constructs related to future orientation that have been found to predict long term financial management strategies, retirement saving intentions and the implementation of saving intentions (Howlett, Kees, & Kemp, 2008; Joireman *et al.*, 2008; Rabinovich & Webley, 2007). However, it is unclear if personality dependent differences in financial strategies actually convert into individual differences in debt holdings.

It appears that those engaging in risky financial behaviour are also likely to partake in other risky behaviours. For instance, Adams and Moore (2007) showed that students identified as having high risk credit behaviour appear to be more likely to engage in risky behaviours such as drink driving and use of illegal drugs (Adams & Moore, 2007).

Dohmen et al., (2009) show that household debt amongst participants in the German Socio-Economic Panel is related to risk attitudes in the domains of health, occupation, driving, sport and leisure, and finance. In this study household debt was most closely related to general risk attitudes rather than a specific domain of risk attitude. It is thus likely that a general propensity to take risks may be predictive of student debt.

III. DATA AND MEASURES

The data were collected through a web-survey (Eurostudent) funded by the Irish Higher Education Authority that was conducted in spring 2007 nationwide in 31 Irish third-level institutions. Students were contacted through their institutional email address. The total sample is 12,800 participants. However, only a random sample of approximately 2,000 participants was asked the questions analysed in the paper. Approximately 60 per cent of the sample was female (which matches the population). The mean age of the sample was 22 (+- 4.69).

III.1. Big Five Personality Taxonomy

The personality measure employed was a shortened validated scale assessing the Big Five Personality dimensions, the Ten-Item Personality Inventory (Gosling, Rentfrow, and Swann, 2003). This measure of the Big Five personality framework developed is a brief version of well-established Big Five assessment scales, where participants are asked to rate their level of agreement with the extent to which personality traits apply to them using a seven-point scale. Gosling *et al.* (2003) evaluated the 10-item measure for convergent and discriminant validity and for test-retest reliability and concluded that when research conditions require brief measures of the dimensions, the 10-item measure is an adequate instrument for use. Given that this forms part of a wider study and that furthermore we were attempting to examine the correlations between several different measures of well-being, it was necessary to employ this shorter measure.

III.2. Consideration of Future Consequences

Strathman *et al.* (1994) tested the CFC scale's empirical validity on college students. The authors ensured that the scale is consistent by comparing the consistency of scores across samples and by examining their stability over time. Furthermore, they tested the relationship of the CFC scale with other indicators of time preferences and found their scale to be positively correlated with the Ray and Najman's Deferment of Gratification Scale (1986) and the Zimbardo Time Perspective Inventory (Zimbardo & Boyd, 1999). As part of the validation and reliability procedures, the authors examined the CFC's predictive power on established outcomes such as health and environmental behaviours. The results indicated that the CFC instrument predicts health behaviours and individuals' beliefs about the environment. Subsequent studies have used this construct in academic settings and found a correlation between CFC scores and academic achievement (Joireman, 1999; Peters, Joireman & Ridgway, 2005). In the survey, for each item, participants were asked to rate on a seven-point scale how characteristic each statement was of them.

III.3. Risk Attitudes Question

In recent literature risk willingness has been measured in several ways, including individual preferences in a real lottery and the number of 'pumps' applied to a virtual balloon with an unspecified bursting point (Dohmen *et al.,* 2009; Lejuez *et al.,* 2002).[1] The risk attitudes question used in this paper has been previously utilised in a number of recent papers by Dohmen & colleagues (e.g. Dohmen *et al.,* 2009). The question asks: 'How do you see yourself: Are you generally a person who is fully willing to take risks or do you try to avoid taking risks? Please indicate on a scale of 0-10, how willing you are to take risks in general, where 0 indicates 'unwilling to take risks' and 10 indicates 'fully prepared to take risks'. Dohmen *et al.* (2009) examine the measurement of risk *attitudes* and demonstrate that they are robustly related to experimental measures of risk *behaviour*. In a complementary field experiment of 450 sample-matched participants, the authors showed that scores on the general risk question were good predictors of risky behaviours in many domains, e.g. smoking, migration, and traffic violations. This is a good indicator that the risk attitude question is a reliable proxy of risky behaviour across many domains. In addition, the subjective risk willingness question is free from the framing effects and numeracy demands that characterize traditional lottery questions (Borghans et al., 2008).

III.4. Measures of Debt

Debt was measured in stock terms, with participants being asked to input their current debt levels across eight categories; debt owed to parents, debt in the form of a bank loan, credit card debt, car loan, overdraft, debt owed to a store or shop card, outstanding fines and student loans. Debt values were measured in euro.

IV. RESULTS

IV.1 Descriptive Statistics and Basic Correlations

The distribution of risk willingness is displayed in Figure 1 below. Mean risk score is 6.78 (+-1.92) indicating that on average students considered themselves as willing to take risks. The distribution of CFC is shown below that in Figure 2. The mean CFC score is 40.42 (+- 6.89), with higher scores indicating greater consideration of the future. The distribution of CFC scores at different levels of risk attitudes are shown below in Table 2. Although there is a slight trend in the expected direction, the correlation between CFC

[1] The Balloon Analogue Risk Task (BART). This task is novel as it replicates the diminishing marginal returns associated with many risky behaviours, such as driving at excess speed. Participants 'pump' on-screen balloons, with each successful pump generating a small payoff. The payoff per balloon is only earned providing participants 'cash in' before the balloon bursts. Performance on the task was significantly correlated with many self-reported risk behaviours such as drug, alcohol and cigarette use.
In the lottery task, participants are asked to choose between a safe amount of €x (in increasing increments), and a 50/50 gamble between €300 and €0. A risk-neutral person should be indifferent between the lottery (with expected value €150) and a safe offer of €150. Risk-seekers will still prefer the lottery for safe amounts more than €150, and vice-versa.

and risk attitudes is only -0.06 suggesting that these two measures are unrelated. Full descriptive statistics for the main variables are displayed in Table 1. Table 3 shows the correlation between risk attitude and personality. As can be seen, risk willingness is positively related to extraversion and openness to experience and somewhat negatively related to neuroticism.

Fifty eight per cent of the sample had some form of debt. Mean debt levels among the students with some form of debt were approximately €2,200 (+- 2351). The median debt level among those with some form of debt was €1,500. Of the seven debt categories, 26 per cent of students owed money to their parents, 10 per cent held debt in the form of a bank loan, 5.4 per cent in the form of a car loan, 20 per cent in the form of a credit card loan, 9.5 per cent in the form of a student loan, 9.8 per cent in the form of an overdraft, .5 per cent in the form of shop/store loans and 5 per cent in the form of fines. Median debt holdings for the categories for those with some form of debt within the category were: €1000 for parents, €3000 for bank debt, €3,250 for car loans, €450 for credit card, €500 for overdraft, €3,000 for student loans, €500 for store loans and €25 for fines.

IV.2. Predictors of Student Debt

Table 4 displays the predictors of student debt using robust regression methodology. There is a marked and persistent effect of risk attitudes on levels of debt (b = 91.8, SE = 24.5, t = 3.75, p < .001) that increases slightly when gender and age are controlled for (b = 93.6, SE = 24, t = 3.9, p < .001). The marginal effect of higher risk-attitude (a one-unit increase) is to increase debt by €91.81 (c.4.17% of mean sample debt). This increases to €93.60 (c.4.25% of mean debt) when controlling for gender and age. Both results are significant at the 1% level. Including consideration of future consequences and personality has only a minor effect on the risk coefficient (b = 93.6, SE = 24, t = 3.9, p < .001 reduced to b = 88.5, SE =27.8, t = 3.2, p < .001). Table 6 displays the effect of risk attitudes on different categories of debt (overdraft, student loan etc.), with the coefficients showing a consistent effect of risk attitudes across five of the eight categories: bank debt, credit card debt, overdraft, fines owed (significant at 5% level), and money owed to parents (significant at 10% level).

The observed results of the consideration of future consequences measure are unambiguous: in our analysis, CFC does not significantly predict debt holdings, neither for total debt nor for any of the debt sub-types. This result is discussed further below. In contrast, the effect of *personality* on debt is both complex and non-uniform. Of the five personality factors, only conscientiousness and agreeableness contribute substantially in the main model. Higher conscientiousness is associated with less debt (significant at 5% level), while higher agreeableness is associated with more debt (significant at 10% level). Examining debt according to its sub-categories provides further mixed results; for example, higher levels of extraversion are associated with less *bank* debt, but larger overdrafts (both significant at 1% level).

One potential cause for concern is that student debt is a highly irregular variable with several zeroes, many outliers and unusual interval-type distribution. It is thus important to

examine the extent to which the results presented are robust to different modelling strategies. Table 5 displays, firstly, a censored Tobit model that takes in to account the bunching at zero. As can be seen, the effect of risk attitudes on debt remains significant in this model (b = 134.8, SE = 45.1, t = 3, $p < .001$). Similarly, the marginal effect of risk attitudes on the probability of holding debt is substantial as can be seen in the results of the Probit model outlined also in Table 5. In general, the results suggest that the predictive power of risk attitudes in debt-holding is very strong. As can be seen in Figure 3 the probability of holding debt increases dramatically along the risk attitudes scale, with the exception on an anomalous category where risk attitudes are equal to 1, which contains only 8 cases.

IV.3. Robustness

In order to test the robustness of the main regression model (in table 4) several robustness checks were conducted. We find the model is robust to excluding large outliers in the dependent variable debt. The model is also robust to including a dummy for international students (who may be paying large tuition fees if non-EU).[2] In addition, excluding international students from the analysis does not significantly alter the results. Accounting for whether participants have children or not, or restricting analysis to those under 30 does not significantly alter the model. Forty two per cent of the sample has no debt, resulting in lots of bunching at zero in the debt variable. The Tobit model shows however that the results are not driven solely by the presence of zeroes. The main parts of the model influence both the decision to take on debt and its expected value. In sum, a variety of other covariates influence debt-holding but do not influence the coefficient on risk-willingness, which remains above 0.77 in all ancillary models estimated.

V. DISCUSSION & CONCLUSION

This paper sets out to a) investigate the construct of risk attitudes as used in a number of recent papers, b) to investigate the relationship between risk attitudes, consideration of future consequences (CFC) and personality, and c) to examine how these factors influence credit behaviour and the likelihood of holding debt. We found a mean risk score (on a 0-10 scale) in our sample is 6.78 (+-1.92) [3]. Risk willingness is moderately positively correlated with extraversion (+ 0.3) and openness to experience (+ 0.37) and negatively correlated with neuroticism (- 0.19). Consideration of future consequences shares only a very weak correlation with risk willingness (- 0.06). The data show a robust independent effect of risk attitude on debt, such that a one point increase in risk willingness predicts extra debt of *circa* 4% of mean sample debt. CFC is not a significant predictor of debt holdings, in contrast to risk willingness.

[2] In fact, using this model, international students have nearly €500 less debt than Irish students, though this does not affect the coefficient on risk willingness.

[3] This is higher than the mean of 4.42(+-2.38) found in Dohmen *et al.'s* (2006) large German SOEP panel study. This is probably due to the considerably older sample in the German study (Mean = 47.17 years (+-17.43)). Dohmen & colleagues show a clear trend of decreasing risk willingness with age.

V.1. Limitations

This study is cross-sectional and measures risk attitudes and debt at a single point in time. A longitudinal design would allow for the measurement of trends in debt, risk attitudes, CFC and personality over the three to four years of a student's undergraduate degree. In addition, this study uses a student-only sample. Although student financial behaviour is a discrete topic in its own right, it should be acknowledged that not all the results reported here may be generalisable to the population at large. As financial actors, students are usually not fully financially independent and do not have the same liabilities (mortgage etc.) as older adults. This may affect their attitudes to risk and likelihood of taking on personal debt.

V.2. Future Research

Future research should examine the stability of risk attitudes over a long-term horizon. It is not yet known how attitude to risk may change or remain stable over time. As mentioned above, a longitudinal design would allow researchers to map the transition from student to labour market participation, usually associated with increased financial responsibility. Future research could examine how this impacts on risk willingness and likelihood of holding debt. Also of interest is the extent to which such longitudinal measures can accurately measure debt holdings, in students and non-students. Of particular interest is the use of risk measures as a screening tool in university students for possible financial difficulties later in college. For example, how well can attitude to risk as a 1st year student predict financial strain as a final year student? The risk measure in this paper is non-invasive, easy to administer, and would be suitable for this purpose.

One unexpected result is the finding that consideration of future consequences is not a significant predictor of debt holdings. This is perhaps surprising given that, to the extent it is consciously made, the decision to hold debt is essentially an intertemporal tradeoff between current and future consumption. Individuals with low consideration of future consequences are more present-orientated, and could therefore be expected to value immediate consumption over future consumption (resulting in debt). Further research is needed to better understand the role of consideration of future consequences as it relates to financial behaviour. Recent evidence from neuroeconomics has highlighted specific brain pathways responsible for the evaluation of risk and the processing of intertemporal tradeoffs (O'Doherty & Bossaerts, 2008). The extent to which these distinct neural representations map into stable individual differences and decision-making tendencies is an important avenue for future research.

V.3. Conclusion

Risk attitudes are an important factor that have been used to explain several behaviours. This is the first paper to examine the extent to which they are related to personality and consideration of the future. Risk attitudes are very weakly correlated with consideration of future consequences and moderately correlated with extraversion, neuroticism, openness and agreeableness. Furthermore, risk attitudes explain credit behaviour almost independently of these personality factors. This reinforces the point of view that risk attitudes are a simple but powerful measure that predict behaviour independently of other measures.

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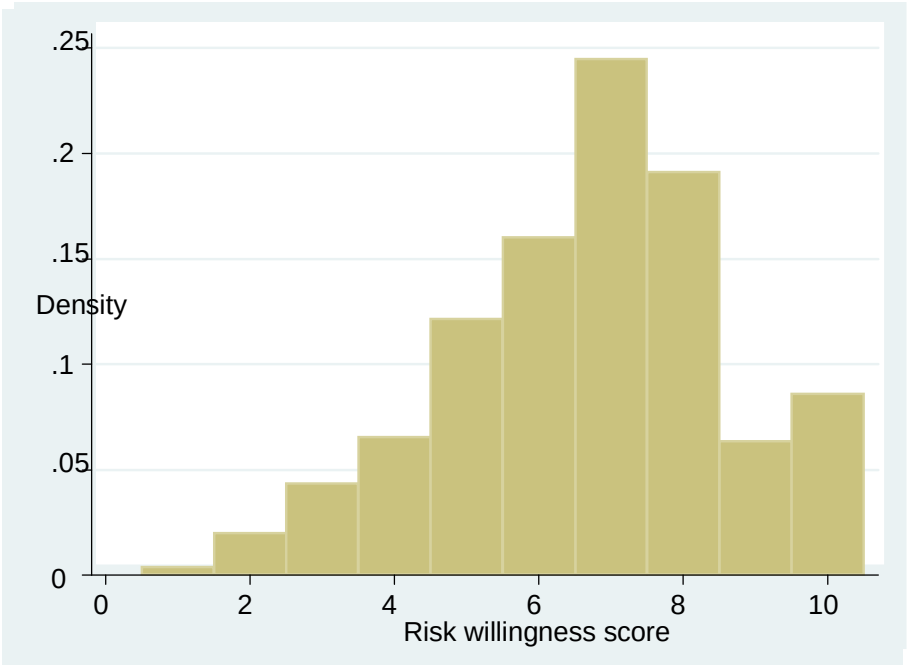
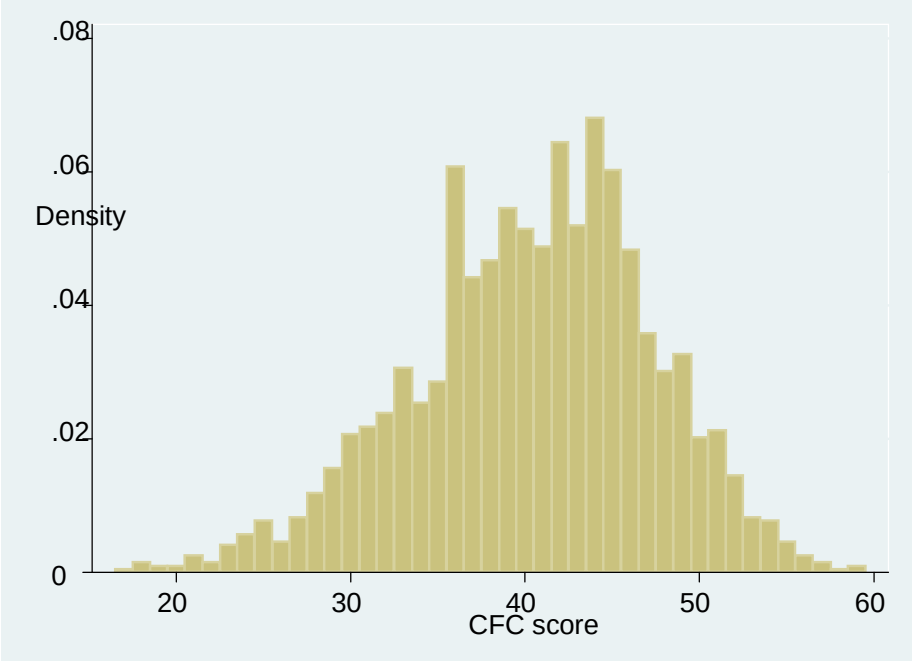
Figures

Figure 1: Distribution of Risk Attitudes Scores



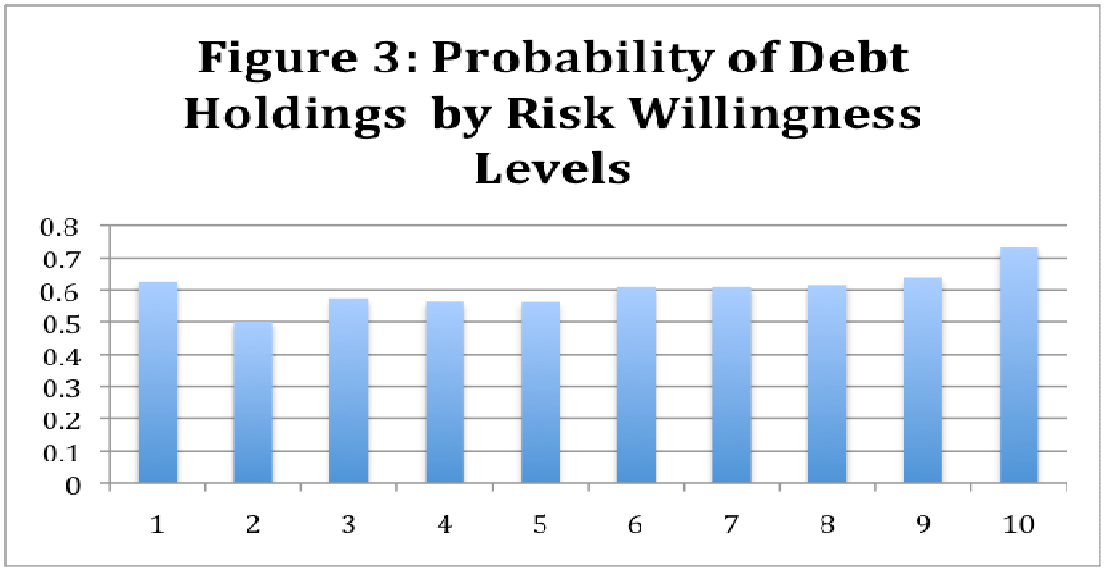
Note: *Risk willingness* is a measure of general risk attitude where 0 indicates 'unwilling to take risks' and 10 indicates 'fully prepared to take risks'.

Figure 2: Distribution of Consideration of Future Consequences Scores



Note: *CFC* means consideration of future consequences, a proxy for time preference with higher values indicating greater consideration of future consequences, scored on a scale of 17-59.

Figure 3: Probability of Debt Holdings by Risk Willingness Levels



Tables

Table 1: Descriptive Statistics for Study Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Age	1757	21.77	4.59	15	66
Female	1759	0.62	0.49	0	1
Debt	1759	1173.20	2003.53	0	9900
Risk Willingness	1752	6.65	1.90	1	10
CFC	1759	40.32	6.90	17	59
Extraversion	1758	9.16	2.85	2	14
Neuroticism	1757	6.64	2.81	2	14
Agreeableness	1756	9.71	2.21	2	14
Conscientiousness	1757	10.27	2.66	2	14
Openness	1756	10.96	2.21	2	14

Note: *Debt* means amount of personal debt held, as self-reported by participants. *Risk willingness* is a measure of general risk attitude where 0 indicates 'unwilling to take risks' and 10 indicates 'fully prepared to take risks'. *CFC* means consideration of future consequences, a proxy for time preference with higher values indicating greater consideration of future consequences.

Table 2: Consideration of Future Consequences (CFC) scores at different levels of Risk Attitudes

Risk-level	Mean	Std. Dev.	Freq.
1 (Unwilling to take risks)	42.125	7.989949	8
2	40.89189	6.907258	37
3	41.72093	6.643265	86
4	40.09756	6.569196	123
5	40.62174	6.295521	230
6	40.94822	6.785482	309
7	40.45011	6.418818	471
8	40.46721	6.766782	366
9	38.89916	7.739832	119
10 (Fully willing to take risks)	39.39394	8.751095	165
Total	40.41693	6.892472	1914

Table 3: Correlation matrix for Risk Willingness and Big Five Personality Traits

	Risk willingness	Extraversion	Neuroticism	Agreeableness	Conscientious	Openness
Risk willingness	1	-	-	-	-	-
Extraversion	0.3006***	1	-	-	-	-
Neuroticism	-0.1881***	-0.2203***	1	-	-	-
Agreeableness	-0.0432*	0.0204	-0.2054***	1	-	-
Conscientious	-0.0446**	0.1081***	-0.1535***	0.1334***	1	-
Openness	0.3743***	0.2787***	-0.1476***	0.1467***	0.1433***	1

Note: *Risk willingness* is a measure of general risk attitude where 0 indicates 'unwilling to take risks' and 10 indicates 'fully prepared to take risks'. *Extraversion, neuroticism, agreeableness, conscientiousness,* and *openness* are personality traits from the big-five personality model. Correlation significance is given by: *** p<0.01, ** p<0.05, * p<0.1

Table 4: Predictors of Student Debt (OLS Regression)

Model Number	(1)	(2)	(3)
COEFFICIENT	Debt	Debt	Debt
Risk Willingness	91.812***	93.602***	88.508***
	(24.476)	(24.016)	(27.822)
Age		97.788***	95.232***
		(10.044)	(10.191)
Gender		28.929	-22.072
		(93.912)	(99.716)
Extraversion			15.184
			(17.860)
Neuroticism			14.802
			(18.094)
Agreeableness			41.728*
			(22.368)
Conscientiousness			-37.675**
			(18.975)
Openness			12.242
			(23.898)
CFC			8.358
			(7.229)
Constant	566.583***	-1,615.326***	-2,188.137***
	(169.466)	(322.928)	(508.297)
Observations	1835	1833	1743
R-squared	0.01	0.06	0.06

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

Note: The dependent variable is the amount of debt held in Euro. The first column (1) uses *risk willingness* only. The second column (2) also includes *age* and *gender*. The third column (3) further includes measures of the 'big five' personality traits and *consideration of future consequences*, a proxy for time preference with higher values indicating greater consideration of future consequences.

Table 5: Alternative Models of Student Debt

Model Number	(1)	(2)
COEFFICIENT	Tobit	MfX Probit
Risk Willingness	134.760***	0.014**
	(45.130)	(0.007)
Age	151.210***	0.019***
	(16.335)	(0.003)
Gender	105.631	0.039
	(161.783)	(0.025)
Extraversion	45.111	0.010**
	(29.044)	(0.004)
Neuroticism	21.879	0.002
	(29.180)	(0.004)
Agreeableness	58.567	0.000
	(36.289)	(0.006)
Conscientiousness	-71.969**	-0.008*
	(30.917)	(0.005)
Openness	31.617	0.006
	(38.845)	(0.006)
CFC	7.022	-0.001
	(11.718)	(0.002)
Income from own family	-0.142	0.000
	(0.116)	(0.000)
1 if non-Irish, 0 if Irish	-929.965***	-0.112***
	(271.582)	(0.039)
Constant	-5,044.919***	
	(837.890)	
Observations	1703	1855

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

Note: The dependent variable is amount of debt held in Euro. The first column (1) estimates a Tobit model. The second column (2) estimates a Probit model using the same variables as column 1. *Income from own family* means the amount of money received by the student from his/her own family.

Table 6: Risk Attitudes and Debt Categories (OLS Regression)

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
COEFFICIENT	Parents	Bank	C'Card	Car	OD	Student	Store	Fine
Risk Willingness	28.053*	29.038**	16.830**	-0.919	7.439**	7.489	2.852	0.504**
	(15.310)	(13.380)	(6.752)	(10.153)	(3.184)	(12.879)	(2.585)	(0.201)
Age	7.397	41.120***	30.400***	14.028***	6.188***	1.106	0.620	-0.068
	(5.676)	(4.961)	(2.503)	(3.764)	(1.180)	(4.775)	(0.958)	(0.074)
Female	-35.526	17.287	0.833	52.478	-27.012**	-22.025	10.062	0.035
	(54.859)	(47.943)	(24.192)	(36.377)	(11.408)	(46.148)	(9.263)	(0.720)
Extraversion	11.415	-27.505***	4.639	-0.458	5.516***	16.885**	3.355**	0.143
	(9.818)	(8.580)	(4.330)	(6.510)	(2.042)	(8.259)	(1.658)	(0.129)
Neuroticism	11.658	-9.253	-0.998	5.765	2.827	6.229	0.624	-0.134
	(9.938)	(8.685)	(4.382)	(6.590)	(2.067)	(8.360)	(1.678)	(0.130)
Agreeableness	15.283	5.137	3.546	2.501	3.045	19.301*	-0.992	-0.110
	(12.297)	(10.747)	(5.423)	(8.155)	(2.557)	(10.345)	(2.076)	(0.161)
Conscientiousness	-11.252	-13.175	-2.562	12.022*	-4.100*	-19.974**	1.262	-0.340**
	(10.439)	(9.123)	(4.603)	(6.922)	(2.171)	(8.781)	(1.763)	(0.137)
Openness	6.149	20.447*	2.582	-3.311	-1.162	-10.817	-4.268*	-0.204
	(13.149)	(11.491)	(5.799)	(8.719)	(2.734)	(11.061)	(2.220)	(0.173)
CFC	5.885	4.846	1.242	-1.838	-0.869	-0.010	-0.299	-0.004
	(3.981)	(3.480)	(1.756)	(2.640)	(0.828)	(3.349)	(0.672)	(0.052)
Income from family	0.008	-0.060*	0.012	-0.038	-0.006	-0.067**	-0.002	0.000
	(0.039)	(0.034)	(0.017)	(0.026)	(0.008)	(0.033)	(0.007)	(0.001)
1=non-Irish, 0=Irish	-260.351***	-156.238**	-36.423	-49.075	-26.246	83.328	21.827	-0.280
	(88.997)	(77.779)	(39.247)	(59.015)	(18.507)	(74.866)	(15.027)	(1.168)
Constant	-400.338	-874.614***	-750.295***	-315.359*	-92.693	129.285	-22.035	7.008*
	(282.177)	(246.607)	(124.439)	(187.115)	(58.679)	(237.371)	(47.646)	(3.703)
Observations	1703	1703	1703	1703	1703	1703	1703	1703
R-squared	0.01	0.06	0.09	0.01	0.03	0.01	0.01	0.01

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

Note: *Parents* means debt owed to parents. *Bank* means debt owed to a bank. *C'Card* means debt owed on a credit card. *Car* means debt owed on a car loan. *OD* means debt owed on overdraft. *Student* means debt owed on a student loan. *Store* means debt owed on store/shop card. *Fine* means any fines outstanding. All debt values are measured in Euro. *Risk willingness* is a measure of general risk attitude where 0 indicates 'unwilling to take risks' and 10 indicates 'fully prepared to take risks'. *CFC* means consideration of future consequences, a proxy for time preference with higher values indicating greater consideration of future consequences. Outliers (>10,000) for each dependent variable are removed.