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THE DETERMINANTS OF RISK AVERSION: THE ROLE OF INTERGENERATIONAL TRANSMISSION

Maria De Paola
Dipartimento di Economia e Statistica
Università della Calabria
Ponte Pietro Bucci, Cubo 1/C
Tel.: +39 0984 492459
Fax: +39 0984 492421
e-mail: m.depaola@unical.it

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The Determinants of Risk Aversion: The Role of Intergenerational Transmission

Maria De Paola[1]

(Department of Economics and Statistics, University of Calabria)

Abstract

This paper studies the relationship between risk attitudes and individual characteristics focusing on the intergenerational transmission of risk preferences. We use a data set on a sample of Italian students allowing us to build different measures of risk aversion, based respectively on a survey asking students about their willing to invest in a risky asset and about their preferences for job security and on the results of an entry test using explicit penalty points in the case of incorrect answers. Consistently with findings emerging form the existing literature, we find that risk aversion is positively related to age, being female and family income and negatively related to individual ability. As far as intergenerational transmission of preferences is concerned, from our analysis it emerges that students whose fathers are entrepreneurs have a higher propensity to take risks, while students whose fathers are employed in the public sector are more risk averse. Only fathers matter for their children risk attitudes. These results are robust to different measures of risk aversion and to different specifications of our model.

JEL Classification: I21; Z13; J24.

Keywords: risk aversion, college choice, education

1. Introduction

A number of important individual choices (investments, educational attainments, type of occupation, home ownership, insurance purchases) are characterized by a high level of uncertainty along a number of dimensions and are likely to be affected by individual risk attitudes. Since different preferences toward risk lead to different choices be aware of what determines these preferences is crucial to understand and predict individual behaviour.

However, individual willingness to bear risk is not observable and data sets providing measures of individual risk attitudes are quite rare. As a consequence, there is only a small (but increasing) literature examining the heterogeneity in individual risk preferences and trying to shed light on the relationship between a number of individual and socio-economic characteristics and the propensity to undertake risky behaviours.

A very interesting question concerns the intergenerational transmission of risk attitudes. Is the willingness to take risks affected by parents' attitudes toward risk? While there is a considerable literature analysing the link between parents and children choices in terms of fertility, saving, religious affiliation, donation to charities etc. (Bisin and Verdier, 2000; Bisin et al., 2004; Fernandez and Fogli,

2005; Fernandez et al., 2005; Wilhelm et al., 2004), little is known about the intergenerational transmission of risk preferences. Among the few papers examining this issue, Dohmen et al. (2010b), using data form the German Socio Economic Panel that provide measures of risk preferences for both parents and their sons, show that children end up having similar attitudes toward risk as their parents. Both fathers and mothers are relevant for shaping children risk preferences. In addition, they show that birth order matters and first born children are more similar to parents compared to younger siblings. Similar results emerge from Charles and Hurst (2003) considering data from a survey in which children and parents were interviewed regarding their preference for income risk. Leuermann and Necker (2010), focusing on observed occupational choices, show that fathers' who have chosen risky jobs positively affect their sons' occupational risk.

These finding are relevant to understand the strong correlation, documented by various studies, in the outcomes of parents and children (for a survey see Bjőrklund, 2007, Lochner, 2008), and to shed light on the persistent differences in behaviour across different social groups (Doepke and Zilibotti, 2005; Glaeser et al., 2002; Kling et al., 2007).

Children may obtain results similar to those obtained by parents, not only because of economic factors such as financial constraints, but also because they share some important preferences. Similarly, differences across cultures and social group may be related to parents transmitting some values to their children.

In this paper we contribute to this literature providing some new evidence on the intergenerational transmission of risk attitudes using data on a sample of about 4,000 students enrolled at an Italian University. This data set allows us to obtain three different measures of individual risk aversion: two of these measures rely on a survey asking students about their willingness to invest in a risky asset and about their preferences for job security; the third considers the number of omitted answers at an entry test where wrong answers were penalised by minus points.

The data also provide detailed information on individual characteristics, such as gender, type of high school attended, high school grades, percentage of correct answers at the entry test, personality traits and on family background in terms of wealth, parents' type of employment and parents' education.

From our analysis on the determinants of risk attitudes, consistently with the existing literature, it emerges that females are more risk averse than males, risk aversion increases with age and decreases with ability. In addition, individuals from wealthier families are less risk averse that subjects with weaker economic background. Moreover, we find that students living in larger villages are less risk averse.

Unfortunately we do not directly observe measures of parents' risk attitudes and we base our analysis of the intergenerational transmission of risk preferences focusing on the type of job performed

by parents. We consider two occupational categories: entrepreneurs and public sector employees. Subjects in these two occupational categories are characterized by different preferences for risk. Entrepreneurship is typically associated with risk bearing, which is widely believed to affect the selection of individuals into entrepreneurial positions. The empirical findings give support to this assumption showing that less risk averse individuals are more likely to opt for entrepreneurship or self employment instead than choosing wage employment (Caliendro et al. 2009; Cramer et al., 2002; Van Praag and Cramer, 2001; De Wit, 1993). At the opposite, subjects employed in the public sector are usually considered as more risk averse compared to their counterparts working in the private sector. In most countries, the public sector offers higher job security and less volatile wage compensation than the private sector (Clark and Postel-Vinay 2009; Bonin et al. 2007). As a consequence, highly risk-averse people might find it attractive to opt for a job in the public sector. A number of works, using both stated preferences about job security and measures of risk aversion based on survey questions like the use of seat belts, smoking and drinking habits etc., find that more risk averse people are more likely to be employed in the public sector than in the private sector (Bellante and Link, 1981; Lewis and Frank 2002). Similar results emerge, using questions on hypothetical lotteries, from Buurman et al. (2009) and Hartog et al. (2002) for the Netherlands and from Guiso and Paiella (2008) for Italy. Finally, Bonin et al. (2007) and Pfeifer (2008), considering the German Socio Economic Panel, show that subjects who are less willing to take risks are more likely to be employed in the public sector.

Relying on this literature, we investigate intergenerational transmission of risk aversion analysing both whether students whose fathers are entrepreneurs show a lower degree of risk aversion and whether students whose parents are employed in the public sector are more risk averse. We find that, controlling for a number of individual and family characteristics, students whose fathers are entrepreneurs are less risk averse, while those students whose parents are employed in the public sector are characterized by higher risk aversion. These findings are robust to different specification of the model and to different measures of risk aversion.

The paper is organized as follows. Section two describes the data and offers a number of descriptive statistics. Section three presents our analysis on the determinants of risk attitudes, measured by the willingness to invest in a risky asset, and on the role of intergenerational transmission. In Section four we undertake some robustness exercises using alternative measures of risk aversion. Section five offers some concluding remarks.

3. Data and descriptive statistics

Our analysis relies upon individual-level data on a sample of first-year undergraduate students enrolled in the academic year 2008-2009 at the University of Calabria, a middle-sized public

university located in the South of Italy[2]. These students at the moment of their enrolment were asked to participate at an on-line survey asking a number of questions on individual characteristics, family background, previous studies, motivation, expectations etc. The participation to the survey was on voluntary basis (only questionnaires that were completed in all their parts were accepted) and about 80% of freshmen have answered to the questionnaire. Among the survey's questions there was one interviewing students about a hypothetical lottery, in which they could choose how much of 100,000 Euros to invest in a risky asset. More in detail the question poses students with the following hypothetical lottery[3]: "Imagine that you had won 100,000 Euros in a lottery. Almost immediately after you collect the winnings, a reputable bank offers you the following investment opportunity, the conditions of which are as follows: You can invest money. There is the chance to double the invested money. However, it is equally possible that you could lose half of the amount invested. You have the opportunity to invest the full amount, part of the amount or reject the offer. What share of your lottery winnings would you be prepared to invest in this financially risky, yet potentially lucrative investment?" Respondents can indicate an investment amount of either 0, 20,000, 40,000, 80,000, or 100,000 Euros.

Table 1 shows the distribution of individuals by reported levels of willingness to invest in the lottery. About 34% of students refused to invest any amount of money in the proposed investment. About 30% of students decided to invest €20,000, while 25.82% of them have chosen to invest €40,000. Finally, only 5.8% and 3.75% of students have invested respectively €80,000 and €100,000.

Table 1. Risk aversion: Willingness to invest in a risky asset

Investment	Frequencies	Percent
€100,000	147	3.75
€80,000	227	5.80
€40,000	1011	25.82
€20,000	1192	30.45
€0	1338	34.18
	3915	100

We use the answers to the question on the willingness to invest in the risky asset to build two indicators of risk attitudes: *Risk Aversion* taking values from 1 (for students who invest all the amount of the win) to 5 (for students who refuse to invest any money), and a dummy variable *Very Risk Averse* taking value of 1 for those who invest strictly less than €40,000 and zero otherwise.

In addition to these measure of risk aversion, we use another question proposed in the on-line survey asking students about their preferences for job security. More precisely, the question was about the type of job students would prefer once they had finished their studies. Students might choose among a large number of options such as a job offering employment protection, a job requiring skills

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[2] The University of Calabria currently has about 33,000 students, who are enrolled in different degrees and at different levels of the Italian University system.
[3] The same question is posed by the German Socio-Economic Panel (SOEP, 2004).

acquired through education, a job giving access to a good career, a job useful to society, a job allowing decisional power and autonomy etc. They were allowed to indicate more than one option. We use the answers to this question to build a dummy variable *Job Security Preferences* taking values of one for those students who answered to appreciate a contractually secure job and zero for those students who did not mention this job feature. About 42% of students indicated job security as a desirable characteristic of their future job.

Finally, we build another indicator of individual risk attitudes, *Omitted Answers*, based on students' answers to an entry examination. Students applying for a place at the different Degree Courses offered by the University of Calabria were required to undertake an entry test, consisting in multiple choice questions, aimed at assessing students' competences in a number of subjects [4]. Correct answers were evaluated one point in the final score, wrong answers were penalised by 0.25 minus points and omitted answers gave rise to 0 points. Since we are able to observe the answers of each applicant for every question in the examination, we calculate for each student the variable *Omitted Answers* as the number of omitted answers on the total number of questions students were supposed to answer. In doing that we only consider those sections of the test aimed at evaluating mathematics and language skills (30+30 questions), which were proposed to the whole population of applicants independently from the field of study chosen. On average students omit 29% of answers, with a minimum of 0 and a maximum of 85% omitted answers. Controlling for individual ability, we expect more risk averse students to omit a higher number of answers.

In Table 2 are reported the descriptive statistics of the variables we use in our analysis. About 59% of sample students are females. There are on average 20 years old. Only 8% of students are employed. Students come from two different types of high school: Lyceums (about 52%) and Technical and Vocational Schools (about 48%). High school grade ranges from 60 to 100, with a mean of about 86.

We have used the results obtained by students at the entry test to build an additional measure of individual ability, *Correct Answers,* given by the percentage of correct answers on the total number of questions at test sections ascertaining respectively mathematics and language competences. The percentage of correct answers at the entry test is on average 45%.

The survey questions allowed us to have also some information on a number of personal traits such as social behaviour, studying effort, locus of control. More precisely we have build: two dummies variables, *Difficult_Relationships_Peers* and *Difficult_Relationships_Teachers*, for students who declared that during their educational career had difficult relationships respectively with their peers and with their teachers; a categorical variable *Effort,* taking values from 1 to 4, describing student effort in studying activities (higher effort is associated to higher values of this variable); a

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[4] The test took place on the 1st September 2008, before the beginning of the academic year.

dummy variable *Locus of Control* for students declaring that results obtained at school reflect their effective value.

We also have data on a number of family characteristics, such as parents' education and type of occupation. The average number of years of education of fathers ranges from 0 to 18, with a mean of 11.34, while mothers have acquired on average 11.58 years of education. About 46% of students have a father employed in the public sector, while mother working as civil servants are about 33%. Students whose father is an entrepreneur are about 7%, while only 2% of mothers in our sample are entrepreneurs.

Table 2. Descriptive statistics for the sample of students

Variables	Mean	Std. Dev.	Min	Max	Obs.
Risk Aversion	3.855	1.072	1	5	3915
Very Risk averse	0.342	0.474	0	1	3915
Job Security Preferences	0.418	0.493	0	1	3915
Omitted Answers Entry Test	0.291	0.168	0	0.85	3915
Female	0.592	0.491	0	1	3915
Age	19.948	3.435	17.717	63.118	3915
High School Type: Lyceum	0.523	0.499	0	1	3915
High School Grade	85.943	12.052	60	100	3915
Employed	0.080	0.272	0	2	3915
Effort	2.589	0.822	0	4	3915
Difficult_Relationships_Peers	0.080	0.271	0	1	3915
Difficult_Relationships_Teachers	0.179	0.383	0	1	3915
Locus of Control	0.444	0.497	0	1	3915
Correct Answers	0.453	0.140	0.038	0.95	3915
Father's Education	11.340	4.024	0	18	3915
Mother's Education	11.585	4.050	0	18	3915
Poor Economic Conditions	0.325	0.468	0	1	3915
Father in Public Sector	0.459	0.498	0	1	3915
Mother in Public Sector	0.326	0.469	0	1	3915
Father Entrepreneur	0.065	0.247	0	1	3915
Mother Entrepreneur	0.023	0.149	0	1	3915
Population	25866.65	78698.45	378	2546804	3915
College Degrees/Population	0.076	0.036	0.008	0.166	3915
Employed/Population	0.332	0.039	0.177	0.541	3915

Unfortunately we do not have information on student family income. However, we use a question proposed in the on-line survey asking if students have chosen to enrol to the University of Calabria also because of the lower costs involved by this choice[5]. We build the dummy *Poor Economic Conditions* taking value of one for students pointing out to lower costs among the reasons driving their university choice. This variable as a mean value of 0.32.

Students live in villages with an average population of 25,866 inhabitants. About 8% of inhabitants have obtained a college degree. The employment rate (Employed Population/Population) is on average 33%.

3. Risk Attitudes, Individual Characteristics and Intergenerational Transmission

[5] Most of students enrolled at the University of Calabria live in the same area where the University is located. Choosing another University will imply higher costs since students should move outside their area of residence.

In this section we investigate the main determinants of individual risk attitudes focusing on the role played by intergenerational transmission. Since we do not directly observe any measure of parents' risk preferences, we look at differences between groups of individuals who have been shown by the economic literature to be characterized by different risk attitudes.

We consider the variable *RiskAversion*, based on the reported amounts of investments in the risky asset, as a proxy of the individual risk attitudes. We recall that the variable *RiskAversion* takes values from 1 (when the individual invests all the win of €100,000) to 5 (zero investment). Each individual chooses the investment he wants among the five alternatives of decreasing levels proposed in the survey. Only the actual choice *RiskAversion* of the individual can be observed, not the desired levels of investments and then the exact measure of individual risk attitudes *RiskAversion**, which is a latent continuous variable. The underlying model is $RiskAversion^* = \beta x + \varepsilon_i$, where x is a vector of independent variables including the attitudes toward risk of the parents of student i, $Parents'RiskAversion_i$, a number variables describing the characteristics of the student and of his family (gender, ability, parents' education, family income etc) and some socio-economic features of the place in which individual i lives. ε_i is an error term capturing idiosyncratic shocks or unobserved student characteristics. β is the vector of regression coefficients which we want to estimate.

Since we only observe the categories of our measure *RiskAversion*, we interpret our dependent variable as an ordinal measure of risk aversion, that is, higher levels reflect higher risk aversion, but we do not assume that, for example, the value 4 represents twice the risk aversion of value 2. Therefore, in our econometric analysis we mainly use an ordered probit model to estimate the determinants of individual risk attitudes.

In Table 3 we present the results of different specifications of our model. In column 1 we investigate, without any control, the effect produced on risk aversion by having parents employed in the public sector and by having parents working as entrepreneurs. The dummy *Father in Public Sector* is positive and significant at 5% level, while *Mother in Public Sector* has not a statistically significant effect[6]. In addition, it emerges that students whose father is an entrepreneur are less risk averse (the effect is statistically significant at 5 percent level), while having as mother an entrepreneur does not produce any impact on offspring.

In column 2 we control for a number of individual characteristics, namely gender, age, employed, and a number of measures of cognitive abilities such as high school grade, type of high school attended and percentage of correct answers at the entry test. Again, the father type of employment is relevant for sons' risk attitudes, while mother profession is not relevant[7].

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[6] The effect does not change much when we only consider the dummy *Father Public Sector* and exclude among regressors *Mother Public Sector*.

As regards the other determinants of risk aversion, we find that women are more risk averse than men (the effect is statistically significant at the 1 percent level). This is consistent with findings emerging from a number of recent works on risk attitudes (Croson and Gneezy, 2009; Dohmen et al. 2010a)[8]. Similarly to studies by Dohmen et al. (2010a) and Hartog et al (2002), we find that older students tend to be more risk averse than younger ones (the effect in some specifications is statistically significant at the 10 percent level). This result is robust to the use of a dummy variable taking values of 1 for student older than 30, reassuring us that the positive relationship between age and risk aversion is not driven by outliers (not reported). When examining the relationship between ability and risk aversion we find ambiguous results. While the variable *Correct Answers* shows a negative coefficient, statistically significant at the 5 percent level, giving support to the idea, highlighted by Dohmen et al. (2010c), of an inverse relationship between cognitive abilities and risk aversion[9], the grade obtained at high school is never statistically significant. In addition, students attending a Lyceum, ceteris paribus, are more risk averse. [10] High School Grade is not statistically significant also when we exclude from the explanatory variables any other measure of individual ability.

In column 3 we add to controls a number of individual non cognitive traits (*Difficult_Relationships_ Peers*, *Difficult_Relationships_Teachers, Effort*, *Locus of Control*). None of these variable is statistically significant, with the exception of *Difficult_Relationshipss_Peers,* which is positive and statistically significant, implying that students who had relational problems with their peers are more risk adverse.

Even after controlling for these personality traits, having a father employed in the public sector still produces a positive and statistically significant effect on student risk aversion. Similarly, the variable *Entrepreneur* maintains a negative and statistically significant coefficient.

To be reassured that these effects are not driven by other family characteristics (which might be related to the type of father occupation), in column 4, we replicate the same specification discussed above including among controls a number of family characteristics, such as the parents' level of education and the proxy for family income. It emerges that students from poorer families tend to be more risk averse. Our proxy for family income, the dummy *Poor Economic Conditions* is positive and statistically significant at the 1 per cent level. Once we control for this indicator of family background, risk aversion does not seem to be affected neither by the father's nor by the mother's level of

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[7] The pseudo R-squared is around 0.06, in line with other studies, confirming the difficulties in explaining risk attitudes with objective variables.

[8] Following Booth and Nolen (2009) we have also tried to investigate whether women are naturally more risk averse or whether it is the result of parental or peer pressure. At this aim we have interacted the dummy female with a dummy taking value of one for female students who have attended single-sex schools. We do not find any statistically significant effect, may be because of the small number of sample students attending such type of school.

[9] On the relationship between abilities and risk attitudes see also Benjaminet al. (2006) and Frederick (2006).

[10] Since Lyceums are more academically oriented, we expect students who have attended this type of school to have acquired higher academic competences compared to those coming from Technical and Vocational Schools.

education. Again, the father type of employment is relevant for sons' risk attitudes, while mother profession is not relevant[11].

Table 3. Ordered Probit Estimates. The determinants of risk aversion. Dependent variable: Risk-Aversion

	(1)	(2)	(3)	(4)	(5)	(6)
Father Public Sector	0.072**	0.064*	0.066*	0.066*	0.065*	0.062*
	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)	(0.036)
Mother Public Sector	-0.009	-0.003	-0.001	-0.001	0.003	0.004
	(0.038)	(0.038)	(0.038)	(0.042)	(0.042)	(0.041)
Father Entrepreneur	-0.153**	-0.153**	-0.156**	-0.144**	-0.155**	-0.151**
	(0.072)	(0.073)	(0.073)	(0.073)	(0.073)	(0.076)
Mother Entrepreneur	-0.003	-0.004	-0.000	0.014	0.016	0.025
	(0.115)	(0.116)	(0.117)	(0.117)	(0.117)	(0.117)
Female		0.174***	0.156***	0.151***	0.151***	0.161***
		(0.037)	(0.038)	(0.039)	(0.039)	(0.039)
Age		0.009	0.008	0.010	0.011*	0.011*
		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Lyceum		0.097***	0.099***	0.101***	0.103***	0.100***
		(0.038)	(0.038)	(0.039)	(0.039)	(0.038)
High School Grade		0.001	0.001	0.001	0.000	0.001
		(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Correct Answers		-0.433***	-0.450***	-0.488***	-0.459***	-0.416***
		(0.143)	(0.144)	(0.144)	(0.145)	(0.141)
Employed		-0.007	-0.004	-0.007	-0.008	-0.028
		(0.076)	(0.077)	(0.076)	(0.076)	(0.076)
Study Effort			0.029	0.032	0.031	0.028
			(0.023)	(0.023)	(0.023)	(0.023)
Difficult_Relationships_Peers			0.197***	0.194***	0.208***	0.210***
			(0.062)	(0.061)	(0.062)	(0.057)
Difficult_Relationships_Teachers			-0.042	-0.048	-0.048	-0.056
			(0.048)	(0.048)	(0.048)	(0.048)
Locus of Control			-0.036	-0.029	-0.031	-0.031
			(0.044)	(0.044)	(0.044)	(0.044)
Mother's Education				-0.003	-0.002	-0.003
				(0.006)	(0.006)	(0.005)
Father's Education				0.005	0.007	0.008
				(0.006)	(0.006)	(0.006)
Economic Conditions				0.111***	0.109***	0.110***
				(0.037)	(0.037)	(0.036)
Population/1000					-1.922***	-2.053***
					(0.641)	(0.680)
(Population/1000) Squared					0.687**	0.731**
					(0.275)	(0.291)
Average Education					-0.161	-0.180
					(0.497)	(0.488)
Employment/Population					-0.322	-0.180
					(0.637)	(0.642)
Pseudo R-Squared / R-Squared	0.0049	0.0054	0.0060	0.0069	0.0083	0.0235
Observations	3915	3915	3915	3915	3915	3915

Notes. Standard errors (corrected for heteroskedasticity) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

Nothing changes also in column 5 where we add some socio-economics variables of the student place of residence. We find that students living in larger villages are less risk averse

[11] The pseudo R-squared is around 0.07, in line with other studies, confirming the difficulties in explaining risk attitudes with objective variables.

(*Population* has a negative and statistically significant coefficient). The marginal negative effect of the number of inhabitants is decreasing, as *Population Squared* shows a positive and statistically significant coefficient. The percentage of inhabitants with a college degree and the average rate of employment in the village of residence do not produce any statistically significant effect.

As the interpretation of coefficients is not immediate in the ordered probit models, assuming cardinality of our risk aversion measure, we have estimated the last specification of our model by OLS (see column 6). It emerges that the signs and significance levels of OLS coefficients are very similar to the estimations obtained with ordered probit. Risk aversion increases by about 0.06 when the student has a father employed in the public sector and decreases by 0.15 when the father is an entrepreneur.

To check the robustness of our results, we have also experimented considering as dependent variable the dummy *Very Risk Averse*, taking value of 1 for individuals who are willing to invest less than €40000 in the risky asset. We consider the following binary response model: $P(VeryRiskAdverse = 1 | x) = \Phi(\beta x)$, where the dependent variable is the dummy variable for risk aversion, x is a set of explanatory variables and Φ is the standard normal cumulative distribution function. Probit estimates are reported in Table 4 (assuming a logistic function or using a linear probability model gives almost the same results). We replicate the same specifications discussed above and in each column, we report the marginal effects (evaluated at mean values of the explanatory variables).

We find almost the same results obtained when considering our cardinal measure *Risk Aversion.* Being public employee increases the probability of a very risk averse offspring by 3 percentage points, significant at the 10% level. Entrepreneurs have a stronger impact on the risk attitudes of their children: having as father an entrepreneur reduces the probability of being very risk averse by about 6 percentage points (statistically significant at the 10% level).

Table 4. Probit Estimates. The determinants of risk aversion. Dependent Variable: Very Risk Averse

	(1)	(2)	(3)	(4)	(5)
Father Public Sector	0.030*	0.028*	0.028*	0.027*	0.026*
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Mother Public Sector	-0.009	-0.006	-0.005	-0.001	0.001
	(0.016)	(0.017)	(0.017)	(0.019)	(0.019)
Father Entrepreneur	-0.055*	-0.058*	-0.059*	-0.054*	-0.059*
	(0.031)	(0.031)	(0.031)	(0.031)	(0.031)
Mother Entrepreneur	-0.006	-0.012	-0.009	-0.005	-0.003
	(0.052)	(0.053)	(0.053)	(0.053)	(0.053)
Female		0.032**	0.024	0.023	0.022
		(0.016)	(0.017)	(0.017)	(0.017)
Age		0.004	0.004	0.004	0.004
		(0.002)	(0.002)	(0.002)	(0.002)
Lyceum		0.039**	0.039**	0.040**	0.042**
		(0.017)	(0.017)	(0.017)	(0.017)
High School Grade		-0.000	-0.000	-0.001	-0.001
		(0.001)	(0.001)	(0.001)	(0.001)
Correct Answers		-0.239***	-0.248***	-0.260***	-0.252***
		(0.064)	(0.064)	(0.064)	(0.064)
Employed			0.044	0.043	0.044
			(0.032)	(0.032)	(0.032)
Study Effort			0.017*	0.018*	0.018*
			(0.010)	(0.010)	(0.010)
Difficult_Relationships_Peers			0.050*	0.048*	0.053*
			(0.029)	(0.029)	(0.029)
Difficult_Relationships_Teachers			0.001	-0.000	0.000
			(0.021)	(0.021)	(0.021)
Locus of Control			-0.012	-0.010	-0.011
			(0.019)	(0.019)	(0.019)
Mother's Education				0.000	0.001
				(0.002)	(0.002)
Father's Education				-0.000	0.001
				(0.003)	(0.003)
Poor Economic Conditions				0.035**	0.035**
				(0.017)	(0.017)
Population/1000					-0.568*
					(0.303)
(Population/1000) Squared					0.218*
					(0.127)
Average Education					-0.026
					(0.214)
Employment/Population					-0.348
					(0.281)
Pseudo R-Squared	0.0016	0.0082	0.0095	0.0103	0.0126
Observations	3915	3915	3915	3915	3915

Notes. Marginal Effects Reported. Standard errors (corrected for heteroskedasticity) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

4. Some Alternative Measures of Risk Attitudes

In this section we investigate the effect of the parents' type of employment on their children attitudes toward risk considering two alternative measures of risk aversion. Since students may have misunderstood the question on the risky lottery or they may have chosen the easier option, we consider their answers to another question of the survey asking them about their preferences on job characteristics. Using this information we have build the binary variable *Job Security Preferences*, which we consider as dependent variable in a probit model. Estimates are reported in columns 1 and 2

of Table 5. In column 1 we control only for individual characteristics, while in column 2 we add among explanatory variables our family background measures and controls for the socio-economic features of the place of residence[12].

It emerges that students whose fathers are public employees are more likely to appreciate jobs offering employment security (the dummy *Father Public Sector* is positive and statistically significant at the 5 percent level), while entrepreneurs seem to induce their children to seek for other types of job characteristics (the dummy *Father Entrepreneur* is negative and significant at the 1 per cent level). Again, only fathers seem to be relevant in shaping offspring preferences for job security.

As far as other explanatory variables are concerned we find that females and older students are less likely to appreciate job security. This may seem at odds with the findings highlighted in the previous section. However, in interpreting these results we have to take in mind that in the socio-economic context we are considering women are usually second earners and often they leave their jobs to grow up their children. These aspects, which we do not observe, may explain a weaker female preference for job security. The effect of age is more difficult to explain and may be related to the fact that older students may have been already employed in jobs that they left because not well suited to their aspirations, explaining a greater attention to other job characteristics different from job security.

As far as individual ability is concerned, we find that our measure of ability based on High School performance does not produce any statistically significant effects, while the percentage of correct answers at the entry test negatively affects job security preferences. Students who put more effort in studying activities are less likely to appreciate job security, which instead is appreciated by students who had difficult relationship with their peers. Mother and father education does not seem relevant for students' preferences for job security. Instead, students with a more economically disadvantaged background show a higher preference for job security.

A crucial concern is whether survey questions can be meaningfully interpreted in terms of actual risk-taking behaviour. To take into account this issue, instead of basing our analysis on the answers given by students to the on line survey, we consider their actual behaviour concerning one aspect that is likely to be affected by risk preferences. At the beginning of the academic year our sample students were required to undertake an entry test aimed at ascertain student competences in a number of subjects. In some Degree Courses this test was selective and only students obtaining the best results were admitted, while in others, giving the large number of places offered, the test was only used to evaluate whether students had to attend some remedial courses. Student performance at the test was evaluated as follows: one point was gained for each correct answer, incorrect answers where evaluated 0.25 minus points and omitted answers 0 points.

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[12] The other specifications of our model are not reported to save space, but results are similar to those shown in columns 1 and 2 of Table 5.

Controlling for individual ability, we expect more risk averse students to omit a higher number of answers and, as a consequence, we build an indicator of risk aversion based on the percentage of omitted answers in the two sections of the test (concerning mathematics and language competences) that were common to all students independently from the field of studies they have chosen.

Table 5. Probit and OLS Estimates. The determinants of risk aversion. Dependent Variable: Job Security Preferences and Omitted Answers Entry Test

	Job Security Preferences		Omitted Answers Entry Test		
	(1)	(2)	(3)	(4)	(5)
Father Public Sector	0.033**	0.035**	0.009*	0.009*	0.069**
	(0.016)	(0.017)	(0.005)	(0.005)	(0.030)
Mother Public Sector	-0.024	-0.018	-0.004	-0.006	-0.028
	(0.017)	(0.019)	(0.006)	(0.006)	(0.035)
Father Entrepreneur	-0.103***	-0.092***	-0.010	-0.010	-0.052
	(0.032)	(0.032)	(0.012)	(0.012)	(0.066)
Mother Entrepreneur	-0.048	-0.035	-0.007	-0.009	-0.140
	(0.055)	(0.055)	(0.019)	(0.019)	(0.113)
Female	-0.040**	-0.048***	0.007	0.008	0.082**
	(0.017)	(0.018)	(0.006)	(0.006)	(0.032)
Age	-0.019***	-0.018***	-0.001	-0.001	-0.005
	(0.003)	(0.003)	(0.001)	(0.001)	(0.006)
Lyceum	-0.031*	-0.027	-0.062***	-0.062***	-0.381***
	(0.017)	(0.018)	(0.005)	(0.006)	(0.031)
High School Grade	-0.001	-0.001	-0.001***	-0.001***	-0.008***
	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)
Correct Answers	-0.047*	-0.049*			
	(0.026)	(0.027)			
Employed	0.012	0.007	-0.010	-0.009	-0.026
	(0.033)	(0.033)	(0.012)	(0.012)	(0.068)
Study Effort	-0.021**	-0.017*	-0.011***	-0.012***	-0.055***
	(0.010)	(0.011)	(0.004)	(0.004)	(0.020)
Difficult_Relationships_Peers	0.088***	0.086***	-0.012	0.010	0.071
	(0.030)	(0.030)	(0.010)	(0.010)	(0.057)
Difficult_Relationships_Teachers	-0.021	-0.026	-0.000	0.001	-0.027
	(0.021)	(0.021)	(0.007)	(0.007)	(0.040)
Responsibility	0.025	0.031	-0.014**	-0.015**	-0.105***
	(0.020)	(0.020)	(0.007)	(0.007)	(0.036)
Mother's Education		-0.004		0.000	0.001
		(0.003)		(0.001)	(0.005)
Father's Education		0.003		0.001	0.003
		(0.003)		(0.001)	(0.005)
Poor Economic Conditions		0.095***		-0.020***	-0.095***
		(0.017)		(0.005)	(0.031)
Population/1000		-0.350		-0.029	-0.637
		(0.319)		(0.139)	(0.765)
(Population/1000) Squared		0.134		0.002	0.299
		(0.132)		(0.055)	(0.289)
Average Education		0.076		-0.035	-0.493
		(0.226)		(0.077)	(0.419)
Employment/Population		0.316		-0.195*	-0.551
		(0.295)		(0.105)	(0.572)
Pseudo R-Squared R-Squared	0.0159	0.0225	0.0551	0.0689	0.0898
Observations	3915	3915	3915	3915	3682

Notes. Marginal Effects Reported for Probit estimates. Standard errors (corrected for heteroskedasticity) are reported in parentheses. The symbols ***, **, * indicate that coefficients are statistically significant, respectively, at the 1, 5, and 10 percent level.

This indicator, which we denote with *Omitted Answers*, is strongly affected by the variable *Risk Aversion* (or alternatively by the dummy *Very Risk Averse),* suggesting that our measure of risk

attitudes based on the hypothetical lottery is a good predictor of actual individual risky behavior (the correlation between the two variables is 0.0424, statistically significant at the 1% level – p_value 0.008 –)[13]. Then, in columns 3 and 4 we report the results of an OLS estimation taking *Omitted Answers* as dependent variable with the aim to examine whether students whose parents are characterized by different preferences for risk aversion show different behaviors when risk is involved. In column 3 we only control for individual characteristics and cognitive and non cognitive abilities, while in column 4 we also add family characteristics and socio-economic features of student place of residence.

It emerges that the dummy *Father Public Sector* has a positive and statistically significant effect on student propensity to omit answers at the entry test, while *Father Entrepreneur* does not produce any significant effect. The same results hold true when we control for family background and socio-economic characteristics of the place of residence (column 4) and when we exclude from our sample students who have answered to all the questions - zero omitted answers - (which may suggest random answering) and those who have omitted more than 50% of questions.

Results remain unchanged also when we control for field of study dummies in relation to the field in which the student has decided to enroll (estimates not reported).

In order to deal with the fact that our dependent variable is a proportion, we have experimented by formulating the dependent variable as a log-odds ratio $\ln[Omitted\_Answers/(1-Omitted\_Answers)]$. In this case too, results are consistent with OLS estimates (see column 6).

As regard the other determinants of our variable of interest, we find that females tend to omit a large percentage of answers, while students attending a Lyceum and with higher School Grade omit a lower number of answers (we do not control for the percentage of correct answers in mathematics and language skill since these variables are co-determined with our dependent variable). Students devoting more effort to studying activities tend to omit a lower number of answers. The dummy *Locus of Control* is negative and highly statistically significant. Student with worse economic conditions omit more answers. The parents' level of education does not produce any significant effect.

5. Concluding Remarks

The economic literature has deeply examined the intergenerational transmission of educational attainment, earnings and income, wealth, fertility decisions, etc. However, little is know on whether the correlation between parents' and children's outcomes is related to the transfer of individual

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[13] The estimation results of a OLS model in which the dependent variable is Omitted_Answers and among the explanatory variables is included, in addition to a large number of individual characteristics and field of study dummies, the variable Risk_Aversion (or Very_Risk_Averse) are available upon request.

abilities and preference which may drive individual behaviours and then a number of relevant outcomes. It might also be that parents' outcomes, for example in terms of income or social position, are crucial because of financial constraints or other market imperfections. Parents' choices themselves may encourage their children to take similar decisions. For example, children whose parents have obtained a College degree may find it natural to enrol at University.

Identifying what gives rise to the intergenerational transmission of outcomes is crucial to understand the role of policies in enhancing social mobility and in designing appropriate interventions.

In this paper we have tried to document the intergenerational transmission of preferences using a new data set on a sample of Italian students and focusing on risk attitudes, which are considered relevant for a large number of individual choices, such as education, type of employment, investments, etc.

We measure individual risk preference considering both survey questions asking about student's willingness to invest in a risky asset and about their preferences for job security and students actual risk-taking behaviour with respect to the number of omitted answers at an entry test where wrong answers were penalised by minus points. Our results on the determinants of risk preferences are consistent with findings highlighted by the existing literature. Females, older students and students with worst family economic conditions are more risk averse. On the other hand, it seems that students with higher ability show an higher propensity to take risks.

To analyse the intergenerational transmission of risk preferences we have considered the effect produced on children risk attitudes by parents employed in the public sectors and by parents working as entrepreneurs. Individuals in these two occupational categories are shown to be characterized by different preferences for risk, with public employee less prone to take risks and entrepreneurs typically characterized by low risk aversion.

From our analysis it emerges that students whose fathers are employed in the public sector are more risk averse, while entrepreneurs tend to reduce the risk aversion of their children. Mother type of job activity is not relevant. These results are robust to alternative specification of our model.

Very similar results emerge also when we measure risk aversion with student preference for job security and with the percentage of omitted answers at the entry test. However, in the latter case only public employees seem to affect children risk preferences, while having as father an entrepreneur turns out to produce no statistically significant effects.

These results suggest that the intergenerational transmission of attitudes and preferences may have a role in explaining the correlation between parents' and children's outcomes and should be taken into account by policy makers when deciding policies aimed at reducing inequality and purse social mobility.

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