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Educational choice and risk preferences: How important is relative vs. individual risk preference?

Abstract

The primary goal of this article is to examine the influence of relative vs. individual risk preference in educational choice. To do so, we discuss relative risk preference in prospect theory and in sociological models of educational choice and debate the notable but widely neglected importance of individual risk preferences for educational plans and decisions. We analyze these different forms of risk preference and demonstrate how they influence the intentions for further education of students attending Gymnasium, the academically oriented secondary school track in Germany. Using data collected from the German Socio-Economic Panel Study (SOEP) youth questionnaire in the years 2003 to 2012, we find not only that students from a higher socio-economic background are less sensitive to their school performance but also that their individual risk preferences are completely irrelevant to their educational plans. The opposite applies to students from a lower socio-economic background: the more risk-averse they are, the less likely they are to opt for a university degree. Most importantly, we find support for the notion of relative risk-seeking in upper social classes and relative risk aversion in lower classes.

Keywords

Educational inequality; Educational decision-making; Risk preference; Relative risk aversion; Tertiary education; Vocational training

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Bildungsentscheidungen und Risikopräferenzen: Zur Relevanz relativer und individueller Risikopräferenzen

Zusammenfassung

Der Einfluss von individueller und relativer Risikopräferenz auf Bildungsintentionen wird am Beispiel von Abiturienten diskutiert und empirisch untersucht. Ausgehend von der Prospekttheorie und soziologischen Modellen der Bildungswahl argumentieren wir, warum zwischen individueller und relativer Risikopräferenz zu differenzieren ist und wie sich diese beiden Facetten auf Bildungsentscheidungen auswirken. Die empirische Überprüfung basiert auf Angaben 17-jähriger Gymnasiasten, die im Rahmen des Sozio-oekonomischen Panels in den Jahren 2003 bis 2012 befragt wurden. Die multivariaten Analysen zeigen deutlich, dass der Einfluss der individuellen Risikoaversion auf Bildungsabsichten nach der sozialen Herkunft variiert: Für Schüler aus privilegierten Familien ist die individuelle Risikopräferenz für die nachschulischen Ausbildungspläne irrelevant. Bei Schülern aus bildungsferneren Haushalten erweisen sie sich hingegen als signifikanter Prädiktor: Je stärker risikosuchend diese Schüler sind, desto eher beabsichtigen sie die Aufnahme eines Studiums und vice versa. Die unterschiedliche Relevanz von individuellen Risikopräferenzen – und auch der schulischen Leistungen – in Abhängigkeit von der sozialen Herkunft der Schüler sind ein indirekter Beleg dafür, dass obere soziale Klassen aufgrund ihrer sozialstrukturellen Position risikosuchend, untere soziale Klassen hingegen risikoavers sind und somit relative Risikopräferenzen nach der sozialen Herkunft variieren.

Schlagworte

Bildungsungleichheit; Bildungsentscheidungen; Risikopräferenzen; Relative Risikoaversion; Tertiäre Bildung; Berufliche Ausbildung

1. Introduction

We focus on the role of risk preferences in educational choice, as previous sociological research on risk aversion has made the misleading assumption that people of different classes are universally risk-averse, and neglected important theoretical arguments and findings in other disciplines. The investigation and theoretical explanation of risk preferences was pioneered by psychologists Kahneman and Tversky (1979; Tversky & Kahneman, 1992), who developed the now empirically well-established prospect theory. This theory is used widely today in economics, where risk comes into play as an individual preference that influences decisions in various areas of life (Borghans, Duckworth, Heckman, & ter Weel, 2008). The economic literature supports the idea that risk-averse behavior leads to lower educational investments, whereas risk-seeking behavior leads to higher educational investments (Brown, Ortiz-Nuñez, & Taylor, 2012; Weiss, 1972).

The sociological model of educational choice by Breen and Goldthorpe (1997) also incorporates risk aversion, which at first suggests an affinity with prospect theory. Although it was developed primarily to explain the persistence of social inequality and the reduction in gender differences in educational attainment in industrialized countries over time, this model has also been used to explain social inequalities at a given point in time (Gabay-Egozi, Shavit, & Yaish, 2010; Stocké, 2007). In the Breen and Goldthorpe model, which followed on the work of Boudon (1974), the authors distinguished between primary and secondary effects of social origin and identified the motive of status maintenance as the main factor accounting for secondary effects. They argue that in striving to avoid downward status mobility, families show a tendency toward risk aversion in educational choices. Our application of prospect theory to educational decisions results in a more socio-economically differentiated view, revealing that risk-averse behavior is more prevalent among lower socio-economic classes, whereas risk-seeking behavior is more prevalent among higher socio-economic classes.

Making reference to prospect theory (Kahneman & Tversky, 1979) and models of educational choice (Breen & Goldthorpe, 1997; Goldthorpe, 1996), we explore differences in relative and individual risk preferences and the socio-economic background conditions under which individual risk preference might affect students' intentions to pursue university or other forms of vocational or higher education after completion of secondary school. We argue that the motive of status maintenance is the major force driving educational decision-making, leading to relative risk-seeking in higher classes and relative risk aversion in lower classes. Individual risk aversion comes into play particularly for students from lower socio-economic backgrounds, since these students normally tend to maintain their status at an earlier stage in the educational career than higher-class students and thus to avoid risky decisions. Thus, the assumption that people from all social classes are universally risk-averse is misleading, because risk aversion is not a key factor in decision making for upper social classes.

In our study, we tested theoretically derived hypotheses based on empirical data from the German *Socio-Economic Panel Study* (SOEP). We analyzed the educational intentions of students who were about to graduate from upper secondary school (*Gymnasium*), the university-oriented track of the German school system, and to thereby obtain their general university entrance qualification (*Abitur*). School-leavers with an *Abitur* show disparities in their intentions as well as in their subsequent educational participation: After graduating from *Gymnasium*, students from lower social classes enroll less often in university, as firm-based apprenticeships are widely accepted in these social groups as an alternative to a university degree (Allmendinger, 1989; Müller & Shavit, 1998).

In the following section, we briefly describe the German educational system and then derive hypotheses based on prospect theory, models of educational choice and concepts of individual risk preference. After describing our data, operationalization and statistical methods, we give a detailed presentation of the empirical results. In the final section, we summarize our findings, point out some limitations of the

study and conclude with remarks on the importance of considering preferences, attitudes and personality in inequality research.

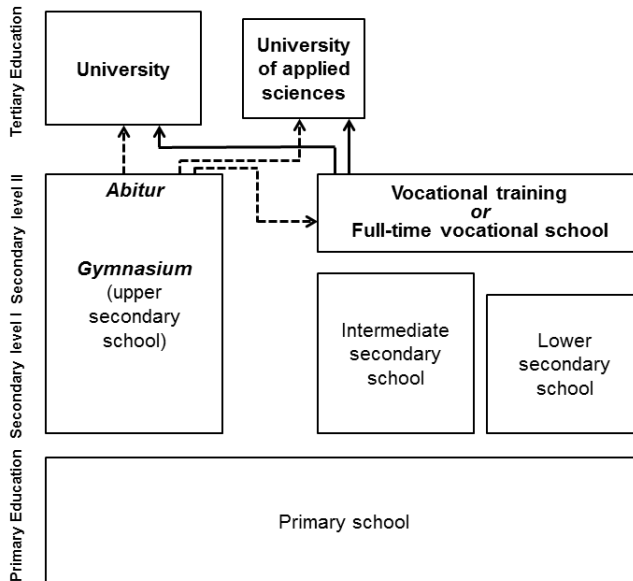
2. The German educational system

The German educational system is characterized by high stratification, high standardization and high occupational specificity (Allmendinger, 1989; Müller & Shavit, 1998; Pfeffer, 2008). The high stratification forces students to make decisions at multiple points in their educational career, thereby increasing the importance of risk preferences in the German educational system as compared to educational systems with low stratification.

In most of the 16 German federal states, the first point at which students are separated into tracks is in primary school, at the end of the fourth grade. The three main types of secondary school in Germany are lower secondary school, intermediate secondary school and upper secondary school, the latter of which (*Gymnasium*) is a university-oriented track. The *Gymnasium* is the most demanding and longest-lasting general educational track at the secondary level. Students graduating from these schools obtain the university entrance qualification (*Abitur*). They can choose from among three main types of vocational and higher education: (1) university (*Universität*), (2) university of applied sciences (*Fachhochschule*) and (3) a vocational education and training (VET) program within the 'dual system' (*duales System*) or full-time vocational school. In addition, we observe that significant proportions of students (4) first complete a VET program and then begin a degree at a university or university of applied sciences, thus obtaining a dual qualification (for a condensed overview of the German educational system, see Figure 1).

Due to the high stratification of the educational system and the attractiveness of the German VET system, Germany has a very low percentage of the population with tertiary degrees compared to most other industrialized countries (Powell & Solga, 2011), although the percentage of secondary school graduates who are eligible for tertiary education has steadily increased in recent years. For *Gymnasium* graduates who were raised in lower- or middle-class families or by parents who did not attend university, VET offers attractive opportunities to gain practical occupational qualifications: vocational training programs are generally shorter in duration, lasting from two to three years, and offer a practical orientation and a high probability of employment (Reimer & Pollak, 2010). Additionally, apprentices receive a salary while still in training (in the case of in-house apprenticeship accompanied by part-time vocational school) under the German dual system. Despite the fact that a vocational degree is a significantly lower qualification than a university degree, such degrees offer relatively stable labor market returns without the financial burdens and risks of university studies (Schindler & Reimer, 2011). These attractive aspects of vocational training tend to divert especially those individuals from tertiary education who have no more than an average probability of graduat-

Figure 1: Schematic structure of the German education system and the transitions under study (arrows)



Note. Dotted arrows: first transitions after receiving general university entrance qualification (*Abitur*); Solid lines: transitions to tertiary education after “detour”.
Source: own illustration.

ing from university (Becker & Hecken, 2009). And for the same reasons, it might attract risk-averse individuals.

3. Theories and empirical findings on risk preference in educational choice

Risk preferences are expressed on a scale ranging from risk-averse to risk-seeking behavior. We focus on two aspects of risk preferences: The first relates to a current situation (position), and is therefore referred to as ‘relative risk preference’, the second to personal attitudes, and is referred to as ‘individual risk preference’. The following section explains the theoretical relevance of these two forms of risk preference in educational decisions and the interaction between them. We argue that the motive of status maintenance is the pivotal force in educational choices, leading to relative risk aversion in lower classes and relative risk-seeking in higher classes. Since students from lower social classes normally tend to maintain their status at an earlier stage in the education system than higher-class students and thus tend to avoid risky decisions, individual risk aversion comes into play especially for those students from lower social classes.

To this end, we start by discussing aspects of prospect theory (Kahneman & Tversky, 1979) and models of educational choice in the version of Breen and Goldthorpe (1997; Goldthorpe, 1996). Slightly different versions have been proposed by Erikson and Jonsson (1996), and by Esser (1999). In a second step, we focus on individual risk preferences and formulate hypotheses addressing both forms thereof.

3.1 Relative risk aversion and risk-seeking in prospect theory

Prospect theory aims at explaining decision under risk and may also be applied to decision under uncertainty¹, as in the case of educational decisions. According to prospect theory, the decision process is divided into an editing and an evaluation phase. Possible outcomes are evaluated relative to a reference point as gains or losses. As losses increase relatively to gains, the value function for losses and gains takes on an asymmetrical s-shaped form. Risk preference is a function of values attached to gains and losses and of decision weights.

In a first step, the editing phase, people frame different ‘prospects’, or offers, as gains or losses relative to their current status. This procedure is referred to as ‘coding’ (Kahneman & Tversky, 1979). Whereas coding is likely to play an insignificant role in a simple lottery situation, where it is fairly clear what the potential gains and losses are, in sociologically relevant decisions, the same offer might have different meanings to different people depending on those individuals’ reference points. In the context of educational decisions, a VET degree might be considered a loss for an upper-class family, neither a loss nor a gain for a middle-class family, and a gain for a lower-class family. This idea is in line with Keller and Zavalloni’s (1964) as well as Boudon’s (1974) arguments about relative educational aspirations.

In a second step, people evaluate each of the edited prospects with respect to their probabilities and associated subjective utilities and then assign a value (V) to each prospect. The utility is the sum of the gains and losses, and follows from the divergence of each from the reference point (Kahneman & Tversky, 1979). After completing this process, people choose the prospect with the highest value.

In contrast to expected utility theory, prospect theory assumes that people hold different utility functions for losses and gains. In the area of losses, the function is convex; in the area of gains, it is concave. The curve is steepest in the case of lowest absolute outcomes. An additional increase in an already large gain leads to a smaller subjective utility than having either this additional outcome or noth-

1 Decision under risk means that probabilities are stated, under uncertainty, that ‘objective’ probabilities are not known to the decision maker or even do not exist. As people do not operate with stated probabilities, but with subjective decision weights, the differentiation between decision under risk and under uncertainty does not seem to be of major relevance (see also later versions of prospect theory developed by Tversky and Kahneman, 1992).

ing at all. The same holds true for losses (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992).

In the case of gains, for example, people often prefer an outcome that is certain to an uncertain lottery game outcome with a higher expected value. If you offer a lottery of either V (€300, 0.50; €0, 0.50), in which the odds of winning €300 or nothing at all are equal, or a certain payoff of €130, the majority of people will opt for the certain outcome, although the statistically expected value of the lottery is €150 (Dohmen et al., 2005). Therefore, the average decision maker is risk-averse in this case. In contrast, if people face losses, they behave in a risk-seeking manner (for more examples, see Kahneman & Tversky, 1979).

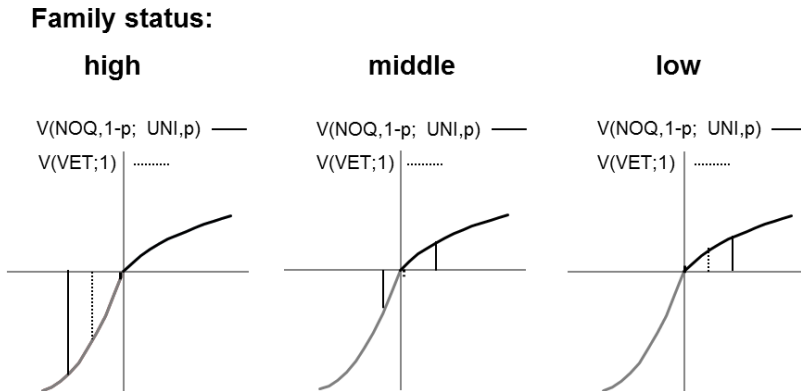
What does this mean for educational decisions? If students and their families consider the value of different educational alternatives in the editing phase, students from the lowest classes encounter positive prospects, which would signify a maintenance of or increase in social status, whereas students from the highest classes would mainly face negative prospects, only one of which would offer the possibility to maintain social status. Lower-class students thus tend to be relatively risk-averse, whereas upper-class students are more risk-seeking.

To clarify the consequences for educational choices, we refer to our example: the educational choices of students with a general university entrance qualification (*Abitur*) in Germany. The outcomes of the first prospect are enrolling in university and pursuing a degree (UNI) and in the case of failing, entering the labor market without qualifications and being an unskilled worker (NOQ). The probability of success should be p , that of failing $1-p$. Consequently, the prospect is $V_1(\text{UNI}, p; \text{NOQ}, 1-p)$. The alternative prospect is vocational education and training (VET). As the VET system traditionally attracts students who have completed lower or intermediate secondary school, we assume a success probability of 1 for students who have completed upper secondary school (*Gymnasium*). The VET is considered as a certainty equivalent. The second prospect is $V_2(\text{VET}, 1)$. The value of the three different outcomes can be ordered into $\text{NOQ} < \text{VET} < \text{UNI}$.

We place the two prospects into the hypothetical value function separately for students from upper, middle and lower social classes, without assuming that the value function as such differs by class (see Figure 2). Students from upper social classes only maintain their family status if they enroll in university. If they graduate, they neither gain nor lose. If they fail, they experience a severe loss. If they choose the second prospect $V_2(\text{VET}, 1)$, they also sustain an intergenerational status loss. The outcomes of all prospects are negative or zero ($\text{NOQ} < \text{VET} < \text{UNI} = 0$). This means that students from upper social classes should be relatively risk-seeking and should attend university in order to avoid a loss. The situation is completely different for students from lower social classes. If they have attained the general university entrance qualification (*Abitur*), they are already at least as qualified as their parents or even more. They face no potential status loss but rather the opportunity to make gains. They are upwardly mobile whether they complete VET or university studies ($0 = \text{NOQ} < \text{VET} < \text{UNI}$). As university is risky, they might prefer the certain alternative V_2 although a higher val-

ue is attached to a university degree. The outcomes of the prospects are positive or zero, and students are consequently relatively risk-averse. Note: aversion to inter-generational status loss leads to risk-seeking behavior in the first case and to risk-aversion in the second case.

Figure 2: Prospect theory and the value of educational alternatives ‘university’, ‘no vocational qualification’, ‘vocational education + training (vet)’



Note. NOQ: no vocational qualification; UNI: university; VET: vocational education + training.
 Source: Own illustrations.

If students belong to a middle-class family, they could achieve the same status as their parents by completing VET. In this case, they neither gain nor lose from an intergenerational perspective. A university degree would be a gain, and failure to attain a university degree a loss ($\text{NOQ} < \text{VET} = 0 < \text{UNI}$). The outcomes of the first prospect are thus mixed. In lottery experiments, people behave in a risk-averse manner when faced with mixed prospects consisting of both losses and gains. In a situation of equal odds of winning and losing, people only play the lottery if the positive outcome is at least twice as large as the absolute value of the negative outcome (Tversky & Kahneman, 1992). In a situation of equally positive and negative outcomes, they play if the probability of winning is substantially higher. Otherwise, they choose the safe alternative of ‘neither winning nor losing’. In our example, this would be taking the VET course.

3.2 Relative risk aversion and further important aspects of sociological models of educational choice

The aforementioned theoretical concepts and our application thereof are similar to sociological models of educational choice. These models are founded on the assumption that preferences do not differ due to class-specific values or socialization or that financial returns to education are not evaluated differently by people of different classes. However, the utility of educational investments differ by fami-

lies, as both parents and children – when they have reached the age of making educational decisions – try to avoid intergenerational downward mobility in socioeconomic status by ensuring that children attain at least the same social status as their parents (Breen & Goldthorpe, 1997; Erikson & Jonsson, 1996; Esser, 1999). Individuals from different social classes are motivated more by the desire to avoid status loss than by the prospect of status advancement (Breen & Goldthorpe, 1997; see also Erikson & Jonsson, 1996; Esser, 1999). The motive of status maintenance is structurally connected to the social position of the family: Failure in one track and the different probabilities of reaching a higher social class lead to behavior that is referred to as relative risk aversion. The choice of university attendance may be risky because, in the event of failure, one faces entry into the unskilled labor market and a resulting low social status. While a university degree is almost the only means of maintaining social status for the upper social classes, families with lower and middle social status tend to opt for a shorter, less risky form of training. A range of empirical studies using adapted rational choice models support the relative risk aversion theory (Becker & Hecken, 2009; Breen & Yaish, 2006; Davies, Heinesen, & Holm, 2002; Jæger & Holm, 2012; Need & de Jong, 2001; Stocké, 2007; Tieben, 2011; Tolsma, Need, & de Jong, 2010; van de Werfhorst & Hofstede, 2007).

Breen and Goldthorpe (1997), who focused for the sake of clarity on the service-class, working-class and underclass, deduced that service-class as well as working-class families have an “identical *relative* risk aversion: they want to avoid, for their children, any position in life that is worse than the one from which they start” (p. 238). What remains unclear is the risk aversion and decision-making behavior of students from the lowest classes. Is there always a fear or risk of downward mobility? The literature following on the work of Breen and Goldthorpe has reiterated the idea that such models assume “classes do not differ in relative risk aversion motivation” (Gabay-Egozi et al., 2010, p. 449; see also Stocké, 2007).

If classes did not in fact differ in relative risk aversion motivation, risk aversion would be constant and would therefore be unsuitable to predict different outcomes. It is therefore unsurprising that previous attempts to test relative risk aversion using children’s or parents’ responses to survey questions on their subjective importance on avoiding downward status mobility have not yielded any significant results (see, e.g. the work of Gabay-Egozi et al., 2010; Stocké, 2007).

A further question is whether the notion of relative risk aversion in models of educational choice is any different than that of loss aversion in prospect theory. Note that prospect theory has a differentiated view of relative risk preference: Depending on parental status, families are either risk-averse or risk-seeking. As prospect theory seems more convincing in this respect, our hypotheses below will only refer to this theory.

Important assumptions of the sociological models of educational choice, which are used in our model specification, are the following:

Success probabilities vary with regard to the relationship between the parents’ background and the child’s skills, knowledge and effort. Grades are the most

important and obvious indicator of a child's performance. Success probabilities should therefore vary by grades (Erikson & Rudolphi, 2010). In addition, higher social classes rate their chances of successfully completing a demanding university degree higher than members of lower social classes do, even when their school performance is low, possibly because higher-class children know they can still rely on their parents' support in case of difficulties. It is also possible that highly educated parents instill the idea in their children that completion of a university education is not so much a question of intelligence as one of perseverance (Erikson & Jonsson, 1996; Esser, 1999).

In order to remain in the educational system, lower social classes have to shoulder relatively high financial burdens consisting of both direct and indirect costs. The absolute costs might be comparable between classes, but lower classes have more limited financial resources and therefore higher relative and/or subjectively assessed costs (Breen & Goldthorpe, 1997; Erikson & Jonsson, 1996).

3.3 Individual risk preference in prospect theory and empirical findings from economic research

The prospect theory on risk aversion and risk-seeking describes the average value functions. However, there are differences between subjects (Tversky & Kahneman, 1992). Individual risk preference may be regarded as a personal attitude, which, alongside (school) performance and parental social status, affects the values assigned to different educational opportunities and the expected success probabilities. Thus, it is distinct from relative risk aversion in models of educational choice and from relative risk preference in prospect theory.

In the field of economics, individual risk preference is an established construct used to explain decisions in areas such as financial investment, labor market behavior and performance, and even health behavior (Bonin, Dohmen, Falk, Huffman, & Sunde, 2007; Borghans et al., 2008; Dohmen et al., 2011). Empirical studies have shown that individual risk preference correlates with education and labor market participation. Using data from the National Register of Scientific and Technical Personnel, Weiss (1972) investigated the influence of risk aversion on human capital investments and returns to education in a sample of university graduates. He detected a negative relationship: Even with a moderate increase in risk aversion, the incentive to invest in education decreases significantly. In a study using data from the US Panel Study of Income Dynamics (PSID), Brown, Ortiz-Nuñez, & Taylor (2012) found significant positive correlations between the degree of risk preference and the level of formal education achieved. They also examined the relationship between adults' risk preferences and investments in human capital, as well as the relationship between parents' risk preferences and their children's results in standardized tests. The higher the parents' risk tolerance, the better the math and reading skills of their children. Wölfel & Heineck (2012) analyzed data from the SOEP, in which over 20,000 adults were interviewed about their risk

preferences in 2004, and did not find any consistent pattern of parental risk attitudes and child enrollment in secondary school types. According to Dohmen et al. (2011), people report on average higher risk preferences if their mother or father holds a higher school-leaving certificate. Taken together, these findings give indications that individual risk preference is not distributed completely at random but it is socially structured to some degree.

Although not all reported findings are consistent, it is important to consider the following mechanisms when examining the role of individual risk preference in inequality of educational opportunity. If higher risk preference leads to higher educational attainment and if risk preferences are transmitted from one generation to the next, the transmission of risk preference should be partly responsible for inequalities in educational opportunities. Or to put it differently: A higher socio-economic background leads to higher risk preference, and higher risk preference in turn raises the chances of higher educational attainment.

3.4 Hypotheses on educational intentions

We argue that the interaction between relative and individual risk preference impacts educational plans. While relative risk preference influences educational plans via the motive of status maintenance, individual risk preference impacts educational plans as a personal attitude. Yet, these mechanisms have to be considered jointly: When future educational decisions are pending, individual risk preference only has an impact when status has already been maintained. Thus, individual risk aversion does not come into play for students from higher social classes until they have reached the same high status as their parents. In contrast, students from lower social classes have reached their parents' status, and here, individual risk aversion can have an impact. We derive the following hypotheses on relative and individual risk aversion and their interactions:

The more risk-averse an upper secondary school (*Gymnasium*) graduate is, the more reluctant this person will be to pursue a university degree (*Hypothesis 1 on individual risk preference*).

According to the motive of status maintenance, students from upper social classes are almost compelled to obtain a university degree. They are relatively risk-seeking. Thus, other factors are rarely taken into account and individual risk preference is unimportant (*Hypothesis 2a on relative risk preference*).

Secondary school graduates from lower and middle social classes do not necessarily need a university degree to maintain their status. They are relatively risk-averse. Those who are individually risk-seeking will attend university, while those who are individually risk-averse will apply for vocational training or other non-university courses (*Hypothesis 2b on relative risk preference*).

If relative risk preferences suppress or allow individual risk preference to influence educational decisions, this should also apply to other features. According to sociological models of educational choice, school performance is an important

factor (see end of section 3.2). We therefore hypothesize that relative risk-seeking in upper social classes should lead to an irrelevance of school performance in later decisions, whereas relative risk aversion in lower social classes should lead to a positive relationship between school performance and university enrollment (*Hypotheses 3a and 3b on relative risk preference*).

4. Data and methods

For the empirical analyses, we used data from the German *Socio-Economic Panel Study* (SOEP). All members of a household who are at least 17 years old are interviewed individually using a personal questionnaire. There is also a supplementary questionnaire for 17-year-olds including information on educational history, school performance and future plans (Wagner, Frick, & Schupp, 2007). The following analyses are based mainly on responses to the supplementary questionnaire in the years 2003 to 2012. We pool the information collected in different years, but every individual is taken into account only once.

4.1 Sample and variables

Since the *Gymnasium* is the school track that prepares students for higher tertiary education, we restrict the analysis to the 17-year-olds who were attending a *Gymnasium* at the time of the survey. These students are also close to finishing their general education and obtaining their *Abitur*.

The dependent variable is based on their responses to two questions: First, respondents are asked: ‘In the future, do you intend to attain a vocational or university degree?’ Those students answering ‘yes’ or ‘yes, maybe’ report their intended educational and occupational qualifications, with multiple answers being possible. From these data, we assign students to one of the five ‘educational pathways’ that are captured in our dependent variable:

- (0) University (UNI);
- (1) University of applied sciences (UAS);
- (2) Vocational training and higher education: dual qualification or undecided (DBL);
- (3) Vocational training: apprenticeship or full-time vocational course (VET);
- (4) No further training: no vocational qualifications (NOQ).

We distinguish between university and university of applied sciences because degrees from the latter are shorter in duration, more occupationally oriented, and curricula are more structured but generally lead to somewhat lower earnings and social status. Thus, studies at a university of applied sciences may be more attractive to lower- and middle-class young people. Students declaring intentions to pur-

sue vocational training and tertiary education might intend to attain a sequential dual qualification (first VET, then a university degree). However, we cannot be sure whether students have really chosen this strategy or are still undecided about their plans for the future. Those students who answered 'no' to the first question on intentions to pursue a vocational or university degree were placed in the category 'no further training'.

We use intentions instead of actual transitions for at least three reasons. First, the aforementioned models deal with students' intentions. It is quite possible that some students will be unable to realize their plans. If they do not get a place in the VET system, for instance, whether due to poor grades or stiff competition, they might be 'forced' to enroll at university. Second, findings based on panel data show a close link between secondary school graduates' intentions and their later enrollment at university in Germany (Maaz & Watermann, 2010). Third, as a panel study, the SOEP makes it possible to follow respondents over time. After ending general education, however, young people have a high risk of dropping out of a household survey like the SOEP. And this might result in a highly selective sample if those enrolling at university are the same individuals who move out of their parents' homes.

To capture individual risk preference, we used respondents' answers to the question 'How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks?' The possible answers range from 0 'unwilling to take risks' to 10 'fully prepared to take risk'. Dohmen et al. (2011) provide evidence that this question is a valid indicator for risk preference, first, by using the data on over 20,000 participants from the 2004 wave of the SOEP, and second through an additional behavioral validation study with 450 participants randomly sampled all over Germany and surveyed in their private households. Using the first data set, they showed that the answer to the aforementioned general risk question correlates highly with reports on more domain-specific questions on risk preference referring to car driving, financial issues, sports/leisure, job career, and health behavior. In addition, the answers to the general question correlate positively with stockholding in the household, with self-employment, smoking and doing sports, whereby reported risk preferences in the domain in question are more strongly correlated (e.g. reports on risk preference in health and actual smoking). In the behavioral validation study, people were interviewed using the same personal questionnaire ordinarily used by the SOEP. One of the first questions was on the general risk preference. After this interview, lasting about 20 minutes, people were asked to take part in a lottery game. The interviewers offered the participants the prospect of winning 300€ or nothing with even odds: $V(€300, 0.50; €0, 0.50)$. Then the interviewers offered gradually increasing certainty equivalents, starting at €0, rising from €10 to finally €190. The point at which people stop playing and take the safe amount of money indicates their level of individual risk preference. Dohmen et al. (2011) showed that the self-reported risk preference and the certainty equivalent in the lottery correlate highly. Thus the self-report item seems to be not only valid but also a time-efficient instrument.

As an indicator of the family's social status, we used the highest parental level of education according to the scheme developed by the research group *Comparative Analysis of Social Mobility in Industrial Nations* (CASMIN; Braun & Müller, 1997). We differentiate between lower secondary school qualification with or without vocational training (CASMIN 1), intermediate school qualification or higher university entrance qualification (*Abitur*) with or without vocational training (CASMIN 2), degree from a university of applied sciences (CASMIN 3a) and university degree (CASMIN 3b). We differentiate between CASMIN 3a and CASMIN 3b, the latter being the "traditional" and more prestigious one and comprising those qualifications that lead to the highest positions on the labor market (see above).

A family's financial situation might limit the options available to them when making educational decisions. As an indicator of the resources available to finance a child's higher education, we used the disposable household income. We first adjusted this income information for purchasing power parity based on 2006 averages. In a second step, we took into account that the same amount of income has different meanings depending on the size of the household. Thus, instead of calculating per capita income, we divided the income by the square root of household size. As income is right-skewed, we took the logarithm of this income measure.

We measured school performance of students at *Gymnasium* level by grades in German, mathematics and first foreign language on the last report card. The variables on individual risk preference, household income (ln) and grades are centered by their mean.

We also constructed variables for respondent's gender, region of residence (Eastern vs. Western Germany) and a linear variable for year of observation, equating the survey year 2008 to 0.

4.2 Multiple imputation

Some variables have missing values due to item non-response or by design. Item non-response is a minor problem. In 21 out of 1,154 cases, a valid answer on future educational plans was missing. The variables for parental education and available household income² have 1 or 2, the variable for grade point average 9 missing values (for more details, see Table A.1 in the Appendix). The question on risk preference is not asked in the SOEP every year. In order to maintain a reasonable sample size, we relied on reports on risk preference at the ages of 17 and 18 and calculated the average of both. In over 97 % of the sample, at least one piece of information on risk preference is available. There was no question on risk preference for

2 The variable of household income is a special case. The SOEP data include fully imputed information on this variable, based on information from all members of the household and on a substantial amount of information on different income sources, income levels as well as taxes and social insurance contributions. Consequently, the number of missing values is almost zero.

17-year-olds interviewed in 2003, for 17- and 18-year-olds in 2005, and data on 18-year-olds are not yet available for 2013, yielding 367 missing values by design. In an additional 32 cases, there is not any valid value due to item non-response or—more importantly—due to panel drop-out.

For all missing values, we conducted multiple chained equation imputations. In the case of risk preference, we imputed missing values for 17- and 18-year-olds and used the interview provided and imputed values to calculate the average risk preference. We specified a background model that included the variables from the subsequent analysis models and also the following information: satisfaction with school performance in the subjects of German, mathematics and first foreign language; individual grades in these three subjects (instead of the grade point average); two factors extracted from a principal components analysis on the beliefs about relevant factors in upward social mobility; involvement in musical activities; participation in competitive sports; frequency of reading for leisure; immigration background (first and second generation); year of survey; existence of tuition fees at time of interview in the federal state (*Bundesland*). Using the Stata add-on program 'ice', we were able to generate a total of 100 complete datasets. The variance of the predicted missing values from the regression-based imputation was increased by adding an error term from the posterior distribution and by random drawings of the regression coefficients from their estimated distributions (Royston, 2005).

4.3 Describing the sample: Bivariate statistics

After imputation, the dataset contained complete information on 1,154 students at upper secondary school (*Gymnasium*). Table 1 shows the educational plans of students by all characteristics used in the multivariate analyses (for a distribution of these figures before imputation, including the amount of missing information, see Table A.1. in the Appendix).

Table 1: Frequency distribution and relative frequencies of different intentions regarding further education (after imputation)

	Frequency	Proportion pursuing				
		UNI	UAS	DBL	VET	NOQ
Frequency distribution	1,154.0	737.9	90.3	142.2	119.1	64.5
Relative frequencies	100 %	64 %	8 %	12 %	10 %	6 %
Risk preference ^a						
< = 3.5 (very low)	139.6	67 %	7 %	11 %	10 %	5 %
4 to 5	395.2	60 %	9 %	14 %	13 %	5 %
6	254.0	66 %	8 %	11 %	9 %	6 %
7	215.3	67 %	6 %	13 %	7 %	7 %
> 7.5 (very high)	149.9	65 %	10 %	10 %	8 %	7 %
Parental education						
CASMIN 1	75.0	56 %	11 %	8 %	18 %	7 %
CASMIN 2	396.3	51 %	10 %	17 %	17 %	5 %
CASMIN 3a	174.2	66 %	9 %	12 %	9 %	5 %
CASMIN 3b	508.5	74 %	6 %	10 %	5 %	6 %
Grade point average ^a						
< = 2.0 (excellent)	233.9	79 %	4 %	9 %	4 %	4 %
2.33-2.66	382.1	71 %	6 %	12 %	8 %	4 %
3.0-3.33	349.3	54 %	10 %	16 %	14 %	7 %
> = 3.66 (poor)	188.8	50 %	13 %	11 %	17 %	9 %
Household income ^a						
1st quartile	280.5	52 %	11 %	15 %	17 %	6 %
2nd quartile	295.4	60 %	11 %	12 %	12 %	5 %
3rd quartile	287.6	66 %	6 %	14 %	8 %	5 %
4th quartile	290.4	77 %	3 %	9 %	4 %	6 %
Region						
West	908.0	67 %	8 %	11 %	8 %	6 %
East	246.0	52 %	9 %	17 %	17 %	5 %
Gender						
Boy	545.0	66 %	9 %	10 %	9 %	6 %
Girl	609.0	62 %	7 %	14 %	12 %	5 %

Note. Source: SOEP 2003-2012. Own calculations relying on 100 completely imputed datasets. UNI: university; UAS: university of applied sciences; DBL: sequence of VET + tertiary education; VET: vocational education and training; NOQ: no further training.

^aPut into larger categories for descriptive statistic only.

Overall, 64 % of the students reported that they intended to enroll at a university (UNI), 8 % to enroll at a university of applied sciences (UAS), 12 % to obtain a dual qualification or that they were still undecided (DBL), 10 % to pursue vocational training (VET) and 6 % reported no intention to pursue any further formal train-

ing after graduation (NOQ). For individual risk preference, there is no clear pattern in the bivariate statistics. Looking at parental education and disposable household income, we see that higher scores in these dimensions go hand in hand with more students reporting university and fewer reporting university of applied science and vocational training. Students with low-qualified parents do not fit this overall pattern regarding their statements on DBL. The group of students with low-qualified parents is small in absolute terms, which might cause this irregularity. For those students reporting no intentions for further training, we see some small fluctuations around the average.

Students' intentions vary strongly by school performance. In Germany, grades range between '1' being the best and '6' being the worst grade. The better the average grades, the stronger their intention to go to university, the weaker their intention to go to a university of applied sciences or to pursue VET. Better school performance also reduces the likelihood that students will plan to abstain from further training. As regards dual qualifications or indecision, there is a non-linear relationship, with the lowest percentages for both the highest- and the lowest-performing students. The differences in intentions by school performance might be due to primary effects. It should be kept in mind, however, that the German educational system is highly stratified (see Section 2). Children from lower social classes only enter the academically oriented school type (*Gymnasium*) if their school performance is very high (Stocké, 2007). One can therefore raise the question whether the performance of students at *Gymnasium* itself varies by social background. Research based on the 2000 *Programme for International Student Assessment* (PISA) has shown only a slight negative correlation between social background and academic performance, namely test results, among students attending *Gymnasium* at the age of 15 in Germany (Baumert & Schümer, 2001). In our data, we observe grade point averages varying between 2.95 to 2.66 from CASMIN 1 to CASMIN 3b. This difference is statistically significant, but small in respect to content.

The literature provides evidence that the children of highly educated parents are more risk-seeking than children of lower-educated parents on average (Dohmen et al., 2011). In our sample, the average risk preference increases from students with the lowest to the highest socio-economic background, from 5.39 to 5.74, but all differences are not significant.

5. Empirical findings on educational intentions: Multivariate results

As the dependent variable on further educational career is categorical with five outcomes, we estimated multinomial logit models (Long, 1997). The first model refers to the whole sample (see Table 2). The coefficient for the variable on individual risk preference is statistically significant (at the 5 % level) for the equation vocational training vs. university, indicating that risk-seeking individuals tend more often

Table 2: The importance of risk preference on the plans for future educational pathway of students obtaining a general university entrance qualification

	M 1			M 2			M 3		
	b	se	AME	b	se	AME	b	se	AME
UAS/UNI									
Risk preference ^a	-0.07	0.08	-0.00	0.01	0.11	0.00	0.01	0.01	-0.01
Parental education (CASMIN 1 or 2)									
CASMIN 3a	0.04	0.34	0.01	0.03					
CASMIN 3b	-0.48+	0.27	-0.01	0.02	0.35	-0.03	0.02		
Grade point average ^a	0.83**	0.19	0.04**	0.01	0.26	0.02	0.01	1.30**	0.28
Household income (ln) ^a	-0.95**	0.25	-0.06**	0.02	0.34	-0.08**	0.02	-0.02	0.41
Girl (boy)	-0.05	0.24	-0.01	0.02	0.35	-0.02	0.02	0.05	0.34
East (west)	0.44	0.29	0.00	0.02	0.37	0.04+	0.03	0.04	0.50
Year (2008 = 0)	0.00	0.04	0.00	0.00	0.06	0.00	0.00	-0.08	0.06
Constant	-2.12**	0.24			0.33			-2.02**	0.30
DBL/UNI									
Risk preference ^a	-0.05	0.07	-0.00	0.01	0.09	0.00	0.01	-0.19+	0.10
Parental level (CASMIN 1 or 2)									
CASMIN 3a	-0.37	0.29	-0.03	0.03					
CASMIN 3b	-0.77**	0.22	-0.06**	0.02	0.29	-0.03	0.03		
Grade point average ^a	0.43**	0.15	0.01	0.01	0.21	0.01	0.02	0.81**	0.23
Household income (ln) ^a	-0.04	0.21	0.01	0.02	0.29	0.01	0.02	0.28	0.34
Girl (boy)	0.43*	0.20	0.04+	0.02	0.27	0.04	0.02	0.40	0.30
East (west)	0.79**	0.22	0.06+	0.03	0.31*	0.05	0.03	0.95**	0.34
Year (2008 = 0)	-0.02	0.03	-0.00	0.00	0.05	0.00	0.00	-0.08+	0.05
Constant	-1.69**	0.20			0.29			-1.73**	0.26

(continued next page)

Table 2: The importance of risk preference on the plans for future educational pathway of students obtaining a general university entrance qualification (continued)

VET/UNI												
Risk preference ^a	-0.17*	0.07	-0.01+	0.01	-0.06	0.12	-0.00	0.01	-0.29**	0.10	-0.03+	0.01
Parental education (CASMIN 1 or 2)												
CASMIN 3a	-0.46	0.32	-0.03	0.02								
CASMIN 3b	-1.27**	0.27	-0.08**	0.02	-0.84*	0.37	-0.04+	0.02				
Grade point average ^a	1.22**	0.18	0.08**	0.01	1.17**	0.28	0.05**	0.02	1.41**	0.24	0.12**	0.03
Household income (ln) ^a	-0.45+	0.25	-0.02	0.02	-1.16**	0.37	-0.05+	0.02	0.27	0.35	0.02	0.04
Girl (boy)	0.53*	0.23	0.04+	0.02	0.55	0.36	0.03	0.02	0.51+	0.30	0.06	0.03
East (west)	1.29**	0.25	0.11**	0.03	1.35**	0.38	0.08**	0.03	1.33**	0.34	0.15**	0.05
Year (2008 = 0)	0.03	0.04	0.00	0.00	0.03	0.07	0.00	0.00	0.01	0.05	0.01	0.01
Constant	-2.14*	0.23			-2.61**	0.38			-1.97**	0.28		
NOQ/UNI												
Risk preference ^a	0.05	0.09	0.00	0.00	0.14	0.12	0.01	0.01	-0.11	0.14	0.00	0.01
Parental education (CASMIN 1 or 2)												
CASMIN 3a	-0.24	0.44	-0.01	0.02								
CASMIN 3b	-0.16	0.30	0.01	0.02	0.09	0.42	0.01	0.01				
Grade point average ^a	0.67**	0.21	0.02+	0.01	0.31	0.27	0.01	0.01	1.36**	0.36	0.04+	0.02
Household income (ln) ^a	-0.26	0.30	-0.01	0.02	-0.80*	0.35	-0.03+	0.02	0.81	0.53	0.04	0.03
Girl (boy)	0.06	0.27	-0.00	0.01	0.21	0.36	0.01	0.02	-0.21	0.44	-0.02	0.02
East (west)	0.04	0.36	-0.01	0.02	-0.73	0.56	-0.04+	0.02	1.03**	0.51	0.03	0.03
Year (2008 = 0)	-0.08	0.05	-0.00	0.00	-0.05	0.06	-0.00	0.00	-0.15+	0.08	-0.01	0.00
Constant	-2.48**	0.28			-2.59**	0.41			-2.61**	0.38		

(continued next page)

Table 2: The importance of risk preference on the plans for future educational pathway of students obtaining a general university entrance qualification (continued)

UNI										
Risk preference ^a	0.01	0.01	-0.01	0.01	0.05**	0.01				
Parental education (CASMIN 1 or 2)										
CASMIN 3a	0.05	0.04								
CASMIN 3b	0.15**	0.03	0.08+	0.04						
Grade point average ^a	-0.15**	0.02	-0.09**	0.03	-0.25**	0.03				0.03
Household income (ln) ^a	0.07+	0.03	0.15**	0.03	-0.06	0.05				
Girl (boy)	-0.06+	0.03	-0.05	0.03	-0.06	0.04				
East (west)	-0.16**	0.03	-0.13**	0.04	-0.20**	0.05				
Year (2008 = 0)	0.00	0.00	-0.00	0.01	0.01+	0.01				
Number of cases (overall)	1154	682-683	471-472							
LogLik (final) (mean)	-1,211.02	-611.6	-571.7							
Pseudo-R ² (mean)	7.9 %	7.7 %	8.1 %							

Significance level: ** $\alpha < 0.01$; * $\alpha < 0.05$; + $\alpha < 0.1$

Note. Source: SOEP 2003–2012. Own calculations relying on 100 completely imputed datasets. Reference categories: in brackets and italic. UNI: university; UAS: university of applied sciences; DBL: sequence of VET + tertiary education; VET: vocational education and training; NOQ: no further training.

^aCentered by the mean.

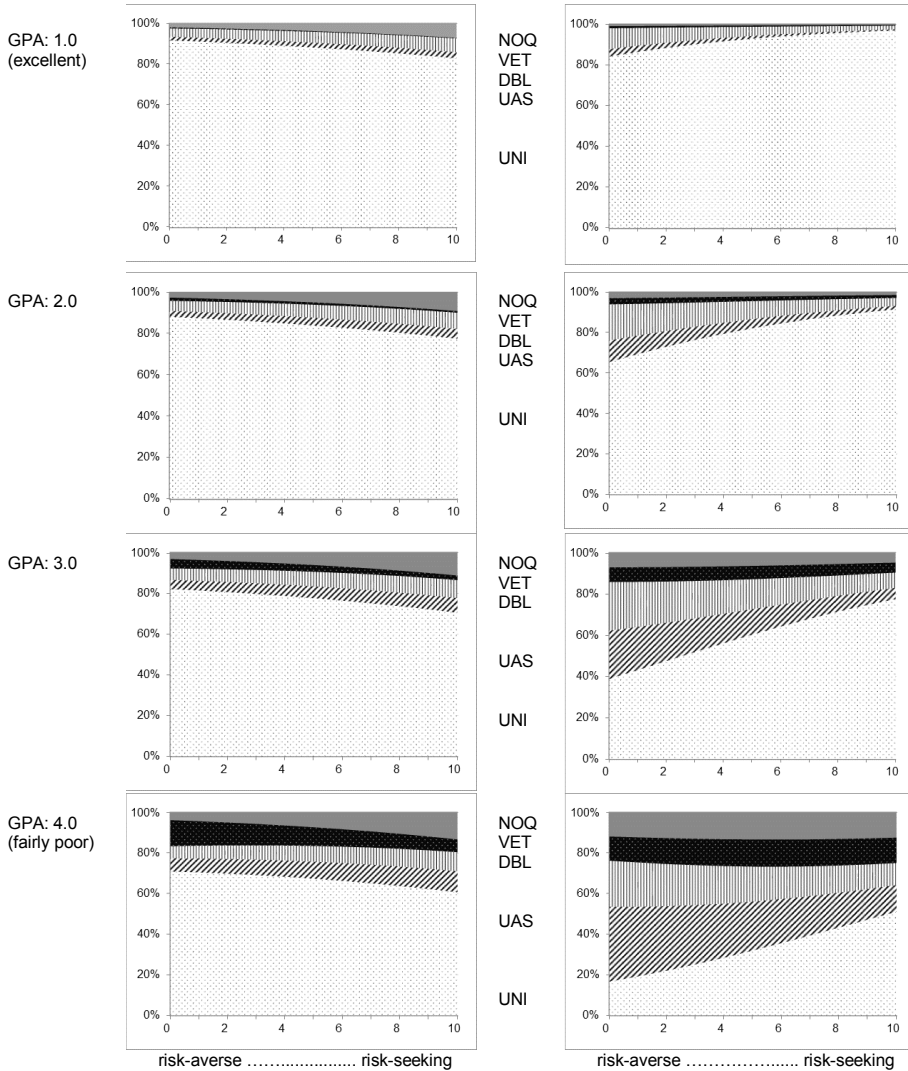
to favor university and less often to take the shortest educational route, vocational training. The three other coefficients for risk preference (university of applied sciences, dual qualification/undecided, and no further training vs. university) are close to zero and not significant. As an indicator of relative risk aversion, we relied on parental education. Due to low case numbers, students with parents belonging to CASMIN 1 were grouped together with CASMIN 2, forming the reference category. In three out of four equations, there are negative and statistically significant effects for students whose parents are university graduates (CASMIN 3b), indicating a higher interest in university education and a lower interest in vocational training and education among this group compared to students with less-educated parents. The small group that reported no intention to pursue further education does not differ with respect to parental education. For the grade point average, ranging from 'excellent' to 'poor', four positive effects were estimated, which were significant at the 1 % level. The worse the grade point average, the more likely students were to report intentions to attend a university of applied sciences, to obtain one or both qualifications (DBL), to pursue vocational training or no further education rather than a university education. However, the probability of belonging to the DBL group might decrease with lower grades, since the coefficient for DBL vs. university education (0.43) is considerably smaller than the coefficients for university of applied sciences and vocational training vs. university education (0.83, and 1.22).

According to Hypotheses 2a and 2b, the impact of individual risk preference should vary with respect to social origin. Therefore, we reran Model 1 with subsamples containing students with higher-educated parents and lower-educated parents separately. Model 2, which is based on students with highly educated parents (CASMIN 3a and 3b), does not show any significant coefficient for individual risk preference. By contrast, Model 3 for students whose parents possess no tertiary education reveals three statistically significant (at least at the 10 % level) effects. The more risk-seeking a student from lower background is, the more likely this student is to pursue a university education and the less likely the student is to pursue VET or to belong to the DBL group.

Hypotheses 3a and 3b claim differences in the effect of school performance on educational pathway intentions. In Model 2, the coefficient in the comparison of vocational training and education vs. university is significant at the 5 % level; all other coefficients estimated for the other three comparisons are considerably lower or not significant. In the case of students from lower socio-economic backgrounds (Model 3), all four coefficients are highly significant at the 1 % level.

We used the estimates of Model 2 and 3 to illustrate the results for the main features of interest, namely individual risk preference, parental education and school performance, by calculating the probabilities. The calculations are based on the reference categories of the other variables. The probabilities refer to a male student from a family with average disposable income living in Western Germany.

Figure 3: Intended educational pathway by grade and risk preference for students with highly educated parents (CASMIN 3b, left-hand column) and low-educated parents (right-hand column)



Note. Source: SOEP 2003-12, 17-year-olds, predictions based on Model 2 and 3, Table 2, calculated for a male youth in Western Germany surveyed in 2008. UNI: university; UAS: university of applied sciences; DBL: sequence of VET + tertiary education; VET: vocational education and training; NOQ: no further training.

Figure 3 displays the educational intentions of students with highly educated parents (CASMIN 3b) on the left-hand side and those with less-educated parents on the right-hand side. The rows are ordered by students' school performance, starting with the highest (with a 1.0 grade point average according to the German grading system) and ending with rather low performers (4.0). The x-axis of each graph indicates the individual risk preference, ranging from risk-averse (0) to risk-seeking (10). The shaded areas display the proportion of students who intend to follow each of the different educational pathways. The dotted area represents those intending to enroll in university, the diagonal shaded area those intending to enroll in a university of applied sciences, the area with vertical lines represents those intending to obtain a dual qualification or still undecided, the black, inverse dotted area those intending to enroll in VET, and the grey shaded area to those intending to leave the educational system after graduation.

The left column of Figure 3 shows that the majority of students of highly educated parents intend to enroll at university even if their grades are poor. However, the proportion of students aiming for other forms of higher education increases as school performance declines. The figures might give the impression that risk-seeking students are less inclined to attend university. As already mentioned above, Model 2 does not reveal any statistical significant influence of risk preference.

Looking at the right-hand column, students at *Gymnasium* whose school performance is high are overwhelmingly inclined to attend university immediately after graduation, even those whose parents are less educated. The large majority of these students do not intend to enroll in VET or a university of applied sciences. The latter forms of education become more and more popular as school performance declines. In addition, there is a pronounced relationship between individual risk preference and educational intentions in the right-hand column. The more risk-seeking a student from a lower socio-economic background is, the more often he or she reports aspiring to attend university.

In addition, we calculated average marginal effects (AME) (see Table 2). The AME support the findings from Figure 2.³ The intention to enroll at university varies only by individual risk preference in the group of students from lower socio-economic backgrounds, and grades are much more important in this group than in the group from higher backgrounds.

What does this mean for the relative risk preference hypothesis? Future educational intentions vary considerably for students with lower academic performance by parental education. Students whose parents have both not completed a university degree more often mention non-university training, while poorly performing students from families in which at least one parent holds a university degree still mainly favor university. These results support the notion of relative risk-seeking in upper social classes and relative risk aversion in lower classes.

3 In the multinomial logistic regression models (MLMN) the AME can be zero but strongly influential as the effects are non-linear. Long (1997, p. 164) writes in his influential book: "Not surprisingly, the marginal is rarely used for the MNL". As a consequence, we give more attention to the predicted probabilities displayed in Figure 3 than to the AME.

In a next step, we tested whether our first impression of the differing importance of individual risk preference and school performance by family background can be validated with rigorous statistical techniques. We therefore modeled interaction terms. The dependent variable in its current form has five outcomes with relatively low case numbers except the university option. Interaction terms for outcomes with low case numbers are difficult to estimate. Because of this, we collapsed the dependent variable into a dichotomous variable, consisting of university (still coded as 0) and all other options (coded as 1).

We estimated four binary logistic regression models. Model 4 contains all variables already used in Model 1. Model 5 takes interaction terms into account between risk preference and family background, Model 6 between grades and family background. Finally, Model 7 contains all interaction terms together (see Table 3).

For students from lower-class families, it is fairly clear that a higher willingness to take risks reduces their intentions to opt for educational options below university (including the option of no higher education at all). If parents have a university degree (CASMIN 3b), the main effect of individual risk preference (-0.18 in Model 5 and -0.22 in Model 7, the corresponding AME are 4 percentage points) is completely cancelled out (0.27 and 0.32, the corresponding AME are 5 or 6 percentage points). The interaction effects are highly significant. At the same time, the main effects of having parents who completed university education is negative and significant, indicating a higher interest in attending university for these students. The interaction effects for CASMIN 3b students with individual risk preference are positive as well but not significant.

In the case of grade point average, we found a positive main effect, indicating that students with lower school performance are less likely to consider university after finishing secondary education. The interaction effects of GPA and parental education (CASMIN 3a and 3b) are negative in Models 6 and 7, relaxing the strong relationship between grades and the intention to attend university. All interaction effects are at least significant at the 10 % level. To sum up, the results presented in Table 3 strongly support our Hypotheses 2a, b and 3a, b.

A few short remarks should be made about our control variables. The educational pathways differ with regard to their direct and indirect costs. Consequently, we incorporated the parental financial situation into all models. In the separate models, Models 2 and 3 in Table 2, only in the case of highly educated parents do we observe significant effects. Especially for students whose parents both have a university education, we observe that the better the parental financial situation is, the less frequently the students intend to enroll in a university of applied sciences, VET, or no further training at all, and the more frequently they intend to enroll in university.

The lack of significant results for the financial situation in the case of students from lower classes is unexpected from a theoretical viewpoint.

The control variables on gender and region are in line with previous findings: Young women and East Germans are less likely to enter university and more like-

Table 3: The importance of risk preference and grades on the plan not to enroll in university of students obtaining a general university entrance qualification

	M 4			M 5			M 6			M 7						
	b	se	AME	b	se	AME	b	se	AME	b	se	AME				
Risk preference ^a	-0.07	0.05	-0.01	0.01	-0.18**	0.07	-0.04**	0.01	-0.07	0.05	-0.01	0.01	-0.22**	0.07	-0.04**	0.01
Parental level of education (CASMIN 1 or 2)																
CASMIN 3a	-0.29	0.20	-0.06	0.04	-0.29	0.20	-0.06	0.04	-0.22	0.20	-0.04	0.04	-0.20	0.20	-0.04	0.04
CASMIN 3b	-0.71**	0.15	-0.15**	0.03	-0.73**	0.16	-0.15**	0.03	-0.66**	0.16	-0.13**	0.03	-0.66**	0.16	-0.13**	0.03
Grade point average ^a	0.75**	0.10	0.15**	0.02	0.76**	0.10	0.15**	0.02	1.05**	0.16	0.21**	0.03	1.15**	0.17	0.23**	0.03
Interaction terms																
Risk * CASMIN 3a				0.07	0.13	0.01	0.03						0.14	0.13	0.03	0.03
Risk * CASMIN 3b				0.27**	0.09	0.05**	0.02						0.32**	0.10	0.06**	0.02
Grade * CASMIN 3a													-0.78**	0.27	-0.16**	0.05
Grade * CASMIN 3b													-0.41+	0.22	-0.08+	0.04
Household income (ln) ^a	-0.38*	0.15	-0.08+	0.03	-0.37*	0.15	-0.08+	0.03	-0.39**	0.15	-0.08**	0.03	-0.40**	0.15	-0.08**	0.03
Girl (<i>boy</i>)	0.28*	0.14	0.06+	0.03	0.27*	0.14	0.06+	0.03	0.29*	0.14	0.06+	0.03	0.28*	0.14	0.05+	0.03
East (<i>west</i>)	0.73**	0.16	0.16**	0.04	0.73**	0.16	0.15**	0.03	0.74**	0.16	0.16**	0.03	0.74**	0.16	0.15**	0.03
Year (2008 = 0)	-0.01	0.02	-0.00	0.00	-0.01	0.02	-0.00	0.00	-0.02	0.02	-0.00	0.00	-0.02	0.02	-0.00	0.00
Constant	-0.61**	0.14		-0.61**	0.14				-0.67**	0.14			-0.69**	0.14		
Number of cases (overall)	1,154			1,154					1,154				1,154			
LogLik (final) (mean)	-683.5			-678.3					-679.0				-672.2			
Pseudo-R ² (mean)	9.4 %			10.1 %					10.0 %				10.9 %			

Significance level: ** $\alpha < 0.01$; * $\alpha < 0.05$; + $\alpha < 0.1$

Note. Source: SOEP 2003–2012. Own calculations relying on 100 completely imputed datasets. Reference categories: in brackets and italic.

^aCentered by the mean.

ly to opt for vocational training. Finally, we see hardly any changes in educational plans over different student cohorts.⁴

6. Summary and conclusion

The notions of risk aversion and of educational choice as a risky decision are gaining prominence in the sociological literature on inequality in educational opportunity (Breen & Goldthorpe, 1997; Davies et al., 2002; Tieben, 2011; van de Werfhorst & Hofstede, 2007; Breen, van de Werfhorst, & Meier Jæger, 2014). In light of the gaps identified in the previous explanations and depictions, we have discussed prospect theory both generally and specifically in the case of educational decisions. Our most important theoretical finding is that the popular notion of relative risk aversion in the sociology of education, which is based on the class position of the parents, appears implausible. Upper social classes are not relatively risk-averse; rather, they are relatively risk-seeking. This finding is in line with recently published work on educational decision-making under doubt (Breen et al., 2014). In an additional step, we examined individual risk preference in explaining social inequality in educational choice. We argued that in higher social classes individual risk preference should play a smaller role, as decisions of children from these families are influenced mainly by status maintenance. The same should hold true for school performance. Furthermore, with reference to the existing literature, we argued that social background and individual risk preference are correlated and this relationship might explain at least to some degree social inequality in educational opportunity.

To obtain empirical insights on the importance of risk preference, we investigated students' intentions to pursue vocational and higher education, focusing on those attending the German *Gymnasium*, which awards graduates with a general university entrance qualification (*Abitur*). These students are a highly selective group: Most of them attend the *Gymnasium* from the fifth grade (about the age of ten) onwards. University education can be considered the logical continuation of this academically oriented educational pathway.

The findings give some indication that the motive of status maintenance leads to both relative risk-seeking and risk-averse behavior, depending on students' socio-economic backgrounds, and that this influences their further educational pathways. With respect to parental education, which is linked to the family's social status, there are clear differences in students' intentions to attend university. These differences are particularly evident for students with poor school performance.

Regarding individual risk preference, we argued that risk-averse *Gymnasium* students should have a lower tendency to pursue a university education and instead intend to complete VET. Referring to the model of educational choice, we

4 If we specify cohort dummies for every single year instead of one linear variable in Table 3, there are also no significant effects.

argued that these patterns should only be observable for students at *Gymnasium* with non-university-educated parents, because otherwise, the motive of status maintenance would predominate. The empirical findings provide evidence in favor of our argument: Individual risk preference proved to be influential only for students with non-university-educated parents. The more risk-seeking these young people are, the more likely they are to pursue a university education. Finally, the lack of empirical evidence on a relationship between the risk preference of students from higher socio-economic backgrounds and their vocational and higher educational intentions can be interpreted, again, as indicating the importance of the motive of status maintenance.

We did not find support for the idea that students differ significantly in their individual risk preferences at age 17. However, we have to consider that we have a highly selective population. The students under examination attended the highest secondary school track, *Gymnasium*, which represents only about one-third of their birth cohort (see Section 2).

It should be kept in mind that our study has its limitations. Since our analysis is restricted to the 17-year-olds who were attending a *Gymnasium* at the time of the survey, this study is not about final or even realized educational decisions but about intentions for further education. Also, as elaborated above, we imputed the data set and used a non-experimental measure of individual risk preference. It could also be argued that a more specific assessment of risk preferences, for example in the context of educational and occupational decisions, would increase the explanatory power of the statistical models. From a theoretical point of view, however, we prefer the non-specific risk measure as it reflects a more general trait and can be more clearly differentiated from relative risk preference in a specific domain. More studies are clearly needed to analyze risk preferences in the context of educational choices. In addition, we relied on grades alone as an indicator of success probability. Results of cognitive competence tests and self-rated success probability would be desirable.

To conclude, previous research has shown that various dimensions of personality, attitudes and preferences influence different aspects of educational success, and our findings provide further support for this idea. However, aspects such as preferences and personal attitudes are obviously not independent of sociologically relevant categories such as socio-economic status, immigrant background or gender, and should therefore be integrated into both theoretical models and population surveys.

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Appendix 1

Table A1: Frequency distribution and relative frequencies of different intentions regarding further education (before imputation)

	Frequency	Proportion pursuing					Missing value
		UNI	UAS	DBL	VET	NOQ	
Frequency distribution	1,154	728	88	139	115	63	21
Relative frequencies	100 %	63 %	8 %	12 %	10 %	5 %	2 %
<i>Risk preference^a</i>							
< = 3.5 (very low)	70	71 %	4 %	7 %	7 %	6 %	4 %
4 to 5	155	59 %	10 %	13 %	14 %	4 %	0 %
6	104	68 %	8 %	8 %	8 %	6 %	3 %
7	96	67 %	5 %	17 %	5 %	5 %	1 %
> 7.5 (very high)	59	59 %	15 %	10 %	10 %	5 %	0 %
Missing value	670	62 %	7 %	13 %	10 %	6 %	2 %
<i>Risk preference^a at least one point of measure</i>							
< = 3.5 (very low)	154	68 %	6 %	11 %	8 %	5 %	3 %
4 to 5	374	56 %	8 %	14 %	15 %	5 %	2 %
6	208	66 %	10 %	10 %	8 %	4 %	2 %
7	193	68 %	5 %	14 %	5 %	7 %	1 %
> 7.5 (very high)	193	65 %	9 %	9 %	9 %	7 %	2 %
Missing value	32	56 %	6 %	9 %	13 %	9 %	6 %
<i>Parental education</i>							
CASMIN 1	75	55 %	11 %	8 %	17 %	7 %	3 %
CASMIN 2	396	50 %	9 %	16 %	16 %	5 %	3 %
CASMIN 3a	174	65 %	9 %	11 %	9 %	5 %	1 %
CASMIN 3b	508	74 %	6 %	9 %	5 %	6 %	1 %
Missing value	1	100 %	0 %	0 %	0 %	0 %	0 %
<i>Grade point average^a</i>							
< = 2.0 (excellent)	233	79 %	4 %	9 %	4 %	4 %	0 %
2.33-2.66	379	70 %	6 %	12 %	8 %	4 %	0 %
3.0-3.33	346	53 %	9 %	15 %	13 %	6 %	3 %
> = 3.66 (poor)	187	48 %	12 %	10 %	17 %	9 %	4 %
Missing value	9	44 %	33 %	0 %	0 %	11 %	11 %
<i>Household income^a</i>							
1st quartile	280	51 %	11 %	14 %	16 %	6 %	2 %
2nd quartile	295	59 %	11 %	11 %	12 %	4 %	3 %
3rd quartile	287	66 %	6 %	14 %	8 %	5 %	0 %
4th quartile	290	76 %	3 %	9 %	4 %	6 %	2 %
missing value	2	50 %	0 %	0 %	0 %	50 %	0 %
<i>Region</i>							
West	908	66 %	7 %	11 %	8 %	6 %	2 %
East	246	52 %	9 %	17 %	17 %	4 %	2 %
<i>Gender</i>							
Boy	545	65 %	9 %	10 %	8 %	6 %	2 %
Girl	609	61 %	7 %	14 %	11 %	5 %	2 %

Note. Source: SOEP 2003–2012. Own calculations. UNI: university; UAS: university of applied sciences; DBL: sequence of VET + tertiary education or undecided; VET: vocational education and training; NOQ: no further training.

^aPut into larger categories for descriptive statistics only.