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ABSTRACT

The Intergenerational Transmission of Risk and Trust Attitudes*

We investigate whether two crucial determinants of economic decision making – willingness to take risks and willingness to trust other people – are transmitted from parents to children. Our evidence is based on survey questions that ask about these attitudes directly, and are good measures in the sense that they reliably predict actual risk-taking and trusting behavior in large-scale, incentive compatible field experiments. We find a strong, significant, and robust correlation between the responses of parents and their children. Exploring heterogeneity in the strength of transmission, we find that gender of the child does not matter, but that children with fewer siblings, and firstborn children, are more strongly influenced by parents in terms of risk attitudes. Interestingly, for trust there is no impact of family size or birth order. There is some evidence of 'receptive' types: children who are similar to the father are similar to the mother, and children who are similar to parents in terms of risk are similar in terms of trust. We find that the transmission from parents to children is relatively specific, judging by questions that ask about willingness to take risks in specific contexts – financial matters, health, career, car driving, and leisure activities. Finally, we provide evidence of positive assortative mating based on risk and trust attitudes, which reinforces the impact of parents on children. Our results have potentially important implications for understanding the mechanisms underlying cultural transmission, social mobility, and persistent differences in behavior across countries. More generally, our findings shed light on the basic question of where attitudes towards risk and trust come from.

JEL Classification: D1, D8, J12, J13, J62, Z13

Keywords: risk preferences, trust, intergenerational transmission, cultural transmission, assortative mating, social mobility, GSOEP

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1 Introduction

Little is known about the origins of the personal traits and dispositions that drive economic decision-making. This paper investigates the origins of two particularly important elements of the decision-maker's endowment: willingness to take risks, and willingness to trust. Understanding the source of risk attitudes is important because almost every economic decision involves risk. For example, investment in stocks, educational attainment, and home ownership are all dependent on attitudes towards risk-taking. Trust is similarly important, but in the realm of social interactions, capturing something fundamental about the way that an individual approaches other people. Many interactions in life involve vulnerability to defection by others, and trust determines whether an individual cooperates in these situations, or enters them at all.[1] We provide evidence suggesting that attitudes towards risk and trust are determined to a substantial degree by an individual's parents. Because of their broad implications for economic decision-making, the transmission of risk and trust attitudes has important ramifications for the economic outcomes of children.

Our evidence is based on a large representative survey of adults living in Germany. For risk, we focus mainly on a question that asks respondents to rate how willing they are to take risks. For trust, respondents indicate how much they agree with various statements about the trustworthiness of others. We are confident about the behavioral validity of our risk and trust survey instruments, because they predict real choices in large-scale field experiments. Our first main finding is that parents who are more willing to take risks, or more willing to trust others, have children who are similarly risk tolerant and trusting. This is true controlling for a wide variety of background characteristics, including permanent income and characteristics of the region of childhood. The intergenerational correlation is also robust to using different types of survey questions about risk and trust attitudes, which vary in terms of context and approach. For example, the survey includes questions about willingness to take risks in five specific contexts – car driving, financial matters, sports and leisure, career, and health. We observe a strong intergenerational correlation in each context. Another question poses respondents with a hypothetical lottery framed

[1] Economic transactions are a prime example of the importance of trust, due to the prevalence of contractual incompleteness. As noted by Arrow: "Virtually every commercial transaction has within itself an element of trust..." (1972, p. 357). Trust may even be self-fulfilling, in the context of an exchange, if an individual interacts with reciprocal types who reward trust by being trustworthy but respond to distrust with defection (Luhmann, 2000; Falk and Kosfeld, 2006).

as a real-world investment opportunity, with given stakes and probabilities. Parental investment is a significant predictor of investment by the child and the magnitude of the effect is considerable; for each additional 1,000 Euros invested by a parent, the child's investment increases by roughly 250 Euros. The intergenerational correlation in trust attitudes is robust to using each of our three trust questions separately, or if we instead use the principle component of these measures. Trusting someone is a risky decision, so we also investigate whether the intergenerational transmission of trust attitudes remains significant once we control for parents' and children's general risk attitudes. This is in fact the case.

Although on the whole children are similar to their parents, the correspondence is closer for some children than for others. For a deeper understanding of the transmission process, we investigate the sources of this heterogeneity. We find that the gender of the child does not affect the strength of the transmission, but find some evidence that family structure matters. Children with fewer siblings have risk attitudes that are more closely aligned with those of their parents, compared to children in large families. Similarly, firstborn children are more influenced by the parents' risk attitudes, compared to their younger siblings, although this latter effect is only marginally significant. Interestingly, for trust we find no impact of family size or birth order. We also find evidence in favor of what one might call "receptive types". Children who are similar, or receptive to the mother also tend to be similar to the father, and children who are similar to their parents in terms of risk attitudes also tend to be similar in terms of trust.

To fully appreciate the extent of the parental influence, it is important to explore whether children end up being similar to their parents only in terms of a general disposition, or whether the transmission process is more fine-tuned, so that children end up being similar to their parents even in relatively detailed ways. We exploit the fact that parents differ in willingness to take risks across the five contexts identified in our survey. For example, some parents are reluctant to take risks in car driving, but are even less willing to take risks in financial matters. If the transmission process involves only a general disposition towards risk, one would predict that the child is risk averse, but not that this particular difference across contexts would be reproduced. Instead, we find strong evidence of specificity in the transmission process: for every context, the best predictor of a child's risk attitude is parents' attitudes in that same context, rather than in other

contexts. This is especially striking given that risk attitudes are strongly correlated across contexts. We also find similar evidence of specificity in the transmission of trust attitudes. The best predictor of a child's response to a given trust question is always the parents' response to that particular question.

We also investigate whether there is evidence of positive assortative mating based on risk and trust attitudes, because of the important implications for the transmission process. If parents tend to seek out and marry individuals with similar attitudes to their own, this would reinforce the impact of parents on children (for a discussion see Bisin and Verdier, 2000). For example, a child with one parent who is relatively willing to take risks would then be likely to have another risk tolerant parent as well, thereby increasing the likelihood that the child ends up with this particular disposition. At this point there is no evidence on assortative mating at the level of trust and risk attitudes, and *a priori* it is unclear whether assortative mating should be positive or negative. We show that there is a strong positive correlation in risk attitudes as well as in trust attitudes, within married couples. This is consistent with positive assortative mating. We find this correlation also when controlling for observables, and even among couples who have been married only recently.

Survey questions are an appropriate methodology for studying intergenerational transmission because they can be administered to a large sample at relatively low cost. A large sample is especially important for studying intergenerational transmission, because each observation requires three individuals: a child, and two parents. Various studies have used survey questions to measure risk attitudes in large samples (e.g., Barsky *et al.*, 1997; Guiso *et al.*, 2002; Guiso and Paiella, 2001; Donkers *et al.*, 2001; Charles and Hurst, 2003; Diaz-Serrano and O'Neill, 2004), but none have investigated intergenerational transmission, the nature of the transmission process, or assortative mating as we do. The closest is Charles and Hurst (2003), who report a parent-child correlation in a question about risk-taking in the employment context. Other studies have used survey questions to measure trust (e.g., Alesina and La Ferrara, 2002; La Porta *et al.*, 1997; Knack and Keefer, 1997), but to our knowledge no previous study has investigated whether trust is transmitted from parents to children. A potential problem with survey studies, however, is that survey questions are not incentive compatible. As a consequence, various factors, including self-serving biases, strategic motives, or simple lack of attention could lead re-

spondents to misreport their true willingness to take risks or trust (for a discussion, see Camerer and Hogarth, 1999).

We can be uniquely confident about the behavioral validity of our survey results, because the particular questions we use have been tested in large-scale field experiments. In a field experiment using a representative sample of 450 German adults, Dohmen *et al.* (2005) show that our main risk question can reliably predict individuals' actual risk-taking behavior, as measured by incentive compatible lottery experiments with real money at stake. Fehr *et al.* (2002) show that our particular trust questions predict actual trusting behavior, measured using an incentive compatible trust game, in a field experiment with a representative sample of 429 German adults. Our hypothetical lottery question has not yet been tested in the field, but we find that it predicts similar lottery choices in laboratory experiments with German college students. Because of these validation exercises, we can be confident that the intergenerational correlation observed in our survey data translates into a meaningful impact on children's actual risk-taking and trusting behavior.[2]

This paper sheds new light on the basic question of where risk and trust attitudes come from, but also has important implications for understanding the mechanisms behind similarities in behavior across generations, and the sources of persistent differences in behavior across different social groups and countries. For example, the literature on cultural transmission seeks to explain the similarity of parents and children in terms of fertility and work practices (Fernández and Fogli, 2005 and forthcoming), preferences regarding the race or work habits of marriage partners (Bisin and Verdier, 2000; Fernández *et al.*, 2004), religious affiliation (Bisin *et al.*, 2004), and donation to charities (Wilhelm *et al.*, 2004). In the theories informing this literature, parents are modelled as actively or passively instilling children with attitudes, preferences, and beliefs similar to their own, thereby leading to similar behaviors across generations (Bisin and Verdier, 2000; Bisin and Verdier, 2001; Fernández *et al.*, 2004; Doepke and Zilibotti, 2005a and 2005b).[3] Although this transmission from parents to children is hypothesized to include the fundamental drivers of individual economic decision-making – impatience, willingness to take risks, and

[2] Dohmen *et al.* (2005) show that all of our risk questions, including the five context-specific measures, can predict various self-reported behaviors, including investing in stocks, participating in sports, smoking, and being self-employed.

[3] The work of Becker and Lewis (1973) and Becker and Tomes (1976), in which parents invest in child "quality", is also relevant, to the extent that parents view similarity to their own preferences as an aspect of child quality.

trust – until now there has been little empirical evidence in the literature documenting transmission at this level (Bisin and Verdier, 2006). Our paper contributes such evidence.

Our findings are also relevant for understanding persistence of socioeconomic status across generations. Various studies have documented a strong correlation in the economic outcomes of parents and children, for example in terms of educational attainment (Mulligan, 1999; Black *et al.*, 2005), income (Mulligan, 1997; Solon, 1992), wealth (Charles and Hurst, 2003), and occupation (Kerckhoff *et al.*, 1985; Long and Ferrie, 2005). It is doubtless the case that this persistence is strongly influenced by the financial constraints facing parents.[4] On the other hand, our findings highlight an additional mechanism, namely the transmission of attitudes from parents to children. Children may end up with similar outcomes to their parents partly because they inherit similar attitudes and thus make similar choices in life.[5] Others have also hypothesized that the intergenerational transmission of attitudes, personality, or other personal traits explains the persistence of socioeconomic status across generations (*e.g.*, Bowles and Gintis, 2002a; Charles and Hurst, 2003; Loehlin, 2005; Osborne, 2005; Heckman and Rubinstein, 2001; Heckman *et al.*, 2006). We contribute to this discussion by providing empirical evidence that parents do in fact have an impact on some of the most economically important attitudes of children.[6] Notably, risk attitudes are relevant for children's behavior in the context of educational choice, and all of the other contexts where intergenerational correlation in outcomes are typically observed.[7]

Intergenerational transmission of risk and trust attitudes also offers an explanation for persistent differences in behavior at the aggregate level. For example, the social capital literature argues that the large differences in trust across countries explain differential rates of economic growth and the functioning of institutions (Putnam *et al.*, 1993; La Porta *et al.*, 1997; Knack and Keefer, 1997; Zak and Knack, 2001). A related line of research shows

[4] For instance, in the case of the intergenerational correlation in wealth, Charles and Hurst (2003) find that the level and variance of parental income are some of the most important determinants.

[5] For example, Black *et al.* (2005) show that simply changing parents' educational attainments in an exogenous way has no impact on children's education. This could indicate that the intergenerational correlation in education works though the transmission of more fundamental attitudes.

[6] A large literature in psychology shows that parents and children give similar responses on personality scales that measure traits such as conscientiousness, sensation-seeking, neuroticism, and agreeableness (for a review, see Loehlin, 2005). While we believe that this literature may eventually be informative for economists, at this point these traits do not map directly into economic models, and have typically not been validated with respect to economic behavior.

[7] Dohmen *et al.* (2005) show that educational attainment, individual wealth, income, and investment in stocks are all positively correlated with willingness to take risks, as measured by the general risk question. General risk attitudes also predict sorting into different occupations (Bonin *et al.*, 2006).

that mutual trust between different countries or ethnic groups is an important determinant of the volume of trade (Fershtman and Gneezy, 2001; Bornhorst *et al.*, 2004; Guiso *et al.*, 2005). A key question is how these differences in trust come to be perpetuated over time. Our evidence suggests that attitudes regarding trust are passed from one generation to the next. Notably, this inertia works against the effect of institutional or other changes in a country that might be expected to change willingness to trust. In the case of a major reorganization in government, for example, trust attitudes in a country might respond only mildly, because parents' attitudes still reflect the environment of distrust present under old institutions. Intergenerational transmission of risk attitudes could also explain important differences in behavior across countries. For example, based on a cross-country survey, Fehr *et al.* (2006) report that average willingness to take risks, as measured by our general risk question, is 5.6 in the U.S. and only 4.4 in Germany (on a scale from 0 to 10). This is a sizeable difference, corresponding to about half of a standard deviation of general risk attitudes in our German sample. One explanation could be that immigrants to the U.S. were more willing to take risks than the average individual in their country of origin. At least, this is consistent with the findings of Jaeger *et al.* (2006), who show that greater willingness to take risks according to the general risk question is associated with a greater likelihood of migrating between regions within Germany. Intergenerational transmission helps explain how this initial difference could persist over time, potentially explaining a variety of well-documented differences in behavior across the two countries, for example in the willingness of individuals to hold risky assets, or in the extent of geographic mobility.

The remainder of the paper is organized as follows: Section 2 describes the data, Section 3 presents the empirical results, and Section 4 concludes.

2 Data Description

Our data come from the German Socio-Economic Panel (SOEP), a representative panel survey of the resident German population (for a detailed description, see Wagner *et al.*, 1993, and Schupp and Wagner, 2002). The initial wave of the survey was conducted in 1984.[8] For this study we focus mainly on the 2003 and 2004 waves, because these include key questions used in our analysis. Each wave includes roughly 22,000 individuals, from

[8] The panel was extended to include East Germany in 1990, after reunification. For more details on the SOEP, see `www.diw.de/gsoep/`.

about 12,000 households.

The SOEP conducts a separate interview with each member of a household over the age of 17. A substantial fraction of the interviews, about one quarter, are computer-assisted personal interviews (CAPI), but in general the survey is filled in on paper forms during an oral interview, either by the interviewer or by the respondent. Importantly, given that we are interested in the correlation or lack of correlation in the responses of family members, interviewers are specifically instructed to administer the survey individually, and to take every precaution to ensure that different household members answer independently and are not influenced by each other's responses. If for some reason one household member wants to fill in the paper survey at the same time that the interviewer conducts a personal interview with another household member, the interviewer has to ensure that these two survey respondents are in different rooms. The large majority of interviews (roughly 80 percent in both 2003 and 2004) were completed while the interviewer was present in the household, but a fraction of respondents returned the questionnaire by surface mail, due to severe difficulties in scheduling an appointment with the interviewer. In our analysis, we verify that our results are robust to excluding these mail-in interviews. As a more conservative robustness check, we also verify that our results are sustained when we restrict the sample to children who live in a separate household from their parents.

Respondents are asked for a wide range of personal and household information, and for their attitudes on assorted topics, including political and social issues. The 2004 wave of the SOEP contains a novel battery of questions about the risk attitudes of individuals. One question asks respondents to indicate their willingness to take risks on an eleven-point scale, with zero indicating complete unwillingness to take risks, and ten indicating complete willingness to take risks. The wording of the general risk question, translated from German, is as follows: "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? Please tick a box on the scale, where the value 0 means: 'unwilling to take risks' and the value 10 means: 'fully prepared to take risks'."[9] The survey also includes five questions that use the same wording and 11-point scale as the general risk question, but take a different approach by asking about willingness to take risks in specific contexts: car driving, financial matters, sports and leisure, career, and health.

[9] German versions of all risk questions are available online, at `www.diw.de`.

A final risk measure is provided by a question that poses respondents with the following hypothetical lottery: "Please consider what you would do in the following situation: 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 within two years. 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, 60,000, 80,000, or 100,000 Euros. This question differs from the previous risk measures in that it includes an even more specific context, and because stakes and probabilities are given explicitly in the question.

In the 2003 wave, the SOEP survey includes three questions about individuals' trust attitudes. These are similar to the standard measures of trust used in other surveys, for example the General Social Survey. Subjects were asked to indicate on a four-point scale to what extent they agree or disagree with the following statements: 1) In general, one can trust people. 2) These days you cannot rely on anybody else. 3) When dealing with strangers it is better to be careful before you trust them. The four answer categories were labelled: strongly agree, agree somewhat, disagree somewhat, strongly disagree.

Ultimately, survey questions are useful if they predict behavior. Our survey measures of risk and trust attitudes have been shown to be behaviorally relevant, in field experiments with representative subject pools. Dohmen *et al.* (2005) conduct a field experiment with 450 adults living in Germany. The participants come from all regions of Germany, and were sampled according to the same random walk method used to construct the full SOEP sample (see Fowler, 1988). All subjects in the experiment first completed a detailed questionnaire, which included the exact same general risk question asked in the 2004 wave of the SOEP. Subjects then participated in a lottery experiment involving substantial monetary stakes. In the experiment, subjects had to decide between a lottery, in which they could either win 300 Euros with probability 1/2 or receive nothing with probability 1/2, and a series of different safe payment alternatives. The lottery option remained the same across choices, but the alternative safe payment option was increased in steps of 10 Euros up to a maximum of 190 Euros. Subjects were informed in advance that

one of their choices would be randomly selected for payment, and that one out of nine participants would actually be paid according to the selected choice. The authors find that the questionnaire responses to the general risk question are reliable predictors of actual risk taking behavior in the lottery experiment. The economic importance of the risk question can also be inferred from the fact that, in a standard Mincer wage regression framework, wages are about 20 percent higher for people who indicate that they are fully prepared to take risks compared to those who are completely unwilling to take risks (on the 11-point scale).[10] Dohmen *et al.* (2005) also show that survey responses to the general risk question in the 2004 wave of the SOEP predict risk-taking behavior in various contexts of life, including investment in stocks, sports behavior, career choice, smoking behavior, and geographic mobility. Each of the five context-specific questions also predicts at least some of these behaviors, as does the hypothetical lottery questions.[11] Although the hypothetical lottery question has not yet been tested in a representative field experiment, we have validated this questions in laboratory experiments with German college students. Using a similar design to Dohmen *et al.* (2005), we find that investment choices in the lottery predict actual risky behavior as measured in incentive compatible lotteries.[12]

Fehr *et al.* (2003) validate the behavioral relevance of our trust measures in a field experiment with 429 subjects. These subjects were sampled by the same method as subjects in the study by Dohmen *et al.* (2005) and are representative of the adult population living in Germany. Subjects first completed a detailed questionnaire that contained the same three questions on trust attitudes that were asked in the 2003 wave of the SOEP. Subjects then played a sequential social dilemma game, a modified version of the trust game developed by Berg *et al.* (1995), which has become a standard tool for eliciting willingness to trust. In the design, two players, both endowed with 10 Euros, were randomly matched. Player A could then send any amount between 1 and 10 Euros to player B. The amount that A sent was doubled by the experimenter so that B received twice the amount that A had sent. B could then send money back to A, but this was not enforceable. The experimenter doubled any amount sent by B with the result that A received twice the

[10] Detailed regression results are available on request.

[11] There is also evidence that the distribution of willingness to take risks among survey respondents, who are representative of the adult population living in Germany, maps into the distribution of risky behavior observed among the adult German population as a whole. For example, the distribution of willingness to take risks in car driving within gender-age-cells of the SOEP sample predicts the gender-age pattern of the traffic offence rate of the entire German population.

[12] Results from these laboratory experiments are available upon request.

amount that B had sent. So, if A sent x Euros and B sent y Euros back, the payoff for Player A was $10 - x + 2y$ Euros, while the payoff for B amounts to $10 + 2x - y$ Euros. The amount that player A sends in this game is a measure of trust.[13] Fehr *et al.* (2003) summarize an individual's responses to the three survey questions about trust using factor analysis, and then show that this combined measure is a significant predictor of the amount that a first-mover actually sends to the other player, in the inventive compatible trust game.

Since we want to investigate whether and to what extent trust and risk attitudes are transmitted from parents to children, we focus our analysis on respondents whose parents also answered the same survey questions. For 3,171 children in the 2004 wave, we have complete information on their own answers to the trust questions and both of their parents' answers to these questions. We also have complete information about willingness to take risks for 3,331 children from the 2004 wave, and both their parents. These samples do not completely coincide because some of the children or their parents that were interviewed in 2003 did not answer the questions about risk attitudes in the 2004 wave. Likewise, in the 2004 wave we do not have information on some subjects' answers to the trust questions in 2003. These are mostly respondents who were not yet interviewed in 2003. In total, we have complete information on either trust or risk attitudes for 3,595 children and both their parents, *i.e.*, for 10,785 individuals. We refer to a 3-person group consisting of two parents and their child as a parents-child pair in the remainder of the paper. A noteworthy feature of our data is that they contain children at a wide variety of ages, which implies that our results are not based only on teenage children. This is because the SOEP interviews adult children living with their parents, but also follows children once they are older and have moved out of the parents' home to form a new household. For our sample of 3,595 parents-child pairs, 55.7 percent live in the same household, while 40.6 percent of children in our sample live in different households than both of their parents. Only a small fraction lives in the same household with only one parent. Half of the children in our sample are older than 23 years of age, and the oldest child is 54. On average, children in our sample are 25.3 years old (std. dev.= 6.96). Fathers in our sample are on average 54.6 years old (std. dev.= 8.70) and mothers are on average 51.7 years of age (std. dev.= 8.3).

[13] A detailed description of the experiment, the empirical analysis and the results can be found in Fehr *et al.* (2003).

Variation in parents' willingness to take risks and trust is a prerequisite for identifying an impact of parents' risk and trust attitudes on children's attitudes. The histograms in Figure 1 show that there is substantial heterogeneity in willingness to take risks (upper panel) and to trust (lower panel), for both mothers and fathers. The histograms for willingness to take risks simply report the fraction for each answer on the 11-point scale both for fathers and mothers. The trust measures are calculated by combining information of all three questions on trust into a scalar via principal component analysis. Analogous to the approach taken in the validation study of Fehr *et al.* (2003), we compute the first principal component of the responses to the three trust questions.[14] An individual's principal component trust measure is then obtained by multiplying the standardized answers to the respective trust questions with the loadings of the questions on the principal component. We will use this combined measure of trust throughout the paper.

Figure 1 also shows that mothers are less willing to take risks than fathers. This is in line with the gender effect that Dohmen *et al.* (2005) find using the entire sample of the 2004 wave. The authors also find that two other plausibly exogenous individual characteristics, age and height, are significant determinants of individual willingness to take risks as well. Table 1 shows evidence of similar effects for our sub-sample of children. The table presents OLS estimates, where the dependent variable in Columns (1) and (2) measures general willingness to take risk measured as survey answer on an eleven-point scale from zero to ten, where 0 means "not willing to take risks" and 10 means "fully willing to take risks". In Column (1), the coefficients for gender, age, and height are all significant at the 1 percent level, and the effect of these determinants is very similar to the estimated effects on willingness to take risks for the full sample used by Dohmen *et al.* In particular, daughters report a willingness to take risks that is about 0.5 scale points lower than the willingness to take risks among sons. Moreover, the reported willingness to take risks decreases by about one point on the scale for each 20 years of age, and increases by about one point for 40 centimeters of height. Column (2) shows that these results

[14] Principal components analysis is preferable to factor analysis as we are interested in capturing the essential variation of the responses and using this in regression analysis across parents-child pairs, rather than for detailed analysis of covariance (see also Tabachnick and Fidell, 2001). However, our results are unchanged if we instead use factor analysis for all regressions. We obtain the principal component without rotation. Analysis of eigenvalues suggests that only the principal component exhibits an eigenvalue larger than unity. The factor loadings, which are multiplying the standardized responses to the trust, reliance and caution questions are -0.8011, 0.8205 and 0.6419, respectively, for children, -0.7849, 0.8199, and 0.6603, respectively, for fathers, and -0.7772, 0.8082, and 0.6395, respectively, for mothers.

are robust to the inclusion of other, potentially endogenous controls. The importance of gender, age and height for individual risk attitudes motivate us to include them in the specifications used in our later analysis.

Turning to our measures of trust, Columns (3) and (4) of Table 1 show how children's trust is related to gender, age and height. In Column (3) we find that older people trust less while taller people trust more. Both effects, however, become insignificant in the full specification shown in Column (4).

3 Results

3.1 Transmission of risk and trust attitudes

We begin our analysis by assessing whether there is an intergenerational correlation in willingness to take risks. Initially, we focus on the general risk question, and then we assess the robustness of our results to using the five questions that incorporate more specific contexts. We also use the hypothetical lottery question, which is framed as a realistic investment opportunity and gives explicit stakes and probabilities. Because the lottery question includes stakes and probabilities, this allows us to describe the magnitude of the impact of parents on children in terms of Euros. In addition, this sheds light on the question of whether intergenerational transmission of risk attitudes is mainly transmission of subjective beliefs about how risky the world is, or whether risk preference is transmitted as well.

Figure 2 provides a first look at the relationship between the general risk attitudes of parents and children, as it appears in the raw data. The figure shows children's average willingness to take risks, for given willingness to take risks of their mother (upper left diagram) or their father (upper right diagram) without controls for any observable characteristics. Children's willingness to take risks is clearly increasing in parents' willingness to take risks. This is illustrated by the positively-sloped regression lines in the diagrams, which are based on a weighted regression of children's willingness to take risks on the respective parent's willingness to take risks. The weighting takes into account the number of children with a parent who states a particular value on the risk scale.[15]

[15] Note that there is an outlier for mothers choosing a value of 10 on the risk scale. This outlier has little impact on the slope of the weighted regression line, however, because there are very few mothers in this

In Table 2 we regress children's answers to the general risk question on the answers of their respective mothers and fathers. We estimate linear regressions, where the dependent variable is the child's general willingness to take risk, measured as a survey answer on an eleven-point scale from zero to ten, where 0 means "not willing to take risks" and 10 means "fully willing to take risks". All coefficients are OLS coefficients, but the results are robust to using other estimation techniques.[16] We report robust standard errors, corrected for possible correlation of the error term across individuals from the same household.

Column (1) of Table 2 shows that children are increasingly likely to answer that they are willing to take risks as mother's and father's willingness to take risks increases. In addition to being highly statistically significant, the impact of parents' risk attitudes is also sizable: The marginal effect is 0.16 for mothers, which implies that a child with a mother who is completely willing to take risks on the 11-point scale reports a willingness to take risks that is about 1.6 points higher on the scale than a child with a mother who is completely unwilling to take risks, assuming that the marginal effect at the mean applies to the entire range of admissible answers. This is about three times larger than the impact of gender — women report about 0.5 points lower measures of willingness to take risks than men — and comparable to the impact of about 34 additional years of age (see Column (1) in Table 1).

To preclude that the observed correlation between parents' and children's attitudes is driven by similarity in exogenous determinants, *e.g.*, a tendency for tall parents to have tall children, we control for gender, age, and height, of both children and parents (see Columns (2) and (3) of Table 2). In light of the results shown in Table 1 it is not surprising to find that daughters are less willing to take risks than sons, and that taller and younger children are more likely to report that they are willing to take risks. Age and height of the parents do not have a statistically significant effect on children's willingness to take risks. Most importantly, the positive impact of parents' willingness to take risks on their children's risk attitudes remains strong, significant and virtually the same in size. This holds also in Column (3), where we use years of schooling of the child, and of both of the parents,

category (see Figure 1, upper left panel).

[16] We have alternatively conducted all estimations with interval regression techniques that correct for censoring of the dependent variable. In this case we find virtually identical results, which are available upon request. We also used a binary measure, indicating willingness to take risks if individuals responded a value greater than five on the scale from zero to ten. All results are essentially the same if we use the binary measure instead of the full scale.

as proxies for permanent income.[17] Controlling for the permanent income of children and parents is particularly important since their incomes are likely to be correlated, and higher income may imply a higher willingness to take risks simply because it cushions the impact of bad outcomes. We also include indicator variables for characteristics of the region where the individual spent the first 15 years of their life (big city, city, small town, countryside, missing) for both children and parents, and indicator variables for children's and parents' religions (catholic, protestant, other Christian, other religion, not a member of any church, missing information on religion). The two coefficients of main interest, mother's and father's willingness to take risks, remain basically unchanged, *i.e.*, the intergenerational transmission of risk attitudes is strong and robust even when controlling for socioeconomic and parental background variables. Notably, in all three specifications the coefficient for mother is somewhat larger than the coefficient for father.

The general risk question is largely context-free, and thus it is valuable to know whether the baseline results on intergenerational transmission are robust to using risk measures that incorporate more specific contexts. In Table 3, each column uses a different question to measure risk attitudes for parents and children. The set of controls is the same as those in our full specification, Column (3) of Table 2. To facilitate comparison, in Column (1) we once again report the coefficients for the general risk question. Columns (2) to (6) report coefficient estimates using each of the five context-specific questions, which ask about willingness to take risks in car driving, financial matters, sports and leisure, health, and career, respectively. As is evident from Table 3 the transmission of risk attitudes is significant at the 1-percent level for every context, for both mothers and fathers. Thus the transmission of risk attitudes is not confined to a general willingness to take risks but holds also for questions incorporating more specific contexts. Interestingly, the coefficient for mothers is larger than the coefficient for fathers, in every case. This latter

[17] In order to avoid dropping of observations due to missing observations, we set all missing observation to zero and include an indicator for missing schooling information. We also estimated all specifications with information on occupational prestige as a proxy for permanent income, instead of education. We use information on childrens' and their parents' occupational prestige in form of the Treiman standard international occupational prestige score, which takes discrete values from 13 to 78, where higher scores indicate higher prestige (see Ganzeboom and Treiman, 1996 for the methods used to construct the scale). As shown by Ermisch *et al.* (2006), this prestige measure exhibits a strong correlation with permanent income. All results are qualitatively and quantitatively unchanged if we use occupational prestige instead of years of schooling. This approach is useful mainly because it mitigates the problem of missing values on income and thus keeps the number of observations reasonably high. However, adding controls for children's and parents' self-reported (log) household wealth in 2002, and (log) net monthly household income in 2004, leaves the results qualitatively unchanged.

finding is consistent with evidence from a meta-analysis on intergenerational transmission of personality and attitudes, in which the correlation between mothers and children across studies is on average higher than the correlation between fathers and children (Loehlin, 2005). The fact that risk attitudes of parents and children are correlated in every context could indicate that all of these measures capture the same, general underlying disposition that is passed across generations. Alternatively, it could be that the measures also capture some additional content, which is specific to the context, and is passed from parents to children as well. In Section 3.2 we return to the issue of the specificity of the transmission process.

Column (7) of Table 3 reports results based on the hypothetical lottery question. The measure differs from the others in that it incorporates an even more specific context, and also includes given stakes and probabilities. This latter feature of the question means that subjective beliefs about stakes and probabilities are held constant across individuals, as opposed to the more open-ended measures like the general risk question, where subjective beliefs may affect willingness to take risks. Thus, answers to the question come closer to capturing pure risk preference, *i.e.*, willingness to take a given gamble. The specification in Column (7) is the same as in the other columns, but the dependent variable is the total amount invested by the child in the lottery, and parents' attitudes are indicated by their respective investment choices. There is substantial censoring at zero, due to the many individuals who choose to invest nothing in the lottery. Thus, in this case we report coefficients that are marginal effects, estimated using interval regression techniques that correct for censoring. The resulting intergenerational correlations are almost identical to those obtained for the other questions.[18] This provides a further indication that the intergenerational correlation is robust, and suggests that it is not just subjective beliefs or perceptions that are transmitted from parents, but also the willingness to take a given gamble.[19] The lottery question also allows us to express the magnitude of the intergen-

[18] We also estimated a Probit regression, available upon request, where the dependent variable is equal to 1 if the child invested a positive amount and zero otherwise. Regressors included indicators for positive investment by mother and father, and the same controls as in Column (7). In this case, the probability that a child invests increases by 0.16 if the father invests, and 0.11 if the mother invests. Parental investment is highly statistically significant, and quantitatively more important than any other control in the regression.

[19] We find very similar results when converting the responses to the lottery question into coefficients of constant relative risk aversion, using wealth information from previous waves, see Dohmen *et al.* (2005) for details of this procedure. When using midpoints of the implied CRRA intervals as variables of interest, we obtain coefficients [standard errors] of 0.286 [0.073] for the impact of mother's CRRA coefficient on the child's CRRA, and 0.160 [0.073] for the impact of the father's CRRA coefficient, the

erational correlation in risk attitudes in monetary terms. The marginal effects shown in the table imply that a parent increasing their investment by 1,000 Euros causes a child to invest roughly an additional 250 Euros.[20] This exercise suggests that the intergenerational transmission is not only statistically significant, but is quantitatively sizeable as well.

The transmission of trust. We now turn to the analysis of the intergenerational transmission of trust. Recall from section 2 that respondents expressed their agreement (on a scale from 1 to 4) with three different statements. The three statements read: "In general, one can trust people" (*general trust*); "In these days you can't rely on anybody else" (*reliance*); and "When dealing with strangers it is better to be cautious before you trust them" (*caution*). Fehr *et al.* (2003) collapsed agreement with these three statements into a single factor and then showed that this measure is a significant predictor of first movers' behavior in a paid trust experiment. First movers who are more trusting according to the survey measure transfer significantly more to the second mover. Since we are interested in behaviorally valid measures we also collapse agreement with the three statements into a single component.[21] In Section 3.2, however, we also assess the robustness of our results to analyzing agreement with each statement separately.

In the presence of intergenerational transmission of trust attitudes, we should see a positive and significant relationship between parents' willingness to trust and the trust attitudes of their children. The lower part of Figure 2 provides a first indication that this is in fact the case. The figure shows how a child's willingness to trust is related to the trust attitudes of mother and father, without conditioning on observable characteristics. The diagrams plot children's average values of the trust measure, constructed via principal component analysis, for given values of the same trust measure of mothers (lower left diagram) and fathers (lower right diagram). The regression lines are weighted by the number of observations of children whose parents' trust measure takes a particular value. The upward slopes of the weighted regression lines give an initial indication that children's tendency to trust is increasing in their parents' willingness to trust.

R^2 is 0.37. However, due to the fact that we can only use non-censored information for individuals and their parents, the sample size shrinks to 371 in the richest specification that corresponds to the specification used in Table 3.

[20] One Euro was worth approximately 1.2 U.S. dollars on average during the period when interviews were taken.

[21] We collapse the measures using principal component analysis, as described in Footnote 14.

To test the relationship suggested in Figure 2 more rigourously we ran three regressions for trust attitudes analogous to the ones reported for risk in Table 2. The results are displayed in Table 4. The dependent variable is the principal component (*trust*) of the child, which is regressed on the respective principal components of the mother and father, respectively. In the first column of Table 4 no further controls are added.[22] The coefficients for mothers' and fathers' trust are positive and significant at any conventional level, supporting the transmission hypothesis. The coefficients remain basically unchanged and highly significant if we add further controls in Columns (2) and (3). Interestingly, the strength of the correlations are comparable to those obtained from the regressions on risk attitudes in Table 2. It is noteworthy that in Column (3) trust attitudes of the parents are the only significant predictors of the children's trust attitudes with the exception of age. Gender, permanent income or religious background of the children or their parents do not significantly explain trust attitudes. This reinforces the importance of parents' impact on the formation of children's attitudes. Notably, and consistent with our findings on risk attitudes, the coefficient for mothers is substantially larger than the coefficient for fathers, in all specifications.

Risk and trust. So far we have assumed that willingness to take risks and willingness to trust are distinct attitudes, which are independently transmitted. One may argue though that trusting someone is a risky decision and thus that willingness to trust could partly reflect risk preference. On the other hand, there are important components of trust that are independent of risk preference, for example beliefs about the trustworthiness of others. Conceptually, there is no reason that this belief-related component of trust should be related to risk preference. It is important to know whether our trust measures capture something distinct from our risk measures, because only if this is the case we can sensibly talk about an independent transmission of risk and trust. To study this question we ran the regressions reported in Table 5. In Column (1) we regress children's willingness to take risks on parents' willingness to take risks and willingness to trust. We also control for the trust attitudes of children and include our standard controls as in Column (3) of Table 2. The marginal coefficients on mothers' and fathers' willingness to take risks are positive and significant and similar in size to those in Column (3) of Table 2. This suggests that

[22] Some observations are lost due to adjusting error terms for clustering at the household level.

the disposition towards trust does not explain risk attitudes. But what about the relation between trust and risk? In Column (2) we regress children's trust jointly on parents' willingness to take risks and their trust attitudes, together with the controls as in Column (1). We find that the coefficients on mothers' and fathers' trust are positive and highly significant. They are also very similar to those obtained in the regressions from Table 4, *i.e.*, without controlling for risk attitudes. This implies that trust attitudes do not simply measure attitudes towards risk and that the transmission of trust attitudes is not merely reflecting a transmission of risk attitudes.

Our results on the joint impact of parents' risk and trust attitudes on the respective attitudes of their children underline that risk and trust are two independent attitudes, which are independently transmitted. Having risk loving parents does not automatically imply that children display high levels of trust, just as having trusting parents does not imply that a child is willing to take risks. The results also emphasize that the intergenerational transmission of attitudes seems to be quite fine-tuned, going beyond the transmission of only vague and unspecific dispositions. We return to this issue in section 3.2.

Heterogeneity. The results shown in Tables 2 and 4 reveal that on average children are systematically affected by their parents' attitudes towards risk and trust. This does of course not mean that all children are affected in the same way. In unreported regressions, which are available on request, we study potential sources of heterogeneity such as child's gender and family structure. We first estimate regressions using the same specifications as in Tables 2 and 4, but interact parents' risk and trust attitudes with the gender of the child. We find no indication that daughters are significantly more or less influenced by parents than sons. This holds for both risk and trust attitudes. We do find some evidence that family structure matters, however. Interacting parents' risk attitudes with number of siblings shows that children with fewer siblings have risk attitudes that are more closely aligned with those of their parents, compared to children in large families. Similarly, firstborn children are more strongly influenced by parents' risk attitudes, compared to younger siblings, although this latter effect is only marginally significant. Interestingly, for trust we find no significant impact of family size or birth order on the transmission process.

We also find that children are heterogeneous in the degree of "receptiveness", in two distinct ways: Children who are similar to their parents in terms of risk are also similar in terms of trust, and children who are similar to the mother are also similar to their father. To obtain the first result we generate the absolute difference between the child's willingness to trust, and the average willingness to trust of the two parents. We then regress this difference on the absolute difference between children and parents in terms of risk attitudes. The coefficient on the risk difference is significant and positive, indicating that children who are more similar to their parents in terms of risk are also more similar in terms of trust. As a robustness check, we also run a regression of the absolute trust difference on observables, including exogenous factors, other controls, and own risk attitudes. We do the same for the absolute risk difference, but substituting own risk attitudes for trust. We then regress the residuals of the trust regression on the residuals from the risk regression, and find a positive and significant coefficient. This shows that the receptivity result holds, even after purging variation in the trust and risk differences explained by observables, including own risk and trust attitudes. For the second receptivity result, we regress the absolute difference between the child and the mother in terms of risk on the absolute difference with respect to father's risk attitudes. We do the same for trust differences with respect to mother and father. For both trust and risk, children who are more similar to the father are also more similar to the mother. This finding is also robust to conditioning on observables, in the same way as described above.[23]

Robustness. A potential concern regarding the results shown in Tables 2 and 4 is that correlations are driven by the fact that parents and children jointly filled out the surveys and somehow coordinated on how to answer different questions. While this is potentially a very serious concern we are quite confident that it does not compromise our findings. First, interviewers are specifically instructed to administer the survey individually, and to make sure that different household members answer independently. If for some reason one household member wants to fill in the paper survey at the same time that the interviewer conducts a personal interview with another household member, the interviewer is instructed to ensure that these two survey respondents are in different rooms. Thus, collaboration is ruled out by design. Second, filling out a survey involves answering about

[23] Detailed results are available upon request.

150 question modules. Thus, even if respondents did have some limited communication during the interview, it is very unlikely that it applies systematically to the small subset of questions that are the key variables in this study. Third, we have estimated all of the regressions in Tables 2 and 4, excluding from the sample observations of parents-child pairs if one of the three individuals had sent in the questionnaire answers by surface mail, *i.e.*, answered the survey without the interviewer being present. In this case, we find a similar and significant intergenerational correlation in risk and trust attitudes. Fourth, we also estimated the same regressions using the 40 percent of children in the sample who have left home and live in a separate household from their parents. In this case the intergenerational correlation is still highly significant, for both trust and risk attitudes. Finally, we have also restricted the sample to parents-child-pairs who all participated in CAPI interviews only, excluding the possibility that questionnaires were completed simultaneously. Again, we find significant correlations similar to those in Tables 2 and 4. All in all, these findings make us confident that our results are not driven by collaboration between family members.

3.2 Specificity of the transmission process

In this section we investigate the specificity of the transmission process. Do parents pass on a relatively general disposition towards risk-taking or trust to their children, or do children end up being similar to the parents even in relatively detailed ways? If the latter is true, this strengthens the influence of the parents on children. We exploit the fact that parents differ in willingness to take risks across different contexts. For example, some parents are reluctant to take risks in car driving, but even more so with respect to financial matters. If a general disposition is transmitted, we would predict that the child is risk averse, but not that this specific difference across contexts is reproduced in the next generation.

In Columns (1) to (6) of Table 6 we regress children's answers to a given risk question on parents' responses to all of the risk questions *simultaneously*. In addition, we control for exogenous factors and our standard controls used in Column (3) of Table 2. Thus, each context-specific question is regressed on answers concerning this particular context, but also on the answers in each of the other contexts. We also control for children's answers to all context-specific risk questions. Note that context-specific measures tend to be correlated for an individual (ranging from 0.26 to 0.45). Thus, if the transmission of

attitudes is rather vague and unspecific, we would expect that the willingness to take risks in a particular context is explained equally well by risk attitudes in this context or any other context. If, on the other hand, the context-specific measures capture distinct attitudes towards risk, we should see that the measures of risk attitudes in the corresponding context have the greatest explanatory power. This is indeed what we find. Table 6 reveals that the respective estimated coefficients, which are found along the diagonal of the table, are all positive and highly significant. Thus, controlling for risk attitudes in all other contexts, children's context-specific attitudes are strongly and significantly associated with those of their parents. Moreover, most other coefficients off the diagonal are insignificant; if they are significant, they are typically smaller than those on the diagonal. In Column (3), *e.g.*, willingness to take risks in financial matters is highly correlated with mothers' and fathers' willingness to take risks in this context, but not significantly correlated with parents' risk attitudes in any other context. Likewise, Column (6) shows that willingness to take risks in health issues is correlated with the respective answers of parents. The only other significant correlation is mothers' willingness to take risks in general, but the coefficient is smaller. These results show a strikingly precise and content-specific transmission of attitudes.

In Table 7 we perform the same exercise as in Table 4, but use answers to three trust questions separately instead of the principal component. This time we are interested in the transmission of the context associated with the three sub-questions regarding trust. Again we regress children's answers to the trust questions on parents' answers, including parents' answers to all question in the regression simultaneously. We also control for children's answers in the respective alternative contexts. Note that, as with the context-specific risk questions, answers to these questions are significantly correlated but that this correlation is not perfect, *i.e.*, each sub-question contains some specific content.[24] It would therefore be a strong result in favor of a detailed and robust transmission of trust attitudes if children's answers to a particular question would be best predicted by parents' answers to that specific question.

As the results in Table 7 show, this is in fact the case. We find the same 'diagonal result' as with context-specific risk attitudes: Controlling for the answers to the other

[24] This is also the result of the principal component analysis. The first component explains a lot (around 57 percent) but not everything.

trust questions, each particular answer to a trust-related question is positively and significantly correlated with mothers' and fathers' answers to this specific question. For the sub-question about caution displayed in Column (3) basically only the parents' answers regarding caution are significant. In case of general trust and reliability in Columns (1) and (2) other answers are also significant but quantitatively much weaker. For example, while in Column (1) the marginal effects for trust are 0.170 for mothers and 0.12 for fathers, marginal effects on reliability or caution are not above 0.05. As with risk attitudes, the results for different measures of trust reveal a high degree of precision in the process of intergenerational transmission, strengthening the impression that children end up being similar to their parents even in relatively detailed ways.

3.3 Assortative mating of parents as a reinforcing mechanism

So far we have focused on the correlation in risk and trust attitudes between parents and children. It is also important, however, to investigate the between-parent correlation in attitudes. As has been pointed out in the literature on cultural transmission, if parents tend to seek out and marry individuals with similar attitudes to their own, this reinforces the transmission of a given attitude to the children (Bisin and Verdier, 2000). For example, if a child has one parent who is relatively willing to take risks, he or she is likely to have a second risk-seeking parent as well, thereby making it even more likely that the child ends up with this type of disposition.

Until now there has been no empirical evidence on whether there is assortative mating at the level of risk and trust attitudes, and *a priori* it is not clear whether assortative mating should be positive or negative. In theory, the direction of assortative mating depends on whether the trait in question is a substitute or complement in the production of joint utility for the couple (Lam, 1988). For example, to the extent that there are gains to specialization in production, and these different tasks are better suited for different risk attitudes, it could be optimal to have one member of the couple who is risk-seeking and another who is risk averse.[25] On the other hand, alignment of attitudes could lead to higher utility for the couple, because both individuals agree about the types of consumption goods or activities that should be purchased, e.g., whether smoking and extreme

[25] In fact, Chiappori and Reny (2006) develop a theoretical model in which negative assortative mating arises in equilibrium, because couples face income risk and it is optimal to have one safe and one risky income in the household portfolio.

sports should be part of the money and time budget of the couple.

Table 8 presents estimation results for the correlation of risk attitudes among couples. The sample includes all cohabiting married and non-married couples for whom we have non-missing values on risk attitudes and other relevant regressors. The dependent variable is the willingness of the female spouse (partner) to take risks on the 11-point scale. The results show, for the same specifications used for the intergenerational analysis before, a strong and positive effect of the male spouse's willingness to take risk. The effect remains positive and significant when controlling for exogenous and other controls in columns (2) and (3). The usual effects of age and height on risk attitudes remain significant. Evidence of positive assortative mating on risk attitudes is not confined to the question about risk taking in general. We find a similarly significant and positive correlation if we use any of the five context-specific risk questions to measure female and male spouse's risk attitudes, and run regressions with the same specifications as in Table 8.[26] Using female spouse's responses to the hypothetical lottery question as the dependent variable, we find a strong positive relationship with the amount invested by the male spouse, again pointing to the presence of positive assortative mating based on risk attitudes. The magnitude of this correlation is large, and can be expressed in monetary terms: if the male spouse invests 1,000 Euros more, the female spouse invests an additional 560 Euros.

When forming a partnership, trust attitudes are probably at least as important as attitudes towards risk. Table 8 investigates whether there is assortative mating based on trust, and whether the correlation is positive as in the case of risk attitudes. For our usual specifications, we find a strong positive relationship between the trust principal component of the female spouse and the trust principal component of the male spouse, suggesting that there is in fact positive assortative mating along the dimension of trust.

As a robustness check, we assess whether there is a significant correlation even for couples who have only been married a relatively short time. If so, this helps to rule out the possibility that people who get married subsequently develop similar attitudes, as opposed to the hypothesis of positive assortative mating in which the similarity in attitudes causes people to get married. Using the same specification as in the columns (2) and (5) of Table 8, we restrict the sample to couples who got married during the current or previous year, and estimate the within-couple correlation. We find that the correlation is

[26] Results are available upon request.

significantly positive, and almost as large as for the full sample of couples: the coefficient on male spouse's risk attitudes is 0.240 and the coefficient for trust attitudes is 0.302, both significant at the five percent level despite substantially fewer observations. These findings lend additional support to the hypothesis of positive assortative mating.

4 Concluding Remarks

We document a robust intergenerational correlation in risk and trust attitudes. Our evidence is based on survey measures that have been tested previously, and shown to predict actual risk-taking and trusting behavior in controlled, incentive compatible field experiments. The correlation is also robust to using various different survey measures. Exploring the sources of heterogeneity, we find that family structure matters. Children with fewer siblings, and firstborn children, are more strongly influenced by the parents in terms of risk attitudes. Interestingly, family size and birth order do not play a significant role for trust. There is also some evidence of receptive types: children who are similar to their mother tend to be similar to their father, and children who are similar to their parents in terms of risk attitudes tend to be similar in terms of trust as well. We investigate the specificity of the transmission process, and find that it is relatively fine-tuned, in the sense that parents' differences in risk taking across contexts are reproduced in the child. The impact of parents on children is even stronger, given that we also find evidence of positive assortative mating, based on risk and trust attitudes.

Our results shed light on the fundamental question of where economically relevant attitudes and dispositions come from, by establishing that children end up having similar attitudes towards risk and trust as their parents. This is important regardless of the precise transmission mechanism, because of the far reaching implications for understanding, e.g. social mobility or persistence of cultural differences. An intriguing question that we have not addressed is which mechanism or combination of mechanisms is most important in the transmission process. We have been hesitant to address this question mainly because we believe that our data are not well-suited for generating compelling new evidence. For example, in our view there are at least three potential transmission channels: genetics, child learning by imitation, and deliberate efforts by parents to shape the preferences and beliefs of their children. These genetic and social influences may act in concert, and pos-

sibly interact.[27] To have a hope of distinguishing genetic transmission from transmission through socialization would require, at the very least, observing children at much younger age, or observing a large sub-sample of children who were not raised by their biological parents, or observing attitudes of a large sample of fraternal and identical twins. Thus we leave this issue for future research. We do suspect, however, that genetics is not the sole transmission mechanism, based on our results on the impact of parental characteristics and family structure. For example, there is not a clear genetic explanation for why family size or birth order should matter for the strength of the transmission process.

To the extent that the transmission process does happen through socialization, it is an important topic for future research to establish whether this is unintentional, or whether it reflects deliberate efforts by the parents to influence the child. Unintentional transmission could happen, for example, through children observing and imitating their parents. On the other hand, to the extent that influencing children is possible, parents could have incentives to "invest" in such activity. First, conflicts are arguably less likely if attitudes are aligned. Second, if parents' utility depends on children's decisions, for example in old age, children make better agents for the parents if they have similar attitudes. Interestingly, our results on family size and birth order are consistent with the well-known quality-quantity tradeoff in parental investment, hypothesized by Becker and Lewis (1973) and Becker and Tomes (1976). If alignment of attitudes is in fact a dimension of child quality, one would predict that parents with fewer children invest more time and resources on instilling their own traits in the child, consistent with what we find in the case of risk attitudes.

The findings in this paper may be just the tip of the iceberg, in terms of economically relevant attitudes that are determined by and individual's parents. For example, impatience is a prime candidate for future research on intergenerational transmission. There has been some theoretical work in which parents deliberately invest in a particular discount rate for the child (Doepke and Zilibotti, 2005a and 2005b). However, at this point there is little empirical evidence on whether and how strongly discount rates are correlated across generations.[28] Another candidate is reciprocity, the tendency to respond

[27] That is to say, the impact of genetics and environment may not simply be additive. For a discussion see Bouchard and Loehlin (2001).

[28] But see Knowles and Postlewaite (2005), who report an intergenerational correlation in propensity to save.

in-kind to hostile or kind actions by others. Like trust, reciprocal inclinations are a crucial determinant of how someone behaves in conditions of contractual incompleteness, except that they are relevant for the behavior of a second-mover, deciding how to respond to kind or unkind behavior. The degree of reciprocity in a society is also an important component of social capital, in particular for the informal enforcement of norms (Fehr and Gächter, 2000 and Bowles and Gintis, 2000b). We have done some initial research on the intergenerational transmission of reciprocity using survey questions in the SOEP, which ask about willingness to return favors of those who have been kind, and punish those who are unkind.[29] Although these questions have not been validated using experiments, they provide an initial indication that reciprocity is transmitted across generations as well: there is a strong positive correlation in the responses of parents and children, indicating that parents who respond in-kind to hostile or kind actions tend to have children who are similarly reciprocal.

[29] For a description of the questions, and survey evidence on the determinants and consequences of reciprocity, see Dohmen *et al.* (2006).

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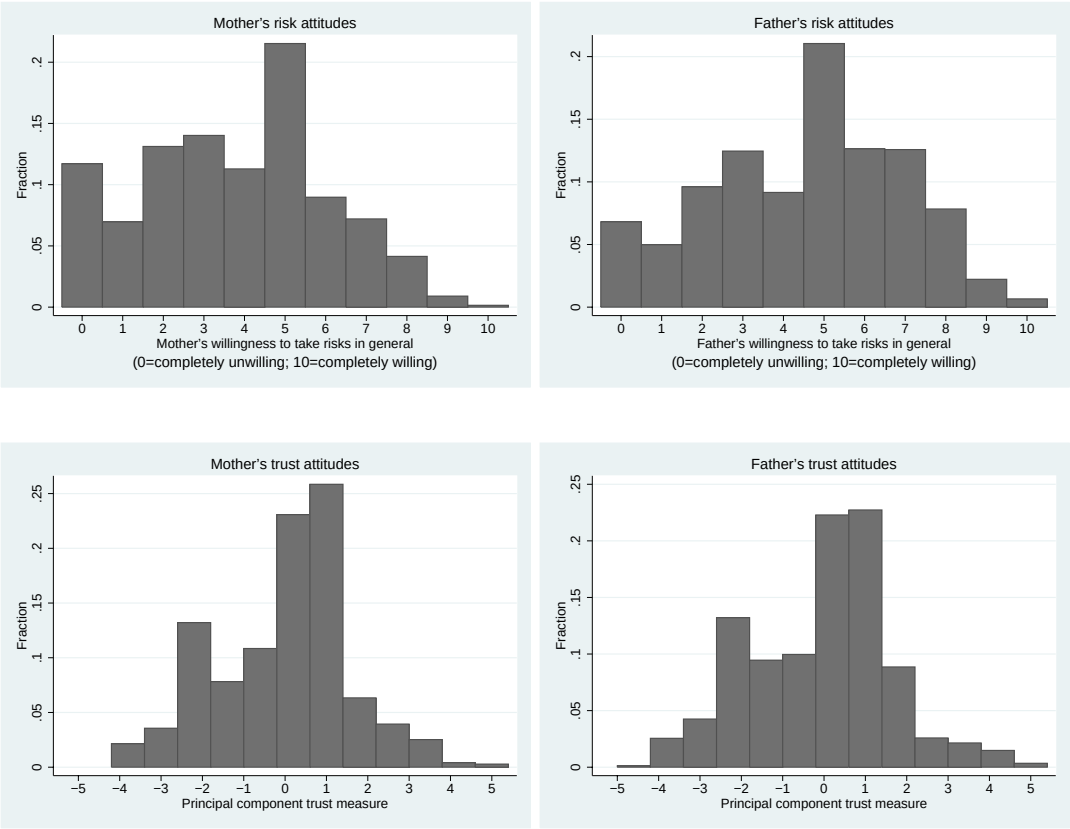
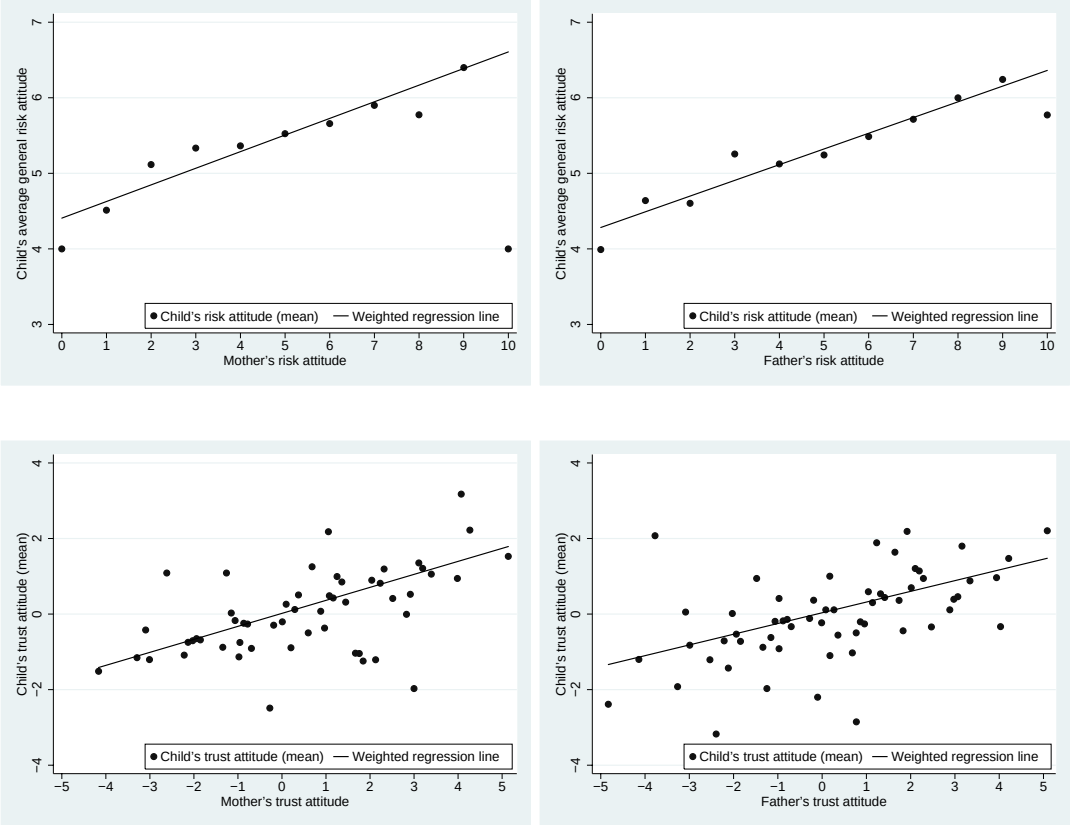
Figure 1: Parents' Attitudes towards Risk and Trust



Notes: The upper histograms in the figure show the distributions of responses to the question about general risk attitudes for mothers (left histogram) and fathers (right histogram). The bottom histograms in the figure show the distributions of the trust principal component, which combines the information from three separate survey measures of trust, for mothers (left histogram) and fathers (right histogram).

Figure 2: Attitudes towards Risk and Trust: Children and Parents



Notes: The upper graphs in the figure show children's average self-reported willingness to take risks for a given willingness to take risks of mothers (left diagram) and fathers (right diagram). The bottom graphs in the figure show children's average principal component "trust" for a given principal component "trust" of mothers (left diagram) and fathers (right diagram).

Tables

Table 1: The Effects of Exogenous Variables on Risk and Trust Attitudes

Dependent variable:	Willingness to take risks		Trust	
	(1)	(2)	(3)	(4)
1 if female	-0.450***	-0.488***	0.066	-0.084
	[0.107]	[0.109]	[0.092]	[0.092]
Age of respondent (years)	-0.047***	-0.047***	-0.010**	-0.009
	[0.006]	[0.007]	[0.005]	[0.006]
Height of respondent (cm)	0.025***	0.023***	0.013***	0.005
	[0.006]	[0.006]	[0.005]	[0.005]
Additional controls	No	Yes	No	Yes
R-squared	0.05	0.06	0.01	0.07
Observations	3320	3320	2971	2971

The dependent variable in Columns (1) and (2) measures general willingness to take risks on an eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks). The dependent variable in Columns (3) and (4) is the principal component measure of individual agreement with three statements regarding trust (general trust, reliance in others, need for caution in dealing with strangers). Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Additional controls include: years of schooling of respondent and respondent's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before age of 16, for child and parents (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion, reference is protestant). All religion information is obtained from the 2003 wave of the SOEP.

Table 2: The Effect of Parents' Risk Attitudes on Children's Risk Attitudes

Dependent variable:	Child's willingness to take risks in general		
	(1)	(2)	(3)
Mother's willingness to take risks in general	0.161***	0.148***	0.150***
	[0.019]	[0.018]	[0.020]
Father's willingness to take risks in general	0.147***	0.134***	0.141***
	[0.019]	[0.019]	[0.019]
1 if female		-0.516***	-0.506***
		[0.114]	[0.116]
Age of respondent (years)		-0.038***	-0.039***
		[0.009]	[0.010]
Height of respondent (cm)		0.021***	0.021***
		[0.007]	[0.007]
Age of mother (years)		0.022**	0.024**
		[0.011]	[0.011]
Age of father (years)		-0.015	-0.017*
		[0.010]	[0.010]
Height of mother (cm)		-0.004	-0.002
		[0.007]	[0.007]
Height of father (cm)		-0.006	-0.004
		[0.006]	[0.007]
Constant	3.956***	3.045**	3.408**
	[0.104]	[1.371]	[1.525]
Additional controls	No	No	Yes
R-squared	0.07	0.11	0.12
Observations	3331	3320	3320

The dependent variable in Columns (1), (2) and (3) measures general willingness to take risks on an eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks). Explanatory risk variables are also coded on the eleven-point scale. Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Additional controls include: years of schooling of respondent and respondent's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before age of 16, for child and parents (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion; the reference category is protestant). All religion information is obtained from the 2003 wave of the SOEP.

Table 3: Robustness to Alternative Risk Measures

	Dependent variable:						
	Child's willingness to take risks in the context of:						Amount invested in
	General	Car driving	Financial matters	Sports & leisure	Career	Health	Hypothetical Lottery
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Willingness to take risks: Mother	0.150***	0.190***	0.181***	0.227***	0.183***	0.215***	0.254***
(in respective context)	[0.020]	[0.024]	[0.023]	[0.022]	[0.021]	[0.022]	[0.038]
Willingness to take risks: Father	0.141***	0.157***	0.125***	0.161***	0.140***	0.125***	0.243***
(in respective context)	[0.019]	[0.022]	[0.020]	[0.021]	[0.021]	[0.021]	[0.035]
R-squared	0.12	0.14	0.13	0.17	0.12	0.10	
Observations	3320	2942	3221	3265	2845	3314	3310

The dependent variable in columns (1)-(6) measures willingness to take risk in the particular context on an eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks). The dependent variable in column (7) is the amount invested in the hypothetical lottery, answers are in categories of 0 Euros, 20,000 Euros, 40,000 Euros, 60,000 Euros, 80,000 Euros and 100,000 Euros. Explanatory risk variables in columns (1)-(6) are coded on the eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks), explanatory variables in column (7) are in Euro-categories. The set of explanatory variables in each column is identical to that in Column (3) of Table 2. Coefficients in columns (1)-(6) are OLS estimates, coefficients in column (7) are Interval Regression estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Log-Pseudo-Likelihood of estimates in column (7) is -4,221.68.

Table 4: The Effect of Parents' Trust on Children's Trust

Dependent variable:	Child's trust (principal component)		
	(1)	(2)	(3)
Trust: Mother	0.257***	0.252***	0.232***
	[0.022]	[0.022]	[0.023]
Trust: Father	0.180***	0.176***	0.155***
	[0.021]	[0.021]	[0.021]
1 if female		-0.002	-0.051
		[0.093]	[0.094]
Age of respondent (years)		-0.024***	-0.019**
		[0.007]	[0.008]
Height of respondent (cm)		0.005	0.004
		[0.005]	[0.005]
Age of mother (years)		0.012	0.011
		[0.009]	[0.009]
Age of father (years)		0.009	0.002
		[0.008]	[0.009]
Height of mother (cm)		0.002	-0.001
		[0.006]	[0.006]
Height of father (cm)		0.003	-0.002
		[0.005]	[0.005]
Constant	0.042	-2.223**	-0.985
	[0.030]	[1.133]	[1.451]
Additional controls	No	No	Yes
R-squared	0.13	0.14	0.17
Observations	2979	2968	2916

The trust variables measure trust as the principal component obtained from agreement with three statements regarding trust (general trust, reliance on others, need for caution in dealing with strangers) measured on a four-point scale. Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Additional controls include: years of schooling of respondent and respondent's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before age of 16, for child and parents (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion; the reference category is protestant). All religion information is obtained from the 2003 wave of the SOEP.

Table 5: The Distinct Transmission of Risk and Trust Attitudes

	Dependent variable:	
	Child's willingness to take risks	Child's trust principal component
	(1)	(2)
Mother's willingness to take risks in general	0.142***	-0.014
	[0.021]	[0.015]
Father's willingness to take risks in general	0.157***	-0.041***
	[0.021]	[0.015]
Trust: Mother	-0.083***	0.233***
	[0.031]	[0.023]
Trust: Father	-0.032	0.161***
	[0.030]	[0.022]
Child's willingness to take risks in general		0.035**
		[0.015]
Trust: Child	0.061**	
	[0.027]	
1 if female	-0.621***	-0.012
	[0.125]	[0.096]
Age of respondent (years)	-0.039***	-0.018**
	[0.010]	[0.008]
Age of mother (years)	0.022*	0.009
	[0.012]	[0.009]
Age of father (years)	-0.017	0.002
	[0.011]	[0.009]
Height of respondent (cm)	0.017**	0.004
	[0.008]	[0.005]
Height of mother (cm)	-0.005	-0.002
	[0.008]	[0.006]
Height of father (cm)	-0.003	-0.002
	[0.007]	[0.005]
Constant	4.887***	-1.351
	[1.648]	[1.271]
Additional controls	Yes	Yes
R-squared	0.13	0.17
Observations	2900	2900

The dependent variable in Column (1) measures general willingness to take risk on an eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks). Explanatory risk variables are coded on the eleven-point scale. The trust variables measure trust as the principal component obtained from agreement with three statements regarding trust (general trust, reliance on others, need for caution in dealing with strangers) measured on a four-point scale. Coefficients in all columns are OLS estimates. Additional controls include: years of schooling of respondent and respondent's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before age of 16, for child and parents (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion; the reference category is protestant). All religion information is obtained from the 2003 wave of the SOEP.

Table 6: Specificity of the Risk Transmission Process

Dependent variable:	Child's willingness to take risks in the context of:					
	General	Car driving	Financial matters	Sports & leisure	Career	Health
	(1)	(2)	(3)	(4)	(5)	(6)
Willingness to take risks in the context of:						
General: Mother	0.092***	-0.027	-0.026	0.012	0.024	-0.043*
	[0.021]	[0.026]	[0.022]	[0.023]	[0.024]	[0.025]
General: Father	0.085***	-0.014	-0.042*	-0.019	0.004	-0.017
	[0.021]	[0.027]	[0.023]	[0.025]	[0.024]	[0.027]
Driving: Mother	-0.032	0.156***	-0.002	-0.022	-0.025	-0.016
	[0.021]	[0.028]	[0.024]	[0.023]	[0.025]	[0.026]
Driving: Father	0.004	0.117***	-0.025	-0.004	0.008	-0.041*
	[0.020]	[0.025]	[0.021]	[0.021]	[0.023]	[0.023]
Financial: Mother	0.017	-0.065**	0.134***	-0.043	-0.040	0.030
	[0.024]	[0.032]	[0.027]	[0.027]	[0.029]	[0.031]
Financial: Father	-0.006	0.036	0.066***	0.032	-0.046*	-0.043*
	[0.021]	[0.028]	[0.023]	[0.024]	[0.025]	[0.026]
Sports: Mother	-0.031	0.012	-0.043*	0.146***	-0.025	-0.009
	[0.023]	[0.031]	[0.025]	[0.027]	[0.027]	[0.027]
Sports: Father	-0.027	-0.058**	0.017	0.089***	0.009	0.014
	[0.020]	[0.025]	[0.021]	[0.023]	[0.022]	[0.024]
Career: Mother	0.006	-0.025	-0.006	0.019	0.064**	-0.017
	[0.021]	[0.028]	[0.024]	[0.023]	[0.026]	[0.026]
Career: Father	-0.018	0.010	0.021	-0.030	0.090***	-0.016
	[0.019]	[0.024]	[0.021]	[0.023]	[0.023]	[0.025]
Health: Mother	0.009	-0.032	-0.003	-0.037	0.029	0.120***
	[0.020]	[0.027]	[0.023]	[0.023]	[0.025]	[0.026]
Health: Father	-0.034*	-0.030	-0.008	-0.030	-0.040*	0.134***
	[0.019]	[0.025]	[0.021]	[0.022]	[0.022]	[0.024]
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.49	0.41	0.39	0.52	0.48	0.41
Observations	2585	2585	2585	2585	2585	2585

The dependent variable in each column measures willingness to take risk in the particular context on an eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks). Explanatory risk variables are coded on the eleven-point scale. Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for correlation of errors at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Additional controls include: years of schooling of respondent and respondent's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before age of 16, for child and parents (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion; the reference category is protestant). All religion information is obtained from the 2003 wave of the SOEP. A substantial fraction, roughly 1/4, of the sample do not have complete answers to risk questions in all contexts due to item non-response, in particular when the question does not apply (e.g., car driving for 17 year old individuals).

Table 7: Specificity of the Trust Transmission Process

Dependent variable is Child's	General trust (1)	Reliability (2)	Need for caution (3)
Trust: Mother	0.169***	0.056**	-0.017
	[0.021]	[0.023]	[0.023]
Trust: Father	0.122***	0.056**	0.038
	[0.022]	[0.023]	[0.023]
Reliability: Mother	0.039**	0.120***	0.038*
	[0.019]	[0.022]	[0.022]
Reliability: Father	0.051**	0.150***	0.013
	[0.020]	[0.022]	[0.021]
Caution: Mother	0.033**	-0.001	0.153***
	[0.017]	[0.018]	[0.021]
Caution: Father	0.021	-0.001	0.092***
	[0.018]	[0.019]	[0.020]
Trust: Child		-0.476***	-0.160***
		[0.023]	[0.023]
Reliability: Child	-0.390***		0.177***
	[0.018]		[0.020]
Caution: Child	-0.114***	0.153***	
	[0.017]	[0.017]	
1 if female	0.010	0.000	-0.014
	[0.033]	[0.036]	[0.037]
Age of respondent (years)	0.002	-0.008***	0.004
	[0.003]	[0.003]	[0.003]
Age of mother (years)	0.004	0.010***	-0.003
	[0.003]	[0.004]	[0.004]
Age of father (years)	-0.003	-0.005*	0.004
	[0.003]	[0.003]	[0.003]
Height of respondent (cm)	-0.001	-0.002	0.003
	[0.002]	[0.002]	[0.002]
Height of mother (cm)	0.003	0.002	0.000
	[0.002]	[0.002]	[0.002]
Height of father (cm)	-0.001	0.000	-0.003
	[0.002]	[0.002]	[0.002]
Constant	1.964***	1.817***	0.289
	[0.504]	[0.545]	[0.593]
Additional controls	Yes	Yes	Yes
R-squared	0.32	0.34	0.19
Observations	2916	2916	2916

The measures for general trust, reliability and need for caution reflect agreement or disagreement with corresponding statements on a four-point scale. The statements are "In general, one can trust people.", "In these days you cannot rely on anybody else.", and "When dealing with strangers it is better to be cautious when dealing with them.", respectively. Answers are reported on a four-category scale from "strongly agree" to "strongly disagree". Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Additional controls include: years of schooling of respondent and respondent's father and mother; corresponding indicator variables for missing schooling information; indicator variables for characteristics of the residence of youth before age of 16, for child and parents (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion; the reference category is protestant). All religion information is obtained from the 2003 wave of the SOEP.

Table 8: The Influence of Male Spouses' Risk Attitudes on Risk Attitudes of Female Spouses

Dependent variable:	Willingness to take risks in general (Female spouse)			Trust (Principal Component) (Female spouse)		
	(1)	(2)	(3)	(4)	(5)	(6)
Willingness to take risks in general: Male Spouse	0.330***	0.302***	0.275***			
	[0.012]	[0.012]	[0.012]			
Trust (principal component): Male Spouse				0.481***	0.477***	0.443***
				[0.011]	[0.011]	[0.011]
Age of female spouse (in years)		-0.016***	-0.017***		0.004	0.006
		[0.006]	[0.006]		[0.004]	[0.004]
Height of female spouse (in cm)		0.018***	0.013***		0.005	0.002
		[0.004]	[0.004]		[0.003]	[0.003]
Age of male spouse (in years)		0.002	0.002		-0.002	-0.004
		[0.006]	[0.006]		[0.004]	[0.004]
Height of male spouse (in cm)		0.010***	-0.000		0.010***	0.005*
		[0.004]	[0.004]		[0.003]	[0.003]
Constant	2.276***	-1.599*	-0.860	0.005	-2.556***	-1.481**
	[0.060]	[0.865]	[0.952]	[0.017]	[0.600]	[0.674]
Additional controls	No	No	Yes	No	No	Yes
R-squared	0.12	0.13	0.17	0.25	0.26	0.28
Observations	7272	7233	7233	6810	6778	6778

The sample is restricted to cohabiting married and non-married couples. The dependent variable in Columns (1), (2)and (3) measures general willingness to take risks on an eleven-point scale from zero (completely unwilling to take risks) to ten (completely willing to take risks). Explanatory risk variables are coded on the eleven-point scale. Coefficients in all columns are OLS estimates. Robust standard errors in brackets allow for clustering at the household level; ***, **, * indicate significance at 1-, 5-, and 10-percent level, respectively. Additional controls include: years of schooling of female and male spouse; corresponding indicator variables for missing schooling information; occupational prestige of female and male spouses' mothers' and fathers'; corresponding indicator variables for missing information on parents' occupational prestige; indicator variables for characteristics of residence of youth before age of 16 (big city, city, small town, countryside, missing); indicator variables for religion of child and parents (catholic, other Christian, other non-Christian, no religion, missing religion; the reference category is protestant). All religion information is obtained from the 2003 wave of the SOEP.