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Direct Evidence on Risk Attitudes and
Migration

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Non-Technical Abstract

Geographic mobility is important for the functioning of labor markets because it brings labor resources to where they can be most efficiently used. It has long been hypothesized that individuals' migration propensities depend on their attitudes towards risk, but the empirical evidence, to the extent that it exists, has been indirect. In this paper, we use newly available data from the German Socio-Economic Panel to measure directly the relationship between migration propensities and attitudes towards risk. We find that individuals who are more willing to take risks are more likely to migrate between labor markets in Germany. This result is robust to stratifying by age, sex, education, national origin, and a variety of other demographic characteristics, as well as to the level of aggregation used to define geographic mobility. The effect is substantial relative to the unconditional migration propensity and compared to the conventional determinants of migration. We also find that being more willing to take risks is more important for the extensive than for the intensive margin of migration.

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Abstract

Geographic mobility is important for the functioning of labor markets because it brings labor resources to where they can be most efficiently used. It has long been hypothesized that individuals' migration propensities depend on their attitudes towards risk, but the empirical evidence, to the extent that it exists, has been indirect. In this paper, we use newly available data from the German Socio-Economic Panel to measure directly the relationship between migration propensities and attitudes towards risk. We find that individuals who are more willing to take risks are more likely to migrate between labor markets in Germany. This result is robust to stratifying by age, sex, education, national origin, and a variety of other demographic characteristics, as well as to the level of aggregation used to define geographic mobility. The effect is substantial relative to the unconditional migration propensity and compared to the conventional determinants of migration. We also find that being more willing to take risks is more important for the extensive than for the intensive margin of migration.

Keywords: risk aversion, migration, Germany

JEL Classification: J61, D81, R23

Geographic mobility plays an important role in the efficient functioning of markets. Moving people and capital to where they can be most productively utilized is essential to any working economy. Because migrants may “grease the wheels” of the labor market (Borjas, 2001) it is important to understand the determinants of geographic mobility. While it has long been hypothesized that individuals’ willingness to take risks may play an important role in migration, and therefore in the efficient functioning of labor markets, there is no direct evidence on whether risk attitudes do, in fact, influence individuals’ migration decisions. This paper attempts to fill this gap in the literature. We also assess how important risk attitudes are for migration behavior relative to other factors such as age, unemployment, income, and home ownership, which are known to be important determinants of migration.¹

To motivate why attitudes towards risk taking might be important for the migration decision, consider that individuals derive utility from consumption and leisure. It is quite reasonable to assume that individuals have more information about income, consumption, and leisure opportunities in their present location compared to other potential locations. This relatively greater uncertainty over some or all of the arguments of the utility function will lead individuals who are more willing to take risks to have a higher probability of migrating.

The direction of the relationship between risk attitudes and migration is potentially ambiguous, however. Risk attitudes could also potentially affect migration decisions if risk-averse individuals desire to live in regions with (known) lower variances of the income distribution. For example, suppose a technological shock leads to industrialization in a developing country. If income variance in the industrialized sector in urban areas is less than the income variance in rural agricultural areas, then risk-averse individuals might migrate from the countryside to the cities. On the other hand, one could think about variance-increasing technological shocks to certain regions that induce individuals that are more risk-

¹ See Greenwood (1997) for a survey of the literature on how demographic, life-cycle, and labor market characteristics affect the internal migration decision in developed countries.

seeking to relocate in order to reap the benefits. Hence, more risk-averse individuals might favor locations with lower variances to avoid uncertainty in income, while lower risk-averse individuals may use migration as a means of improving their chances of receiving a higher-than-average wage.²

In the modern German context that we examine, we consider the former argument regarding imperfect information to be more applicable. To be sure, there are some differences in income variances across regions in Germany, but they are small compared to those that exist in developing countries or between developing and developed countries. We therefore find it more plausible that general uncertainty about other locations is the more important channel through which risk attitudes determine intra-German geographic mobility.

To our knowledge, no previous empirical study examines the relationship between migration and risk attitudes, directly measured. We use newly available data from the German Socio-Economic Panel (SOEP) that includes *direct* measures of attitudes towards risk, and find that being more willing to take risks is a positive, statistically significant, and quantitatively important determinant of migration. This result is robust to stratifying by age, sex, education, national origin, and a variety of other demographic characteristics that are usually posited as determinants of migration decisions, as well as to the level of aggregation used to define geographic mobility. Our data on risk attitudes are derived from a series of questions asked in the 2004 wave of the SOEP. These questions were highly correlated with a wide range of objective measures of behaviors involving risk from both field and laboratory experiments (Dohmen et al., 2005). Thus, we are confident that our measures of risk attitudes successfully capture an underlying tendency towards risk-taking, which has an impact on

² Most of the previous literature on the role of risk attitudes for migration has focused on this sorting argument, and on migration as a means of diversification of family income. See, for example, Smith (1979), Levhari and Stark (1982), Katz and Stark (1986), Xu (1992), and Daveri and Faini (1999), among others. Heitmueller (2005) posits a model in which risk averse individuals are less likely to migrate, and calibrates the model using actual data, but does not estimate how risk aversion determines migration propensities.

actual behavior in diverse areas of life. The question is then whether migration is a decision that is driven in an important way by attitudes towards risk.

We find that being relatively willing to take risks is associated with an increase of at least 1.6 percentage points in the probability of ever migrating between 2000 and 2005, even after conditioning on individual characteristics. This effect is substantial relative to the unconditional migration propensity of 5.1 percent. When estimating a random effects probit model, in which covariates such as unemployment, income, marital status, and educational attainment are allowed to vary over time, we continue to find a positive and statistically significant relationship between being willing to take risks and the probability of migrating, with the magnitude of the marginal effect being as (or more) important as being married or unemployed. We also estimate random effects Tobit models and conclude that risk attitudes are more important on the extensive margin (whether to move or not) than the intensive margin (how far to move, conditional on moving).

The next section of the paper describes the data. In Section II we present descriptive results on the relative general risk attitudes of movers and stayers. In Section III we examine the relationship between migration and risk attitudes in a multivariate regression context and assess the sensitivity of our results to our geographic definition of mobility. In this section we also examine the possibility of reverse causality between migration and the response to the risk attitude question and how risk attitudes in a variety of specific contexts affect migration. We offer some conclusions in Section IV and briefly discuss how differences in risk attitudes across countries might affect relative labor market performance.

I. Data

The SOEP is a representative panel survey of the resident adult population of Germany.³ The initial wave of the survey was conducted in 1984 and the panel was extended to include East Germany in 1990, after German reunification. The SOEP surveys the head of each household in the sample as well as all other household members over the age of 17. Respondents are asked for a wide range of personal and household information, including information about incomes and employment, and for their attitudes on different topics, including political and social issues.

We are interested in investigating whether migration behavior is determined by individual attitudes towards risk, beyond the usual determinants of migration studied in the literature. The 2004 wave of the SOEP contains a novel set of questions about individuals' risk attitudes that can be used for this purpose. The primary variable of interest is the question that asked individuals for their attitude towards risk in general, allowing 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.⁵ Our analysis uses responses on the scale as an index of willingness to take risks. We also check whether our analysis is robust to using an alternative measure: a binary indicator for

³ For a detailed description of the SOEP, see Wagner et al. (1993), and Schupp and Wagner (2002). Additional details can be found at <http://www.diw.de/english/sop/> (last seen 14 February 2007).

⁵ The exact wording of the question (translated from German) is: "How do you see yourself: Are you generally a person who is fully willing to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means: 'unwilling to take risks' and the value 10 means: 'very willing to take risks'." German versions of all risk questions are available online, at http://www.diw.de/deutsch/sop/service/fragen/fr2004/personen_2004.pdf (last seen 14 February 2007).

whether someone chose a value of six or higher on the scale.⁶ This helps minimize potential problems from different use of scales. We refer to this variable as the “risk indicator” and interpret it as an indicator that individuals are “relatively willing to take risks”, with individuals belonging to the reference group as “relatively unwilling to take risks”. Risk attitudes were also elicited using the same 11-point scale in several specific contexts, including financial matters, career issues, and sports and leisure activities, which we also use in the analysis. Because we observe responses to the risk attitude questions only in 2004, we treat these as fixed characteristics of the individual.

The general risk question has been experimentally validated and shown to be a reliable measure of an individual’s actual propensity to take risks. Dohmen et al. (2005) used a pool of 450 subjects with characteristics comparable to the respondents of the SOEP and conducted real-stakes lottery experiments. Participants in the experiment also answered the same general risk question from the SOEP questionnaire that is used in this paper. The responses turned out to be good predictors of actual risk taking behavior in the paid experiment. Dohmen et al. (2005) also show that responses to the general risk question predict other behaviors involving risk, such as holding stocks, being self-employed, or smoking. Thus we can be fairly confident that the general risk question is a behaviorally valid measure of an individual’s underlying attitude towards risk. In our analysis we will mainly focus on the general risk measure, because it is the only one of the risk questions that has been validated in a field experiment, and because it seems to capture the multiple aspects of risk attitudes that determine migration.

⁶ Robustness checks conducted by Dohmen et al. (2005) suggest that choosing a threshold of six and above on the eleven point scale does not affect the behavioral validity of the responses.

The smallest geographic unit defined in the publicly available version of the SOEP is the *Raumordnungsregion* (literally, “spatial district”, although we will refer to them as “regions” in the rest of the paper). Germany is divided geographically into 97 such regions, which are defined by the *Bundesamt für Bauwesen und Raumordnung* (Federal Office for Building and Regional Planning) and reflect an aggregation of *Landkreise* and *kreisfreie Städte* (administrative districts, something akin to counties in the U.S.), taking into account economic agglomeration and commuting flows. Each region captures a center of economic activity and its surrounding area and corresponds to a regional labor market. Figure 1 shows the 97 regions in Germany. We define a migration as a move from one region to another. In robustness checks, however, we also consider migration within regions, migration between *Bundesländer* (German federal states) and migrations defined by various thresholds of distance (e.g. 25km, 50km, 100km, etc.). We measure distance of moves as the straight-line “great circle” distance (Sinnot 1984) based on the longitude and latitude of the center of the region.

For our analysis, we restrict the sample to the 2000 through 2005 waves of the SOEP, including data since the most recent survey refreshment in 2000, in order to have a large balanced panel and also provide a sufficient number of observed migrations. We concentrate on prime-age individuals who were between 18 and 65 years of age during the entire survey period, leaving us with a sample of 10,967 individuals with 5 years of data.⁸

⁸ This implies that only individuals born between 1940 and 1983 are contained in our sample. We eliminate from the sample individuals who had missing information on any of the variables used in the analysis as well as 20 individuals whose information on moving dwelling and moving region were inconsistent.

II. Risk Attitudes of Migrants and Non-Migrants

Figure 2 shows the distribution of responses to the general risk question for “movers” (individuals who changed region at least once between 2000 and 2005) and “stayers” (individuals who did not change region in that period). While both distributions have a modal value of 5 on the 11-point scale, the distribution for movers has less weight in the left hand tail and more weight in the right hand tail. In addition, the average of the risk index is greater for movers than for stayers. The lower panel shows differences in the log share for each of the levels of the risk question. Clearly, a greater proportion of movers than stayers are likely to respond that they are relatively more amenable to taking risks.

In Table 1 we present for movers and stayers the average of the risk index as well as the share of the sample for which risk indicator is equal to one, stratified by a variety of demographic characteristics. As reflected in Figure 2, the averages of the risk index and risk indicator are substantially larger for the 5.1 percent of the sample who moved than for those who never moved within the sample period. Moreover, those who moved more than once are more risk-friendly than those who moved only once. These results are a first strong indication (albeit not conditional on any individual characteristics) in favor of the hypothesis that migrants are less risk-averse than non-migrants.

Across nearly all of the demographic categories (sex, age, education, marital status, and place of origin) we find strikingly consistent results that movers are more willing to take risks than stayers regardless of the risk measure we used. Roughly speaking, for most of the demographic groups, 10 to 15 percent more of the movers in our sample indicate being relatively more willing to take risks than do stayers. Note, too, that the migration propensities differ substantially across the various demographic groups, in the expected direction – older individuals are less likely to migrate, those who are married are less likely to migrate, and

better-educated individuals are more likely to migrate. Nevertheless, the difference in risk attitudes between the movers and stayers is remarkably similar and consistent *regardless* of the demographic group.

One result from Table 1 worth discussing in more detail is that individuals who were born abroad and migrated to Germany are on average less willing to take risks than native Germans. This might seem, at first impression, to contradict our consistent finding that individuals who migrate are, on average, more willing to take risks. There are many factors, however, that could lead to this difference between the average risk attitudes of native Germans and individuals born abroad. For example, people born in Turkey could be more risk averse, on average, than native Germans for cultural reasons. Yet Turks who migrate to Germany may be much more willing to take risks than those that did not migrate and stayed in Turkey. There is, in fact, substantial heterogeneity in the relative risk attitudes of non-natives. In a regression using the full 2004 wave of the SOEP of the risk index on age, a female dummy variable, and dummy variables for region of birth, we find (for example) that North American and western European immigrants in Germany are significantly more willing to take risks than native Germans, while Asian, southern European, and eastern European immigrants in Germany are significantly less willing to take risks than native Germans.⁹ The results in Table 1 may therefore mainly be due to composition effects, as a large share of immigrants in Germany come from Turkey and Greece, and do not reflect a tendency, in general, for immigrants to be more (or less) risk averse than natives. Without measuring the risk attitudes of the reference group of non-migrants in countries that send immigrants to Germany, it is therefore very difficult to draw sensible conclusions about the

⁹ These results include Turkey as part of Asia. When we include a dummy variable for being born in Turkey as a separate regressor, it is negatively and highly statistically significant while the Asia dummy variable is negative and statistically not significant, with the other coefficients relatively unchanged. These results are available from the authors by request.

selectivity on risk attitudes of immigrants and non-immigrants by referring only to immigrants in Germany and German natives.

Finally, we examine how risk attitudes affect moves motivated by different reasons. The bottom panel of Table 1 presents the average of the risk measures by different reasons for migration (family, job, housing, or other reasons). These categories are non-exclusive, i.e., individuals can state several reasons for moving.¹⁰ Individuals who move for family reasons (e.g. moving out of ones parents' house, separating from a spouse or partner) are relatively more amenable to taking risks than those who move for other reasons, although they are followed closely by individuals who move for job reasons.¹¹ Regardless of the reason for migrating, however, all movers are more willing to take risks than individuals who do not move.

III. Risk Attitudes as Determinants of Migration

Baseline Results

We have seen in Table 1 that risk attitudes are correlated with a variety of personal characteristics, some of which may be simultaneously determined with migration. In Table 2, we present estimates from a probit model where the dependent variable is an indicator of whether the individual ever moved across regions during 2000-2005. In columns (1) through (3) we present results using our risk index as the measure of risk attitudes, while in columns (4) through (6) we use the binary risk indicator described above. In columns (2) and (5) we control for factors that are not in the individual's control and are not related to their current

¹⁰ Thirty-nine percent of the movers in Table 1 give multiple reasons for moving.

¹¹ These averages do not control for age, which is primarily why individuals who move for family reasons have a higher average risk than those who move for job reasons.

location (sex and age) while in columns (3) and (6) we control for additional variables that may be jointly determined with migration decisions (marital status and years of education) as well as variables that may determine an individual's initial location (origin/nationality).

In all six models we find statistically significant evidence that individuals who are relatively more willing to take risks are also more likely to move. In column (1) we estimate that a one-unit change in the risk index increases the probability that an individual migrates between labor markets by 0.62 percent. This implies an increase in the probability of moving of 1.7 percentage points for a one standard deviation (2.7 point) increase in the willingness to take risks. Relative to the unconditional migration probability of 5.1 percent, this effect is quite substantial. Similarly, in column (4) when use the risk indicator, we find that the probability of migration is about 3.3 percentage points higher (or more than half of the unconditional probability) for individuals who are relatively more willing to take risks.

In columns (2) and (5) we control for age and sex, because the results in Table 1 clearly indicate that these characteristics are strongly related to risk attitudes. Given the strength of the correlation between risk, age and sex, it is not surprising that the estimated coefficients on our risk measures decline, in both cases by approximately one third. Both measures remain statistically significantly different from zero at any conventional level, however. Using the risk indicator, individuals who are relatively more willing to take risks have a migration probability 2.2 percentage points higher than individuals who are not, an effect that is about half of the unconditional migration probability.

Controlling for marital status, education, and place of origin in columns (3) and (6) reduces the effect of risk attitudes on the probability of migration by about half compared to the models in which we do not include any additional covariates and by about a third compared to the models in which we included only age and sex. These variables may, in part, be jointly determined with migration. Nevertheless, the effect of risk attitudes on the probability of migrating is still quantitatively important and statistically significant. Roughly speaking, the partial effect of the risk indicator is equivalent to about three years of education and about three times more important than being female in determining whether an individual migrates. Being relatively more willing to take risks is only about half as important (in absolute value) as being married, however.¹³

While we feel that regional moves are the most appropriate as they likely represent changes in labor markets, one concern is that our results are an artifact of the particular geographic definitions we are using. To address this issue, we present in Table 3 estimates from the same models as in Table 2, but using a variety of different definitions of moves. In columns (1) through (3) we present the estimated coefficients on the risk index variable while in columns (4) through (6) we present the estimated coefficients on the risk indicator variable. We also present the unconditional migration probability (i.e. the mean of the dependent variable) for each of the definitions of geographic mobility.

In row a) of Table 3, we first examine whether risk attitudes affect intra-regional moves for those individuals who do not change region. The SOEP asks each individual whether they changed dwellings in the last year, and we use this variable to identify moves

¹³ Adjusting for the clustering of multiple observations from the same household had very little effect on the estimated standard errors and did not alter in any way the conclusions of hypothesis tests on them. We find a similarly positive and statistically significant relationship between average risk attitudes within a household and migration when we run similar regressions at the household level, as well as when we run individual-level regressions separately for men and women. We have also estimated the models from Table 2 controlling for age and education non-parametrically (i.e. with dummy variables for each year of age and each year of schooling) as well as including dummy variables for occupation and current region in 2000. The coefficients on our risk measures were virtually unchanged and remained statistically significant at any conventional level. All of these additional results are available from the authors by request.

that do not also entail a change of region. We find that risk attitudes are positively related to intra-regional moves, but that this effect is statistically not significant once we control for age and sex. Moreover, the estimated coefficients in all models are quite small relative to the unconditional probability of changing dwelling. When we add individuals who also changed region (as well as dwelling) back into the analysis in row b), we once again find a statistically significantly relationship between risk attitudes and migration, but this effect is relatively small compared to the unconditional migration probability, e.g. for the risk indicator, the coefficient is less than one tenth the size of the unconditional migration probability when we include age and sex as regressors.

Rows d) through h) of Table 3 present results where we define moves based on the distance between geographic centers of the regions, with each row excluding moves of successively longer distances. For all of the models, including those with age, sex, education, marital status, and place of origin as regressors, risk attitudes are an important determinant of migration. Moreover, the estimated coefficients are a substantial fraction of the unconditional migration probability. For the risk indicator, this fraction ranges from 30 to 81 percent of the unconditional migration probability, depending on the definition of migration and the other covariates. In comparison, for the models in row a) examining how risk attitudes determine intra-regional moves, the estimated coefficients on the risk indicator are only between 4 and 14 percent of the unconditional migration probability. As a final comparison, row i) of Table 3 shows how risk attitudes determine the migration between *Bundesländer* (federal states), with, not surprisingly, similar findings. We conclude from Table 3 that our results are clearly not a function only of the particular definition of migration that we are using and that risk attitudes are an especially important determinant of moves that involve changing labor markets.

While economists usually assume that preferences are stable over time and place, another concern is that most of the observed migrations in these data occur *before* the risk questions were posed in the 2004 wave and that our results might possibly be an artifact of reverse causality. Through a process of positive feedback, successful migration could possibly make individuals more likely to respond that they are willing to take risks. To address this concern, in Table 4 we present results from estimating the same models from Table 2, using as the dependent variable a) an indicator for those who migrated before the questions were asked, i.e. any time between 2000 and 2004, b) an indicator for those who migrated after the questions were asked (i.e. between 2004 and 2005), and c) the same as b), but eliminating individuals from the regression who had also migrated between 2000 and 2004, prior to the question being asked. The top panel of Table 3 presents results for using the index variable as our measure of risk while the bottom panel presents results using the risk indicator. The first column in both panels gives the unconditional probability of migrating (i.e. the share of the sample that moved in the indicated period).

While the magnitudes of the coefficients in the *ex ante* and *ex post* regressions vary because the unconditional probability of migrating differs, in both cases risk attitudes are an important determinant of migration. This holds in the *ex post* regressions even when we remove individuals from the sample who had migrated previously. Indeed, relative to the unconditional probability of migrating, it appears that risk attitudes were *more* important in determining migration after the risk questions were asked than before, leading us to conclude that our results are not likely to be driven by reverse causality. Of course, moves may take some time to plan and individuals who migrated between 2004 and 2005 may have already begun such planning when the risk questions were asked. To the extent that the available data allow, however, it would appear that risk attitudes are a determinant of migration and not vice versa.

Panel Estimates of the Effect of Risk Attitudes on Migration

The regressions in Tables 2 are static and do not take into account any time varying characteristics. In Table 5 we present results from estimating random-effects probit models, which account for the non-independence of the error term across time due to unobserved time-invariant individual characteristics. The dependent variable is a binary indicator for changing region in the year after the characteristics were observed.¹⁴ That is, the results are forward-looking in the sense that all of the regressors are predetermined relative to the realization of the outcome. As with the “static” results in Table 2, columns (1) and (4) present results of regressing the migration indicator on just the risk measures. In columns (2) and (5) we add age and sex variables, and in columns (3) and (6) we add a variety of static and time-varying characteristics that may be jointly determined with migration: unemployment status, self-employment status, gross income in the month prior to the survey, whether the individual owns their own dwelling, marital status, the number of children in the household, years of education, and place of origin.

As in Table 2, we find that the risk measures are positively and statistically significantly correlated with migration. The magnitudes of the coefficients are substantially smaller than in the static probit model, but this is to be expected given that the unconditional (annual) migration probability in our sample is 1.2 percent (as opposed to the five-year migration probability of 5.2 percent). In column (1), the coefficient of 0.00047 indicates that a one standard deviation increase (2.7 points) in the risk index would lead to a 0.13 percentage point increase in the probability of migration (about 11 percent of the unconditional migration probability), while in column (4) the marginal effect for the risk

¹⁴ Because the risk measures, the primary foci of our analysis, do not vary over time, we cannot estimate fixed effects models. At this stage there are no data available that would allow for a dynamic analysis of the relationship between risk attitudes and migration behavior.

indicator is a 0.26 percentage point increase in the probability of migration (about 22 percent of the unconditional probability).

Controlling for age and sex, in columns (2) and (5), reduces the coefficients on both risk measures by about 28 percent, although both are still statistically significant at any conventional level. Adding the various fixed and time-varying characteristics reduces the coefficients on both risk measures by (approximately) an additional 16 percent. The effects of the risk measures on migration probabilities, while small, are again statistically significantly different from zero. Moreover, the magnitude is *not* small relative to the marginal effects of the other covariates. For example, the coefficient on the risk indicator is larger in absolute value than the effects of being unemployed, being female, or any of the place of origin indicators. The effect of being relatively willing to take risks on migration probabilities is the same (again, in absolute value) as roughly 3 years of education or 3.5 children. It has roughly the same effect on migration probabilities as being married. From these results, we conclude that risk attitudes are among the most important determinants of the propensity to migrate.

Risk Attitudes and the Extensive and Intensive Margin of Migration

To check whether risk attitudes also affect the intensive margin of migration behavior, we estimate random effects Tobit models, using the distance of migration as the dependent variable. The Tobit model allows us to decompose the effect of risk attitudes on the probability of migration and on the migration distance, conditional on having migrated. In the top panel of Table 6 we present results using the risk index as the determinant of migration, while the bottom panel uses the risk indicator. In column (1) we include only the risk measures as regressors, while in column (2) we add age and sex, and we include in column (3) all of the fixed and time-varying regressors that we employed in Table 3.

As with our previous results, we continue to find that risk attitudes play a significant role in determining migration. The effect of the risk index and the risk indicator positively and significantly affect both the probability of moving and the distance moved. However, compared to the unconditional probability of moving (about 1.2 percent) or the distance moved, conditional on moving (about 185 kilometers), the marginal effect of either risk measure is, in relative terms, greater on the probability of moving. For example, in the model in which we control for all of other covariates, the marginal effect of being relatively willing to take risks on migration is about one third of the unconditional probability of moving, while the marginal effect on distance moved (conditional on moving) is only about four percent of the average distance moved (conditional on moving). Thus, it would seem that risk attitudes play a much larger role in determining whether or not people migrate than in determining how far they migrate.

Migration and the Willingness to Take Risks in Different Contexts

In addition to the question about attitudes towards risks in general, the 2004 wave of the SOEP also asked individuals about their attitudes towards risks in a variety of contexts: careers, financial matters, driving, sports, health matters, and trusting others, each measured on the same 11 point scale as the general risk question. These measures are somewhat correlated with each other in the sample from Table 4, with correlation coefficients ranging from 0.325 (between attitudes towards risk in trusting others and those in attitudes towards driving), to 0.592 (between the general risk measure and attitudes in risk taking in career matters). We would expect that attitudes towards taking risks in career matters would be as, or more, related to migration than the general risk measure. The willingness to take risks in trusting others might also be related to migration, as most geographic moves will involve

some degree of encountering new individuals and establishing new relationships. We would expect risk in driving and sport activities to be relatively less important for migration propensities, to the extent that they do not serve as proxies for risk attitudes in general.

In Table 7 we explore how attitudes towards risks in these other contexts are related to migration.¹⁵ Each entry in the table represents the results from a separate regression and reports the coefficient on the 11 point risk scales in each of the different contexts as well as the general risk measure. Similar to Table 2, the first column presents results from models in which the risk measure was the only regressor, while the second column adds age and sex variables, and the third column adds variables for place of origin, marital status, and years of education. The results in the first column show that each of the risk measures is significantly related to migration when we do not control for any other factors, with being willing to take risks in career matters being most related to migration. When we control for sex and age in column (2), however, we find that the effect of risk attitudes towards driving and financial matters now are (statistically) unrelated to migration. In the third column, when we control for place of origin, marital status, and years of education, the estimated coefficient on risk taking in sports also become statistically not significant. These results are roughly what we would expect, with the possible exception of being willing to take risks in health matters. Beyond the general risk measure, risk taking in career is most strongly related to migration and risk taking in trusting other people is somewhat less, but still significantly, related to migration. These results suggest that the willingness to take risks in different contexts is related to migration, but willingness to take risks in career is probably the most important risk attitude that determines migration.¹⁶

¹⁵ The sample used for this analysis is slightly smaller than that used for Table 2, as we dropped individuals who did not respond to one or more of the risk questions. Note that the results for the general risk measure are virtually identical to those reported in Table 2.

¹⁶ See Dohmen et al. (2005) for an in-depth discussion of variation in willingness to take risk across different contexts, and how these are related and yet different.

IV. Conclusions and Implications

In this paper we provide the first direct evidence that individuals' risk attitudes affect their migration propensities. While relatively few Germans migrate (about 1.2 percent per year in our sample), risk attitudes would appear to play an important role in determining who does and does not move from one labor market to another. Being willing to take risks, measured in a variety of ways, positively and significantly affects the probability of migration and, to a much lesser extent, the distance of those moves. Roughly speaking, the marginal effect of our indicator of being relatively willing to take risks is about 11 to 22 percent of the unconditional annual probability of migrating between labor markets, and this effect is larger than those of conventional correlates of migration like being married or unemployed. Our results are even stronger when we estimate models that examine the five-year migration probabilities. Risk attitudes seem to matter most when changing labor markets, and are not as strongly related to intra-regional moves. This result is supported by results showing that willingness to take risks in career matters is even more strongly related to migration than the general risk attitudes measures that we use for the majority of the paper.

Labor mobility is important for the efficient functioning of labor markets. The available evidence suggests that differences in risk attitudes may, in part, explain different rates of geographic mobility observed in Germany versus the U.S. Our results suggest that individuals who are relatively more likely to take risks are also more willing to migrate. Using the same survey question to measure willingness to take risks in a survey that is representative of the U.S. population, Fehr et al. (2006) find evidence that Americans are substantially more willing to take risks than Germans, with a 2.2 point difference in the average response to the general risk question. *Ceteris paribus*, this difference in the risk scale would have led to a roughly 0.6 to 1.4 percentage point increase in the share of our sample

who moved between 2000 and 2005, using the results in Table 2. This is substantial, relative to the unconditional migration probability of 5.1 percent in our sample.

The difference in risk endowments across countries may partially explain the greater mobility of Americans and why the U.S. labor market, in general, performs better than European labor markets – risk attitudes might actually help to “grease the wheels” of the U.S. labor market. This, of course, raises the question of why risk attitudes might differ substantially across countries. One explanation is that the U.S. was founded relatively more recently, by waves of immigrants who were likely to be risk takers. In a recent paper, Dohmen, et al. (2006) showed that risk attitudes are correlated across generations. The transmission of risk attitudes from parents to children could explain the persistence of the difference in risk attitudes across countries over time. Future research on cross-national attitudes towards risk taking will be able to probe this question further.

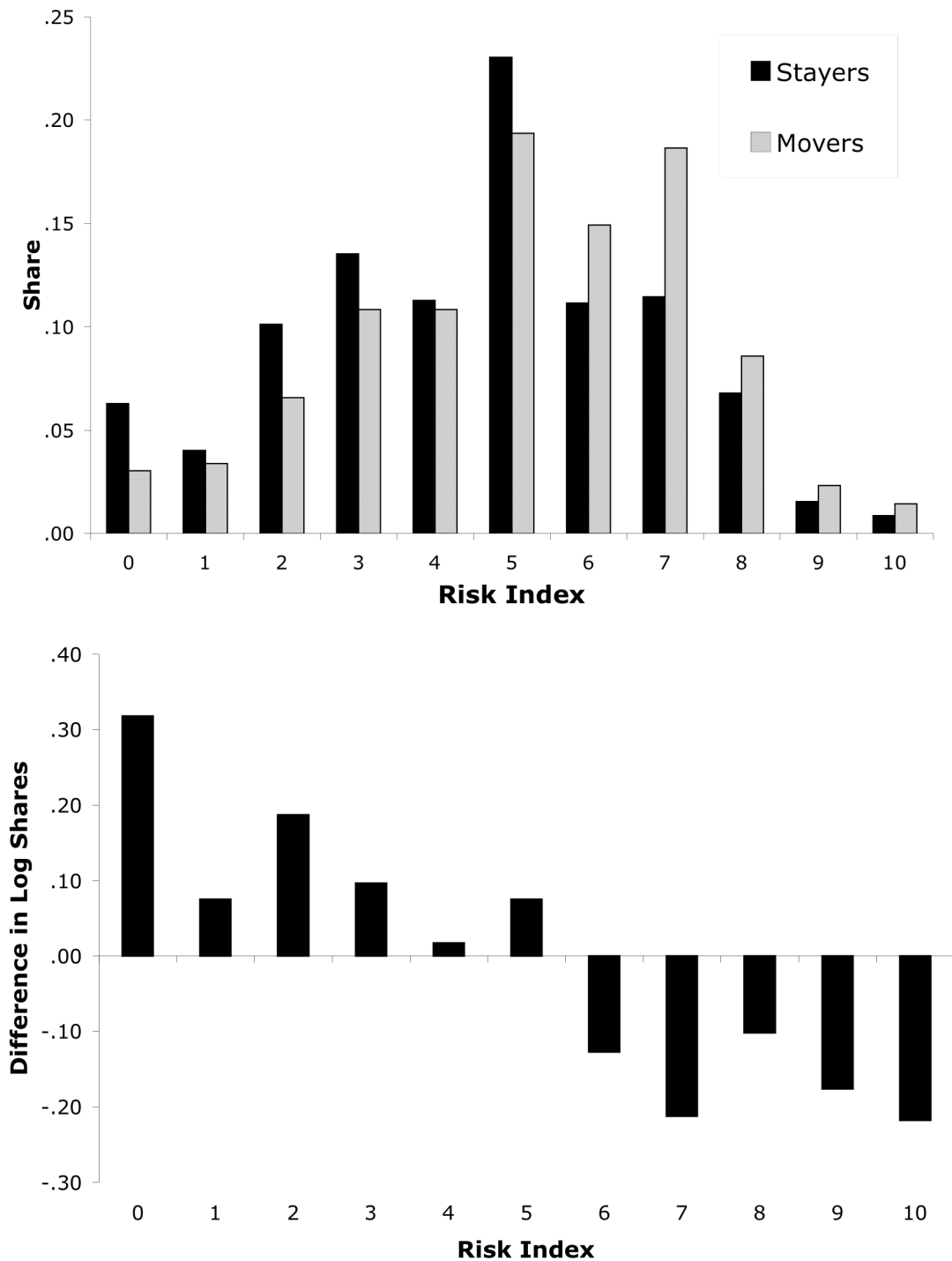
REFERENCES

- Borjas, George J. (2001) "Does Immigration Grease the Wheels of the Labor Market?" *Brookings Papers on Economic Activity*, 2001(1), 69-119.
- Daveri, Francesco and Riccardo Faini (1999) "Where Do Migrants Go?" *Oxford Economic Papers* 51(4), 595-622.
- Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jürgen Schupp, and Gert G. Wagner (2005) "Individual Risk Attitudes: New Evidence from a Large, Representative, Experimentally-Validated Survey," IZA Discussion Paper 1730, September.
- Dohmen, Thomas, Armin Falk, David Huffman, and Uwe Sunde (2006) "The Intergenerational Transmission of Risk and Trust Attitudes," IZA Discussion Paper 2380, October.
- Fehr, Ernst, Urs Fischbacher, Michael Naef, Jürgen Schupp and Gert G. Wagner (2006) "A Comparison of Risk Attitudes in Germany and the U.S.," *mimeo*, Institute for Empirical Research in Economics, University of Zurich.
- Greenwood, Michael J. (1997) "Internal Migration in Developed Countries," in Mark R. Rosenzweig and Oded Stark, eds., *Handbook of Population and Family Economics*, 647-720. Amsterdam: Elsevier.
- Heitmueller, Axel (2005) "Unemployment Benefits, Risk Aversion, and Migration Incentives," *Journal of Population Economics* 18(1), 93-112.
- Katz, Eliakim and Oded Stark (1986) "Labor Migration and Risk Aversion in Less Developed Countries," *Journal of Labor Economics* 4(1), 134-149.
- Levhari, David and Oded Stark (1982) "On Migration and Risk in Less Developed Countries," *Economic Development and Cultural Change* 31(1), 191-196.
- Sinnot, R. W. (1984) "Virtues of the Haversine," *Sky and Telescope*, 68(2), 159.
- Smith, Terence R. (1979) "Migration, Risk Aversion, and Regional Differentiation," *Journal of Regional Science* 19(1), 31-45.
- Xu, Chenggang (1992) "Risk Aversion, Rural-Urban Wage Differentiation, and Migration," Centre for Economic Performance Discussion Paper 108, November.

Figure 1
Raumordnungsregionen in Germany



Figure 2
General Risk Attitudes for Movers and Stayers
 2000-2005



Source: Authors' tabulations from the 2000-2005 waves of the SOEP. The index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks." Movers are individuals who changed region at least once between 2000 and 2005. Sample size is 10,967.

Table 1
Average Measures of Risk Attitudes for Stayers and Movers

	Average of Risk Index for		Share with Risk Indicator=1		N		Share Movers
	Stayers	Movers	Stayers	Movers	Stayers	Movers	
All	4.488	5.139	.318	.460	10,404	563	.051
One move		5.042		.441		476	
Two or more moves		5.667		.563		87	
Sex							
Men	4.965	5.449	.403	.525	4,982	263	.050
Women	4.049	4.867	.239	.403	5,422	300	.052
Age (in 2000)							
18-25	4.977	5.173	.407	.445	1,049	173	.142
26-35	4.643	5.632	.337	.507	2,644	223	.078
36-45	4.531	4.864	.321	.427	3,251	103	.031
45+	4.181	4.703	.274	.391	3,460	64	.018
Years of education (in 2000)							
1-9	3.628	4.837	.216	.442	1,173	43	.035
10.5-11	4.405	4.894	.298	.413	3,186	104	.032
11.5-13	4.632	5.174	.329	.462	3,838	236	.058
13.5+	4.814	5.306	.381	.489	2,207	180	.075
Married (in 2000)							
No	4.807	5.309	.366	.475	3,378	375	.100
Yes	4.334	4.798	.295	.431	7,026	188	.026
Place of origin							
Western Germany	4.538	5.248	.321	.483	6,086	319	.050
Eastern Germany	4.737	5.144	.346	.446	2,896	195	.063
Abroad	3.764	4.408	.245	.367	1,422	49	.033
Reasons for moving							
Family		5.418		.502		239	
Jobs		5.259		.484		316	
Housing		4.885		.427		192	
Other		4.951		.407		81	

Source: Authors' tabulations from the 2000-2005 waves of the SOEP.

Note: Movers are individuals who changed region at least once between 2000 and 2005. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing." Risk indicator is a binary variable, which is 1 when the risk index is 6 or greater. Reasons for moving are not exclusive categories; individuals can specify more than one reason.

Table 2
Risk Attitudes and the Probability of Migrating between 2000 and 2005

Covariates	(1)	(2)	(3)	(4)	(5)	(6)
Risk index	.0062 (.0009)	.0040 (.0008)	.0026 (.0008)			
Risk indicator				.0316 (.0049)	.0216 (.0043)	.0160 (.0040)
Age (2000)		-.0029 (.0002)	-.0021 (.0002)		-.0029 (.0002)	-.0021 (.0002)
Female		.0040 (.0037)	.0043 (.0034)		.0039 (.0037)	.0045 (.0034)
Married (2000)			-.0360 (.0049)			-.0361 (.0049)
Years of education (2000)			.0049 (.0006)			.0049 (.0006)
Place of origin						
Western Germany			ref.			ref.
Eastern Germany			.0075 (.0040)			.0076 (.0040)
Abroad			-.0016 (.0057)			-.0021 (.0056)
Pseudo- R^2	.0100	.0746	.1067	.0105	.0758	.1084

Source: Authors' tabulations from the 2000-2005 waves of the SOEP.

Note: Entries in table are marginal effects from probit estimation, evaluated at sample means. Standard errors in parentheses. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks." Risk indicator is a binary variable, which is 1 when the risk index is 6 or greater. Mean of dependent variable is .0513. Sample size is 10,967.

Table 3
Risk Attitudes and the Probability of Migrating between 2000 and 2005:
Sensitivity to Different Definitions of Geographic Mobility

Covariates	Uncond. Mig. Prob.	Risk Index			Risk Indicator		
		(1)	(2)	(3)	(4)	(5)	(6)
a) Changed dwelling (regional stayers only)	.286	.0102 (.0019)	.0031 (.0020)	.0035 (.0021)	.0406 (.0096)	.0140 (.0098)	.0128 (.0099)
b) Changed dwelling (all)	.322	.0141 (.0020)	.0060 (.0021)	.0054 (.0021)	.0606 (.0097)	.0296 (.0100)	.0253 (.0101)
c) Changed region (from Table 2)	.052	.0062 (.0009)	.0040 (.0008)	.0026 (.0079)	.0316 (.0049)	.0216 (.0043)	.0160 (.0040)
d) Longest move was 25km or more	.049	.0064 (.0009)	.0042 (.0008)	.0029 (.0008)	.0328 (.0049)	.0227 (.0043)	.0169 (.0039)
e) Longest move was 50km or more	.041	.0056 (.0008)	.0037 (.0007)	.0025 (.0007)	.0265 (.0045)	.0178 (.0038)	.0125 (.0034)
f) Longest move was 100km or more	.030	.0049 (.0007)	.0035 (.0006)	.0025 (.0006)	.0244 (.0039)	.0180 (.0034)	.0130 (.0029)
g) Longest move was 150km or more	.024	.0039 (.0006)	.0029 (.0005)	.0020 (.0005)	.0192 (.0035)	.0140 (.0030)	.0098 (.0026)
h) Longest move was 300km or more	.013	.0020 (.0005)	.0016 (.0004)	.0010 (.0004)	.0082 (.0025)	.0063 (.0023)	.0040 (.0019)
i) Changed <i>Bundesland</i>	.033	.0050 (.0007)	.0034 (.0007)	.0023 (.0006)	.0241 (.0040)	.0167 (.0035)	.0120 (.0031)
<i>Covariates</i>							
Age, female			X	X		X	X
Place of origin, married, years of education				X			X

Source: Authors' tabulations from the 2000-2005 waves of the SOEP.

Note: Entries in table are marginal effects from probit estimation, evaluated at sample means. Standard errors in parentheses. Each entry comes from a separate regression. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks" Risk indicator is a binary variable, which is 1 when the risk index is 6 or greater. Mean of dependent variable is .0513. Sample size for first row (change dwelling without changing region) is 10,404. Sample size for other rows is 10,967.

Table 4
Risk Attitudes and Probability of Migrating, before and after Posing of Risk Questions

Dependent Variable and Covariates	Uncond. Migration Probability	Marginal Effects		
		(1)	(2)	(3)
<i>Risk Index</i>				
a) Ever moved, 2000-2004	.045	.0051 (.0009)	.0032 (.0008)	.0020 (.0007)
b) Moved, 2004-2005	.010	.0016 (.0004)	.0010 (.0003)	.0007 (.0003)
c) Moved, 2004-2005, no prior moves	.006	.0011 (.0003)	.0007 (.0003)	.0005 (.0003)
<i>Covariates</i>				
Age, female			X	X
Origin, married, years of education				X
<i>Risk Indicator</i>				
a) Ever moved, 2000-2004	.045	.0262 (.0046)	.0175 (.0040)	.0123 (.0036)
b) Moved, 2004-2005	.010	.0073 (.0022)	.0045 (.0018)	.0031 (.0016)
c) Moved, 2004-2005, no prior moves	.006	.0058 (.0019)	.0040 (.0016)	.0028 (.0014)
<i>Covariates</i>				
Age, female			X	X
Origin, married, years of education				X

Source: Authors' tabulations from the 2000-2005 waves of the SOEP.

Note: Entries in table are marginal effects from probit estimation, evaluated at sample means. Standard errors in parentheses. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks" Risk indicator is a binary variable, which is 1 when the risk index is 6 or greater. Sample size for "Ever Moved, 2000-2004" and "Moved, 2004-2005" rows is 10,967. Sample size for "Moved, 2004-2005, No Prior Moves" rows is 10,472. Covariates measured at beginning of period (i.e. in 2000 and 2004).

Table 5
Risk Attitudes and Probability of Migrating: Random Effects Probit

Covariates	(1)	(2)	(3)	(4)	(5)	(6)
Risk index	.00047 (.00009)	.00033 (.00008)	.00025 (.00070)			
Risk indicator				.00258 (.00055)	.00186 (.00045)	.00145 (.00041)
Age		-.00023 (.00003)	-.00018 (.00003)		-.00023 (.00003)	-.00018 (.00003)
Female		.00028 (.00029)	.00001 (.00031)		.00026 (.00029)	.00001 (.00030)
Unemployed			.00045 (.00063)			.00046 (.00063)
Gross monthly earnings (€1000s)			-.00029 (.00012)			-.00029 (.00012)
Self-employed			.00155 (.00085)			.00154 (.00085)
Owns dwelling			-.00395 (.00064)			-.00393 (.00064)
Married			-.00164 (.00047)			-.00165 (.00047)
Number of children in household			-.00041 (.00018)			-.00041 (.00018)
Years of education			.00047 (.00008)			.00047 (.00080)
Place of origin						
Western Germany			ref.			ref.
Eastern Germany			.00007 (.00032)			.00080 (.00032)
Abroad			-.00107 (.00039)			-.00011 (.00038)
Log likelihood	-3429.37	-3279.29	-3124.39	-3428.87	-3276.93	-3121.66

Source: Authors' tabulations from the 2000-2005 waves of the SOEP.

Note: Entries in table are marginal effects from random effects probit estimation, evaluated at sample means. Standard errors in parentheses. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks". Risk indicator is a binary variable which is 1 when the risk index is 6 or greater. Mean of dependent variable is .0119. Sample size is 54,835 person-years.

Table 6
Risk Attitudes and Migration Distance: Random Effects Tobit

Covariates	(1)		(2)		(3)							
	Marginal Effects		Marginal Effects		Marginal Effects							
	Coeff.	P(Move=1)	E Dist	Move=1]	Coeff.	P(Move=1)	E Dist	Move=1]	Coeff.	P(Move=1)	E Dist	Move=1]
Risk index	27.833 (4.079)	.0016 (.0002)	2.7670 (.4012)	21.122 (4.072)	.00099 (.00019)	1.999 (0.383)	15.421 (3.908)	.00059 (.00015)	1.386 (0.350)			
Log likelihood	-7494.91		-7346.27		-7206.70							
Risk indicator	121.581 (17.735)	.0077 (.0012)	12.3464 (1.8201)	101.196 (18.198)	.00516 (.00099)	9.746 (1.772)	78.481 (17.165)	.00319 (.00077)	7.150 (1.621)			
Log likelihood	-7533.21		-7344.48		-7188.27							
<i>Covariates</i>												
Age, female				X	X	X	X	X	X	X	X	X
Place of origin, married, years of education							X	X	X	X	X	X

Source: Authors' tabulations from the 2000–2005 waves of the SOEP.

Note: Marginal effects are evaluated at sample means. Standard errors in parentheses. The risk index is an individual's response to a question asking about "willingness to take risks, in general" on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks." Risk indicator is a binary variable, which is 1 when the risk index is 6 or greater. Unconditional mean of move distance is 2.2 km, mean of move distance conditional on moving is 185.4 km, share of sample with positive move distance is .0119. Sample size is 54,835 person-years.

Table 7
Attitudes on Risk in Different Contexts and the Probability of Migrating, "Static" Probit

Context	(1)	(2)	(3)
Willingness to take risks in			
General	.0060 (.0010)	.0039 (.0009)	.0025 (.0008)
Career	.0070 (.0008)	.0041 (.0008)	.0025 (.0007)
Financial matters	.0032 (.0010)	.0015 (.0009)	-.0001 (.0009)
Driving	.0026 (.0009)	<.0001 (.0008)	-.0006 (.0008)
Sport	.0058 (.0009)	.0022 (.0008)	.0006 (.0008)
Health matters	.0046 (.0009)	.0026 (.0008)	.0019 (.0008)
Trusting other people	.0050 (.0009)	.0033 (.0008)	.0018 (.0008)
<i>Covariates</i>			
Age, female		X	X
Place of origin, married, years of education			X

Source: Authors' tabulations from the 2000-2005 waves of the SOEP.

Note: Entries in table are marginal effects from separate probit regressions, evaluated at sample means. Standard errors in parentheses. The risk indices are an individual's response to questions asking about willingness to take risks in the specified context, on a scale from 0 to 10, where 0 indicates "unwilling to take risks" and 10 indicates "very willing to take risks." Mean of dependent variable is .054. Sample size is 10,149.