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# Risk Attitudes of Nascent Entrepreneurs: New Evidence from an Experimentally-Validated Survey

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# ABSTRACT

# Risk Attitudes of Nascent Entrepreneurs: New Evidence from an Experimentally-Validated Survey[*]

The influence of risk aversion on the decision to become self-employed is a much discussed topic in the entrepreneurial literature. Conventional wisdom asserts that the role model of an entrepreneur requires to make risky decisions in uncertain environments and hence that more risk-averse individuals are less likely to become an entrepreneur. Empirical tests of this assumption are scarce however, mainly because reliable measures for risk-aversion are not available. We base our analysis on the most recent waves of the German Socio-Economic Panel (SOEP) which allow us to use experimentally-validated measures of risk attitudes. Most importantly and in contrast to previous research, we are able to examine whether the decision of starting a business is influenced by objectively measurable risk attitudes at the time when this decision is made. Our results show that in general individuals with lower risk aversion are more likely to become self-employed. Sensitivity analysis reveals, however, that this is true only for people coming out of regular employment, whereas for individuals coming out of unemployment or inactivity risk attitudes do not seem to play a role in the decision process.

JEL Classification:     D81, J23, M13

Keywords:     risk attitudes, entrepreneurship, self-employment

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# 1 Introduction

It seems intuitively appealing to expect that entrepreneurs are willing to take higher risks than employees. Previous theoretical and part of the empirical research (see *inter alia* Kihlstrom and Laffont (1979), Rees and Shah (1986), Stewart *et al.* (1999), Wagner (2003), Müller (1999), and Ekelund *et al.* (2005), where the latter two approaches are making use of psychometric data) supports the conventional wisdom that the role model of an entrepreneur requires to make risky decisions in an uncertain environment which is why only those persons who are able to bear higher risks may start as an entrepreneur. From this point of view the risk attitude of a person is one of the crucial variables in a person's choice between entrepreneurship and a salaried job.

Recent theoretical discussion cast serious doubt on the validity of this assumption. Theoretical approaches from psychological science pointed out that risk attitudes are only one among many personal variables possibly influencing the decision to become an entrepreneur (cf. Rauch and Frese, 2000). An even more important objection, however, was that the perception of risk connected with certain decisions might be different for every person. It has been shown, for example, that persons with higher experience, abilities or knowledge in the industry where they want to become self-employed perceive the risk connected with certain decisions as lower (cf. Gifford, 2003).

In accord with these objections part of the empirical research found mixed results (see e.g. Schiller and Crewson, 1997) showing that risk aversion cannot be easily separated from other influences. Rosen and Willen (2002) came to the conclusion that the willingness of a nascent entrepreneur to accept risks is not a dominant factor in his/her decision to start an own business; and Cramer *et al.* (2002) do not feel confident enough to conclude anything concerning the causality between risk aversion and entrepreneurial selection although their empirical results support the conventional wisdom that the choice to become an entrepreneur is positively correlated with the person's risk attitude. Furthermore, Blanchflower and Oswald (1998) found that there is a positive correlation between the wealth status of a person and his/her risk attitude.

This discussion shows that the measurement of risk attitudes and the impact of differing levels of risk aversion on the choice of entrepreneurship is a more elusive concept than it seemed to be in the first place. A crucial point of this discussion is that entrepreneurial

decisions under risk do also depend on the abilities of the decision maker. This means more specifically that the probability of an unprofitable outcome (a bad risk) will be lower, the higher the acquired skills of the entrepreneur are in the business where he/she wants to become self-employed. For instance the risk of failure might be completely different for two persons opening the same kind of business at the same location if one person has more experience of working in the selected branch of trade than the other (and everything else remains constant). In this sense, the decision maker might have a direct impact on the probability distribution of certain outcomes in a risky environment. Hence, it is important to distinguish between subjectively perceived and objectively measurable risk as we will do in this analysis. We define objectively measurable risks in the sense that the probabilities of all outcomes connected with a certain risky decision are exogenously given and cannot be influenced by the decision maker while risky environments where the actions of a certain person have (or are supposed to have) an impact on the probability distribution of each outcome, are defined as non-objectively measurable risk.

Furthermore, almost all previously conducted empirical approaches were not able to test the risk attitudes of a person at the time of his/her transition to self-employment. They rather compared the risk attitudes of successful entrepreneurs with employed persons and estimated ex-post whether the observed attitudes could have had an impact on the probability that an individual became self-employed earlier in life. Thus, these approaches had to rest on two assumptions, namely i) that the risk attitudes are stable over time and ii) that the chosen data set is representative for the situation at the moment of the decision to become self-employed, which is unlikely since failed entrepreneurs are by definition excluded.

In this paper, we, thus, concentrate on the question whether the decision of *starting* a business is positively influenced by the willingness to bear higher objectively measurable risks *at the time* when this significant decision is made. A rigorous test revealing such risk attitudes is possible if persons, being in the transition from a certain (un)employment status to self-employment, are directly asked at the time of their transition to what extent they would invest a certain amount of money in a safe or a risky asset where the payoffs and probability distributions of all outcomes are exogenously given.

Moreover, our data set allows us to explicitly control for the previous labor market status of the persons, i.e. whether they were employed or unemployed/inactive before they

decided to become self-employed. There is only little empirical evidence with respect to the question whether we have to expect differences in risk taking behavior in these two subgroups. Hinz and Jungbauer-Gans (1999) found that formerly unemployed entrepreneurs run significantly smaller businesses while Steward *et al.* (1999) report that there is a positive correlation between risk taking behavior and the size of the small businesses. Combining both observations leads to the hypothesis that founders out of unemployment are more risk averse than those out of employment.

The rest of the paper is organized as follows. In Section 2 we describe the data used in the analysis and especially introduce the measures of risk aversion employed. Section 3 contains the results and Section 4 concludes.

## 2   Data Set and Risk Measurement

We base our analysis on the German Socio-economic Panel (SOEP), a representative panel survey containing detailed information regarding the socio-economic situation of about 22,000 individuals living in 12,000 households in Germany.[1] We use individuals observed in both waves of 2004 and 2005 as the population base for our analysis.[2]

Like in most empirical studies about entrepreneurial choice, we use self-employment as a measurable proxy for the concept of entrepreneurship. Individuals are classified as self-employed when they report self-employment as their primary activity. We restrict the sample to individuals between 18 and 65 years of age and exclude farmers, civil servants, and those currently in education, vocational training, or military service. The excluded individuals presumably have a limited occupational choice set, or at least they have different determinants of occupational choice which could distort our analysis. We also exclude family members who help in a family business from the dataset, because helping family members are not entrepreneurs in the sense that they run their own business.

We can identify a transition into self-employment if an individual was not self-employed in the 2004 wave (i.e. he/she was dependently employed, unemployed or inactive) and was self-employed in the 2005 wave. Of 8,553 individuals in our sample who were not self-employed in 2004, 143 became self-employed between the 2004 and the 2005 interviews.[3]

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[1]For a more detailed data description see Haisken De-New and Frick (2003).

[2]Please note that the analysis is based on a preliminary version of the SOEP for the wave 2005.

[3]Individuals who had missing values in one of the variables used in the latter estimations were excluded from the sample.

Considering population weights, this corresponds to 1.59%.

Key to our analysis are new measures of risk attitudes that were added to the SOEP in the 2004 wave. Several questions asked for attitudes towards risk in general and within specific contexts, amongst which are financial matters and career. The respondents indicated their willingness to take risks on an eleven-point scale ranging from zero (complete unwillingness) to ten (complete willingness). We consolidate answers 0-2 in a "low risk", 3-7 in a "medium risk" and 8-10 in a "high risk" category. Another question corresponded more closely to conventional lottery measures. Respondents were asked to state how much (in categories of fifths) of 100 thousand Euros which they had hypothetically won in a lottery they would invest in a risky asset. Respondents were told that there were equal chances to double the amount invested or lose half of it. In contrast to the other risk questions, which potentially incorporate both risk preference and risk perception, the lottery question holds perceptions of the riskiness of a decision constant across individuals by giving explicit stakes and probabilities. Again, we summarize the answers to this question in three categories, "no investment", "medium investment" (20, 40 or 60 thousand Euros) and "high investment" (80 or 100 thousand Euros). From the lottery question we also infer an approximate Arrow-Pratt coefficient of relative risk aversion (RRA, see Pratt, 1964) for each individual, allowing for a more structural analysis (see appendix A for the derivation of the coefficient).

Dohmen *et al.* (2005) validated the reliability of these survey measures of risk attitudes with a field experiment. A representative sample of 450 adults had the opportunity to make risky choices with real money at stake, and also answered the general risk question from the SOEP. The authors found that answers to the general risk question were good predictors of actual risk-taking behavior in the experiment. Furthermore, the answers to the lottery question were strongly correlated with responses to the general risk question. Hence, we draw on these findings and take it as given that the observed measures are in fact a good proxy for the underlying objectively measurable risk attitudes.

Table 1 provides weighted mean values of the characteristics of the individuals in our 2004 sample and their responses to the risk questions separately for the self-employed, dependently employed and not employed or inactive people.

INSERT TABLE 1 ABOUT HERE

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The table reveals important differences between individuals in the three different employment states (significant differences in comparison to the group of the self-employed are indicated with stars). Self-employment seems to remain a male-dominated domain in Germany: Only 31% of the self-employed are female, in comparison to 50% of the employees and even 70% of the unemployed or inactive population. The self-employed are better educated: 39% of them have completed higher secondary school (Fachhochschulreife or Abitur), but only 26% of the employees and 16% of those not working; similarly, 32% of the self-employed have a university degree whereas this is true only for 20% of the employees and 13% of the unemployed and inactive people. Additionally, self-employed have more work experience than the other groups (on average 18.6 years). Intergenerational links can be inferred from the fact that 13% of the self-employed have a father who is also self-employed, but only 8% of the other group's members. Capital income is unequally distributed: the self-employed earned on average 3,487 Euro on interests and dividends in 2003 (the year prior to the first interview), whereas employees collected 1,163 Euro and those not working 996 Euro.

The answers to the risk related questions also differ between the three groups; the share of individuals in the highest risk category is always higher for the self-employed, except for one case significantly. This is an indication for the relevance of the risk attitude for occupational choice. In the question asking for the willingness to take risks in general, for example, 21% of the self-employed report a high willingness to take risks, but only 9% of the employees and 10% of those not working. Similarly, 19% of the self-employed indicate they were highly willing to take risks in occupation, but less than 9% of the other respondents. The average relative risk aversion parameter is not significantly different between the self-employed and the employed, but it is significantly higher for the unemployed and inactive.

# 3   Estimation Results

The aim of our empirical analysis is to identify the role of risk attitudes of nascent entrepreneurs. To do so, we model the transition probabilities into self-employment from 2004 to 2005 by standard logit regressions, where the dichotomous left-hand side variable takes the value 1 if the individual becomes self-employed between the 2004 and 2005 interviews

and 0 otherwise. As already reported we observe 143 transitions into self-employment in this period, where 74 transitions were made out of regular employment, and 69 out of unemployment or inactivity. Since we want to check if the influence of risk attitudes differs between former employment status, we run three separate regressions. The results (coefficients and marginal effects) can be found in Table 3. Column (1) refers to all transitions, whereas columns (2) and (3) contain the results for the individuals coming from regular employment and unemployment or inactivity respectively. In this first set of regressions we use the above described 'lottery question' as one (of many) explanatory variable(s). Additionally, we include some obvious socio-demographics (education, gender, region, age, (un)employment experience, etc.) and two variables which have been proven to be rather influential for the decision to become self-employed in previous research: First, the amount of start-up capital to which the potential founder has access (cf. Blanchflower and Oswald, 1998). Since we do not have a direct measure of individuals' wealth, we use the capital income of the year 2003 (reported in 2004) as a proxy for possible capital constrains. Second, we include a dummy indicating whether the father of the person who aims to become self-employed was an entrepreneur, as well. There is some evidence of a positive correlation between the occupational choices of parents and their children (see e.g. Lentz and Laband (1990) or Dunn and Holtz-Eakin (2000)).

<center>INSERT TABLE 3 ABOUT HERE</center>

Before we concentrate on the influence of risk attitudes we briefly discuss the effects of other variables on the transition into self-employment. Looking at all transitions into self-employment reveals that a high-school degree has a significant positive influence on the probability to become self-employed. To be more precise, having a high-school degree increases the probability to become self-employed by 1 percentage point, which is economically very significant, considering that the overall weighted transition probability in the sample is only 1.59%. Whereas we do not find a significant effect of this variable on those individuals who were regularly employed before becoming unemployed (column (2)), with 2.2% the marginal effect is even higher for those individuals who were previously unemployed or inactive (column (3)).

A self-employed father has a significant influence on transitions out of regular employment only, and increases the likelihood to become an entrepreneur by 0.5%. Capital

<center>7</center>

income in 2004 has the expected positive effect for all transitions and transitions from regular employment, i.e. individuals who have higher capital income - our proxy for capital endowment - have a higher probability to become self-employed. It is quite interesting to note that both variables - neither the intergenerational link nor the capital income - influence transitions out of unemployment or inactivity.

Furthermore, employees are not as likely as unemployed or inactive people to enter self-employment, as indicated by the strong negative effect of the employment dummy (indicating whether an individual was employed in 2004 or not) in column (1). This state dependence of regular employment increases strongly with tenure; the longer individuals stay in a wage and salary job the more unlikely they are to give it up.

We will now turn to the influence of our risk measure. As already discussed in section 2 we included the answer to the 'lottery question' in three categories. Using 'no investment' as the base category, we can see the influence of 'medium investment' and 'high investment' in the first two lines of the table. Whereas individuals who decide to make a 'medium investment' do not have a higher probability to become self-employed, the less risk averse individuals choosing a high investment have a much larger probability to do so. Looking at all transitions we can see a significant increase of 2.9% whereas with 2.2% the increase is a bit lower for individuals coming from regular employment. However, for formerly unemployed or inactive individuals risk attitudes, like capital constraints, do not seem to play a role for the decision to become self-employed.[4]

<center>Insert Table 4 about here</center>

Since the 'lottery question' was only one possible measure of risk aversion, we re-estimated the models (with the same set of other explanatory variables) with four different risk measures. The results can be found in Table 4. We focus on the coefficients and marginal effects of the risk measures.[5] Column (1) contains the 'general willingness to

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[4]We tested the sensitivity of our results with respect to the chosen risk categories. When we included all possible answers to the hypothetical investment question as separate dummies, the category indicating investment of the full 100,000 Euros had a positive and highly significant coefficient. The marginal effects of the other (statistically not significant) dummies strictly increased with the size of invested amounts, from a 2% higher entry probability when the individual invests 20,000 Euros (in comparison to investing nothing) to 7.6% when he/she invests the full amount. The other risk measures gave a similar picture, with the effects of the highest willingness to take risks being largest and most significant. In summary, our finding that the less risk averse are more likely to enter self-employment seems to be driven to a large extend by the most risk-seeking individuals. Full results are available upon request.

[5]Full estimation results are available on request.

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take risk', whereas columns (2) and (3) refer to the willingness to take risk in 'financial matters' and 'occupational choice'. Finally, column (4) contains the results for the relative risk aversion parameter $\rho_{RRA}$. Once again, we run the regression for all transitions first and then for those coming out of regular employment and out of unemployment or inactivity.

If we concentrate on all transitions first it becomes clear that individuals who report a high willingness to take risks have higher probabilities to become self-employed regardless of the kind of risk measure. The largest increase in probabilities can be found for the willingness to take 'occupational risks' where we find an increase of 3.9%. Moreover, this is the only measure where even individuals who only report a medium willingness to take risks also have a higher probability to become self-employed when compared to individuals who are only willing to take low risks. The parameter $\rho_{RRA}$ has the expected negative sign and shows that individuals with higher risk aversion are less likely to become self-employed. Whereas the separate regression for the individuals coming out of regular employment support these findings, we do not find any significant effects of any of the risk measures for individuals coming out of unemployment or inactivity (except for medium willingness to take risks in occupation).

Hence, we can conclude that risk attitudes matter for transitions from regular employment to self-employment, but hardly for transitions from unemployment or inactivity to self-employment.

To test the sensitivity of our results and explore gender differences, we estimated the regressions separately for men and women, too. Clearly, what has to be kept in mind is that by further differentiating the sample we run into problems of small sample size. To be specific, we observe 87 transitions into self-employment for females (41 out of regular employment and 46 out of unemployment or inactivity) and 56 transitions for males (33 / 23). Table 5 shows the distribution of the risk measures in both samples differentiated by employment status in 2004 and shows that women are on average more risk averse than men (stars indicate statistically significant differences). Table 6 contains the relevant estimation results. When looking at the influence of risk aversion on the transition into self-employment results are remarkably stable, i.e. for both gender we find a negative effect of risk aversion on the probability to enter self-employment even though two of the risk measures are not significant for women ('lottery question' and 'financial risk') and one measure ('general risk') is insignificant for men coming from regular employment.

# 4    Conclusions

By making use of the SOEP, we conducted a direct test whether the risk attitudes of a
person have an impact on his/her decision to become self-employed. As all persons had to
evaluate their own inclination towards risk (where the validity of these answers was tested
in a field experiment with real money) and had to make the decision how much to invest
(of a fixed amount of 100 thousand Euros) in a binary lottery, we have a decisive test
whether the objectively measurable risk attitudes observed at the time of the transition
to self-employment are a crucial variable in the decision making process of a person who
wants to start an own business. Interestingly, much in contrast to recent research our data
support the conventional wisdom that persons with a higher inclination towards risk have
a significantly higher probability to become a nascent entrepreneur. However, sensitivity
analysis revealed that this result holds only for those individuals who were previously
employed. For previously unemployed or inactive persons we observed no significant
influence of the risk attitudes, indicating that other variables drive their decision towards
self-employment.

Therefore, the present approach is able to close an essential gap which existed in the
previously conducted empirical research. Cramer *et al.* (2002) found differences in risk
attitudes for persons who were either in entrepreneurial or employed positions for years.
Their data set had a 'big timing problem' as they used variables with a time span of more
than forty years. Accordingly, they had to base their analysis on the assumption that the
risk attitude of a person is an individual trait that is constant over life.

Our results are also more conclusive than the approach of Rosen and Willen (2002).
They compare the mean incomes and their variances of employed persons with persons
who were successfully self-employed for more than five years. As unsuccessful entre-
preneurs are usually closing their businesses in the first five years after the foundation,
unsuccessful entrepreneurs (and, thus, the risk of failing as an entrepreneur) are system-
atically excluded in their data. Therefore, their main finding that "the increase in mean
consumption that rewards the increased variance of self-employment is much too large to
be rationalized by conventional measures of risk aversion" is not astonishing, at all. The
income of self-employed people was systematically overestimated as the (probably rather
low) incomes of those entrepreneurs who failed were almost not included in their data

set. In contrast to this, we asked the nascent entrepreneurs about their risk attitudes at a time when they were not able to foresee to what extent they would succeed in their own business.

Our approach is in contrast to Wagner (2003), as well. According to his results, even unemployed persons become entrepreneurs because of lower risk aversion. However, his analysis of risk aversion is based on a question (fear of failure) which is not necessarily correlated with risk aversion. A fear of failing as a self-employed might also be induced by missing knowledge or missing skills of the person. Therefore, his results are important, as it seems that people - having made a self-assessment with respect to their individual probability of surviving as an entrepreneur - decide in the right way. People evaluating themselves as badly skilled as entrepreneurs decide with lower probability towards self-employment even if they are unemployed. However, the data set of Wagner does not give us necessarily a clue about the risk attitudes of these unemployed persons.

Our results have several implications. Starting with the differences between previously employed and unemployed persons, we show that risk attitudes have an impact on the choice to enter self-employment for formerly employed individuals but not for the unemployed or inactive. As promoting self-employment has become a central issue in the public policy of many industrialized countries, our results implicate that nascent entrepreneurs might need different support measures depending on their previous status.

The differing risk attitudes might also explain why previously unemployed entrepreneurs develop smaller businesses in terms of start-up capital and new job provision than previously employed entrepreneurs. Both, making use of more capital and creating new jobs, is usually connected with higher risks.[6]

The observation that the risk attitudes of both male and female entrepreneurs had a similarly crucial impact has an important implication, too. Within the German population we observed that men are more than twice as active as entrepreneurs as women and we also found that women are significantly more risk averse than men (again in the German population). This means that the share of female persons with high levels of risk attitudes is lower than the share of male persons. Since the risk attitudes at least of previously

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[6]It seems to be a stable pattern that previously employed entrepreneurs start their businesses with more capital and a higher pace of employment growth than previously unemployed entrepreneurs. Hinz and Jungbauer-Gans (1999) observed these pattern already ten years ago. Recent surveys of an entrepreneurship monitor run by the German public bank KfW in 2005 confirm this observation (Kreditanstalt für Wiederaufbau, 2005).

employed persons play such a crucial role in this occupational choice it becomes clearer why there is a smaller share of female entrepreneurs in the German population.

In summary, these results tell us, first, that persons with higher risk attitudes are more likely to become entrepreneurs given they start their business out of regular employment. Second, for persons who become self-employed out of unemployment the risk attitude seems to have no impact on this significant decision. Third, for women and men risk attitudes have a similar impact on the decision to start as an entrepreneur, thus the womens' higher average risk aversion could explain why there is a lower share of female entrepreneurs - at least in the German population.

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# Tables

Table 1: Weighted Mean Characteristics by Employment State (SOEP 2004) and t-Test of Equal Means

| Variable | Employment Status in 2004 | | |
| --- | --- | --- | --- |
| | Self-Employed | Regularly Employed | Not working |
| female | 0.311 | 0.502*** | 0.699*** |
| east | 0.168 | 0.190 | 0.226** |
| highschool | 0.386 | 0.259*** | 0.162*** |
| apprenticeship | 0.409 | 0.502** | 0.466* |
| highertechncol | 0.282 | 0.250 | 0.208** |
| university | 0.320 | 0.204*** | 0.125*** |
| age (in years) | 45.15 | 42.17*** | 42.10*** |
| workexp10 (in years) | 18.62 | 16.98** | 11.98*** |
| unemexp10 (in years) | 0.57 | 0.53 | 2.06*** |
| disabled | 0.037 | 0.066** | 0.077** |
| german | 0.939 | 0.944 | 0.893** |
| nchild | 0.608 | 0.564 | 0.828*** |
| married | 0.581 | 0.557 | 0.585 |
| separated | 0.030 | 0.024 | 0.023 |
| divorced | 0.117 | 0.097 | 0.132 |
| fatherse | 0.130 | 0.076** | 0.075** |
| capitalinc (1,000 Euro) | 3.487 | 1.163*** | 0.996*** |
| duration (in years) | 8.301 | 10.360*** | |
| Risk Measures | | | |
| medinvest | 0.385 | 0.423 | 0.331* |
| highinvest | 0.031 | 0.024 | 0.010** |
| medrisk | 0.680 | 0.736** | 0.642 |
| highrisk | 0.206 | 0.094*** | 0.103*** |
| medriskfin | 0.494 | 0.466 | 0.334*** |
| highriskfin | 0.050 | 0.023** | 0.017** |
| medriskocc | 0.642 | 0.619 | 0.517*** |
| highriskocc | 0.188 | 0.074*** | 0.086*** |
| rra | 2.893 | 2.824 | 3.149** |
| Observations | 884 | 6,825 | 1,728 |
| Entries from 2004 to 2005 | 143 | 74 | 69 |

*Note:* The numbers give the fractions in the sample where the variable is true (if not stated otherwise). Stars indicate whether the mean is significantly different from the mean in the self-employed sample (two-sample t-test with equal variances): ***/**/* indicates significance at the 0.1%/5%/10% level. See Table 2 for a detailed description of the used variables.

Table 2: Detailed Description of the Variables Used

| Variable Label | Description |
|---|---|
| female | Dummy for females |
| east | Dummy for individuals who live in East-Germany |
| highschool | Dummy for individuals who have a high school degree ("Fachhochschulreife" or "Abitur") |
| apprenticeship | Dummy for individuals who finished an apprenticeship ("Lehre") |
| highertechncol | Dummy for individuals who finished a higher technical college or similar |
| university | Dummy for individuals who have a university degree |
| age | Age of individual |
| agesqr | Age squared |
| workexp10[a] | Years of work experience, divided by 10. |
| unemexp10[a] | Years of unemployment experience, divided by 10. |
| disabled | Dummy for handicapped / physically challenged individuals |
| german | Dummy for German nationality |
| nchild | Number of children under 17 in the household |
| married | Dummy for married and not separated individuals. Omitted category for marital status is "single"/"widowed". |
| separated | Dummy for married, but separated individuals |
| divorced | Dummy for divorced individuals |
| fatherse | Dummy for individuals whose father is/was self-employed |
| capitalinc | Income from interests, dividends and renting out in 2004 (reported retrospectively in 2005) in 1000 Euros. |
| duration[a] | Tenure of current spell in 2004 (self-employment or regular employment) |
| dursq | Square of duration variable |

**Risk Measures**

**Hypothetical risky investment after winning 100 thousand Euros in the lottery**

| | |
|---|---|
| lowinvest | Dummy for individuals who would invest nothing. Omitted category. |
| medinvest | Dummy for individuals who would invest 20, 40 or 60 thousand Euros. |
| highinvest | Dummy for individuals who would invest 80 or 100 thousand Euros. |

**General willingness to take risks[b]**

| | |
|---|---|
| lowrisk | Dummy for individuals who indicated 0-2 on 11-point scale, omitted category. |
| medrisk | Dummy for individuals who indicated 3-7 on 11-point scale. |
| highrisk | Dummy for individuals who indicated 8-10 on 11-point scale. |

**Willingness to take risks in financial matters[b]**

| | |
|---|---|
| lowriskfin | Dummy for individuals who indicated 0-2 on 11-point scale, omitted category. |
| medriskfin | Dummy for individuals who indicated 3-7 on 11-point scale. |
| highriskfin | Dummy for individuals who indicated 8-10 on 11-point scale. |

**Willingness to take risks in occupation[b]**

| | |
|---|---|
| lowriskocc | Dummy for individuals who indicated 0-2 on 11-point scale, omitted category. |
| medriskocc | Dummy for individuals who indicated 3-7 on 11-point scale. |
| highriskocc | Dummy for individuals who indicated 8-10 on 11-point scale. |
| rra | Approximate Arrow Pratt coefficient of relative risk aversion (see Appendix A). |

[a] Uses information from the lifetime employment history in the SOEP.
[b] 11-point scale: 0=complete unwillingness, 10=complete willingness.

*Note:* Dummy variables equal one if condition holds and zero otherwise.

Table 3: Logit Estimation Results: Probability of Entry into Self-Employment

| Employment Status in 2004: | (1) All | | (2) Regularly Employed | | (3) Not Working | |
|---|---|---|---|---|---|---|
| | Coefficient | Marg. Effect | Coefficient | Marg. Effect | Coefficient | Marg. Effect |
| medinvest[1] | 0.244 | 0.003 | 0.346 | 0.002 | 0.234 | 0.007 |
| | (0.178) | (0.002) | (0.250) | (0.002) | (0.258) | (0.007) |
| highinvest[1] | 1.269 | 0.029 | 1.592 | 0.022 | 0.584 | 0.021 |
| | (0.390)** | (0.015)* | (0.416)*** | (0.010)** | (1.026) | (0.047) |
| female[1] | 0.072 | 0.001 | 0.126 | 0.001 | -0.448 | -0.014 |
| | (0.204) | (0.002) | (0.252) | (0.001) | (0.361) | (0.012) |
| east[1] | 0.267 | 0.003 | 0.380 | 0.002 | 0.150 | 0.004 |
| | (0.205) | (0.003) | (0.274) | (0.002) | (0.317) | (0.009) |
| highschool[1] | 0.684 | 0.010 | 0.560 | 0.004 | 0.651 | 0.022 |
| | (0.243)** | (0.004)** | (0.368) | (0.003) | (0.312)** | (0.013)* |
| apprenticeship[1] | -0.105 | -0.001 | -0.122 | -0.001 | -0.188 | -0.005 |
| | (0.225) | (0.003) | (0.323) | (0.002) | (0.343) | (0.009) |
| highertechncol[1] | 0.130 | 0.002 | 0.005 | 0.000 | 0.188 | 0.005 |
| | (0.227) | (0.003) | (0.315) | (0.002) | (0.335) | (0.010) |
| university[1] | 0.361 | 0.005 | 0.239 | 0.001 | 0.563 | 0.019 |
| | (0.264) | (0.004) | (0.346) | (0.002) | (0.360) | (0.015) |
| age | 0.113 | 0.001 | 0.101 | 0.001 | 0.324 | 0.009 |
| | (0.076) | (0.001) | (0.108) | (0.001) | (0.130)** | (0.003)** |
| agesq | -0.002 | -0.000 | -0.001 | -0.000 | -0.004 | -0.000 |
| | (0.001)* | (0.000)* | (0.001) | (0.000) | (0.001)** | (0.000)*** |
| workexp10 | 0.158 | 0.002 | -0.001 | -0.000 | 0.498 | 0.014 |
| | (0.182) | (0.002) | (0.340) | (0.002) | (0.252)** | (0.006)** |
| unemexp10 | -0.141 | -0.002 | -0.601 | -0.004 | -0.975 | -0.027 |
| | (0.477) | (0.006) | (1.040) | (0.006) | (0.654) | (0.018) |
| disabled[1] | -0.178 | -0.002 | -0.434 | -0.002 | -0.092 | -0.002 |
| | (0.425) | (0.004) | (0.738) | (0.003) | (0.549) | (0.014) |
| german[1] | 0.118 | 0.001 | -0.161 | -0.001 | 0.489 | 0.011 |
| | (0.370) | (0.004) | (0.485) | (0.003) | (0.561) | (0.011) |
| nchild | -0.053 | -0.001 | -0.151 | -0.001 | -0.005 | -0.000 |
| | (0.098) | (0.001) | (0.148) | (0.001) | (0.146) | (0.004) |
| married[1] | 0.269 | 0.003 | 0.257 | 0.001 | 0.539 | 0.014 |
| | (0.252) | (0.003) | (0.347) | (0.002) | (0.451) | (0.011) |
| separated[1] | 0.194 | 0.003 | 0.429 | 0.003 | -0.081 | -0.002 |
| | (0.601) | (0.009) | (0.748) | (0.007) | (0.974) | (0.025) |
| divorced[1] | 0.319 | 0.004 | 0.247 | 0.002 | 0.575 | 0.020 |
| | (0.372) | (0.006) | (0.545) | (0.004) | (0.571) | (0.025) |
| fatherse[1] | 0.409 | 0.006 | 0.634 | 0.005 | -0.304 | -0.007 |
| | (0.281) | (0.005) | (0.328)* | (0.003) | (0.561) | (0.012) |
| capitalinc | 0.005 | 0.000 | 0.009 | 0.000 | -0.000 | -0.000 |
| | (0.003)* | (0.000)* | (0.003)** | (0.000)** | (0.005) | (0.000) |
| empl[1] | -1.651 | -0.035 | | | | |
| | (0.243)*** | (0.007)*** | | | | |
| duration | | | -0.276 | -0.002 | | |
| | | | (0.059)*** | (0.000)*** | | |
| dursq | | | 0.006 | 0.000 | | |
| | | | (0.001)*** | (0.000)*** | | |
| cons | -5.822 | | -5.959 | | -10.282 | |
| | (1.497)*** | | (2.003)** | | (2.811)*** | |
| chi2 | 137.37 | 137.37 | 88.44 | 88.44 | 43.27 | 43.27 |
| ll | -671.89 | -671.89 | -365.18 | -365.18 | -266.55 | -266.55 |
| Entries from 2004 to 2005 | | 143 | | 74 | | 69 |
| Observations | 8553 | 8553 | 6825 | 6825 | 1728 | 1728 |

***/**/* indicates significance at the 0.1%/5%/10% level. Standard errors are in parentheses. See Table 2 for a detailed description of the used variables.

[1] Marginals for discrete change of dummy variable from 0 to 1.

Table 4: Logit Estimation Results: Probability of Entry into Self-Employment with Varying Risk Measures

| Risk parameter: | (1) General Risk | | (2) Finance Risk | | (3) Occupational Risk | | (4) Relative Risk aversion | |
|---|---|---|---|---|---|---|---|---|
| | Coefficient | Marg. Effect | Coefficient | Marg. Effect | Coefficient | Marg. Effect | Coefficient | Marg. Effect |
| **Employment Status in 2004: Not Self-Employed** | | | | | | | | |
| medium[1] | 0.080 | 0.001 | 0.121 | 0.001 | 0.636 | 0.007 | | |
| | (0.248) | (0.003) | (0.183) | (0.002) | (0.236)** | (0.002)** | | |
| high[1] | 0.915 | 0.016 | 1.308 | 0.030 | 1.646 | 0.039 | | |
| | (0.305)** | (0.008)** | (0.380)*** | (0.015)** | (0.282)*** | (0.012)** | | |
| rra | | | | | | | -0.142 | -0.002 |
| | | | | | | | (0.064)** | (0.001)** |
| chi2 | 150.21 | | 143.17 | | 198.95 | | 128.99 | |
| ll | -670.07 | | -671.67 | | -660.72 | | -673.82 | |
| **Employment Status in 2004: Regularly Employed** | | | | | | | | |
| medium[1] | -0.056 | -0.000 | 0.155 | 0.001 | 0.609 | 0.003 | | |
| | (0.362) | (0.002) | (0.258) | (0.001) | (0.368)* | (0.002)* | | |
| high[1] | 1.025 | 0.009 | 1.804 | 0.027 | 2.071 | 0.030 | | |
| | (0.420)** | (0.006)* | (0.399)*** | (0.012)** | (0.397)*** | (0.011)** | | |
| rra | | | | | | | -0.224 | -0.001 |
| | | | | | | | (0.090)** | (0.001)** |
| chi2 | 93.57 | | 88.83 | | 134.43 | | 78.04 | |
| ll | -364.20 | | -362.98 | | -353.58 | | -366.78 | |
| **Employment Status in 2004: Not Employed[2]** | | | | | | | | |
| medium[1] | 0.183 | 0.005 | 0.186 | 0.005 | 0.588 | 0.016 | | |
| | (0.343) | (0.009) | (0.269) | (0.008) | (0.320)* | (0.009)* | | |
| high[1] | 0.496 | 0.017 | | | 0.437 | 0.014 | | |
| | (0.476) | (0.019) | | | (0.521) | (0.020) | | |
| rra | | | | | | | -0.076 | -0.002 |
| | | | | | | | (0.094) | (0.003) |
| chi2 | 49.19 | | 45.01 | | 47.64 | | 43.31 | |
| ll | -266.52 | | -266.00 | | -265.08 | | -266.77 | |

***/**/* indicates significance at the 0.1%/5%/10% level. Standard errors are in parentheses. See Table 2 for a detailed description of the used variables.

[1] Marginals for discrete change of dummy variable from 0 to 1.

[2] The variable 'high risk in financial matters' had to be dropped for the sample of not employed individuals, since there were no observations with transitions.

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Table 5: Weighted Mean Characteristics Differentiated by Gender and Employment Status (SOEP 2004) and t-Test of Equal Means

| | Men | | | Women | | |
|---|---|---|---|---|---|---|
| | | | Employment Status in 2004 | | | |
| Variable | Self-Employed | Regularly Employed | Not working | Self-Employed | Regularly Employed | Not working |
| Risk Measures | | | | | | |
| medinvest | 0.405 | 0.453 | 0.352 | 0.341 | 0.393** | 0.322 |
| highinvest | 0.045 | 0.034 | 0.016 | 0.001** | 0.014*** | 0.007 |
| medrisk | 0.644 | 0.747 | 0.67 | 0.758** | 0.725 | 0.631 |
| highrisk | 0.243 | 0.125 | 0.159 | 0.124** | 0.063*** | 0.079** |
| medriskfin | 0.535 | 0.529 | 0.392 | 0.402** | 0.403*** | 0.309** |
| highriskfin | 0.069 | 0.038 | 0.025 | 0.008*** | 0.009*** | 0.014 |
| medriskocc | 0.637 | 0.646 | 0.538 | 0.655 | 0.592** | 0.508 |
| highriskocc | 0.208 | 0.087 | 0.143 | 0.143 | 0.061** | 0.061** |
| rra | 2.786 | 2.699 | 3.083 | 3.128** | 2.949*** | 3.177 |
| Observations | 578 | 3,463 | 488 | 306 | 3,362 | 1,240 |
| Entries from 2004 to 2005 | 33 | 33 | 23 | 41 | 41 | 46 |

*Note:* The numbers give the fractions in the sample where the variable is true. Stars indicate whether the mean for females is significantly different from the mean for males (two-sample t-test with equal variances): ***/**/* indicates significance at the 0.1%/5%/10% level. See Table 2 for a detailed description of the used variables.

Table 6: Logit Estimation Results: Probability of Entry into Self-Employment with Varying Risk-Classifications Differentiated by Gender

| | | | Men | | | | | Women | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Risk parameter: | (1) Lottery Coeff. | (2) General Coeff. | (3) Finance Coeff. | (4) Occup. Coeff. | (5) $\rho_{RRA}$ Coeff. | (6) Lottery Coeff. | (7) General Coeff. | (8) Finance Coeff. | (9) Occup. Coeff. | (10) $\rho_{RRA}$ Coeff. |
| **Employment Status in 2004: Not Self-Employed** | | | | | | | | | | |
| medium[1] | 0.209 (0.295) | 0.300 (0.550) | 0.242 (0.308) | 0.793 (0.494) | | 0.280 (0.225) | 0.009 (0.286) | 0.072 (0.233) | 0.600 (0.277)** | |
| high[1] | 1.535 (0.471)** | 1.004 (0.601)* | 1.800 (0.472)*** | 2.092 (0.534)*** | | 0.881 (0.772) | 0.910 (0.395)** | 0.026 (1.053) | 1.263 (0.391)** | |
| rra | | | | | -0.152 (0.101) | | | | | -0.146 (0.085)* |
| **Employment Status in 2004: Regularly Employed** | | | | | | | | | | |
| medium[1] | 0.567 (0.410) | 0.293 (0.790) | 0.470 (0.463) | 1.605 (1.035) | | 0.191 (0.330) | -0.156 (0.425) | -0.090 (0.335) | 0.426 (0.413) | |
| high[1] | 1.918 (0.501)*** | 1.281 (0.820) | 2.144 (0.538)*** | 3.413 (1.053)** | | 0.782 (1.165) | 1.129 (0.544)** | 0.939 (1.020) | 1.447 (0.522)** | |
| rra | | | | | -0.319 (0.139)** | | | | | -0.145 (0.126) |
| **Employment Status in 2004: Not Employed[2]** | | | | | | | | | | |
| medium[1] | -0.202 (0.495) | 0.098 (0.860) | -0.063 (0.505) | 0.297 (0.740) | | 0.440 (0.315) | 0.159 (0.406) | 0.266 (0.321) | 0.649 (0.375)* | |
| high[1] | | 0.248 (1.015) | | -0.089 (1.018) | | 0.851 (1.056) | 0.663 (0.600) | | 0.713 (0.606) | |
| rra | | | | | 0.120 (0.197) | | | | | -0.173 (0.114) |

***/**/* indicates significance at the 0.1%/5%/10% level. Standard errors are in parentheses. See Table 2 for a detailed description of the used variables.

[1] Marginals for discrete change of dummy variable from 0 to 1.

[2] The variable 'high risk in financial matters' had to be dropped for the sample of not employed individuals, since there were no observations with transitions.

# A  Arrow-Pratt Coefficient of Relative Risk Aversion

From the responses to the hypothetical investment question, under certain assumptions we can calculate proxies for individual Arrow-Pratt coefficients of relative risk aversion (RRA). Utility is a function of wealth. Individuals may choose to invest an amount $inv$ between zero and $x = 100,000$ Euros (the hypothetical windfall gain). There are equal probabilities $\alpha$ of earning a profit of $inv$ and loosing half of it. Thus, the agent maximizes his/her expected utility subject to the budget constraint:

$$max \quad (\alpha U(x + inv) + \alpha U(x - \frac{inv}{2})) = max(f(inv)) \tag{1}$$
$$s.t. \quad 0 \leq inv \leq 100,000$$

The problem is solved by finding the null of the first derivative:

$$f'(inv) = 0 \quad \overset{\alpha > 0}{\Longrightarrow} \quad U'(x + inv) = \frac{1}{2}U'(x - \frac{inv}{2}) \tag{2}$$
$$\overset{Taylor-approx.}{\Longrightarrow} \quad U'(x) + invU''(x) \approx \frac{1}{2}U'(x) - \frac{inv}{4}U''(x)$$
$$\overset{inv \neq 0 \wedge U'(x) \neq 0}{\Longrightarrow} \quad \rho_{ARA} = \frac{-U''(x)}{U'(x)} \approx \frac{2}{5inv}$$

Individuals cannot indicate risk neutral or risk loving attitude by construction of the hypothetical investment question, which implies the assumption $U''(x) < 0 \forall x$. As $\alpha > 0$, it follows that

$$f''(inv) = \alpha U''(x + inv) + \frac{1}{4}\alpha U''(x - \frac{inv}{2}) < 0 \forall inv \tag{3}$$

Thus, $f(inv)$ reaches its global maximum at the null. $\rho_{ARA}$ is the Arrow-Pratt measure of absolute risk aversion. We approximate the individual's total wealth endowment $w$ with the hypothetical 100,000 Euros to calculate the coefficient of relative risk aversion $\rho_{RRA}$:

$$\rho_{RRA} = \rho_{ARA} \cdot w \approx \frac{2}{5inv} \cdot 100,000 \tag{4}$$

As $inv$ is nonnegative, $\rho_{RRA}$ is always positive (risk averse agents). If an individual chooses to invest nothing ($inv = 0$), we arbitrarily set his/her $\rho_{RRA}$ to 4 (double the coefficient of an individual choosing the smallest investment possible, i.e. 20,000 Euros).