The Impact of Self-Employment Experience on the Attitude towards Employment Risk

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Abstract

Most empirical studies on self-employment decisions assume stable risk attitudes. In this paper, we use data from a large household panel to provide the first study that allows for endogeneity on both sides, when examining the relationship between risk attitudes and entry into entrepreneurship. We find that entering self-employed is associated with a relative increase in the individual risk attitude measures. This shift in risk attitudes is quantitatively large and statistically significant even after controlling for individual characteristics, employment types, and the duration of self-employment. Our findings suggest that entry into self-employment leads to endogenous changes in the individual willingness to take occupational risks. We conjecture that this is driven by a change in risk perception after experiencing self-employment. This observation may explain the mixed results in the literature concerning effect of risk attitudes on the decision to enter entrepreneurship. By uncovering the interaction between occupational risk attitudes, background risks, and self-employment decisions, our study contributes to a better understanding of the effect of incentive and nudging policies that aim at fostering sustainable entrepreneurship.

Keywords: Risk attitudes, Entrepreneurship, German Socio-Economic Panel

JEL classification: D03, D81, M13

1. INTRODUCTION

Self-employment is considered to be an engine for labor market stabilization, for (regional) structural change, and for economic growth (Audretsch & Fritsch 1994). Entrepreneurship is also crucial in providing the competitive forces that prevent excess profits, supporting efficient market outcomes (Audretsch, Keilbach & Lehmann 2006). Therefore, it is important to understand the determinants of individual self-employment decisions. In this context, the perception of employment risk has been identified as a decisive factor (Barsky et al. 1997; Cramer et al. 2002; Fairlie 2002; Caliendo, Fossen & Kritikos 2009, 2014). Although it is intuitively appealing to assume that individuals with a relatively low measure of perceived risk avoidance are more likely to take on the risk of self-employment, most empirical studies in the field only measure the individuals' risk preferences, but not their perceptions of the risk of self-employment. This approach comes at the cost of treating risk perception as stable over time, neither effected by the general economic situation, nor by the individual experience of self-employment (Barsky et al. 1997; Caliendo, Fossen & Kritikos 2009, 2010).[1]

The validity of the assumption of invariant risk perceptions, however, has been critically challenged by a number of studies, especially in connection with employment and labor income risks (Heaton & Lucas 2000; Guiso & Paiella 2008). These studies show that background risk (e.g. from uninsurable exogenous shocks to labor income, proprietary income, and real estate prices) and liquidity or credit constraints strongly influence the willingness of household to take financial risks. As background risk and liquidity constraints increase, risk-taking decreases leading to higher measures of risk aversion. Consequently, risk aversion measures are found to vary over time and with the individual economic situation of the household.

We add to the literature on time variant risk aversion measures by providing empirical evidence that measured risk attitudes also vary with the experience of individuals in self-employment. Using data from different waves of an experimentally validated questionnaire, the German Socio-Economic Panel (SOEP), we inquire whether risk attitudes are affected by entry into self-employment.[2] The SOEP contains questions on individuals' willingness to take risks in general and in specific contexts, including occupational risk. Occupational risk has been shown to constitute a relevant domain for employment decisions (Caliendo, Fossen & Kritikos 2010). We apply a difference-in-difference

[1] See also Jaeger et al. (2010) for a similar assumption in the context of risk attitudes and migration.

[2] We use the terms "self-employed" and "entrepreneur" equivalently and interchangeably throughout the paper referring to individuals who indicate that they are self-employed in the questionnaire. Our focus group consists of those individuals, who indicate dependent employment in the first wave (2004), but indicate self-employment in later waves of the panel survey. We call these individuals "entrepreneurs" or "future entrepreneurs" and differentiate them from the "non-entrepreneurs" (who never indicate self-employment) and the "2004 entrepreneurs" who already indicated being selfe-employed in the first wave in 2004.

approach[3] and examine whether individuals' occupational risk measure is affected by entry into self-employment. We test whether those individuals who become entrepreneurs within the time frame of our panel data (i.e. are not self-employed in 2004, but are self-employed later) express a different trend in risk attitudes than individuals who do not enter self-employment. We find that entry into self-employment leads to a relative increase in risk attitudes, an increase that is quantitatively large and significant even after controlling for individual characteristics, different employment status, duration of entrepreneurship, or whether one's father was an entrepreneur. We further show that these changes in risk attitudes dominate the effect of initial differences in individual risk levels.

Our results suggest that some of the basic findings in the entrepreneurship literature may need reconsideration. That literature has been mostly focused on the assumption of a stable willingness to take risks that affects the self-employment decision. While Cramer et al. (2002) find support for a positive relationship between risk tolerance and entrepreneurial entry, Barsky et al. (1997) find no statistically significant effect of risk tolerance on selection into self-employment. Caliendo, Fossen and Kritikos (2009) show that individuals with a lower risk aversion are more likely to become self-employed. Hartog, Ferrer-i Carbonell and Jonker (2002) present evidence that successful entrepreneurs are less risk averse than regular employees. Fairlie (2002) provides indirect evidence on the hypothesis that risk seeking individuals are more likely to choose self-employment by showing that having been involved in drug dealing (a presumably risky activity) has a significantly positive effect on the probability of later legal self-employment. Using longitudinal data on risk tolerance to control for measurement errors, Ahn (2010) finds that relative risk tolerance has a positive and statistically significant effect on the probability of entering self-employment. Sarasvathy, Menon and Kuechle (2013), however, argue that entrepreneurs fall along the entire risk attitude spectrum, casting doubts on the assumption that a supra-normal willingness to take risks is necessary for self-employment (see also Brockhaus 1980; Sarasvathy, Simon & Lave 1998).

Our study adds to the literature on risk attitudes and self-employment by showing that varying risk attitudes may be one reason for the mixed findings so far. We find that the willingness to take occupational risks substantially increases in entrepreneurship, i.e. after experiencing self-employment. As in the related literature on the portfolio effects of changes in background risk (Heaton & Lucas 2000; Guiso & Paiella 2008), we conjecture that both changes the economic situation and in occupational experience (especially regular vs. self-employment) influence risk attitude measures by shifting the perception of the risks that individuals face.

2. DATA

[3] In the appendix we replicate our results in applying single nearest neighbor propensity score matching. The results are of similar significance and size as presented in the estimation section 5.

The SOEP, the underlying data set, is a representative survey of the German population and was initiated in 1984. It contains a large variety of longitudinal information on approximately 22,000 individuals.[4] In measuring risk attitudes we follow the approach proposed by several studies which rely on a subjective assessment of a respondent's willingness to take risks (Caliendo, Fossen and Kritikos 2009, 2014; Jaeger et al. 2010; Dohmen et al. 2012).[5] We have information about the individual willingness to take risks for two periods. Our primary measure of risk attitude was added to the SOEP in the 2004 wave and was collected for a second wave in 2009. Therefore, we make use of the waves from 2004 to 2009, and for our robustness analysis, we also consider the waves 2003, 2010, 2011, and 2012.

We focus on time trends in *occupational risk* attitude, which is considered most relevant in the context of entrepreneurship or self-employment (see also Caliendo, Fossen and Kritikos 2009).[6] The behavioral relevance of the risk measure used herein has been validated in a large-scale experiment. Using a representative sub-sample of 450 participants, Dohmen et al. (2011) show that the SOEP measures of risk attitudes have good predictive power of risk-taking attitudes involving self-employment. In line with Caliendo, Fossen and Kritikos (2009) and Dohmen et al. (2012), we thus assume that using SOEP data provides behaviorally valid information on individual risk attitudes.

To identify the effect of entrepreneurship on risk attitudes, we first use risk information of individuals (*riskocc04*) at a time they were not self-employed (future entrepreneurs given the year 2004). Second, we measure risk at an additional point in time (2009) *after* some of the individuals became self-employed (*riskocc09*). Thus, we identify entry into entrepreneurship if an individual was not self-employed in 2004 but was in one of the subsequent years.

We rely on two measures of self-employment as proxies for entrepreneurship. The first measure refers to occupational status: individuals are classified as entrepreneurs if they experienced a change in their occupational status to self-employment as their main position (*selfemp*). Second, we rely on whether an individual experienced changes in receiving income from self-employment. That is, individuals are classified as entrepreneurs if they began receiving an income from self-employment in one of the years after 2004 (*inc_selfemp*). We add both proxies, *inc_selfemp* and *selfemp*, to the empirical analysis as dummy variables, with the value of 1 if individuals experienced the respective transitions.

[4] For more detailed information about the SOEP, see Wagner, Burkhauser and Behringer (1993) and Wagner, Frick and Jürgen Schupp (2007). Further information is available at http://www.diw.de/en/diw_02.c.221178.en/about_soep.html (accessed February 3, 2014).

[5] The appropriate measurement of risk attitudes is subject of a lively debate. Economists usually argue that choice behavior reveals preferences. That is why Necker and Voskort (2014) establish a revealed preference approach. In contrast to that Barsky et al. (1997) and Cramer et al. (2002) evaluate individual risk attitudes by using questions on the respondent's willingness to participate in a hypothetical lottery.

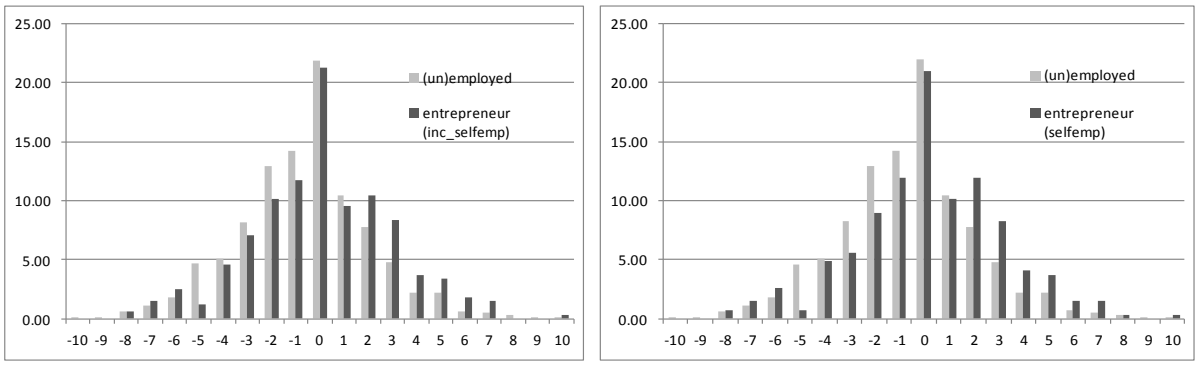
[6] The exact question used to derive information about individual risk attitude is as follows: "People can behave differently in different situations. How would you rate your willingness to take risks in your occupation?" People respond to an 11-point scale, where values of 0 indicate high risk aversion and values of 10 indicate full willingness to take risks.

We restrict the sample to individuals between 17 years of age in 2004 and 65 years of age in 2009, who were either employed or unemployed in 2004.[7] This leaves us with a balanced panel data set containing information on 7353 individuals, 324 of whom decided to start a business during the 2005 and 2009 periods, with entrepreneurship based on the income measure. If entrepreneurship is based on self-employment as a main activity, we are left with 267 individuals who became entrepreneurs.

3. RISK ATTITUDES OF SELF-EMPLOYED AND NON-SELF-EMPLOYED

FIGURE 1

Changes in risk attitudes from 2004 to 2009 for entrepreneurs and non-entrepreneurs



Source: Authors own illustration from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.

Figure 1 shows the distributions of the change rates in the willingness to take occupational risks (*riskocc0409*) for entrepreneurs and individuals with no transition between 2005 and 2009. We derive time trends in individual risk attitudes by calculating the difference in risk values from 2009 and 2004 (*riskocc0409 = riskocc09 – riskocc04*). Because both *riskocc04* and *riskocc09* are measured on 11-point scales, the variable *riskocc0409* can reach values from –10 to +10. The left-hand side of figure 1 measures entrepreneurship with the income definition (*inc_selfemp*). On the right-hand side, entrepreneurship refers to changes to self-employment as the main occupational status (*selfemp*). As both figures show, there are substantial changes in individual risk attitudes in occupation over time, regardless of the transition towards entrepreneurship. Only roughly 22% of non-entrepreneurs and 21% of nascent entrepreneurs show stable patterns in the willingness to take occupational risks. A more detailed comparison of the two distributions reveals differences between both nascent entrepreneurs and non-entrepreneurs. While both distributions are centered on zero, the distribution for entrepreneurs in both figures has more weight on the right-hand side. In contrast, the distribution of non-entrepreneurs has more weight on the left-hand side (see also table 1). Furthermore, a greater

[7] This means that we exclude non-employed individuals, individuals in vocational training, individuals doing an internship, and individuals in military or civil service from the analysis. We also exclude individuals with missing information on any of the variables used to perform the analysis. Regarding the choice of occupational profiles, robustness checks show that the exclusion of certain groups does not affect the significance and direction of the results.

proportion of self-employed than non-self-employed people experience an increase in the willingness to take occupational risks, while a greater proportion of non-self-employed than self-employed people exhibit a decrease in risk attitude.

TABLE 1
Risk attitudes from 2004 and 2009 for non-entrepreneurs, (future) entrepreneurs, and 2004 entrepreneurs

	Non-entrepreneurs: employed and unemployed	(future) Entrepreneurs		Entrepreneurs already in 2004	
		inc_selfemp	*selfemp*	*inc_selfemp*	*selfemp*
Average risk attitude 2004	3.913	4.876	4.835	5.27	5.21
Average risk attitude 2009	3.284	4.913	5.014	4.672	4.612
Average change in risk attitude	-0.629	0.037	0.179	-0.597	-0.598
Mean comparison test	Highly significant decrease	No significant increase	No significant increase	Highly significant decrease	Highly significant decrease
% change in risk < 0	48.94	39.51	37.08	50.74	51.30
% change in risk > 0	29.14	39.20	41.95	31.99	31.13
N	7029	324	267	544	575

Source: Authors own calculation from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.

Table 1 provides additional results of some basic descriptive statistics. We depict for (future) entrepreneurs and non-entrepreneurs the average risk index for the years 2004 (*riskocc04*) and 2009 (*riskocc09)*, as well as the change in the risk index (*riskocc0409*). The yearly risk indices for 2004 and 2009 are substantially larger for (future) entrepreneurs, which is in line with Caliendo, Fossen and Kritikos's (2009, 2014) studies. However, while (future) entrepreneurs, on average, experience an increase in their risk index from 0.04 to 0.18, non-entrepreneurs behave differently and show risk attitudes that decrease by 0.60 points. For comparison only, columns 5 and 6 of table 1 show the corresponding values for individuals who had already been self-employed in 2004. Though their average risk indices for the years 2004 and 2009 are higher than for non-entrepreneurs, these individuals experience a decrease in their risk index similar to non-entrepreneurs.

In table 2, we present for entrepreneurs (based on the income definition) and non-entrepreneurs the changes in the risk index from 2004 to 2009, sub-divided by a variety of socio-economic characteristics. These variables later serve as controls in the empirical framework to identify the effect of entrepreneurship on changes in the individual willingness to take occupational risks. In general, non-entrepreneurs are characterized by a reduction in their willingness to take risks in all sub-categories. In contrast, entrepreneurs experience an increase in their risk index in the vast majority of sub-categories (24 of 37). In the cases that show negative changes in risk attitudes, this decrease is still comparatively smaller than those of the non-entrepreneurs.

TABLE 2
Average risk changes for entrepreneurs (*inc_selfemp*) and non-entrepreneurs

	Average risk change		N			Share within	
	Non-Entrpr.	Entrpr.	Non-Entrpr.	Entrpr.	Share selfemp	Non-Entrpr.	Entrpr.
All	-0.629	0.037	7029	324	4.41		
Sex							
Male	-0.619	-0.238	3546	193	5.16	50.45	59.57
Female	-0.640	0.443	3483	131	3.62	49.55	40.43
Age							
17-25	-0.171	0.043	480	23	4.57	6.83	7.10
26-35	-0.413	0.354	1507	99	6.16	21.44	30.56
36-45	-0.641	0.116	2393	112	4.47	34.04	34.57
46-60	-0.825	-0.411	2649	90	3.29	37.69	27.78
ISCED							
0-2	-0.449	0.087	809	23	2.76	11.64	7.32
3-4	-0.657	0.226	3958	159	3.86	56.97	50.64
5-6	-0.659	-0.227	2181	132	5.71	31.39	42.04
Work exp.							
0	-0.070	0.172	243	29	10.66	3.46	8.95
0.1-5	-0.424	0.140	1175	57	4.63	16.72	17.59
5.1-10	-0.584	0.633	1167	79	6.34	16.61	24.38
>10	-0.725	-0.321	4441	159	3.46	63.21	49.07
Unemp exp.							
0	-0.570	0.168	4256	184	4.14	60.58	56.79
0.1-1	-0.682	-0.431	1445	72	4.75	20.57	22.22
1.1-2	-0.639	-0.194	485	31	6.01	6.90	9.57
>2	-0.824	0.486	840	37	4.22	11.96	11.42
Job duration							
0-5	-0.486	-0.051	2320	157	6.34	36.73	58.15
6-15	-0.642	0.175	2336	80	3.31	36.99	29.63
>15	-0.719	-0.242	1660	33	1.95	26.28	12.22
Married							
No	-0.620	-0.073	2556	137	5.09	36.36	42.28
Yes	-0.635	0.118	4473	187	4.01	63.64	57.72
Kids							
0	-0.690	-0.085	4305	177	3.95	61.25	54.63
1	-0.607	-0.286	1414	77	5.16	20.12	23.77
≥2	-0.455	0.700	1310	70	5.07	18.64	21.60
Living							
East	-0.772	0.021	1850	94	4.84	26.32	29.01
West	-0.578	0.043	5179	230	4.25	73.68	70.99
Origin							
Abroad	-0.415	0.375	458	16	3.38	6.52	4.94
Germany	-0.644	0.019	6571	308	4.48	93.48	95.06
Disable							
No	-0.613	0.055	6568	307	4.47	93.63	94.75
Yes	-0.877	-0.294	447	17	3.66	6.37	5.25
Inc. Finance							
No	-0.614	0.234	5306	214	3.88	75.49	66.05
Yes	-0.676	-0.345	1723	110	6.00	24.51	33.95
Height							
0-180	-0.647	0.132	5727	243	4.07	81.62	75.00
≥181	-0.556	-0.247	1290	81	5.91	18.38	25.00
Father entrep.							
No	-0.649	0.007	6440	276	4.11	91.62	85.19
Yes	-0.418	0.208	589	48	7.54	8.38	14.81

Source: Authors own calculation from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.
Notes: (Control) variables refer to the year 2004. A detailed description of the variables appears in the appendix.

4. ENTREPRENEURSHIP AS DETERMINANT OF CHANGES IN INDIVIDUAL RISK ATTITUDES

The results of the descriptive analysis show that the personal willingness to take occupational risks changes over time and that it changes differently for people who become entrepreneurs than for non-entrepreneurs. In search of a causal effect of entry into entrepreneurship on risk attitudes, we apply a difference-in-difference (DiD) design (Ashenfelter 1978; Card & Krueger 1994). The basic idea of a DiD identification strategy is to calculate the difference of the mean risk attitudes of entrepreneurs and non-entrepreneurs before and after the entrepreneurs started their businesses. Our empirical strategy is that only one "group" is affected by "treatment," which in our case is the entry into entrepreneurship. Thus, we have information about risk attitudes on two groups, where only one group is treated in the second period, with risk attitudes measured before (in 2004) and after (in 2009) treatment for both groups. Note that in our context we use the wording "treatment" simply to indicate if an individual experiences a transition into entrepreneurship.

Several assumptions must hold to infer causal mean effects for the treated group. First, the treatment must not affect risk attitudes of the non-treated group, meaning that there are no relevant interactions between entrepreneurs and non-entrepreneurs (see Rubin 1977). In our case, it is unlikely that an individual's change in willingness to take occupational risks has a direct or indirect effect on others' occupational risk attitudes. Second, individuals may anticipate becoming an entrepreneur, which involves changes in risk attitudes (affecting the pre-treatment outcome) or pre-treatment adaptation in other covariates. If this is the case, risk attitudes in 2004 might already be affected by endogeneity issues (Lechner 2011). Our data set allows us to at least partially control for this problem. That is, we make use of a question in the SOEP wave of 2003 that asks individuals to estimate the individual probability of becoming an entrepreneur within the next two years. This question enables us to restrict the sample to those who did certainly not intent to become self-employed in 2004. Third, the common trend assumption is a key element of the DiD design. In our case, it implies that if entrepreneurs had not started a new business, both non-entrepreneurs and "non-entering" entrepreneurs would have experienced the same time trend in risk attitudes, conditional on the covariates (Lechner 2011). Thus, any differences in the trend of individual willingness to take risks can be interpreted as an effect of the treatment. In section 5, we offer some evidence in favor of the common trend assumption. We make use of the SOEP waves of 2010, 2011, and 2012 to control for whether individuals who became entrepreneurs in one of these years experienced the same time trend in risk attitudes as non-entrepreneurs in the 2004–2009 period.

The underlying equation of the basic DiD approach can be specified as follows:

$$Y_i = \beta_0 + \beta_1 T_i + \beta_2 t_i + \beta_3 (T_i \cdot t_i) + \beta_4 X_i + \varepsilon_i ,$$

where T = 0,1 indicates whether an individual received treatment (T = 1) or not (T = 0). We observe individuals in two periods, t = 0,1, where 0 indicates the period before treatment and 1 indicates the period after treatment. Covariates are depicted by X. The coefficient β_3 captures the true effect of the treatment. In the supplementary information (S1 to S2b) we also present estimates based on a matching approach. The results are of similar significance and size as presented in the subsequent section 5.

5. ESTIMATION RESULTS

Before we apply DiD estimations, we directly estimate the effect of entrepreneurship on risk attitudes in 2009 when controlling for risk attitudes before the transition into self-employment in 2004. This is equivalent to estimate the effect of entrepreneurship on the *change* in risk attitudes after transition including the risk index 2004 as covariate. We estimate linear regression, where self-employment is measured either by *inc_selfemp* (columns 2 and 3) or *selfemp* (columns 4 and 5). Results of table 3 show that on average a transition into self-employment is highly correlated to an increase in risk attitudes. Coefficients for female, age, and unemployment experience are all negative and highly significant. Coefficients on education, German origin, and father entrepreneurship are positive and significant. Occupational risk attitudes in 2004 itself are strongly related to risk attitudes in 2009.

TABLE 3
OLS, sample employed and unemployed in 2004

	Risk attitudes 2009			
Dependent variable	(*inc_selfemp*)		(*selfemp*)	
	(2)	(3)	(4)	(5)
inc_selfemp	1.239***	1.104***		
	(0.134)	(0.137)		
selfemp			1.350***	1.234***
			(0.151)	(0.171)
Risk occupation 2004	0.405***	0.357***	0.407***	0.357***
	(0.011)	(0.012)	(0.011)	(0.012)
Sex (female =1)		-0.417***		-0.424***
		(0.083)		(0.083)
East		0.042		0.045
		(0.063)		(0.063)
Education		0.136***		0.141***
		(0.020)		(0.020)
Age		-0.068***		-0.067***
		(0.024)		(0.024)
Age_sq		0.000		0.000
		(0.000)		(0.000)
Work experience		-0.002		-0.001
		(0.004)		(0.004)
Unemployment experience		-0.059***		-0.059***
		(0.015)		(0.015)
Disable		-0.168		-0.166
		(0.117)		(0.117)
German		0.145		0.147
		(0.124)		(0.124)
Married		-0.041		-0.040
		(0.067)		(0.067)
Income finance		0.000		0.000
		(0.000)		(0.000)
Kids		-0.003		-0.003
		(0.034)		(0.034)
Height		0.001		0.001
		(0.004)		(0.004)
Father entrepreneur		0.189**		0.186**
		(0.092)		(0.092)
Constant	1.697***	3.560***	1.698***	3.539***
	(0.051)	(0.859)	(0.051)	(0.858)
N	7353	7119	7353	7119
R^2	0.173	0.212	0.174	0.213

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.
Notes: *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Coefficients in all columns are OLS estimates. Robust standard errors are in brackets. Covariates refer to the year 2004.

In table 4, we begin with a basic DiD design. Here, we use only individual information about risk attitudes from the years 2004 and 2009 without additional covariates. Entrepreneurs are individuals who experience a transition to entrepreneurship in at least one of the years from 2005 to 2009. When using *inc_selfemp* as a proxy for entrepreneurial entry, the model contains information about risk attitudes for 324 nascent entrepreneurs and 7029 remaining employed or unemployed people. When considering *self_emp* as a proxy, the number of nascent entrepreneurs decreases to 267, with 7086 remaining employed or unemployed. Table 4 reports the results.

TABLE 4
DiD approach, sample employed and unemployed in 2004, without covariates

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*; no covariates							
Risk	3.914	4.877	0.963	3.284	4.914	1.629	0.666
Std. error	0.029	0.148	0.151	0.030	0.139	0.142	0.207
t	132.73	10.44	6.40	-17.01	9.04	5.65	3.22
P>t	0.000	0.000	0.000***	0.000	0.000	0.000***	0.001***
N	7029	324		7029	324		
Panel B: emp. & unemp.; *selfemp*; no covariates							
Risk	3.923	4.835	0.912	3.294	5.015	1.721	0.809
Std. error	0.029	0.165	0.168	0.030	0.159	0.162	0.233
t	133.48	9.45	5.44	-17.1	9.29	5.91	3.47
P>t	0.000	0.000	0.000***	0.000	0.000	0.000***	0.001***
N	7086	267		7086	267		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.
Notes: *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported.

Columns 2 to 4 of table 4 present the pre-treatment risk attitudes for entrepreneurs and non-entrepreneurs, and columns 5 to 7 show the corresponding post-treatment risk attitudes. Column 8 (DiD) depicts the difference between both values, which can be interpreted as the average treatment effect on the treated group. Comparing the average risk values for entrepreneurs and non-entrepreneurs in 2004, we find that entrepreneurs (*inc_selfemp*) had a higher willingness to take occupational risks than non-entrepreneurs. This difference of 0.96 is highly significant and in line with prior research that argues that more risky individuals are more likely to become entrepreneurs (Barsky et al. 1997; Cramer et al. 2002; Caliendo, Fossen & Kritikos 2009, 2010, 2014). With regard to the post-treatment period 2009, we find that this difference increases from 0.96 to 1.63 in the year 2009, implying a large increase in the difference between risk attitudes of individuals entering entrepreneurship and non-entrepreneurs. As column 8 shows, this increase in the difference by 0.67 is large and significant, providing support for the argument that risk attitudes change over time and that entrepreneurship has a positive effect on individual willingness to take occupational risks. The results also hold when we use the proxy *selfemp* (panel B of table 4). Here, the DiD estimate even increases by 0.81 points.

Table 5 presents the results for the DiD approach with the covariates. In line with the regression estimates depicted in table 3, the set of covariates consists of individual information from the year 2004 and includes variables on gender, origin (East or West Germany, German or foreigner), education (using the ISCED classification), age, work experience, unemployment experience, nationality, disability, marital status, income from finance (differentiated by rents and interest), the number of children, height, duration of actual employment, and whether the individual's father was an entrepreneur when the individual was 15 years of age. The results for this specification remain robust. While the coefficients for the DiD remain almost constant (0.71 when using *inc_selfemp*, 0.83 when

using *selfemp*), the insertion of covariates reduces the pre-treatment differences in the willingness to take occupational risks to 0.67 and 0.69.

TABLE 5
DiD approach, sample employed and unemployed in 2004

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*							
Risk	2.861	3.529	0.668	2.22	3.597	1.377	0.709
Std. error	0.648	0.668	0.149	0.648	0.661	0.144	0.206
T	4.41	3.86	4.48	1.87	3.96	5.59	3.44
P>t	0.000	0.000	0.000***	0.001	0.000	0.000***	0.001***
N	6811	308		6811	308		
Panel B: emp. & unemp.; *selfemp*							
Risk	2.842	3.534	0.692	2.202	3.727	1.525	0.833
Std. error	0.648	0.671	0.166	0.648	0.665	0.164	0.232
t	4.39	3.87	4.16	1.85	4.15	5.78	3.59
P>t	0.000	0.000	0.000***	0.001	0.000	0.000***	0.000***
N	6865	254		6865	254		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.
Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004.

The results also remain robust when we check whether entrepreneurs are still entrepreneurs in 2009. That is, we check whether individuals who, for example, became self-employed in 2005 and dropped out one year later harm our results. In this case, we restrict our treatment group to individuals who became self-employed in 2005, 2006, 2007, 2008, or 2009 and were still self-employed in 2009. Table 6 indicates stable results in both specifications (panel A and panel B), with increasing values of willingness to take occupational risks by 0.93 and 0.89. Pre-treatment levels of risk differences remain in the range from 0.62 to 0.75.

TABLE 6
DiD approach, sample employed and unemployed in 2004, entrepreneurs continuous to 2009

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*; self-emp. continuous to 2009							
Risk	2.971	3.596	0.624	2.338	3.889	1.552	0.927
Std. error	0.649	0.684	0.199	0.649	0.676	0.188	0.272
T	4.58	3.88	3.15	1.99	4.33	5.56	3.40
P>t	0.000	0.000	0.002***	0.000	0.000	0.000***	0.001***
N	6942	177		6942	177		
Panel B: emp. & unemp.; *selfemp*; self-emp. continuous to 2009							
Risk	2.997	3.744	0.747	2.367	3.999	1.632	0.885
Std. error	0.649	0.691	0.217	0.649	0.681	0.199	0.293
t	4.62	4.08	3.45	2.03	4.41	5.19	3.01
P>t	0.000	0.000	0.001***	0.000	0.000	0.000***	0.003***
N	6962	157		6962	157		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.
Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004.

5.1. Different transition paths

The data set facilitates distinguishing between different paths of transition to entrepreneurship. Here, we differentiate between nascent entrepreneurs who were employed or unemployed in 2004 and become self-employed later. Thus, we control for whether the former employment status of the entrepreneurs influences changes in the willingness to take occupational risks. Table 7 shows the results. Entrepreneurs with a transition from regular employment (panel A and panel B) experience a significant average increase in their willingness to take occupational risks of between 0.64 and 0.75 points.[8] Note that in both cases, pre-treatment differences in risk attitudes in 2004 decrease to 0.53 and 0.54. For transitions from unemployment to entrepreneurship (panel C and panel D) we find a substantially larger increase in risk attitudes. The differences hold values of between 1.21 and 1.35 at a 5% significance level.

[8] If not stated otherwise, all regressions include the entire set of control variables (see table 2) with the exception of regressions restricted to the sample of employed individuals, which also controls for the time span individuals are employed at their current employer.

TABLE 7
DiD approach, sub-sample employed and unemployed in 2004

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp.; *inc_selfemp*							
Risk	2.691	3.218	0.527	2.077	3.241	1.164	0.637
Std. error	0.693	0.711	0.152	0.693	0.708	0.153	0.215
t	3.88	3.43	3.47	1.80	3.50	4.69	2.97
P>t	0.000	0.000	0.001***	0.003	0.000	0.000***	0.003***
N	6128	259		6128	259		
Panel B: emp.; *selfemp*							
Risk	2.660	3.196	0.536	2.048	3.332	1.284	0.748
Std. error	0.692	0.715	0.172	0.693	0.711	0.176	0.245
t	3.84	3.41	3.12	1.78	3.64	4.78	3.05
P>t	0.000	0.000	0.002***	0.003	0.000	0.000***	0.002***
N	6181	206		6181	206		
Panel C: unemp.; *inc_selfemp*							
Risk	3.409	4.266	0.858	2.512	4.579	2.067	1.209
Std. error	2.015	2.098	0.474	2.014	2.053	0.403	0.607
t	1.69	3.82	1.81	2.96	3.96	3.86	1.99
P>t	0.091	0.042	0.071*	0.212	0.026	0.000***	0.046**
N	679	48		679	48		
Panel D: unemp.; *selfemp*							
Risk	3.540	4.345	0.805	2.636	4.792	2.156	1.351
Std. error	2.014	2.100	0.474	2.013	2.061	0.425	0.622
t	1.76	3.92	1.70	3.09	4.10	3.98	2.17
P>t	0.079	0.039	0.090*	0.191	0.020	0.000***	0.030**
N	680	47		680	47		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.

Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004.

5.2. Exogeneity of pre-treatment outcome and covariates I

The DiD design relies on several critical assumptions. Individuals may anticipate becoming an entrepreneur, which entails changes in risk attitudes or pre-treatment adaptation in other covariates. Thus, our risk measure in 2004 could already be an outcome from planning to enter entrepreneurship. We try to ensure that the pre-treatment outcomes as well as covariates are not affected by the decision to become an entrepreneur by making use of a question in the SOEP wave in 2003. Individuals were asked to estimate the probability that career changes would take place within the next two years, on a 100-point scale, where 0 meant that such change would definitely not occur. One part of this question involves the likelihood of becoming self-employed and/or freelancing. In what follows, we restrict the sample to individuals who stated that the likelihood of becoming self-employed was zero. That is, we focus only on those who definitely did not want or expect to become self-employed in the near future.

The restriction of the sample leads to a decrease in the number of entrepreneurs, who were unemployed in 2004, to 21 cases. Therefore, we report only the results for the full sample and for the transition from regular employment to entrepreneurship. The results, depicted in table 8, also remain robust in this specification. Entrepreneurship leads to increases in the willingness to take occupational

risks of between 0.95 and 1.12 points. These changes are highly significant at the 1% level. Notably, this specification also emphasizes the small and non-significant differences in individual risk attitudes of nascent entrepreneurs and non-entrepreneurs in the pre-treatment period. The differences here range from 0.16 to 0.41 points, casting doubts on the assumption that risk attitudes of nascent entrepreneurs are higher by nature, remain stable over time, and are not affected by entrepreneurship itself.

TABLE 8
DiD approach, full sample and subsample employed in 2004, with no intention to become an entrepreneur in 2003

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*; no intent becoming self-emp. in 2004							
Risk	3.003	3.127	0.125	2.361	3.493	1.131	1.007
Std. error	0.654	0.689	0.211	0.654	0.681	0.201	0.290
t	4.59	3.18	0.59	2.02	3.96	5.14	3.47
P>t	0.000	0.000	0.553	0.000	0.000	0.000***	0.001***
N	6811	156		6811	156		
Panel B: emp. & unemp.; *selfemp*; no intent becoming self-emp. in 2004							
Risk	3.018	3.222	0.204	2.378	3.692	1.314	1.110
Std. error	0.653	0.692	0.230	0.653	0.683	0.221	0.318
t	4.62	3.31	0.89	2.04	4.21	5.22	3.49
P>t	0.000	0.000	0.375	0.000	0.000	0.000***	0.000***
N	6865	132		6865	132		
Panel C: emp.; *inc_selfemp*; no intent becoming self-emp. in 2004							
Risk	2.383	2.684	0.301	1.753	3.009	1.256	0.954
Std. error	0.853	0.885	0.226	0.853	0.887	0.244	0.331
t	2.79	2.72	1.33	1.65	3.13	4.21	2.88
P>t	0.005	0.002	0.183	0.040	0.001	0.000***	0.004***
N	4425	114		4425	114		
Panel D: emp.; *selfemp*; no intent becoming self-emp. in 2004							
Risk	2.338	2.750	0.412	1.710	3.239	1.529	1.117
Std. error	0.853	0.890	0.254	0.853	0.889	0.270	0.370
t	2.74	2.80	1.62	1.60	3.38	4.55	3.02
P>t	0.006	0.002	0.105	0.045	0	0.000***	0.003***
N	4447	92		4447	92		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.
Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004.

5.3. Exogeneity of pre-treatment outcome and covariates II

In a similar vein, pre-treatment values of risk attitudes and covariates might be less or not affected by the treatment if a sufficient time span exists between pre-treatment and treatment. We check for this by focusing only on entrepreneurs who entered into self-employment not before 2007, 2008 or 2009, so that there are at least three years between the responses to the questions on risk attitudes and entry into entrepreneurship. Table 9 reports the results. In all regressions, the coefficients of the post-treatment differences in risk attitudes remain highly significant and quantitatively large. The values range from 0.77 to 1.40, depending on the empirical specification. Pre-treatment differences in risk attitudes stay between 0.34 and 0.72.

TABLE 9

DiD approach, full sample with nascent entrepreneurs entering in 2007, 2008, or 2009

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*; self-emp. not before 2007							
Risk	2.929	3.632	0.703	2.288	3.756	1.468	0.765
Std. error	0.655	0.685	0.190	0.655	0.680	0.192	0.269
T	4.47	3.96	3.71	1.95	4.12	4.69	2.84
P>t	0.000	0.000	0.000***	0.000	0.000	0.000***	0.004***
N	6800	170		6800	170		
Panel B: emp. & unemp.; *inc_selfemp*; self-emp. not before 2008							
Risk	3.013	3.735	0.721	2.371	3.982	1.611	0.889
Std. error	0.658	0.712	0.259	0.658	0.704	0.252	0.360
T	4.58	4.03	2.79	2.04	4.36	4.25	2.47
P>t	0.000	0.000	0.005***	0.000	0.000	0.000***	0.014**
N	6797	97		6797	97		
Panel C: emp. & unemp.; *inc_selfemp*; self-emp. not before 2009							
Risk	3.060	3.400	0.340	2.417	4.010	1.593	1.253
Std. error	0.662	0.753	0.352	0.662	0.774	0.391	0.525
t	4.63	3.51	0.97	2.09	4.38	3.55	2.39
P>t	0.000	0.000	0.333	0.000	0.000	0.000***	0.017**
N	6793	41		6793	41		
Panel D: emp. & unemp.; *selfemp*; self-emp. not before 2007							
Risk	2.873	3.583	0.710	2.232	4.057	1.825	1.115
Std. error	0.655	0.698	0.241	0.655	0.692	0.239	0.339
T	4.39	3.89	2.95	1.89	4.55	5.38	3.29
P>t	0.000	0.000	0.003***	0.001	0.000	0.000***	0.001***
N	6854	116		6854	116		
Panel E: emp. & unemp.; *selfemp*; self-emp. not before 2008							
Risk	2.956	3.675	0.720	2.315	4.439	2.124	1.404
Std. error	0.658	0.755	0.371	0.658	0.743	0.357	0.514
T	4.49	3.91	1.94	1.98	4.93	4.65	2.73
P>t	0.000	0.000	0.052*	0.000	0.000	0.000***	0.006***
N	6839	55		6839	55		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2010, version 27, SOEP, 2011, doi:10.5684/soep.v27.

Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004. Results of the panel version emp. & unemp.; *selfemp*; self-emp. not before 2009 are omitted because of a low number of cases.

5.4. Common trend assumption

The DiD design only offers reliable estimates if both sub-populations (entrepreneurs and non-entrepreneurs) not being treated experience the same time trends in risk attitudes, conditional on the covariates (Lechner 2011). It is, however, not possible to test this assumption directly. We control for the validity of this assumption by comparing the changes in willingness to take occupational risks of non-entrepreneurs between 2004 and 2009 and those that started a new business in the period after 2009. Both groups should experience similar time trends in risk attitudes between 2004 and 2009 because they are not subject to the treatment. We present estimates for different empirical specifications using both proxies for self-employment. First, with the main occupational status definition, we define self-employed as becoming self-employed in 2010, 2011, or 2012, and aggregates of these years. Second, when using transition to income from self-employment as a proxy, we rely on income information from 2010 and/or 2011 to identify individuals who became

entrepreneurs. Table 10 depicts the results for the single years, and table 11 depicts the results for aggregate years.

TABLE 10
DiD approach, full sample with entrepreneurs entering in 2010, 2011, or 2012

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*; self-emp. in 2010							
Risk	3.117	3.734	0.617	2.471	3.303	0.831	0.215
Std. error	0.664	0.734	0.306	0.665	0.740	0.329	0.449
t	4.69	3.96	2.02	2.15	3.38	1.27	0.48
P>t	0.000	0.000	0.044**	0.000	0.000	0.012**	0.632
N	6737	51		6737	51		
Panel B: emp. & unemp.; *inc_selfemp*; self-emp. in 2011							
Risk	3.103	3.408	0.305	2.455	3.138	0.683	0.378
Std. error	0.666	0.792	0.43	0.667	0.807	0.451	0.623
t	4.66	3.49	0.71	2.13	3.23	1.14	0.61
P>t	0.000	0.000	0.478	0.000	0.000	0.130	0.544
N	6698	37		6698	37		
Panel C: emp. & unemp.; *selfemp*; self-emp. in 2011							
Risk	3.028	3.323	0.295	2.383	3.094	0.711	0.416
Std. error	0.666	0.784	0.431	0.666	0.779	0.413	0.597
t	4.55	3.40	0.68	2.06	3.21	1.30	0.70
P>t	0.000	0.000	0.494	0.000	0.000	0.085*	0.486
N	6724	35		6724	35		
Panel D: emp. & unemp.; *selfemp*; self-emp. in 2012							
Risk	3.071	3.432	0.361	2.424	3.699	1.275	0.914
Std. Error	0.667	0.830	0.492	0.667	0.866	0.541	0.731
t	4.60	3.51	0.73	2.10	3.84	2.05	1.25
P>t	0.000	0.000	0.464	0.000	0.000	0.018**	0.211
N	6686	30		6686	30		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29.
Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004. Results of the panel version self-employment as main activity in 2010 are omitted because of a low number of cases. Panels A and C apply the SOEP waves 2004 to 2011. Panels B and D apply the SOEP waves 2004 to 2012.

The findings add credibility to the identification assumptions. The single year values of the DiD values are all insignificant and range from 0.22 to 0.38, when using the transition to income from self-employment in 2010 or 2011 (panel A and panel B in table 10). The results are similar for the *selfemp* proxy (panel C and panel D in table 10). Here, we find higher values for the DiD. However, in none of these specifications is the DiD statistically significant. Notably, also pre-treatment differences remain at a low range between 0.29 and 0.62

The results of the aggregated year specifications in table 11 are also strongly in favor of common trends in risk attitudes of non-entrepreneurs and entrepreneurs entering 2010 onwards. The estimated DiD values are all insignificant and range from 0.28 to 0.51. When considering only individuals with a self-reported probability of entering into entrepreneurship being zero in 2009, pre-treatment differences as well as the DiD values strongly decrease (panel D and panel E). While panel D still finds a very small positive difference in change of risk attitudes between non-entrepreneurs and

entrepreneurs entering after 2009, this value becomes even negative when using *selfemp* (panel D). Furthermore, panels B to D in table 11 report very low and insignificant pre-treatment differences between those two groups.

TABLE 11
DiD approach, full sample with entrepreneurs entering in 2010, 2011, and 2012

	2004			2009			
Outcome variable	Control (2)	Treated (3)	Diff(Before) (4)	Control (5)	Treated (6)	Diff(After) (7)	DiD (8)
Panel A: emp. & unemp.; *inc_selfemp*; self-emp. in 2010 & 2011							
Risk	3.090	3.578	0.488	2.442	3.214	0.772	0.284
Std. error	0.664	0.712	0.255	0.664	0.718	0.270	0.371
t	4.65	3.78	1.91	2.11	3.33	1.54	0.77
P>t	0.000	0.000	0.056*	0.000	0.000	0.004***	0.443
N	6700	88		6700	88		
Panel B: emp. & unemp.; *selfemp*; self-emp. in 2010 & 2011							
Risk	3.088	3.417	0.329	2.442	3.106	0.664	0.335
Std. error	0.664	0.753	0.366	0.664	0.751	0.361	0.513
t	4.65	3.52	0.90	2.11	3.22	1.26	0.65
P>t	0.000	0.000	0.368	0.000	0.000	0.065*	0.513
N	6743	45		6743	45		
Panel C: emp. & unemp.; *selfemp*; self-emp. in 2010 to 2012							
Risk	3.092	3.432	0.339	2.442	3.352	0.910	0.571
Std. error	0.664	0.724	0.296	0.664	0.732	0.308	0.427
t	4.66	3.56	1.15	2.11	3.56	2.19	1.34
P>t	0.000	0.000	0.251	0.000	0.000	0.003***	0.181
N	6713	75		6713	75		
Panel D: emp. & unemp.; *inc_selfemp*; self-emp. in 2010 & 2011, no intent becoming self-emp. in 2009							
Risk	2.978	3.223	0.245	2.329	2.648	0.318	0.073
Std. Error	0.666	0.769	0.390	0.666	0.806	0.451	0.596
t	4.47	3.30	0.63	2.00	2.67	0.41	0.12
P>t	0.000	0.000	0.530	0.000	0.001	0.480	0.902
N	6700	40		6700	40		
Panel E: emp. & unemp.; *selfemp*; self-emp. in 2010 to 2012, no intent becoming self-emp. in 2009							
Risk	3.062	3.249	0.187	2.411	2.582	0.171	-0.016
Std. error	0.665	0.776	0.411	0.665	0.809	0.465	0.620
t	4.61	3.30	0.45	2.08	2.58	0.15	-0.03
P>t	0.000	0.000	0.650	0.000	0.001	0.714	0.979
N	6713	39		6713	39		

Source: Authors own calculations from Socio-Economic Panel (SOEP), data for years 1984-2012, version 29, SOEP, 2013, doi:10.5684/soep.v29.

Notes: emp = employed in 2004, unemp = unemployed in 2004. *** indicate significance at the 1% level, ** significance at the 5% level, * significance at the 10% level. Robust standard errors are reported. See table 2 for a full list of included covariates. Covariates refer to the year 2004. The results of the panel version emp. & unemp.; selfemp; self-emp. in 2010 to 2011, no intent becoming self-emp. in 2009 are omitted because of a low number of cases. Panel B applies SOEP waves 2004 to 2011. Panels A, C, D, and E and apply SOEP waves 2004 to 2012.

Findings suggest that non-entrepreneurs and "non-entering" entrepreneurs exhibited the same time trend in risk attitudes during the 2004–2009 period: Both groups experience a decrease in risk attitudes as can be seen from comparing column (2) with column (5) for the control group and from comparing column (3) with column (6) for the treated group. This is in sharp contrast with the regression results for individuals entering entrepreneurship before 2010, in which all regressions show an increase in individual risk attitudes for the treatment group.

6. CONCLUSION AND IMPLICATIONS

The assumption of stable risk attitudes is widespread in the research on self-employment. A small but growing literature, however, finds that individual risk-taking decreases with an increase in the degree of background risk, i.e. risk from uninsurable exogenous shocks to labor income, proprietary income, and real estate prices (Heaton & Lucas 2000; Guiso & Paiella 2008). Using a large panel data set, we show that entering self-employment has a quantitatively large and highly significant feedback effect on individual willingness to take occupational risks. As an identification strategy, we compare risk attitude information on individuals before and after self-employment (i.e. at a time, when they were either regularly employed or unemployed, and at a later time, when they were self-employed). Our DiD estimations reveal that individuals who experience a transition to entrepreneurship display a significantly greater willingness to take occupational risks than individuals who remain regularly employed or unemployed during the same period.[9]

The results resist several robustness checks. Our data set enables us to rule out the possibility that individuals had already adjusted their risk attitudes or other control variables before treatment. That is, we ensure that anticipation effects do not harm our results. We also provide evidence in favor of a common trend assumption, which is a key element in the DiD approach. That is, we control for whether individual, who enter self-employment after we measured risk attitudes the second time, experience the same time trend in risk attitudes as non-entrepreneurs. Furthermore, we rely on two measures of self-employment: the first measure pertains to self-employment as main occupation and the second to receiving income from self-employment. We also check whether changes in the willingness to take occupational risks are influenced by the former employment status of the "future" entrepreneurs. The results remain robust.

Our findings suggest that entry into self-employment leads to endogenous changes in the individual willingness to take occupational risks. We conjecture that the increased willingness to take risks in entrepreneurship is driven by a change in risk perception after experiencing self-employment. This observation may explain the mixed results in the literature concerning effect of risk attitudes on the decision to enter self-employment. A precise knowledge of the interaction between risk attitudes and self-employment decisions is central for incentive and nudging policies that aim at fostering sustainable entrepreneurship. Our study contributes to a better understanding of the effect of such policies, by uncovering the interaction between occupational risk attitudes, background risks, and self-employment decisions.

[9] In line with other studies, we use self-employment as a proxy for entrepreneurship.

References

Ahn, Taehyun, "Attitudes toward risk and self-employment of young workers," *Labour Economics* 17:2 (2010), 434–442.

Amaral, A. Miguel, Rui Baptista, and Fancisco Lima, "Serial Entrepreneurship: Impact of Human Capital on Time to Re-Entry," *Small Business Economics* 37:1 (2011), 1–21.

Ashenfelter, Orley, "Estimating the Effect of Training Programs on Earnings," *The Review of Economics and Statistics* 60:1 (1978), 47–57.

Audretsch, David B., and Michael Fritsch, "The Geography of Firm Births in Germany," *Regional Studies* 28:4 (1994), 359–365.

Audretsch, David B., Max C. Keilbach, and Erik E. Lehmann, *Entrepreneurship and Economic Growth* (Oxford: Oxford University Press, 2006).

Barsky, Robert B., Thomas Juster, Miles S. Kimball, and Matthew D. Shapiro, "Preference Parameters and Individual Heterogeneity: An Experimental Approach in the Health and Retirement Study," *Quarterly Journal of Economics* 112:2 (1997), 537–579.

Bisin, Alberto, and Verdier, Thierry, Cultural transmission, in: Steven N. Durlauf and Lawrence E. Blume (Eds.), *The New Palgrave Dictionary of Economics* (Basingstoke: Palgrave Macmillan, 2005).

Block, Joern, Philipp Sandner, and Frank Spiegel, "How Do Risk Attitudes Differ within the Group of Entrepreneurs? The Role of Motivation and Procedural Utility," *Journal of Small Business Management* (forthcoming), DOI: 10.1111/jsbm.12060.

Borghans, Lex, Angela Lee Duckworth, James J. Heckman, and Bas ter Weel, "The Economics and Psychology of Personality Traits," *Journal of Human Resources* 43:4 (2008), 972–1059.

Bowles, Samuel, "Endogenous Preferences: The Cultural Consequences of Markets and other Economic Institutions," *Journal of Economic Literature* 36:1 (1998), 75–111.

Brockhaus, Robert H., "Risk Taking Propensity of Entrepreneurs," *Academy of Management Journal* 23:3 (2008), 509–520.

Caliendo, Marco, Frank M. Fossen, and Alexander S. Kritikos, "Risk Attitudes of Nascent Entrepreneurs – New Evidence from an Experimentally Validated Survey," *Small Business Economics* 32:2 (2009), 153–167.

Caliendo, Marco, Frank M. Fossen, and Alexander S. Kritikos, "The Impact of Risk Attitudes on Entrepreneurial Survival," *Journal of Economic Behavior & Organization* 76:1 (2010), 45–63.

Caliendo, Marco, Frank M. Fossen, and Alexander S. Kritikos, "Personality Characteristics and the Decision to Become and Stay Self-Employed." *Small Business Economics* 42:4 (2014), 787–814.

Card, David and Alan B. Krueger, "Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania," *The American Economic Review* 84:4 (1994), 772–793.

Cramer, Mars (J.S.), Joop Hartog, Nicole Jonker, and Mirjam Van Praag, "Low Risk Aversion Encourages the Choice for Entrepreneurship: An Empirical Test of a Truism," *Journal of Economic Behavior and Organization* 48:1 (2002), 29–36.

Das, T. K. and Bing-Sheng Teng, "Time and Entrepreneurial Risk Behaviour," *Entrepreneurship: Theory and Practice* 22:2 (1997), 69–71.

Dohmen, Thomas, Armin Falk, David Huffman, and Uwe Sunde, "The Intergenerational Transmission of Risk and Trust Attitudes," *Review of Economic Studies* 79:2 (2012), 645–677.

Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jürgen Schupp, and Gert G. Wagner, "Individual Risk Attitudes: Measurement, Determinants, and Behavioral Consequences," *Journal of the European Economic Association* 9:3 (2011), 522–550.

Dunn, Thomas and Douglas Holtz-Eakin, "Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links," *Journal of Labor Economics* 18:2 (2000), 282–305.

Fairlie, Robert W., "Drug Dealing and Legitimate Self-Employment, " *Journal of Labor Economics* 20:3 (2002), 538-567.

Hartog, Joop, Ada Ferrer-i-Carbonell and Nicole Jonker, "Linking Measured Risk Aversion to Individual Characteristics," *Kyklos* 55:1 (2002), 3–26.

Hryshko, Dmytro, María José Luengo-Prado and Bent E. Sørensen, B. E., "Childhood determinants of risk aversion: The long shadow of compulsory education." *Quantitative Economics* 2:1 (2011), 37–72.

Jaeger, David A., Thomas Dohmen, Armin Falk, David Huffman, Uwe Sunde, and Holger Bonin, "Direct Evidence on Risk Attitudes and Migration," *The Review of Economics and Statistics* 92:3 (2010), 684–689.

Janney, Jay J., and Gregory G. Dess, "The Risk Concept for Entrepreneurs Reconsidered: New Challenges to the Conventional Wisdom," *Journal of Business Venturing* 21:3 (2006), 385–400.

Lane, Robert, *The Market Experience* (Cambridge: Cambridge University Press, 1991).

Lechner, Michael, "The Estimation of Causal Effects by Difference-in-Difference Methods," *Foundations and Trends in Econometrics* 4:3 (2011), 165–224.

Politis, Diamanto, (2005), "The Process of Entrepreneurial Learning: A Conceptual Framework," *Entrepreneurship Theory & Practice*, **29**, 399–424.

Rubin, Donald. B., "Assignment to Treatment Group on the Basis of a Covariate," *Journal of Educational Statistics* 2:1 (1977), 1–26.

Sarasvathy, Saras D., Anil R. Menon, and Graciela Kuechle, "Failing Firms and Successful Entrepreneurs: Serial Entrepreneurship as a Temporal Portfolio," *Small Business Economics* 40:2 (2013), 417–434.

Sarasvathy, Saras D., Herbert A. Simon, and Lester Lave, "Perceiving and Managing Business Risks: Differences between Entrepreneurs and Bankers," *Journal of Economic Behavior and Organization* 33:2 (1998), 207–226.

Ucbasaran, Deniz, Mike Wright, and Paul Westhead, "A Longitudinal Study of Habitual Entrepreneurs: Starters and Acquirers," *Entrepreneurship and Regional Development* 15:3 (2003), 207–228.

Ucbasaran, Deniz, Mike Wright, and Paul Westhead, "Opportunity Identification and Pursuit: Does an Entrepreneur's Human Capital Matter?" *Small Business Economics* 30:2 (2008), 153–173.

Van Gelderen, Marco, Lidewey van de Sluis, and Paul Jansen, "Learning Opportunities and Learning Behaviors of Small Business Starters: Relations with Goal Achievement, Skill Development and Satisfaction," *Small Business Economics* 25:1 (2005), 97–108.

Wagner, Gert G., Joachim R. Frick, and Jürgen Schupp, "The German Socio-Economic Panel Study (SOEP) - Scope, Evolution and Enhancements," *Schmollers Jahrbuch* 127: 1 (2007), 139–169.

Wagner, Gert G., Richard V. Burkhauser, and Friederike Behringer, "The English Language Public Use File of the German Socio-Economic Panel," *Journal of Human Resources* 28:2 (1993), 429–433.

Westhead, Paul and Mike Wright, "Novice, Serial and Portfolio Founders: Are They Different?" *Journal of Business Venturing* 13:3 (1998), 173–204.

Zhao, Hao and Scott E. Seibert, "The Big-Five Personality Dimensions and Entrepreneurial Status: A Meta-Analysis Review," *Journal of Applied Psychology* 91:2 (2006), 259–271.

APPENDIX

Table A1. Detailed description of the calculation of the variables

Label	Description
Riskocc04	Willingness to take occupational risks in 2004 (11 point scale)
Riskocc09	Willingness to take occupational risks in 2009 (11 point scale)
Riskocc0409	Change in willingness to take occupational risks from 2004 to 2009
Inc_selfemp	Dummy = 1 if individual received income from self-employment (after 2004)
Selfemp	Dummy = 1if individual was self-employment as main activity (after 2004)
Sex	Dummy = 1 if female
Age	Age of the individual in 2004
Age_sq	Age squared
ISCED	Education level in 2004 based on ISCED classification
Work exp.	Years of work experience in 2004
Unemp exp.	Years of unemployment experience in 2004
Duration	Year of current employment relationship in 2004
Married	Dummy = 1 if married or living together in 2004
Kids	Number of children under 17 living in the household in 2004
East	Dummy = 1 if individual lives in Eastern Germany in 2004
German	Dummy= 1 if individual is from Germany
Disable	Dummy = 1 if individuals is handicapped/physically challenged
Inc_Rent	Amount income from rent in 2004 in euro
Inc_Interest	Amount income from interest and dividends in 2004 in euro
Inc. Finance	Sum of income from rents, interest, and dividends in euro
Height	Body height
Father_entrepr	Dummy = 1 if individual's father was an entrepreneur when she/he was 15 years of age

Source: Authors own illustration.

SUPPLEMENTARY INFORMATION - RESULTS OF THE MATCHING APPROACH

It can be shown that we derive the very similar results as those of section 5, when we apply single nearest neighbor propensity score matching. In table S1 we replicate most important calculations of section 5, including a comparison of risk attitudes of *future* entrepreneurs analog to the "common trend regressions" in the main body of the paper. Table S2a and S2b report the balancing properties for single nearest neighbor propensity score matching.

Table S1. Results of single nearest neighbor propensity score matching

Sample	**Number of treated**	**Number of controls**	**ATT**	**Boot-strapped Std. Err.**	**Z**	**P> | z |**
Replication of table 5, panel A						
Employed and unemployed in 2004, *inc_selfemp*	307	307	0.945	0.232	4.07	0.000
Replication of table 5, panel B						
Employed and unemployed in 2004, *selfemp*	253	253	1.403	0.267	5.25	0.000
Replication of table 8, panel A						
Employed and unemployed in 2004, with no intent to become an entrepreneur in 2003, *inc_selfemp*	156	156	1.301	0.336	3.89	0.000
Replication of table 8, panel B						
Employed and unemployed in 2004, with no intent to become an entrepreneur in 2003, *selfemp*	132	132	0.962	0.339	2.84	0.005
Replication of table 11, panel D						
Full sample with entrepreneurs entering in 2010, 2011 and 2012, *inc_selfemp*	38	40	0.575	0.630	0.91	0.361
Replication of table 11, panel E						
Full sample with entrepreneurs entering in 2010, 2011 and 2012, *selfemp*	38	39	-0.359	0.589	-0.61	0.543

Source: Authors own calculation.
Notes: Bootstrapped standard errors are reported with 100 bootstrap replications. See table 2 for a full list of included covariates. Covariates refer to the year 2004. One exception is being made. Due to balancing properties the variable Inc_Finance is used in a grouped version with (0=0) (1/5000=1) (5001/500000=2).

Table S2a. Balancing properties for single nearest neighbor propensity score matching

	Replication of table 5, panel A Employed and unemployed in 2004, *inc_selfemp*			Replication of table 5, panel B Employed and unemployed in 2004, *selfemp*			Replication of table 8, panel A Employed and unemployed in 2004, with no intent to become an entrepreneur in 2003, inc_selfemp		
	Mean		**t-test**	**Mean**		**t-test**	**Mean**		**t-test**
Variable	**Treated**	**Control**	**p > | t |**	**Treated**	**Control**	**p > | t |**	**Treated**	**Control**	**p > | t |**
Sex	0.397	0.423	0.512	0.427	0.411	0.719	0.410	0.365	0.418
East	0.296	0.287	0.790	0.281	0.257	0.548	0.250	0.269	0.700
ISCED	4.186	4.098	0.463	3.976	3.941	0.789	4.032	3.942	0.584
Age	39.22	38.82	0.616	38.96	38.59	0.674	40.46	41.31	0.444
Age_sq	1628.4	1609.1	0.759	1613.1	1590.3	0.744	1733.3	1798.7	0.472
Work exp.	12.82	12.05	0.331	12.38	12.20	0.831	14.04	14.78	0.511
Unemp exp.	0.729	0.778	0.709	0.772	0.763	0.954	0.717	0.688	0.860
Disable	0.052	0.052	1.000	0.051	0.051	1.000	0.064	0.115	0.114
German	0.951	0.958	0.699	0.944	0.932	0.579	0.929	0.942	0.645
Married	0.590	0.596	0.870	0.577	0.541	0.421	0.686	0.746	0.261
Inc_Finance	0.476	0.492	0.783	0.427	0.439	0.851	0.538	0.494	0.597
Kids	0.733	0.798	0.412	0.719	0.672	0.570	0.833	0.865	0.784
Height	174.47	174.02	0.556	174.14	174.53	0.636	174.02	173.87	0.877
Father_entrepr	***0.150***	***0.134***	***0.564***	***0.158***	***0.166***	***0.810***	***0.147***	***0.167***	***0.642***
Riskocc04	***4.853***	***4.892***	***0.845***	***4.822***	***4.703***	***0.604***	***4.186***	***4.224***	***0.894***
N	307	307		253	253		156	156	

Source: Authors own calculation.
Notes: Mean values are depicted.

Table S2b. Balancing properties for single nearest neighbor propensity score matching

	Replication of table 8, panel B Employed and unemployed in 2004, with no intent to become an entrepreneur in 2003, *selfemp*			Replication of table 11, panel D Full sample with entrepreneurs entering in 2010, 2011 and 2012, *inc_selfemp*			Replication of table 11, panel E Full sample with entrepreneurs entering in 2010, 2011 and 2012, *selfemp*		
	Mean		**t-test**	**Mean**		**t-test**	**Mean**		**t-test**
Variable	**Treated**	**Control**	**p > | t |**	**Treated**	**Control**	**p > | t |**	**Treated**	**Control**	**p > | t |**
Sex	0.462	0.386	0.215	0.350	0.300	0.638	0.538	0.590	0.653
East	0.242	0.220	0.663	0.125	0.075	0.462	0.128	0.128	1.000
ISCED	3.818	3.886	0.705	4.050	3.875	0.600	3.615	3.769	0.630
Age	40.11	41.33	0.346	41.12	39.40	0.528	39.92	38.33	0.548
Age_sq	1713.1	1825.1	0.294	1842.6	1690.2	0.493	1738.4	1588.4	0.483
Work exp.	13.21	15.17	0.128	15.41	14.06	0.621	14.15	12.93	0.659
Unemp exp.	0.707	0.719	0.950	0.215	0.305	0.560	0.387	0.269	0.465
Disable	0.061	0.083	0.477	0.050	0.000	0.156	0.102	0.120	1.000
German	0.917	0.924	0.821	0.925	0.900	0.697	0.923	0.821	0.180
Married	0.667	0.659	0.987	0.650	0.675	0.816	0.692	0.718	0.807
Inc_Finance	0.515	0.545	0.748	0.375	0.325	0.720	0.436	0.308	0.399
Kids	0.788	0.705	0.474	0.500	0.500	1.000	0.564	0.744	0.490
Height	173.05	174.38	0.238	174.35	176.80	0.275	172.28	172.18	0.960
Father_entrepr	***0.159***	***0.182***	***0.625***	***0.050***	***0.050***	***1.000***	***0.026***	***0.000***	***0.320***
Riskocc04	***4.197***	***4.546***	***0.273***	***4.325***	***4.525***	***0.722***	***4.077***	***3.974***	***0.853***
N	132	132		38	40		38	39	

Source: Authors own calculation.
Notes: Mean values are depicted.