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**Abstract.** This study analyzes how risk attitudes change when individuals become parents using longitudinal data for a large and representative sample of individuals. The results show that men and women experience a considerable increase in risk aversion which already starts as early as two years before becoming a parent, is largest shortly after giving birth and disappears when the child becomes older. These findings show that parenthood leads to considerable changes in individual risk attitudes over time. Thus, analyses using risk preferences as the explanatory variable for economic outcomes should be careful in interpreting the findings as causal effects.

**JEL classification:** D1, D81, J13, J16.

**Keywords**: Risk aversion, risk preferences, preference stability, parenthood, children, gender differences

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## 1. Introduction

Risk preferences are important determinants for almost every economically relevant decision of individuals such as financial investments, consumption, employment and occupational choice. While standard economic models assume risk preferences to be stable over time, the empirical literature has found that they do change as a consequence of negative macro shocks such as natural disasters (Hanaoka et al. 2014, Eckel et al. 2009), civil conflicts (Voors et al. 2012) or financial crises (Guiso et al. 2013). Yet, little is known about the impact of individual-specific life events on preferences. One exception is Sahm (2012) who sheds light on the importance of job displacements and serious health diagnoses. In this paper, we analyze the family-related event of becoming a parent. While some authors have assumed that parenthood increases risk aversion (e.g. DeLeire and Levy 2004), to our knowledge, we are the first to show this empirically.

The analysis is based on representative longitudinal household data containing information on individuals' general risk attitudes in seven panel waves in addition to demographic and family-related information. Applying individual fixed-effects regressions, we investigate whether individuals' risk attitudes change as a consequence of parenthood and (if so) whether it is a permanent change or a transitory one that fades away when children grow old.

This paper contributes to the empirical literature that is concerned with identifying the extent to which risk preferences predict individuals' behavior, for example, with respect to health-related behavior, financial investments (Barsky et al. 1997, Dohmen et al. 2011), occupational choice (Bonin et al. 2007, Caliendo et al. 2009), marriage and childbearing (Schmidt 2008). If risk preferences change as a result of life events that are themselves correlated with the behavioral outcomes of interest, a regression of outcomes on risk preferences without accounting for their endogeneity would produce biased estimates. Parenthood is likely to be correlated with a variety of individual choices which makes this aspect important for a wide range of applications.

Furthermore, due to the different roles of men and women in parenthood, e.g., in giving birth and raising children, we test whether the impact of parenthood on risk attitudes differs by gender. This contributes to the literature concerned with explaining gender differences in economic choices. It could also help to explain the stylized fact that women appear to be more risk averse than men (e.g. Eckel and Grossman 2008). If risk aversion of women reacted more sensitive after childbirth than that of men, this could explain some of the gender gap in risk aversion.

## 2. Data

The analysis relies on data from the German Socio-Economic Panel (SOEP), a representative longitudinal survey of private households in Germany.[1] SOEP includes a question on general risk attitudes in 2004, 2006 and from 2008 to 2012, leaving us a total of seven panel waves of data. The general risk attitude is measured by a survey question on individuals' self-assessed willingness to take risks. The English translation of the risk question reads: "How do you see yourself: Are you generally a person who is willing to take risks or do you try to avoid risks? Please answer on a scale from 0 to 10, where 0 means 'not at all willing to take risks' and 10 means 'very willing to take risks'." Dohmen et al. (2011) show, also using the SOEP data, that this question is behavioral valid and a reliable predictor of actual risk-taking behavior in a paid lottery-type experiment.

The estmation sample is restricted to individuals aged 17 to 64. It covers 29,000 individuals and 107,000 person-year observations. There is hardly any item nonresponse in the question of risk attitudes (0.4 percent) and in the other variables used in the empirical analysis. On average, each individual reports information on his or her risk attitude in three to four panel waves. 6,700 individuals answer the question on risk attitudes in seven waves, 3,000 individuals in six waves and 1,800 in five waves. Taken together these individuals who answer the risk question at least five times account for almost 70 percent of all person-year observations. Within the time period under consideration 1,243 respondents experienced the birth of their first child. This provides ample opportunities to observe individual changes in risk attitudes and parental status over time.

Table 1 displays the summary statistics on the willingness to take risks by gender and parental status. The average risk attitude is 4.68, with women reporting a lower willingness to take risks (4.27) than men (5.14). For both genders alike, childless individuals have a higher risk attitude than parents. When splitting the sample further by years since birth of the first child, risk aversion varies a lot for both genders in a non-systematic way. However, since the descriptive statistics do not account for parents' age that has been shown to correlate with risk aversion (Schurer 2015), a final conclusion can only be drawn from regression results.

[1] The data has been extracted using the Stata add-on-package PanelWhiz v4.0 (Oct 2012). Haisken-DeNew and Hahn (2010) document PanelWhiz.

Table 1 – Summary statistics of individuals' risk attitudes

| | Women | | Men | | All | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD |
| All | 4.27 | 2.21 | 5.14 | 2.21 | 4.68 | 2.26 |
| Without children | 4.67 | 2.19 | 5.33 | 2.21 | 5.04 | 2.23 |
| With children | 4.08 | 2.20 | 4.98 | 2.20 | 4.46 | 2.25 |
| By years since birth of first child | | | | | | |
| < 1 year | 4.12 | 2.11 | 5.19 | 2.16 | 4.61 | 2.20 |
| 1-3 years | 4.33 | 2.15 | 5.25 | 2.10 | 4.76 | 2.17 |
| 4-6 years | 4.28 | 2.14 | 5.19 | 2.13 | 4.70 | 2.18 |
| 7-9 years | 4.13 | 2.17 | 5.17 | 2.19 | 4.61 | 2.24 |
| 10-18 years | 4.16 | 2.17 | 5.10 | 2.18 | 4.60 | 2.22 |
| > 18 years | 3.99 | 2.22 | 4.83 | 2.23 | 4.33 | 2.26 |
| Observations | 56,023 | | 51,061 | | 107,084 | |

## 3. Estimation and results

The aim of the regression analysis is to show how parenthood changes individuals' willingness to take risks. The following regression model is estimated:

$$y_{it} = B_{it}'\beta + X_{it}'\delta + \alpha_i + \varepsilon_{it}$$

where $y$ is the risk attitude of individual $i$ at time $t$ (with t=2004, 2006, 2008-2012). The vector $B$ comprises dummy variables that indicate the time after the birth of the first child: the first year after childbirth ($b_0$) and for each following year up to when the child is aged 6 ($b_1$ to $b_6$). From 6 years after childbirth onwards, the following group dummies are defined: 7 to 9 years, 10 to 12 years, 13 to 15 years, 16 to 18 years and 19 years and above. To look at changes in risk attitudes up to three years before childbirth, we also include the three dummy variables $b_{-3}$ to $b_{-1}$. Any changes before childbirth might indicate that individuals first settle down before becoming parents and that settling down already influences risk preferences. The vector of control variables $X$ comprises age in a cubic specification, year dummies and a binary indicator for the birth of a second child. The latter enables us distinguishing the effect of becoming a parent (by having a first child) from the effect of a subsequent birth. The coefficient $\alpha_i$ comprises individual fixed-effects.

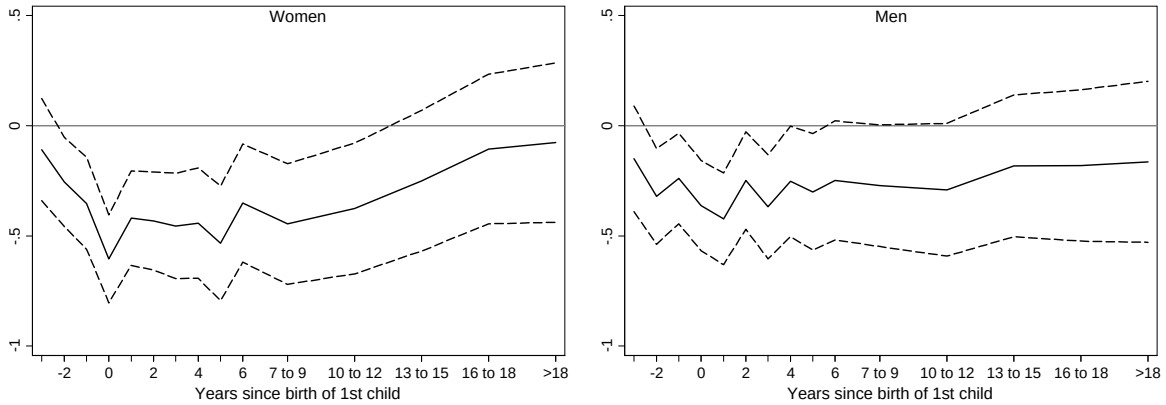
The regression is estimated by applying the linear fixed-effects model. Furthermore, we apply the following three fixed-effects models that take the ordinal nature of the dependent variable into account: the "blow-up and cluster" (BUC) estimator (Baetschmann et al. 2014), the two-step minimum estimator (Das and van Soest 1999), henceforth DvS, and the estimator suggested by Ferrer-i-Carbonell and Frijters (2004), henceforth FCF.

The regression results are presented in Table 2. Since the results from the linear fixed-effects model (Table 2, columns 1 and 5) are basically the same as those from the other models (Table 2, columns 2 to 4 and 6 to 8), the following discussion concentrates on the linear fixed-effects results. For illustrative purposes, Figure 1 depicts the point estimates (solid lines) together with the 90% confidence interval (dashed lines). It can be seen that both women's and men's risk attitude is significantly lower after the birth of the first child and that both become more risk averse as early as two years before the birth of the first child.[2]

For women, Table 2 shows that the size of the decrease in risk attitudes is 0.6 points in the year after the first child was born.[3] This is equivalent to a drop by more than a fourth of a standard deviation. Between $b_1$ and $b_{7\text{-}9}$, the effects are still significantly negative ranging from $-0.35$ to $-0.53$ points. Afterwards, risk attitudes rise continuously and 12 years after the birth of the first child the effect becomes statistically insignificant. Men also become more risk averse around the birth of the first child, but the point estimate is somewhat smaller for them ($-0.36$ points in $b_0$). The level of risk attitudes is lowest in the year when the child is one year old ($-0.42$ points) which is equivalent to a decrease by a fifth of a standard deviation. Five years after childbirth, the effects for men cannot be rejected to differ from zero on a significance level of 10 percent.[4] Figure 1 suggests that the overall pattern of how risk attitudes change as a consequence of parenthood is somewhat flatter for men than for women. However, this suggestion is not supported by statistical tests: There are neither significant gender differences when testing each birth-related coefficient against one another nor are they significant when running a joint test of equality of all gender-specific birth-related coefficients. For the interpretation of the results, note that the impact of having a second child is insignificant which indicates that becoming a parent for the first time changes risk attitudes and not the birth of a second child.

[2] The effects before childbirth do not appear to be driven by marriage. In specifications controlling for marriage or for marital status the results remain unchanged for the birth-related coefficients and the marriage dummy is always insignificant.
[3] Also note that for women the effect in $b_0$ differs significantly from the effect in $b_{-1}$ (p-value 0.0157).
[4] When using the 5 percent significance level, this would be the case three years after childbirth. Also, fewer of the point estimates for men would be considered to differ from zero. In contrast, for women conclusions are the same irrespective of using the 5 or 10 percent significance level.

Figure 1 – Birth of the first child and the evolution of risk attitudes by gender




Note: The figures display the estimated regression coefficients (solid lines) together with the 90% confidence intervals (dashed lines) from the linear fixed-effects models presented in Table 2.

## 4. Conclusion

The results show that risk attitudes are not stable across time. Both men and women become more risk averse after the birth of their first child. This change of risk attitudes starts as early as two years before giving birth and is most pronounced shortly after the birth of the first child. The effect becomes smaller and statistically insignificant when the child grows older. Overall, we find clear evidence that family-related events can change individual risk attitudes. Therefore, in empirical applications that analyze how risk preferences predict individual decision making, risk attitudes cannot be treated as exogenous. Another finding is that the relationship between time since childbirth and risk attitudes does not differ significantly by gender. Thus, we conclude that the consequences of parenthood do not contribute to explaining the empirical finding of a gender gap in risk attitudes.

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Table 2 –The change of risk attitudes after becoming a parent

| | Women | | | | Men | | | |
|---|---|---|---|---|---|---|---|---|
| | Linear FE | BUC | DvS | FCF | Linear FE | BUC | DvS | FCF |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Birth of first child $b_{-3}$ | -0.1086 | -0.1309 | -0.1072 | -0.0990 | -0.1501 | -0.2391 | -0.0732 | -0.2702 |
| | (0.1409) | (0.1815) | (0.1666) | (0.1703) | (0.1458) | (0.1960) | (0.1738) | (0.1908) |
| Birth of first child $b_{-2}$ | -0.2542** | -0.3131** | -0.2080 | -0.2763* | -0.3204** | -0.4842*** | -0.5404*** | -0.4588*** |
| | (0.1232) | (0.1539) | (0.1457) | (0.1519) | (0.1321) | (0.1750) | (0.1589) | (0.1691) |
| Birth of first child $b_{-1}$ | -0.3519*** | -0.4371*** | -0.4204*** | -0.4773*** | -0.2393* | -0.3461** | -0.2905* | -0.2365 |
| | (0.1265) | (0.1610) | (0.1495) | (0.1574) | (0.1249) | (0.1722) | (0.1540) | (0.1709) |
| Birth of first child $b_0$ | -0.6042*** | -0.7790*** | -0.7081*** | -0.6884*** | -0.3623*** | -0.5220*** | -0.4263*** | -0.4126** |
| | (0.1214) | (0.1544) | (0.1462) | (0.1463) | (0.1246) | (0.1672) | (0.1473) | (0.1649) |
| Birth of first child $b_1$ | -0.4193*** | -0.5389*** | -0.4928*** | -0.4251*** | -0.4226*** | -0.5646*** | -0.4783*** | -0.5865*** |
| | (0.1300) | (0.1644) | (0.1554) | (0.1605) | (0.1263) | (0.1709) | (0.1555) | (0.1703) |
| Birth of first child $b_2$ | -0.4324*** | -0.5684*** | -0.5049*** | -0.4919*** | -0.2487* | -0.3818** | -0.3007* | -0.4616*** |
| | (0.1356) | (0.1724) | (0.1620) | (0.1675) | (0.1345) | (0.1795) | (0.1619) | (0.1742) |
| Birth of first child $b_3$ | -0.4546*** | -0.5828*** | -0.5671*** | -0.4871*** | -0.3678** | -0.5115*** | -0.5166*** | -0.4674** |
| | (0.1454) | (0.1834) | (0.1735) | (0.1735) | (0.1439) | (0.1891) | (0.1725) | (0.1844) |
| Birth of first child $b_4$ | -0.4414*** | -0.5617*** | -0.5018*** | -0.4589** | -0.2521* | -0.3893* | -0.3522* | -0.4525** |
| | (0.1522) | (0.1895) | (0.1791) | (0.1843) | (0.1527) | (0.1990) | (0.1797) | (0.1962) |
| Birth of first child $b_5$ | -0.5334*** | -0.6631*** | -0.6085*** | -0.6098*** | -0.3000* | -0.4356** | -0.4413** | -0.4771** |
| | (0.1581) | (0.1972) | (0.1884) | (0.1935) | (0.1605) | (0.2089) | (0.1914) | (0.2009) |
| Birth of first child $b_6$ | -0.3512** | -0.4439** | -0.4093** | -0.3535* | -0.2480 | -0.3563* | -0.3104 | -0.5510*** |
| | (0.1632) | (0.2023) | (0.1927) | (0.1972) | (0.1643) | (0.2140) | (0.1970) | (0.2090) |
| Birth of first child $b_{7-9}$ | -0.4459*** | -0.5704*** | -0.5321*** | -0.4833** | -0.2718 | -0.3990* | -0.3680* | -0.4970** |
| | (0.1664) | (0.2071) | (0.1976) | (0.1992) | (0.1680) | (0.2181) | (0.2017) | (0.2130) |
| Birth of first child $b_{10-12}$ | -0.3755** | -0.4826** | -0.4035* | -0.3854* | -0.2903 | -0.4214* | -0.3944* | -0.4955** |
| | (0.1804) | (0.2242) | (0.2147) | (0.2163) | (0.1832) | (0.2374) | (0.2211) | (0.2304) |
| Birth of first child $b_{13-15}$ | -0.2494 | -0.3178 | -0.2268 | -0.3297 | -0.1820 | -0.2709 | -0.2321 | -0.4803* |
| | (0.1941) | (0.2408) | (0.2316) | (0.2318) | (0.1955) | (0.2530) | (0.2365) | (0.2464) |
| Birth of first child $b_{16-18}$ | -0.1056 | -0.1348 | -0.0573 | -0.1480 | -0.1801 | -0.2630 | -0.2225 | -0.4185 |
| | (0.2063) | (0.2553) | (0.2460) | (0.2464) | (0.2088) | (0.2684) | (0.2523) | (0.2617) |
| Birth of first child $b_{>18}$ | -0.0762 | -0.0958 | -0.0177 | -0.1521 | -0.1636 | -0.2423 | -0.1844 | -0.4341 |
| | (0.2202) | (0.2721) | (0.2626) | (0.2627) | (0.2221) | (0.2844) | (0.2684) | (0.2779) |
| Birth of second child $b_{\geq 0}$ | 0.1106 | 0.1218 | 0.1416 | 0.0656 | 0.0036 | 0.0118 | 0.1026 | 0.1738 |
| | (0.0870) | (0.1046) | (0.0969) | (0.1034) | (0.0934) | (0.1156) | (0.1105) | (0.1104) |
| Age and year effects | yes | yes | yes | yes | yes | yes | yes | yes |
| Observations | 56,023 | 183,116 | 49,978 | 49,978 | 51,061 | 161,716 | 45,272 | 45,272 |

Note: The dependent variable is the self-reported risk attitude measured on a scale from 0 (extremely risk averse) to 10 (very willing to take risks). Estimates account for clustering at the person level.

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