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## Sooner or Later – Economic Insecurity and the Timing of First Birth

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and the Timing of First Birth**

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Michael Kind and Jan Kleibrink<sup>1</sup>

## Sooner or Later – Economic Insecurity and the Timing of First Birth

### Abstract

*Does economic insecurity delay fertility? Using data from the German Socio-Economic Panel (SOEP) for the years 2001-2011, the impact of economic insecurity on the timing of first birth is examined. Focusing on the timing decision within a career context, different measures of insecurity are analyzed. These include subjective and objective influences on the individual and on more aggregate levels. Results show that men are unaffected by the evaluation of the economic situation on their individual level but they complement positive economic situations on the macro-level with fertility. On the contrary, women delay fertility in response to economic insecurity on the individual level but prepone fertility when observing insecurity on the macro-level.*

*JEL Classification: J13*

*Keywords: Economic uncertainty; family formation; timing of birth; survival analysis*

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# 1 Introduction

Demographic change is a major issue in developed countries. Over the past decades, the share of the working-age population has declined as compared to retirees. As a consequence, social security systems are under heavy pressure as the number of contributors decreases whereas the number of receivers increases. In order to reduce the financial pressure on the system in the short run, politicians were forced to readjust social security systems (e.g. the duration of transfers or the total amount of transferred money). As a long-term strategy, politicians have increased incentives to counteract the demographic change. Besides e.g. an attraction of skilled migrants, increasing fertility rates is one objective of policy makers. To achieve the latter, a detailed understanding of the determinants of family planning from an individual perspective is crucial.

In this study, we examine differences in the timing of birth of the first child within the career due to individual and aggregate economic insecurity. We use data from the German Socio-Economic Panel (SOEP) for the years 2001-2011 to examine the impact of individual-level and aggregate-level economic insecurity on the timing of parenthood.

The determinants of fertility have been widely studied in the economic literature. While western societies have witnessed a systematic decline of fertility over the past decades, female education and employment have risen significantly. This observation is the motivation for a large amount of studies analyzing the effect of objective individual characteristics (micro-level) on fertility, e.g. education (e.g. Blossfeld and Huinink, 1991; De Wit and Ravanera, 1998; Liefbroer and Corijn, 1999; Martin, 2000; Gustafsson, 2001; Kreyenfeld, 2004), type of work contract (e.g. De la Rica and Iza, 2005) or unemployment (e.g. Hoem, 2000; Santow et al., 2001; Kreyenfeld, 2004). Next to the papers analyzing the effect of objective determinants, other studies investigate the relationship of subjective measures of economic stability and fertility timing (e.g. Kohler and Kohler, 2002; Kreyenfeld, 2010). Another strand of the literature (e.g. Örsal and Goldstein, 2010; Adsera, 2005) takes a different perspective and analyzes the effect of economic conditions on the macro-level, such as the unemployment rate or GDP of a country, on individual fertility.

While some studies conclude that economic success impacts, or at least is correlated with fertility timing (e.g. Bhaumik and Nugent, 2005; Bernardi, Klärner, and von der Lippe, 2008; Berninger, Weiss, and Wagner, 2011), other studies fail to find an unambiguous, significant relationship (e.g. Kreyenfeld, 2010; Schmitt, 2008).

This study builds on the strategies from micro- and macro-level studies and is thereby the first to analyze measures from different levels of economic insecurity for the same individuals. We start to examine the economic condition from a subjective individual perspective (worries about one's own economic situation) and then switch to objective measures on the individual level by focusing on employment with a temporary contract and past unemployment experience (as e.g. Kreyenfeld, 2010). However, the result might be biased due to endogeneity of micro-level economic insecurity as individuals potentially select themselves into (in)secure jobs. Thus, we withdraw from the economic condition on the individual level towards the economic condition on higher levels. Here, the relationship between the unemployment rate within a respondent's profession and the timing of birth of the first child is analyzed. As one could argue that this might be biased due to the decision of the worker to work in a specific occupation, we advance to an even higher level. Here, we examine the causal impact of nationwide economic conditions (as e.g. Adsera, 2005; Örsal and Goldstein, 2010), measured by the national unemployment rate and the Ifo Business Climate Index. The Ifo Business Climate Index is a subjective evaluation of the macroeconomic situation by leading business men. Thus, it can be argued to be a subjective macro-level indicator. On the macro-level, the issue of endogeneity does not occur. However, there is a trade-off between exogeneity and relevance when we expand our analysis to the macro-level, as the source of economic insecurity is more distant to the individual.

To put it in a nutshell, studies analyzing the determinants of fertility diverge regarding the level (micro vs. macro) and mode (subjective vs. objective) of observed influences as well as the focus of the analysis (education, unemployment, economic stability). While most of these studies remain on one level, this is the first study to analyze different levels of economic insecurity. By using information of the above-mentioned dimensions of economic conditions, we reveal different channels over which economic conditions affect individual's fertility timing in Germany.

Furthermore, the study contributes to the literature concerning the operationalization of the timing information. Past studies (e.g. Kreyenfeld, 2010; Nicoletti and Tanturri, 2008) focus on the timing of birth of the first child with regard to the age of parents. We argue that this timing variable is subject to unobserved heterogeneity that might bias the results. While past studies control for the level of education of parents, they neglect differences in educational biographies that lead to variation in the age when a given level of education is finished. As most of the planned births occur after the end of education, this heterogeneity is an important determinant in the timing decision of fertility. Previous studies have discussed this issue (e.g. Tölke and

Dienwald, 2003; O’Donoghue, Meredith, and O’Shea, 2011) and our study contributes to this literature by including the heterogeneity due to educational biographies in our analysis as we analyze fertility timing within potential labor market experience.

The results show gender differences in the reaction to economic insecurity, explained by different career consequences for fathers and mothers. While men do not react to micro-level insecurity, women do. Being in a fixed-term contract during the decision period leads to a delay of fertility for women. Furthermore, individual unemployment experience in the past delays birth of the first child of women. In good macroeconomic times, women decide to delay parenthood whereas men prepone fertility compared to women. We conclude that economic insecurity is a determinant of family planing that impacts men’s and women’s fertility timing differently. From a policy perspective, this is important as it shows that public support has to offset future parents’ concerns about individual economic insecurity.

The paper is structured as follows: Section 2 explains the econometric strategy, followed by section 3 where the data is described. In section 4, results are presented and discussed while section 5 concludes.

## 2 Empirical Strategy

We start to observe individuals once they finish education and then follow them throughout their career until their first child is born. However, for about 80% of our sample, we do not observe the birth of the first child (i.e. the observation is right-censored). This high share of right-censored observation is mostly due to sample attrition (i.e. individuals drop out of the sample). We assume that this is due to the age group we focus on. As these individuals are in the early stages in their career, they are quite mobile, i.e. they leave their parents’ household, move to a different city. Therefore, they are more likely to drop out of the survey. In order to include information on whether the individual did not experience the birth of the first child until he/she left the sample, a duration model is needed.

We argue that individuals evaluate their fertility timing decision in every period. Thus, economic insecurity of each period is relevant for individual behavior. As a result, the empirical investigation is based on time-varying covariates on a monthly base. As we include monthly information in our model and do not observe clustering of events around specific points in time, we run continuous time duration models.

In this paper, we report the results from a parametric proportional hazard model

assuming a Weibull distribution for the time-event relationship  $\lambda_0$  (see equation 1).

$$\lambda(t|x) = \lambda_0(t, \alpha) \cdot \phi(x, \beta) \tag{1}$$

As robustness checks, we run various other duration models: a COX-Model, piecewise-constant hazard and parametric models with different distributional assumptions (exponential, gombertz). The point estimates changed only slightly in the third decimal place. The COX-Model is the model depending on the least amount of assumptions but delivered a substantially lower degree of fit. The piecewise-constant hazard model, which has been applied most often in the previous literature (e.g. Kreyenfeld, 2010), forces the researcher to assume time periods within which the hazard is constant. As the research question analyzed here does not offer arguments to fix these time periods to certain points in time, we do not see the superiority of this model. Hence, we apply parametric models which are the most efficient if the distributional assumption is correct. As this cannot be tested, we rely on the fit of the regressions. As the fit is at its best when using the parametric models, these models are reported in this study.<sup>1</sup>

In a first step, we pool our sample over men and women and analyze the effect of all abovementioned economic insecurity variables on fertility timing. Then, we interact the economic insecurity variables with a dummy variable for gender. Here, we exploit gender differences in the fertility timing as a reaction to variations in economic insecurity. The birth of a child reflects very different events for men and women. Obviously, women are physically affected and therefore have to leave their job at least on a temporary basis while men do not. Thus, we expect to find differences in the effects.

### 3 Data

For the empirical analysis, we use data from the German Socio-Economic Panel (SOEP), a representative German household panel dataset.<sup>2</sup> We use a pooled sample

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<sup>1</sup>Tables for the robustness checks are available on request. As pointed out before, results change negligibly.

<sup>2</sup>All data were extracted using the Stata Add-on PanelWhiz written by John P. Haisken-DeNew (Haisken-DeNew and Hahn, 2006). For more information on the SOEP, see Haisken-DeNew and Frick (2005) and Wagner, Frick, and Schupp (2007).

of 11 consecutive waves, covering the years 2001 - 2011.<sup>3</sup> As we analyze the impact of economic uncertainty on the timing of birth within individual careers, our sample is restricted to persons in employment. This assumption is crucial for the research question asked here. The focus of this paper is whether individuals are influenced by economic uncertainty when timing fertility within their career. However, if including individuals who are not in employment when making the decision to have a child, one is faced with another source of possible heterogeneity, especially for females. Women might sort out of the labor market before making the timing decision when planning to have children at any time. The case whether female employment in general lowers fertility is widely discussed (for an extensive review of this field of literature, see Kreyenfeld, 2010). This, however, is a different focus of analysis.

It is important to note that our sample focuses on individuals, not couples. This is especially important for the analysis of gender differences. If couples are analyzed there should be no gender differences in the reaction to macro-level variables. Within a household, the timing decision should be equally affected. In this paper, employed individuals are subject to the analysis, where in most cases they are sole income earners within the household (about two thirds of the sample). Thus, gender differences can be exploited.

The SOEP is a panel dataset including observations on a yearly base. Information on the Ifo Index and unemployment rates, which we include from other data sources, as well as information on the dependent variable, the birth of a child, are available on a monthly level. To use this information to the full extend, we reshape the SOEP data to the monthly level. For this, we hold the information of the independent variables from the SOEP, given in the yearly questionnaire, constant for twelve months.

The event analyzed is the birth of the first child. While the operationalization of the timing seems trivial, it is not necessarily straight-forward when taking a closer look. The most obvious approach is to focus on parents' age when having their first child. However, this procedure may lead to a pitfall. Former studies about the determinants of fertility timing have stressed the importance of educational attainment (e.g. Blossfeld and Huinink, 1991; De Wit and Ravanera, 1998; Liefbroer and Corijn, 1999; Martin, 2000). Having children while being in education is an exception and unlikely intentional. Therefore, this analysis concentrates on fertility after the end of education. On average, individuals with higher educational degrees are older when they have their first child. This is accounted for by controlling for the educational attainment in regression analyses. However, this control does not account for the heterogeneity in age when finishing education. For each educational attainment, there is

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<sup>3</sup>Some information for fathers is only available from 2001 onwards.

a mean age of finishing education. When only controlling for the educational degree, one has to make the assumption that the deviations from this mean age are no considerable source of variation. This assumption is highly doubtful. During education, there are numerous sources of procrastination or acceleration, including an early/late school enrollment, repeated years at school or changes in the academic track. The probability of deviations from the mean rises with the level of education. When considering university/ polytechnic graduates, differences within a given educational degree can likely amount to several years (the standard deviation for age when the education is finished for individuals with a high education within our sample is about 5 years). Not taking this into account can bias the results of the econometric analysis. Therefore, we analyze the timing within the career. The SOEP offers information on the age when finishing education. From this age onwards, individuals start their labor market careers. By focusing on this, we are able to avoid a source of heterogeneity and obtain more reliable results.<sup>4</sup>

All independent variables are included with a moving average of a time lag of 17 to 19 months. We take the moving average of observations within this time window to cover the relevant decision period. It naturally takes nine months between conception and the birth of a child. However, using a time lag of nine months does not cover the relevant decision period as the time between the decision to have a child and the actual conception has to be regarded. To consider the relevant decision period, we rely on two findings from previous economic studies. In an early work on family economics, Becker, Duesenberry, and Okun (1960) argue that the time period between the decision to have a child and the birth is 19 months. In a more recent paper on this topic, Miller (2011) argues empirically that it is about 17 months. It is a very restrictive assumption to rely on the observations for one month only because the decision to have a child is hardly formed within one month but a result of a longer decision-making process. We take the moving average of a three-months time horizon between 19 and 17 months before the birth of a child to account for this.<sup>5</sup> Concerning employment with a time-limited work contract, we include a dummy indicating if an individual has this type of contract in all three relevant months.

In the analysis we include 42,165 person-month observations from 1,114 individuals. As standard controls (Table 1), age, education, living in West Germany, migration background, health, marital status and household income are included. One issue mentioned in the literature is that individuals with a high preference for family would

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<sup>4</sup>As robustness checks, we also run our regressions using the age at first birth instead of the career variable. Tables can be found in the Appendix. Results are comparable in size and sign.

<sup>5</sup>Running the regressions with only observations for a single month does not considerably change results qualitatively nor quantitatively.

Table 1: Descriptive Statistics of Personal Characteristics

	Women		Men	
	Mean	Std.Dev.	Mean	Std.Dev.
Low Education (lag)	0.08	(0.27)	0.21	(0.41)
Medium Education (lag)	0.59	(0.49)	0.54	(0.50)
High Education (lag)	0.33	(0.47)	0.25	(0.43)
Migrant (lag)	0.06	(0.23)	0.10	(0.31)
Times in Hospital (lag)	0.11	(0.77)	0.09	(0.60)
West Germany (lag)	0.76	(0.43)	0.81	(0.39)
Public Employee (lag)	0.06	(0.24)	0.07	(0.25)
Self-Employed (lag)	0.05	(0.22)	0.08	(0.27)
Married (lag)	0.25	(0.44)	0.27	(0.44)
HH Income (lag)	2850.61	(1577.81)	3007.45	(1612.42)
N	18368		23753	

Note: Authors' calculations based on the SOEP (2001 - 2011).

select themselves into occupations with a higher security ("Selection Hypothesis"). Hence, the effect measured is biased due to self-selection. By including two dummies in the model that control for self-employment and employment in the public sector, this possible selection process is accounted for, at least for the most extreme cases. While self-employment is connected to a high financial risk, as the owner is responsible not only for earnings but also for losses, working in the public sector reflects the other extreme. On average, those employed in the public sector face a lower uncertainty due to the higher social responsibility of the public sector for its employees. It is argued that both of these variables serve as proxies for the work-family trade-off.

Table 1 shows the descriptive statistics of the abovementioned variables. The first three variables are dummies for educational degrees, an important determinant when analyzing the timing of fertility. Descriptives show that the biggest part of the female as well as the male observations have a medium educational degree, including the highest school degree and/or a vocational education. About one third of the women in our sample have a tertiary educational degree (high education), the share of men is lower with about one quarter of observations. Hence, the share of individuals in the low education category is higher for men. The share of migrants is higher in the male sample with 10% as opposed to 6% in the female sample. The health variable, number of times in hospital per year, is evenly low for men and women. About 80% of the individuals live in West Germany. The two occupational states included to represent high/ low risk occupations are observed for a small share of the sample. 6% of the observed women work in the public sector, 7% are self-employed. The distribution is nearly the same for males (7% in the public sector, 8% self-employed).

As measures of uncertainty, six different measures are included in the model (see Table 2). Since they are highly correlated with each other, they have to be included

separately in our model to avoid multicollinearity.

Table 2: Descriptive Statistics of Insecurity Measures

	Women		Men	
	Mean	Std.Dev.	Mean	Std.Dev.
Subj. Economic Worries (lag)	0.97	(0.66)	0.89	(0.65)
Temp. Contract (lag)	0.18	(0.38)	0.15	(0.36)
Past UE Experience (lag)	0.61	(1.35)	0.47	(1.03)
Unemployment Rate (lag)	9.65	(1.30)	9.70	(1.27)
Occupational UE-rate (lag)	8.74	(6.88)	10.20	(7.38)
Ifo: Climate (lag)	100.39	(7.10)	100.33	(6.89)
Ifo: Situation (lag)	101.34	(9.93)	101.06	(9.65)
Ifo: Expectations (lag)	99.64	(6.15)	99.77	(5.95)
N	18368		23753	

Note: Authors' calculations based on the SOEP.

First, we include a variable on the individual's perception of his own economic situation. The individual is asked "What is your attitude towards the following areas – are you concerned about them?". Then, the questionnaire refers to "Your own economic situation". Individuals respond to this question on a three-point scale and can choose between "Not concerned at all" (coded as 0), "Somewhat concerned"(coded as 1) and "Very concerned"(coded as 2). Descriptives show that individuals are, on average, somewhat concerned about their economic situation. Here, the individuals evaluate all circumstances concerning their economic situation.<sup>6</sup>

The first objective individual level measure used is based on the response to the question: "Is your contract of employment for an unlimited or limited period?". There is no bias due to subjective self-evaluation, but individuals may possess information that is unobservable to the researcher. The effects of a fixed-term contract known in the empirical literature are e.g. worse health and a lower quality in working life (Kompier, Ybema, Janssen, and Taris, 2009). An unlimited contract is beneficial for family planning as it allows the mother to return to the job she has worked in before. A mother who takes a parental leave before she gets an unlimited contract might fear the risk of not being offered an unlimited contract once she returns.

The second objective measure on the individual level controls for individual unemployment spells in the past. Individuals who have been unemployed before might have a high valuation of current employment. Having experienced unemployment might increase preferences for current employment and delay fertility to remain in the job. Here, it is important to remember that our sample consists of employed individuals only.

<sup>6</sup>The individual self-evaluation of the economic situation was also used in a study by Kreyenfeld (2010) using the same dataset.

The country-wide unemployment rate is used as a monthly measure of economic insecurity on a country-wide level. Data are provided by the Statistical Office of Germany. It is assumed that individuals are informed about the level of unemployment and thus form individual expectations of unemployment risks. Then, the unemployment rate is not only important when thinking about the own unemployment risk but it also is widely known and covered in the media, so it creates an overall feeling of economic (un)certainty.

The occupation-specific unemployment rate is a measure of unemployment on an aggregate level, which is linked to the individual. While some occupations might be heavily affected by economic downturns, resulting in high unemployment rates, others might be less sensitive to general economic conditions. Data on occupation-specific unemployment rates is provided by the German Federal Employment Agency<sup>7</sup> and merged to the SOEP data using occupational classifications from the Statistical Office of Germany.

The Ifo Index is provided by the Ifo Institute for Economic Research.<sup>8</sup> The index is published on a monthly level and widely recognized in the population as it receives a lot of media coverage in Germany. In 2012, for example, on more than 20 days, at least one article of Germany's best-selling newspaper included the Ifo Index. Data is collected by sending surveys to about 7,000 participants of firms from different industries. They are supposed to give their evaluation of the current economic situation and their expectation for the next six months. They respond on a three-point scale, where they can judge the current economic situation (business outlook) to be "good" (more favorable), "satisfactory" (unchanged) or "poor" (less favorable). The monthly balance concerning the business situation is the difference in percentage shares between "good" and "poor". Then, the balances are increased by 200 and normalized to the average of the base year, which is currently 2005. Thus, the Ifo Index is calculated according to equation 2.

$$\text{index value} = \frac{\text{balance in the current month} + 200}{\text{average balance in the base year} + 200} * 100 \quad (2)$$

The Ifo Business Climate Index is a combination of the information on the business situation and the expectation. The balance of the business climate is calculated as

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<sup>7</sup>The data is collected and published in the project "Berufe im Spiegel der Statistik" by the Institut für Arbeitsmarkt- und Berufsforschung, the research institute of the German Federal Employment Agency. For further information, see <http://bisd.infoSYS.iab.de/>.

<sup>8</sup>For detailed information, see <http://www.cesifo-group.de/ifoHome/facts/Survey-Results/Business-Climate.html>.

shown in equation 3.

$$\text{business climate} = \sqrt{(\text{situation} + 200)(\text{expectations} + 200)} - 200 \quad (3)$$

Applying this index has several advantages. As there is only one index for the whole country, it is clearly exogenous to the individuals in our sample. As the Ifo surveys are answered by respondents in the firms, there is a subjective component in this quasi-objective variable. Therefore, it includes more information than other macro-variables like GDP. As respondents are asked for the current situation as well as for their future expectations, we can compare individual reactions in terms of fertility to the current situation and future prospects.

As discussed before, all variables included in the analyses are lagged with a moving average from 17 to 19 months, according to findings by Becker, Duesenberry, and Okun (1960) and Miller (2011).

## 4 Results

Table 3 shows the first regression results. The columns of Table 3 show the results of eight separate regressions, each including the abovementioned control variables and one insecurity measure. The first three columns show the results from the individual perspective, the first an individual level subjective measure, the second and third individual level objective measures. Columns four and five show the impact of unemployment rates, the nation-wide unemployment rate and the rate for each occupation. The last three columns show the results of economic security as measured by the Ifo Index.

The hazard ratio of the variable for the subjective economic worries is close to one and insignificant. That we do not observe a statistically significant effect might be traced back to the previously discussed endogeneity problem of subjective variables in analyses regarding the timing of fertility. The result is different for being employed with a temporary contract. Being employed with a temporary contract in the decision period delays parenthood. The hazard ratio of about 0.641 means that in each month, the probability of having the first child, conditional on being childless, is about 35% smaller for those employed by a temporary contract compared to individuals employed with a permanent contract. As having a temporary contract is an insecure employment situation, this result is intuitive. The hazard ratio for having been unemployed in the past is also smaller than 1 and significant at the 5% level. Hence,

Table 3: Parametric Model - Pooled Sample

	1	2	3	4	5	6	7	8
Subjective Economic Worries (lag)	1.044 (0.137)							
Temp. Contract (lag)		0.641* (0.169)						
Past UE Experience (lag)			0.759** (0.098)					
Unemployment Rate (lag)				1.003 (0.177)				
Occupational UE-rate (lag)					0.986 (0.012)			
Ifo: Climate (lag)						0.975 (0.021)		
Ifo: Situation (lag)							0.984 (0.022)	
Ifo: Expectations (lag)								0.976 (0.019)
SC Years	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
N	42121	42121	42121	42121	42121	42121	42121	42121

Note: Authors' calculations based on the SOEP (2001 - 2011) using a parametric survival model. In contrast to the other variables, an increase in the Ifo Index means an improvement of the economic situation. \*\*\* p<0.01; \*\* p<0.5; \* p<0.1.

higher past unemployment experience is associated with a delay of parenthood. Each additional year of unemployment experience reduces the probability of having a child by roughly 25%. As the mean point in career<sup>9</sup> when the first child is born in our sample is around six years, an additional year of unemployment experience accounts for a severe part of potential labor market experience. Thus, the size of the effect is not surprising. Furthermore, as these individuals have experienced unemployment in the past, they strongly focus on their current employment.

The hazard ratios for the unemployment rates, both on the national as well as on the occupational level, are very close to 1 and insignificant. This shows that individuals most likely do not react to the unemployment rates in their fertility decision. Two arguments explain this finding. First, it might be the case that individuals only regard their occupational unemployment rate, when they are either actively or passively looking for a job. Then, the occupational unemployment rate might have an impact on individual fertility timing. However, the individuals observed in this study are currently employed and are therefore unlikely to search for a job. Second, on the nation-wide level, the unemployment rate is regularly reported in the media and thereby more likely to be observed by the public. However, there might be two opposing effects that level each other out. On the one hand, a feeling of economic uncertainty in times of high unemployment rates, which might cause individuals to delay fertility. On the other hand, as we observe employed individuals, their perception of the own economic situation might be relatively more positive as they are better off than others. This might cause them to prepone fertility.

The final set of influences is the evaluation of the economic situation and expectation

<sup>9</sup>Point in career= current age - age when finished education.

in the Ifo Index. We observe hazard ratios smaller than, but close to 1. Thus, the results hint at a negative relationship between fertility and the Ifo Index. Here, the interpretation is different to the other variable of interest in the analysis because a higher index represents a better situation. Hence, the hazard ratios of the Ifo Business Climate Index as well as of the Ifo Business Situation/ Expectation Index hint at a delay of fertility in good economic situations.

The results described here are for the pooled sample and therefore only a first step of the analysis. As previous papers have shown (see e.g. Örsal and Goldstein, 2010), men and women react differently to the economic conditions with regard to fertility decisions. Hence, it might as well be the case that there are opposing effects for men and women, which level out in the pooled sample.

Table 4: Parametric Model - Male Interactions

	1	2	3	4	5	6	7	8
Subjective Economic Worries (lag) * Male	1.410 (0.352)							
Subjective Economic Worries (lag)	0.885 (0.144)							
Temp. Contract (lag)* Male		1.922 (0.950)						
Temp. Contract (lag)		0.470** (0.174)						
Past UE experience (lag)* Male			1.365 (0.333)					
Past UE Experience (lag)			0.657** (0.130)					
Unemployment Rate (lag)*Male				0.992 (0.128)				
Unemployment Rate (lag)				1.006 (0.197)				
Occupational UE-rate (lag) *Male					0.987 (0.026)			
Occupational UE-rate (lag)					0.993 (0.017)			
Ifo: Climate (lag) *Male						1.063*** (0.025)		
Ifo: Climate (lag)						0.951** (0.021)		
Ifo: Situation (lag) *Male							1.042** (0.018)	
Ifo: Situation (lag)							0.965 (0.023)	
Ifo: Expectations (lag) *Male								1.054** (0.027)
Ifo: Expectations (lag)								0.956** (0.019)
SC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	42121	42121	42121	42121	42121	42121	42121	42121

Note: Authors' calculations based on the SOEP (2001 - 2011) using a parametric survival model. In contrast to the other variables, an increase in the Ifo Index means an improvement of the economic situation. \*\*\* p<0.01; \*\* p<0.5; \* p<0.1.

Table 4 is constructed in the same way as Table 3 with the only difference that we now see two coefficients for each model, an interaction of the variables of interest with a dummy variable (1 if male, 0 if female) and the variables of interest. While the economic insecurity variable represents the effect for females, the interaction can be interpreted as the difference in reaction of men compared to women.

For the subjective evaluation of the economic situation, the coefficients are different

for men and women. However, both coefficients remain statistically insignificant.<sup>10</sup> Nevertheless, there is a first hint at the existence of different reactions of men and women. This becomes even clearer for the second individual measure, being employed with a temporary contract. The interaction with the dummy variable "male" is quite large but insignificant, the effect for females is much lower than 1 and statistically significant at the 5% level. Hence, the effect found for the pooled sample is driven by women who delay fertility when they are employed on a temporary contract. For women, the probability of giving birth to their first child, conditional on being employed on a temporary contract in the decision period, is about 50% lower than for women employed on a permanent contract in the decision period. The gender difference can be explained by the different consequences the birth of a child has for mothers and fathers and their careers. First, women have to leave their jobs, at least for some months around the birth. Second, it is still much more common for women in Germany to leave their job for a longer parental leave period than for men. Therefore, female careers are severely affected while this is not necessarily true for males to the same extent. Women with a temporary contract face a high insecurity when leaving their jobs to become mothers as their probability of getting an unlimited contract might be lowered. As a result, they tend to delay fertility into career stages when they have permanent contracts. The second objective measure on the individual level, past unemployment experience, shows comparable results with a significant delaying effect for females and an insignificant interaction with the male dummy. The mechanism behind this is very similar. Women who have experienced unemployment in the past value their current employment highly and do not want to risk a break for the birth of a child.

The individual variables show that men and women react to their individual economic situation differently. The question remains whether this is also true for influences on higher levels of observation.

The empirical results for the two measures of unemployment do not reveal any new insights. As for the pooled regressions, all hazard ratios are close to 1 and statistically insignificant. Hence, we cannot observe a fertility reaction to the unemployment rates.<sup>11</sup>

The measures regarding the Ifo Business Climate Index and the Ifo Business Situa-

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<sup>10</sup> As a robustness check, we include only individuals reporting high economic insecurity. This accounts for the possibility that individuals only react with regard to fertility when they feel in deep trouble. However, these hazard ratios remain insignificant.

<sup>11</sup> To account for the possibility that the unemployment rates remain insignificant because they are included as continuous variables, we run robustness checks including dummy variables indicating whether individuals are in the top quintile of the unemployment rates. The hazard ratios remain insignificant.

tion/ Expectation Index show interesting results. For the first time, the interactions for males are significant.<sup>12</sup> Women, who have a lower labor market participation rate than men, especially after the birth of a child, delay fertility in good economic situations. As it is the common case that women, at least for a certain period of time, leave their job due to fertility, they do this in bad economic situations while they participate in the labor market in better ones. Higher opportunity costs of leaving the labor market when the overall economic situation is good (as argued by e.g. Engelhardt and Prskawetz, 2004) might serve as an explanation of the results for women. On the contrary, interactions show that men prepone childbirth (compared to women) in good economic situations, i.e. they complement fertility and economic upturns.

The implications of having a child on future careers are completely different for men and women. The labor market careers of women become more difficult, are slowed down or even stopped after having a child. Hence, in good economic situations, women are not prone to change their situation by a fertility decision. For men, a child can be seen as a further benefit in good economic times. As males are less affected by the birth of a child, good economic situations can lead to a more secure situation in which fertility is well-timed.

## 5 Conclusion

This study analyses the effect of the economic situation on individual fertility decisions in Germany by applying data from the German Socio-Economic Panel in a survival model framework. For the first time, the effect of economic conditions is evaluated on three levels: (1) the individual level represented by the subjective evaluation of the own economic situation, working on a temporary contract and former unemployment experience, (2) the unemployment rates on the occupational and the nation-wide level and (3) the overall economic situation in the country represented by the Ifo Business Climate Index. This strategy ensures a broad picture of the economic situation by combining objective and subjective evaluations on different levels, avoiding the problem of endogeneity.

Results show that men and women react differently to the economic conditions they are faced with when making their fertility decision. Relatively to women, men pre-

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<sup>12</sup>As explained above, most of the individuals observed are sole income earners of a household. As this is completely different for future mothers and fathers, they react differently to macro-influences. We repeated the macro-level analysis only including individuals not having a currently employed partner. While this lowers the precision of the model fit, the Ifo Index effects are comparable in size and sign.

pone fertility in good economic times, so they complement fertility with economic security. This finding is reasonable because women are still more likely to take a longer career break for a parental leave than men do. Hence, male labor market careers are not as severely affected by the birth of a child and they make this important long-term commitment in secure times.

Results for women are different. On the individual level, women postpone having children when working on a time-limited working contract and when they have experienced unemployment in the past. The careers of women are heavily affected by the birth of a child, many women take a longer maternity leave after the birth and when coming back to the job they might not be able to reach the former level again. This explains the findings on the individual level, as formerly unemployed women delay fertility because they highly value current employment. Time-limited contracts mean that the future employment situation is insecure and a career break in this situation can lower the probability of getting an unlimited contract in the future. Applying the Ifo Business Climate Index, we see that women delay fertility in good economic situation due to high opportunity costs.

The results found in this analysis are of high political relevance. Demographic aging, as a result of declining fertility rates, is an important topic in Germany. The consequences of demographic aging on public finance are manifold and lead to various policy reforms. To counteract this development, it is of societal interest that individuals decide to have a first child early in their lives as this stretches the time frame for further children. This paper shows, for the first time, that individual fertility timing is differently affected by individual- and aggregate-level conditions. Policy makers should be aware of the impact of economic conditions on fertility in order to improve policies that support family formation. For women, it appears to be important to secure labor market participation when and/or after the child is born<sup>13</sup>. For men, the complementary relationship between economic conditions and family formation has to be kept in mind. Policies that buffer the impact of economic downturns on individuals could reduce delays in family formation from men's perspectives.

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<sup>13</sup>For similar evidence on other countries, see e.g. Ellingsæter and Rønsen (1996) and Andersson (2000).

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# Appendix

Table 5: Parametric Model - Pooled Sample - Age at Birth

	1	2	3	4	5	6	7	8
Subjective Economic Worries (lag)	1.067 (0.141)							
Temp. Contract (lag)		0.670 (0.177)						
Past UE Experience (lag)			0.753** (0.098)					
Unemployment Rate (lag)				1.621** (0.320)				
Occupational UE-rate (lag)					0.986 (0.012)			
Ifo: Climate (lag)						0.976 (0.023)		
Ifo: Situation (lag)							0.991 (0.023)	
Ifo: Expectations (lag)								0.973 (0.022)
SC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Years	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	42121	42121	42121	42121	42121	42121	42121	42121

Note: Authors' calculations based on the SOEP (2001 - 2011) using a parametric survival model. In contrast to the other variables, an increase in the Ifo Index means an improvement of the economic situation. \*\*\* p<0.01; \*\* p<0.5; \* p<0.1.

Table 6: Parametric Model - Male Interactions - Age at Birth

	1	2	3	4	5	6	7	8
Subjective Economic Worries (lag) * Male	1.426							
	(0.359)							
Subjective Economic Worries (lag)	0.900							
	(0.146)							
Temp. Contract (lag)* Male		2.194						
		(1.094)						
Temp. Contract (lag)		0.466**						
		(0.173)						
Past UE experience (lag)* Male			1.351					
			(0.344)					
Past UE Experience (lag)			0.655**					
			(0.132)					
Unemployment Rate (lag)*Male				0.958				
				(0.123)				
Unemployment Rate (lag)				1.655**				
				(0.360)				
Occupational UE-rate (lag) *Male					0.988			
					(0.027)			
Occupational UE-rate (lag)					0.992			
					(0.018)			
Ifo: Climate (lag) *Male						1.062**		
						(0.026)		
Ifo: Climate (lag)						0.953**		
						(0.023)		
Ifo: Situation (lag) *Male							1.043**	
							(0.019)	
Ifo: Situation (lag)							0.972	
							(0.024)	
Ifo: Expectations (lag) *Male								1.046*
								(0.027)
Ifo: Expectations (lag)								0.956**
								(0.022)
SC	Yes							
Years	Yes							
N	42121	42121	42121	42121	42121	42121	42121	42121

Note: Authors' calculations based on the SOEP (2001 - 2011) using a parametric survival model. In contrast to the other variables, an increase in the Ifo Index means an improvement of the economic situation. \*\*\* p<0.01; \*\* p<0.5; \* p<0.1.