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Veröffentlichungsversion / Published Version
Arbeitspapier / working paper

Federal Institute for
Population Research

BiB Working Paper 5/2022

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Second Birth Fertility in Germany:

Social Class, Gender, and the Role of Economic Uncertainty

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Abstract:

This study uses a gender and class perspective to study rates of progression to the second birth in Germany. Using data from the German Socio-Economic Panel for the period 1990-2020, we distinguish individuals by whether they are in (a) higher managerial/professional, (b) lower managerial/ professional, (c) skilled manual/higher routine nonmanual, or (d) the nonskilled manual/lower routine nonmanual classes. Our analysis reveals strongly elevated second birth rates among men and women in the managerial classes. We also show that upward mobility after the first birth is associated with higher second birth rates, particularly among men.

Keywords: Fertility, Germany, Uncertainty, Social Class, Employment

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1 Introduction

Classical demography has devoted substantial attention to the issue of class differences in marriage and fertility behaviour. Malthus (1998 [1798]) is unquestionably the most foundational scholar in this context. A general premise of his work is that there is a strong negative class-fertility gradient. He argued that the higher social classes, which at that time were composed of landlords and members of the aristocracy, would limit their number of children out of a "fear of lowering their condition in life" (ibid.: 6). He also assumed that although the lower social classes often lacked the necessary wealth and economic security to support a large family, their unrestrained sexual behaviour would result in high fertility. Malthus' writings certainly reflect a striking degree of presumptuousness and a strong bias towards believing that the behaviour of his own social class was rational and conscientious (Petersen 1990; Pullen 2019). Nevertheless, his framework generated clear and testable hypotheses regarding the association between class, economic security, and fertility behaviour. Notestein (1936: p. 29) later elaborated on this perspective by asserting that class differences would "narrow or perhaps even reverse" if the fertility of the lower classes could be brought "more completely under control".

In contrast to early classical demographic research (Brentano 1910; Malthus 1998 [1798]; Sallume & Notestein 1932; Notestein 1936), contemporary demography has devoted relatively little attention to the role of social class differences in fertility behaviour. Fertility researchers only rarely refer to this concept, and instead tend to focus on differences in birth dynamics by education (e.g., Bartus et al. 2013; Nitsche et. al 2018; Nisén et al. 2021), earnings (e.g., Andersson et al. 2014; Heckman and Walker 1990), or employment (Hofman et al. 2017; Matysiak and Vignoli 2008). However, the role of economic uncertainty in fertility has garnered substantial attention among fertility researchers (Vignoli et al. 2020), particularly in the context of the global financial crisis (e.g., Goldstein et al. 2013; Schneider 2015, 2017) and the recent COVID-19 pandemic (e.g., Guetto et al. 2021).

Given the increase in levels of labour market uncertainty, analyses of differences in behaviour across social classes may help to shed light on contemporary fertility behaviour. Social class originates in the Weberian distinction between "class" (*Klasse*) and "status" (*Stand*). Whereas "status" can be defined simply as prestige, social class is defined through people's labour market positions, which are, in turn, tied to their long-term life chances, their economic

vulnerabilities, and their employment risks (Erikson and Goldthorpe 1992; Goldthorpe 2007, 2010; Grusky and Sørensen 1998). Thus, social class analysis provides firmly theorised and validated occupation-based categories that reflect economic uncertainties.

The main goal of this paper is to elaborate on the concept of social class in the analysis of contemporary fertility behaviour. Moreover, we provide empirical evidence on the relationship between social class and second birth rates in post-reunification Germany. Studying a single parity may be characterised as a "piecemeal approach" (Heckman and Walker 1990, p. 1416). However, assuming that most people have achieved a certain class position by the time they have their first child, the advantage of focusing on the second birth is that it enables us to examine how people's class mobility after the first birth affects their subsequent fertility behaviour. The analysis relies on a proportional hazard model in which we use a piecewise constant specification for the underlying process. Some concerns have been raised that proportional hazard models may conflate timing and quantum effects (Bartus et al. 2013; Kreyenfeld 2002). In a robustness check, we employ a cure fraction model that allows us to separate the two components.

2 Theoretical considerations and prior research

2.1 Prior research on uncertainty and fertility

The Great Recession of 2008 has led to renewed scholarly interest in the role of economic uncertainty in fertility behaviour. This broad strand of the literature includes studies that use objective measures of macroeconomic conditions, such as unemployment and growth, as proxies for uncertainty. Recognising that uncertainty is high when economic conditions are dire, these studies generally agree that fertility rates are procyclical: i.e., they decrease during business cycle troughs, and increase during peaks (Adsera 2005, 2011; Cazzola et al. 2016; Currie et al. 2014; Goldstein et al. 2013; Gozgor et al. 2021; Karaman Örsal & Goldstein 2018; Sobotka et al. 2011). On the one hand, these short-run declines in period fertility may eventually translate into a "true" decline in completed cohort fertility, which implies a decrease in the total number of children that women of a certain cohort will have. On the other hand, these short-run declines in period fertility may be explained in part by postponement. For example, Adsera (2011) found that first and second births occurred later

in European countries that experienced high and persistent unemployment in the 1980s. However, one challenge that most of these studies encounter is that isolating fertility postponement (tempo effect) from a permanent decline in fertility (quantum effect) can be difficult (Sobotka et al., 2011).

In addition to unemployment rates, this strand of the literature has also considered other objective measures of economic uncertainty, including GDP (Luci-Greulich & Thévenon 2014; Matysiak et al. 2021), consumer confidence (Comolli 2017; Schneider 2015), and press coverage of economic developments (Gozgor et al. 2021; Guetto, Morabito et al. 2021; Schneider 2015). These studies have also provided support for the claim that adverse economic conditions are negatively correlated with fertility. Particularly during the global financial crisis of 2007-08, which was characterised by sudden and steep increases in unemployment, firm closures, and, more broadly, negative reports on the state of the economy, Schneider (2015) found that states in the U.S. that were hit hardest by the recession also had the largest decreases in general fertility rates. The fertility declines in these states at the height of the recession were attributed not just to the overall increase in uncertainty and economic hardship in these areas, but also to the increase in contraceptive use among select population subgroups, particularly among unmarried women and women from lower-income backgrounds (Schneider 2015, 2017).

The findings mentioned above are complemented by an equally thick strand of the literature that has used subjective measures of economic uncertainty as determinants of fertility behaviour. These indicators are usually constructed from items in individual and household surveys that ask respondents whether they are worried about their own finances or the general state of the economy. Studies that used subjective measures of economic uncertainty have found that its effect on fertility is more nuanced; that is, that economic uncertainty seems to affect only select population subgroups. Kreyenfeld (2010) and Hofmann and Hohmeyer (2013) have both reported that there is little evidence that economic worries translate into first birth postponement. However, studies that have taken levels of education into account have shown that economic uncertainty accelerates the transition to the first birth among less educated women (Kreyenfeld 2010, 2015). Indeed, there is strong evidence of differences in fertility behaviour in response to economic uncertainty by gender, population subgroup, and birth order.

In addition, a large body of research has examined how economic worries affect not just fertility *behaviour*, but fertility *intentions*. It has, for example, been shown that subjective economic uncertainty negatively affects birth intentions, and that this relationship is more pronounced among men, given that men are often expected to take on a "primary provider role" (Busetta et al. 2019; Fahlén & Oláh 2018; Kuhnt et al. 2021). Finally, a relatively recent strand of the literature has also pointed to the role of future narratives of uncertainty as a driver of fertility intentions (Brauner-Otto & Geist 2018; Gatta et al. 2021; Vignoli et al. 2020).

2.2 Social class position and economic uncertainty

Many of the abovementioned studies have grappled with the question of how a valid operational definition of economic uncertainty can be found. Having children is a long-term and binding commitment. Thus, it is not only people's current economic conditions, but also their future employment prospects that influence their decisions about whether and, if so, when to have children. In this context, the concept "social class", which is well-established in research on social stratification and mobility, provides a potentially useful link. The theoretical backbone of contemporary class concepts is that in capitalist societies, individual life chances are essentially shaped by labour market, occupational, and employment conditions. Thus, social class is not interchangeable with education or income. Instead, it is a well-defined and "parsimonious indicator of the social positions of individuals" that helps us to "better understand fundamental forms of social relations and inequalities to which income is merely epiphenomenal" (Conelly et al. 2016: p. 3). Class researchers typically aggregate similar occupations into broader socioeconomic class categories (Erikson et al. 1979; Goldthorpe 2007; Oesch 2006; Wright 1985). Although class concepts differ with respect to their theoretical underpinnings and the basic mechanisms that are assumed to define and to distinguish classes, the prevalent class schemes, as developed by Erikson et al. (1979), Goldthorpe (2007), Wright (1985), and Oesch (2006), are aligned in terms of their basic occupational distinctions. For this study, the class schema proposed by Goldthorpe (2007) is particularly useful, as it suggests that occupational classes are inherently defined through employment relations. Accordingly, it is assumed that members of the same social classes have similar overall life chances, and are also exposed to similar degrees of economic vulnerability and uncertainty.

Goldthorpe (2007: pp. 110-118) differentiated occupations based on whether the related *tasks are difficult to monitor*, and by whether the *human assets* required for the occupations are specific. At the one extreme are occupations in which the tasks are difficult to monitor. People in these occupations usually have highly specific human assets (knowledge and expertise). At the other extreme are occupations in which the tasks are easy to supervise, and the quantity of work output is easy to measure. Furthermore, the human assets needed in these occupations are not specific. According to Goldthorpe, (2007) the "nature of the tasks" and the "specificity of the human assets" determine the employment relationship. Based on this premise, he identified nine categories, with upper and lower service classes, manual workers, unskilled and semi-skilled laborers, and semi-skilled routine employees making up the main categories (for details, see also the "Data, variables, and analytical strategy" section).

Nonskilled and semi-skilled workers and *routine non-manual employees* are often employed under short-term contracts. This implies that the jobs these workers take generally do not involve a long-term commitment from either the employer or the employee (Erikson and Goldthorpe 1992: p. 41). Thus, the workers in these classes are subject to considerable economic uncertainty. The typical occupations in these classes include waiter, cleaner, shop assistant, housekeeper, taxi driver, and truck or van driver. In contrast to non-/semi-skilled and routine non-manual occupations, occupations in the *upper and lower service classes* are mostly embedded in larger organisations, and "involve a longer term and generally more diffuse exchange" (ibid.: p. 103). Most importantly, the rewards associated with these occupations may include "prospective elements", such as employment security and "well-defined career opportunities" (ibid.: p. 103). Although the service classes have also been affected by the rise of fixed-term contracts, members of these classes generally enjoy greater employment stability than nonskilled and semi-skilled laborers or routine non-manual employees. These occupations include lawyer, scientist, engineer, higher-grade manager, and secondary school teacher (upper service class); as well as nurse, kindergarten teacher, technician, and lower-grade manager (lower service class). The *skilled manual workers* hold an intermediate position. These occupations involve mixed forms of employment relationships. The type of work done is either more difficult to monitor than non-/semi-skilled work, or it requires medium levels of specific human assets/human capital. The typical occupations in this category include machine operator, plumber, and electrician. Although class concepts do not necessarily entail a hierarchical ordering (Conelly et al. 2016), social

classes can be ranked by their degree of employment risk, with levels of economic vulnerability and uncertainty being highest among the semi-skilled and routine workers, and lowest among the upper service class.

2.3 Prior research on occupational class and fertility

While social class is a well-established concept in sociological labour market research, only a relatively thin strand of recent literature has focused on the relationship between social class and fertility. Moreover, while a few of the studies on this topic have employed well-defined class concepts, they have often adopted different strategies for classifying occupations. Some of the early studies, which were published when a large fraction of the population was still working in the agricultural sector, were particularly concerned with the elevated fertility of people working as farmers or farm labourers. An example is the study by Dinkel (1952), who argued that people in different occupations have different "ways of life" in terms of the practices and values that affect fertility. He showed that in the early 20th century, farm owners and labourers had fertility rates that were 40% to 72% higher than those of professionals, depending on the region of residence in the U.S. He attributed this gap in part to the labour needs of farming households (Dinkel 1952; Maloney et al. 2014). Similar patterns have also been observed in Sweden in the mid-1900s, where farmers were shown to have the highest fertility rates among all occupational groups (Dribe and Scalone 2014). More recent work has challenged these findings. For example, Köppen et al. (2017) found a drastic increase in childlessness among male farmers in France starting with the 1960s cohorts.

More recent research has also emphasised the importance of incorporating a gender perspective into explanations of relationships between social class and fertility (Szreter, 2015). It has been reported that since the 1990s in Sweden, women's occupational class has had a U-shaped relationship with the transition to parenthood, with women in low-skilled and high-skilled occupations having higher birth risks than women in middle-skilled occupations (Dribe & Smith, 2021). Research on Austria has found that women whose educational levels typically lead them to have lower-class occupations are less likely to remain childless than women whose educational levels generally lead them to have higher-class occupations (Neyer et al. 2017). Begal and Mills (2013) used data from the Netherlands to study the birth behaviour of women of the 1940–1985 cohort by groups of occupations, and found that women in

teaching-related occupations transitioned relatively quickly to first birth. Their results also indicated that women in communicative jobs (healthcare, teaching) transitioned relatively rapidly to higher-order fertility, while women in technology-related occupations had comparatively low higher-order birth risks.[5] The study that has come closest to using the established sociological concepts of social class is Ekert-Jaffe, et al. (2002). Using data for the 1950s cohorts in England and France, the authors found no strong variation in women's fertility depending on their social class. However, they observed that the second birth rates of women with a spouse in a higher managerial position were well above average.

2.4 Hypotheses

As Goldthorpe (2007) argued, social classes are based on people's occupations and employment positions, which provide them with differing levels of socio-economic resources, including with varying degrees of employment security. Employment security is rooted in the nature of the job-related tasks the employee is expected perform, and on the kind of job contract deemed necessary to incentivise the employee to perform the tasks. Accordingly, class positions differ with respect to employee-employer commitment levels and trust relationships, and in terms of the long-term character of employment contracts. Assuming that fertility choices are long-term, binding biographical decisions that require some degree of economic certainty, it can also be assumed that fertility behaviour differs by social class. Given the more advantaged positions of the upper service class, individuals in this class should have the highest second birth rates; while the semi-skilled and unskilled workers should have the lowest second birth rates (*hypothesis 1*).

Compared to their income and earnings, peoples' class positions are rather stable traits that mirror their long-term employment and lifetime chances. However, the childbearing years coincide with a period in people's lives in which they are typically seeking to advance in their professional career or are participating in education or vocational training. In Germany, as in most other European countries, the age at first birth has risen to about age 30 for women and to about age 32 for men. Although the scholarly literature often assumes that class positions

[5] In the Latin American context, scholars have also examined the class and fertility-nexus (Castro Torres 2021). However, instead of relying on occupation-based class concepts, they measured social class using a large battery of variables, including electricity and water supply.

are rather fixed beyond age 30, upward mobility – and, to a lesser extent, downward mobility – may occur beyond that age. As having a higher class position is linked to greater economic security, we assume that upward mobility will lead to higher second birth rates (*hypothesis 2*).

The analysis is based on data for post-reunification Germany (1990-2020). Important family policy reforms were enacted in this time period in Germany, most notably the expansion of childcare in 2005 and the reform of parental leave benefits in 2007. Scholars have argued that these reforms have been consequential, as they represent a sharp departure from Germany's previously well-established path of providing policy support for a conservative family model centred on the male breadwinner (Fleckenstein 2011). While the full-time employment rates of mothers have increased in recent years, employment patterns after the first birth are still strongly gendered, particularly in western Germany. Against this background, we assume that social class is a stronger predictor of men's than of women's fertility transitions (*hypothesis 3*).

Finally, people's class positions reflect their long-term employment chances and their levels of economic security and vulnerability. Among the benefits of the German Socio-Economic Panel (GSOEP) dataset, which we will use in our investigation, is that it includes not only measures of social class, but also items that estimate levels of economic uncertainty and vulnerability, such as the subjective feeling of having economic worries. This information allows us to study whether and, if so, how this measure correlates with the respondents' social class positions. It also enables us to explore whether the effect of social class is robust to the inclusion of more direct measures of uncertainty. Generally, we expect to find that having economic worries mediates some of the class differences. While we do not conduct a complete mediation analysis, we assume that the effect of social class becomes weaker after controlling for other measures of uncertainty (*hypothesis 4*).

Beyond these four guiding research hypotheses, the analyses will take into account the possibility that social class has a distinct influence on *the timing and the quantum* of second birth fertility. Because they tend to be older when they have their first child, members of the service class are likely to face a "time squeeze" that leads them to progress more rapidly to the second birth than, for example, members of the nonskilled and semi-skilled and the routine non-manual classes, who often have their first child at a younger age. We will use a cure fraction model to check whether a more fine-grained modelling approach that

differentiates between timing and quantum effects generates the same results as standard event history models.

3 Data, variables, and analytical strategy

3.1 Data and analytical sample

Data for this investigation come from the German Socio-Economic Panel (GSOEP) release 37 (Socio-Economic Panel 2022). The GSOEP is a yearly household panel that was launched in 1984. The original sample includes West German respondents and an oversample of migrants from the former labour recruitment countries. Since its inception, various subsamples have been added to this dataset, most prominently an East German subsample in 1990. For this investigation, we use data from the years 1990 to 2020.[6] Thus, the investigation covers post-reunification Germany. We limited the sample to respondents who had a first child from 1990 onwards, and provided valid information on each individual's social class in the year of the first birth. We omitted respondents who were self-employed or farmers when they had their first child, as this group was rather small and heterogenous. Finally, we censored the cases 12 years after the first birth, and restricted the sample to episodes in which the respondents were aged 18 to 55. The final analytical sample includes 2,282 men who fathered 1,161 second children, and 2,819 women who contributed 1,371 births to the study population.

3.2 Variables

Dependent variable. The dependent variable is the transition to the second child, with the process time being measured in months from the birth of the first child to the start of the second pregnancy (i.e., the date of childbirth backdated by nine months). In some cases, the month of childbirth was missing from the data. We imputed the missing information using a random number generator. While we had information on the month of childbirth, information on the time-varying covariates (such as economic worries and subsequent class positions) was

[6] The COVID-19 crisis may have affected fertility in Germany. However, most interviews are conducted at the beginning of the year. As 2020 is the last year when interviews were conducted, only a few 2020 births are included in the analysis.

available only at the time of the interview. We assumed in these cases that the respondents' characteristics were fixed until the next interview. Figure A1 in the appendix plots the survival curves to the birth of the second child by social class and gender. The figure suggests that when the first child was age 10, the probability of having a second child was around 63% which is in line with recent official estimates (Statistisches Bundesamt 2019).[7]

Social class. The key variable of interest is the *class position in the year of first childbirth,* which we treat as a time-constant covariate in the investigation. We have chosen to focus on the class position at first birth in part because it allows us to examine how downward or upward mobility relates to fertility behaviour (see below). We have operationalised the class position using the Erikson Goldthorpe Portocarero (EGP) class schema (Erikson et al. 1979). The version that is adopted in the GSOEP distinguishes nine class positions.[8] We have already removed from the sample the self-employed (with and without employees) and agricultural laborers and farmers because they were a very heterogeneous group, and because farmers comprised only a very small fraction of the population. We also grouped routine service workers and nonskilled manual workers into a single category because the shares of men employed in routine service jobs and the shares of women employed in nonskilled manual jobs were extremely low. If a person was not employed in the year when s/he had a child, we used the person's class position in the previous year. However, some respondents, and particularly women, were not working both in the year when they had child and in the previous year. For these cases, we built a separate category that indicates that the person was not employed (including a small fraction of individuals who were in education). In total, we distinguished the following five class positions:

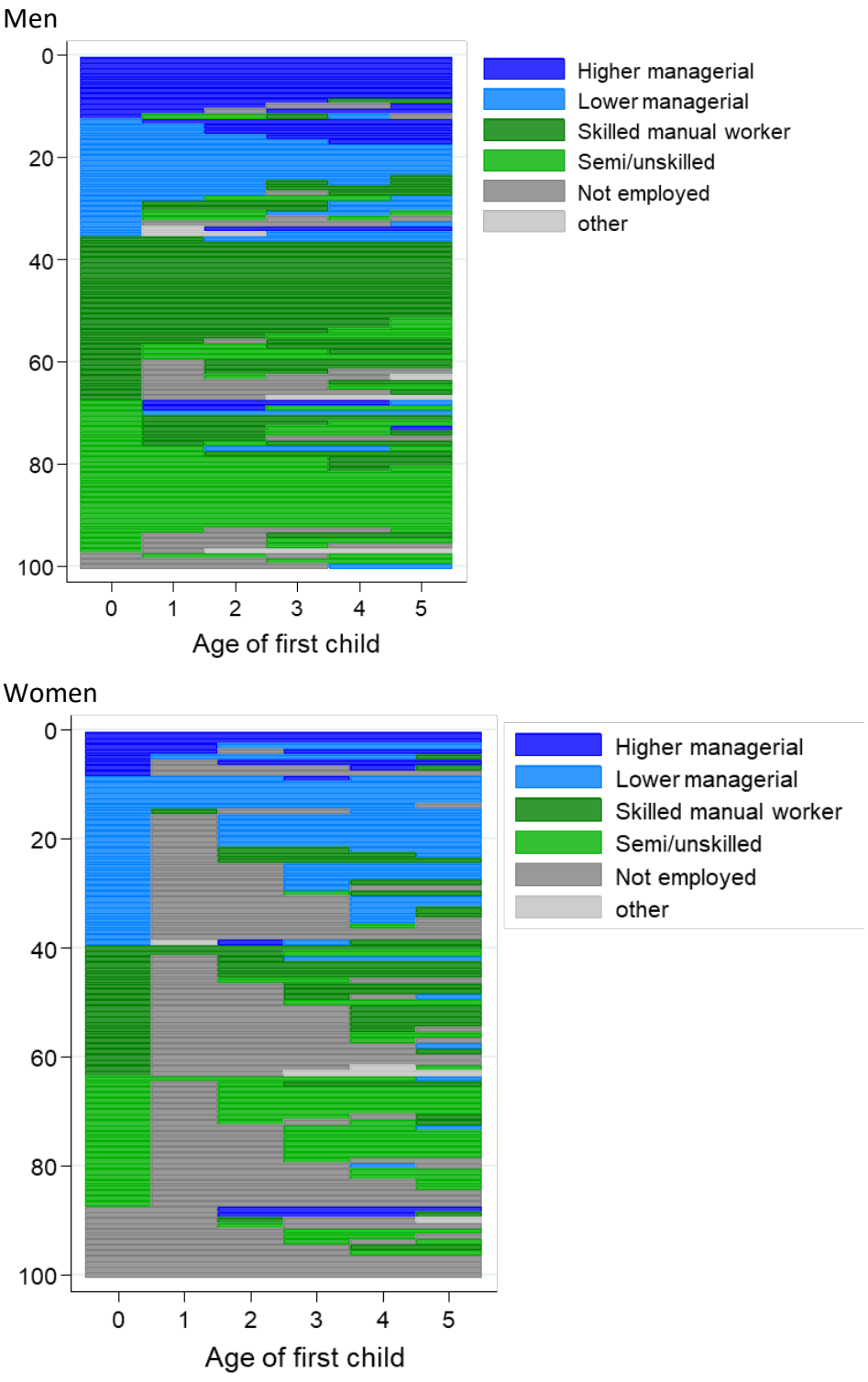
- Upper service class (higher managerial and lower professional class),
- Lower service class (lower managerial and lower professional class),
- Skilled manual class,
- Semi- and unskilled (manual and routine nonmanual) class, and
- Not employed class (including individuals in education).

[7] The parity progression ratio that was calculated based on German vital statistics for women ages 45 to 49 in the year 2018 was about 68% (Statistisches Bundesamt 2019).

[8] Following Goldthorpe (2007) and Erikson et al. (1979), the GSOEP has classified occupations into: I. Higher-grade managers and professionals; II. Lower-grade managers and professionals; IIIa. Higher-grade routine non-manual employees; IIIb. Lower-grade routine non-manual employees; IV. Self-employed; VI. Skilled manual workers; VIIa. Semi- and unskilled manual workers; VIIb. Agricultural workers; IV. Farmers.

Figure 1 provides descriptive insights into the class dynamics for up to five years after the first childbirth. The figures display sequence index plots of 100 women and 100 men randomly selected from the sample. The plots show strongly gendered employment patterns. A larger fraction of men than of women were in the upper service class at the time of their first birth, whereas more women than men were not employed in the year when their first child was born (or in the prior year). We do not observe relevant employment breaks among the men, whereas the women often left the labour market after the first birth. Our finding that the share of men who took leave was low may be surprising, as studies have shown that a significant fraction of German fathers have taken leave since the implementation of the parental leave benefit reform of 2007 (Geisler and Kreyenfeld 2019). This pattern barely shows up in our data, because the duration of the leave taken by men was relatively short in the majority of cases. These episodes are not captured by our analysis, as we only measure the respondents' social class and employment status once per year (at the time of the interview), and assume that their characteristics were fixed until the next interview. The figure also shows a high degree of stability in the respondents' class positions. The overwhelming majority of the men retained their class position in the five years after their first child was born. While the female respondents often took a long break after having their first child, most returned to their prior class position when they re-entered the labour market. If the respondents changed classes, they mostly moved within the service or the manual/routine class, whereas shifts from the service class to the manual/routine class (or vice versa) were rare. Especially for the male respondents, the dominant picture is one of considerable class stability. Thus, for men, the theoretical claim that class membership is a relatively stable employment feature is well supported by our data.

Figure 1: Social class by the age of the first child



Note: 100 randomly selected cases who contributed at least five consecutive years of data after the first childbirth to the analysis. For respondents who were not employed or were on parental leave in the year of the first birth, the social class in the previous year was used. Note that the cases were not censored at the second birth for this representation (unlike in the regression analysis).

Source: SOEP, v37, 1990-2020, unweighted estimates

Social mobility. To capture the effects of *social mobility,* we have generated a variable that combines the class position at the first childbirth and the class position in the years after the childbirth. We distinguish between individuals who remained in the position they had in the year of their first birth and individuals who experienced upward or downward mobility. Here, we assume the following hierarchy of class positions: upper service class > lower service class > skilled manual class > nonskilled and semi-skilled manual/routine classes. A separate category includes the respondents who were not employed either at the first childbirth or in the period that followed. Thus, we do not consider the move from non-employment at the first birth to participation in the labour market as upward mobility. Table 1 reports the sample statistics for social mobility by class and gender. Within the given class framework (disregarding non-employment), it was not possible for members of the upper class to move up, or for members of the semi-skilled and unskilled classes to move down. Thus, upward mobility was possible for the lower and medium social classes only, while the semi-skilled and unskilled classes did not contribute any exposure time to the downward moves. The table provides some relevant insights into the class-specific mobility patterns. While upward moves were rare for women after the first birth, a significant fraction of the men – particularly those who were previously in unskilled or semi-skilled occupations – experienced upward mobility after the first birth.

Economic uncertainty. The GSOEP includes various measures of economic uncertainty, which allows us to examine how these measures are correlated with class positions. In our analysis, we use the subjective feeling of having *economic worries.* The respondents' economic worries were operationalised with a survey question that asked them whether they were very worried, somewhat worried, or not worried about their personal financial situation. In line with our theoretical expectations, we observe that the respondents' financial worries varied considerably depending on their class position. For example, individuals who were in a semi-skilled or an unskilled position were three times more likely than members of the upper service class to report being very worried about their economic situation (Table 1). Moreover, individuals who were not working at the first birth also indicated that they were very concerned about their economic situation. The patterns were similar for both women and men, but the association was slightly stronger for the women than for the men (Spearman's rank correlation coefficient was -0.23 for women and -0.17 for men).

Socio-demographic controls. The regression analysis also controls for the standard socio-demographic variables (the table with the complete summary statistics is included in the appendix, see Tables A1 and A2). We account for *the duration since the previous birth* (baseline hazard). Region is included in the models by distinguishing between West and East Germany (including West Berlin). We also control for migration background, and differentiate between natives and individuals with a *migration background*. *Age at childbearing* is another important control. This variable may be a confounder, as it could be strongly correlated with social status, and it may have a distinct influence on the timing and the quantum of fertility. Table 1 provides support for the assumption that there was a strong age gradient in first childbearing by social class. The average age at first childbearing was much higher among the respondents in the upper service class than among the respondents in the manual and routine occupations.

Table 1a: Economic worries by social class, distribution by person-years, men, column %

	Men's social class in the year of the first birth				
	Upper service	**Lower service**	**Skilled manual**	**Semi/unskilled**	**Not employed**
Social mobility					
Stable	86	73	71	66	-
Upward	-	11	8	19	-
Downward	11	11	9	-	-
Not employed	3	5	11	14	100
Economic worries					
Very worried	9	13	24	27	34
Somewhat worried	50	51	54	55	49
Not worried	41	36	22	18	17
Age at first birth					
Mean	34.1	33.5	29.9	29.3	27.8

Table 1b: Economic worries by social class, distribution by person-years, women, column %

	Women's social class in the year of the first birth				
	Upper service	**Lower service**	**Skilled manual**	**Semi/unskilled**	**Not employed**
Social mobility					
Stable	52	49	42	40	-
Upward	-	3	6	10	-
Downward	13	10	6	-	-
Not employed	35	38	45	50	100
Economic worries					
Very worried	11	16	22	30	29
Somewhat worried	54	57	60	55	52
Not worried	35	27	19	15	19
Age at first birth					
Mean	32.1	30.3	28.5	27.0	25.0

Note: Sample includes persons at risk of a second birth. For the distribution of economic worries, person with missing information for that particular variable were excluded.

Source: SOEP, v37, 1990-2020, unweighted estimates

3.3 Analytical strategy

3.3.1 Main analysis

Our analytical strategy consists of two steps. In a first step, we use a piecewise constant model to estimate the transition rates to the second child. The piecewise constant model is particularly suitable for studying vital events, such as birth dynamics (Hoem 1987; Hoem and Hoem 1989). Like the Cox model, it belongs to the large group of proportional hazard models.

However, unlike the Cox model, it provides parameter estimates for the baseline hazard, which allows the researcher to better grasp the underlying process. The baseline hazard in our analysis is the duration since the last birth. The baseline h_0(t) is partitioned into different pieces, while the hazard is assumed to be constant within the respective segments. In our model, time t is partitioned into four segments: i.e., into 0-23, 24-47, 48-71, and 72-143 months after the first childbirth. The hazard at time t, given a set of X covariates, is defined as:

$$h(t|X) = h_0(t) \times \exp(\beta x) \quad (1)$$

while the baseline hazard is defined as follows:

$$h_0(t) = \begin{cases} h_1, t(0, \tau_1\ ], \\ h_2, t(\tau_1, \tau_2\ ], \\ h_3, t(\tau_2, \tau_3\ ], \\ h_4, t(\tau_3, \tau_4\ ] \end{cases} \quad (2)$$

The main covariates in the first model (M1 for men and W1 for women) are the variables for social class position and class mobility. In a second model (M2 for men and W2 for women), we also account for the subjective feeling of uncertainty.

3.3.2 Robustness checks

The descriptive statistics (see Table 1) show that the age at first birth varied systematically by social class. This finding may have implications for the model's assumptions. Individuals who were older when they had their first child may have faced a "time squeeze" that led them to progress rapidly to having a second child. Thus, the elevated birth rates may indicate that individuals who were older when they had their first child were less likely to have a second child, but spaced their first and second births closer together when they did have a second child. As the age at first childbearing and social class are so closely related, the failure to properly model the influence of the age at first birth on second birth rates may lead to biased results.

We employ a cure fraction model to separate the timing and the quantum effects. There are two broad families of cure fraction models. First, the mixture cure model (Berkson and Gage 1952) that relies on a survival function written as a mixture of two components, one corresponding to the proportion of "immune" subjects in the population (those who never have a second child), and a second one corresponding to the survival function of the

population who will experience the event (see e.g., Beaujouan and Solaz 2013 in a fertility context). Second, the promotion-time model, also named the bounded cumulative hazard model (Yakovlev and Tsodikov 1996), which has recently been employed in fertility research as well (e.g., Bremhorst et al. 2016). This approach explicitly acknowledges that the population survival function $S_p(t)$ converges (when $t > T$) to a non-zero value π corresponding to the 'immune' fraction. In our context, T would denote the minimum number of months after the first birth after which it is reasonable to conclude that subjects with one child will not have a second, π denoting the expected proportion of subjects in this situation. It implies that the cumulative hazard function $H_p(t)$ is bounded by $\theta = -\log(\pi)$ and can be written as $H_p(t) = \theta F(t)$ where $F(t)$ is a cumulative distribution function such that $F(0) = 0$ and $F(t) = 1.0$ when $t > T$. The associated density function $f(t)$ can be viewed as a normalized form of the population hazard function $h_p(t) = \theta \times f(t)$ governing the dynamics of events. A flexible spline-based form for $f(t)$ will be considered. Covariates x can enter the specification of θ and $F(t)$ using $\theta(x) = \exp(\beta_0 + \beta' x)$ and $S(t|x) = 1 - F(t|x) = S_0(t)^{\exp(\gamma' x)}$.[9] The promotion-time model has been formalised for models with time-constant covariates, but the inclusion of time-varying covariates is still an emerging topic in the statistical literature (see Lambert and Bremhorst (2020) and Lambert & Kreyenfeld (2022) for recent proposals). For this reason, we will stick to the values found for the covariates at the first birth. As this is not possible for social mobility or economic worries, we omit these variables from this part of the investigation.

4 Results

4.1 Social class, social mobility, and second birth fertility

Table 2 reports the results from a set of event history models that estimated the likelihood of the transition to the second child. All models report a consistent pattern with respect to the control variables: i.e., the second birth rates are highest two to three years after the first childbirth. Furthermore, there is a strong negative correlation between the age at first childbirth and the progression rates to the next childbirth. Moreover, the second birth rates

[9] Note that identification issues can arise if the follow-up is not sufficiently long to observe the 'plateau' in the population survival function (see Bremhorst and Lambert 2016; Lambert and Bremhorst 2019)

are roughly 50% lower in East than in West Germany. This finding is very much in line with prior research on the East-West differences in higher-order childbearing behaviour (Arránz Becker et al. 2010). We find no relevant differences between native and migrant populations. This may be surprising, as it is often assumed that the migrant population has higher fertility than the native population. It should be noted that this study focuses on second-order births, for which native-migrant differences tend to be less pronounced. Furthermore, apart from migrants of Turkish origin, many of the more recent migrants in Germany come from Central and Eastern European countries that are characterised by low second birth rates.

The analysis also shows that the men's social class when they had their first child is strongly related to their second birth behaviour (Model M1): i.e., the lower the social class, the lower the second birth rate. The group that stands out is semi-skilled and unskilled men, as their second birth rate is 50% lower than that of the reference group (upper service class positions). The pattern for women is similar, but the differences are attenuated (Model W1). Class mobility also plays out differently for women and men. Among men, upward mobility is associated with an increase of roughly 30% in the second birth rate, while downward mobility and non-employment are unrelated to the second birth rate. The parameter for upward mobility for women is in the same direction and of similar magnitude as for men, but it is only weakly significantly different from the reference category (stable class position). This weak significance may not come as a surprise, given the small fraction of women who experienced social upward mobility after their first birth (see Table 1 as well as Table A2 in the appendix).

Models M2 and W2 display the results from the models that include the additional measures of economic uncertainty (subjective economic worries). While the men's economic worries do not seem to influence the second birth rates (Model M2), the women's economic worries are associated with a postponement of second childbearing (Model W2). The second birth rates of women who reported being very worried are 21% lower than those of women who reported being not worried. Women who said they are somewhat worried have a birth rate that is 14% lower than that of the reference category. While this effect seems strong, the inclusion of this variable does not greatly affect the class pattern. Thus, among women, there seems to be an independent effect of subjective worries that is not captured by their own class position.

Table 2: Piecewise constant event history model. Relative second birth risks (hazard ratios).

	Men				Women			
	M1		**M2**		**W1**		**W2**	
Age of first child								
Age first child 0-1	Ref.		Ref.		Ref.		Ref.	
Age first child 2-3	1.65	***	1.65	***	1.58	***	1.58	***
Age first child 4-5	0.81	**	0.81	**	0.84	*	0.85	*
Age first child 6-11	0.32	***	0.32	***	0.34	***	0.34	***
Age at first birth								
Age 18-23	0.99		1.00		1.02		1.05	
Age 24-28	1.12		1.12		1.00		1.01	
Age 29-32	Ref.		Ref.		Ref.		Ref.	
Age 33-55	0.73	***	0.72	***	0.48	***	0.48	***
Region								
West Germany	Ref.		Ref.		Ref.		Ref.	
East Germany	0.60	***	0.60	***	0.68	***	0.69	***
Migration background								
Native	Ref.		Ref.		Ref.		Ref.	
Migration background	1.01		1.01		1.07		1.08	
Social class at first birth								
Upper service	Ref.		Ref.		Ref.		Ref.	
Lower service	0.73	***	0.73	***	0.72	***	0.73	***
Skilled manual	0.68	***	0.67	***	0.75	***	0.78	**
Semi/unskilled	0.50	***	0.49	***	0.56	***	0.60	***
Not employed	0.77		0.77		0.58	***	0.60	***
Social mobility								
Upward	1.29	***	1.31	***	1.34	**	1.33	*
Stable	Ref.		Ref.		Ref.		Ref.	
Downward	0.85		0.85		0.98		0.98	
Not employed	0.88		0.90		1.15	**	1.16	**
Financial worries								
Very worried			1.00				0.79	***
Somewhat worried			1.14	*			0.86	*
Not worried			Ref.				Ref.	

Note: Further variables in the model for 'other' social mobility and 'missing' for economic worries. * p<0.1; ** p<0.05; *** p<0.01

Source: SOEP, v37, 1990-2020. Own unweighted estimates.

4.2 Timing and quantum effects

Table 3 reports the results from the cure fraction models. The model results for the male sample shows that the previously reported 'class effects' are mainly quantum effects. Thus, we can ascertain that there is a strong and positive class and fertility nexus. The members of the upper service class are the most likely to progress to the second birth, and the semi/unskilled workers and routine non-manual laborers are the least likely to have a second child. We also find that the age at first fatherhood has a distinct influence on the timing and the quantum of male second birth fertility. While a late age at first fatherhood leads to the first and second child being more closely spaced, it lowers the quantum of fertility. As regards to the control variables, we find no significant effect for migration background. Further, the reduced hazard rate that we found for East Germany in the previous investigation seems to be related particularly to quantum effects.

In many respects, the results for the female sample concur with the results for the male sample. Most of the class differences can be attributed to quantum effects. A pronounced pattern is found for women who were not employed in the year of the first childbirth: i.e., they are rather unlikely to have a second child, but if they have a second child, they often have it at short durations after first birth. The age at first childbearing has the same effect in the female sample as in the male sample. An early age at childbearing increases the quantum, but it also increases the birth interval. Late childbearing has the opposite effect, as it lowers the quantum, but it shortens the birth interval.

Table 3: Cure fraction model. Relative second birth risks (hazard ratios)

	Men				Women			
	Quantum		Timing		Quantum		Timing	
Age at first birth								
Age 18-23	1.05		0.80	**	1.33	***	0.59	***
Age 24-28	1.19	**	0.86		1.15	**	0.73	***
Age 29-32	Ref.		Ref.		Ref.		Ref.	
Age 33-55	0.61	***	1.48	***	0.44	***	1.45	***
Region								
West Germany	Ref.		Ref.		Ref.		Ref.	
East Germany	0.63	***	0.88		0.75	***	0.77	***
Migration background								
Native	Ref.		Ref.		Ref.		Ref.	
Migration background	1.12		0.81		1.05		1.02	
Social class at first birth								
Upper service	Ref.		Ref.		Ref.		Ref.	
Lower service	0.77	***	0.92		0.69	***	1.14	
Skilled manual	0.75	***	0.84		0.72	**	1.25	**
Semi/unskilled	0.53	***	0.96		0.57	***	1.14	
Not employed	0.68	***	1.14		0.56	***	1.38	***

Note: * p<0.1; ** p<0.05; *** p<0.01

Source: SOEP, v37, 1990-2020. Own unweighted estimates.

5 Conclusion

While classical demography had a strong interest in the relationship between social class and fertility, contemporary fertility research rarely uses the class concept to investigate birth behaviour. Instead, scholars mostly focus on income, education, and employment when examining how labour market conditions are related to fertility behaviour. However, the global financial crisis, the COVID-19 pandemic, and, more recently, the recession that is expected to follow the Russian war of aggression in Ukraine, have led to increasing scholarly interest in the uncertainty and fertility nexus. Nonetheless, there is still considerable ambivalence about how to properly operationalise economic uncertainty and long-term employment chances. In this context, it is conspicuous that most demographers have failed to take into consideration the large body of sociological work on the relationship between social class, economic vulnerability, and life chances. We argued in this paper that social class is a well-theorised concept with firmly validated categories that has been effectively employed in

sociological labour market research, and that can also prove useful in demographic investigations.

The empirical part of this investigation focused on second birth fertility in post-reunification Germany (1990-2020). We chose to look at second childbearing in order to explore how class mobility after the first childbirth affected birth behaviour. The results of the descriptive investigation indicated that there was considerable stability in men's class positions after the first birth. The findings also indicated that while women often took a break from employment after the first childbirth, they were usually able to retain their previous class position when they re-entered the labour market. These results may be explained in part by the parental leave regulations in Germany, which shield parents from downward mobility when they take leave. However, the descriptive statistics also showed that women were less likely than men to experience upward mobility. Furthermore, while we found that moving up the social ladder increased men's second birth risks significantly, we only observed a statistically weak association between women's mobility and their second birth fertility. We also found that the association between social class and second birth fertility was stronger in the male than in the female sample. Nevertheless, the overall pattern was similar for both genders, with members of the upper service classes having the highest birth rates, and members of the nonskilled manual/lower routine nonmanual classes having the lowest birth rates. We also examined the question of whether subjective feelings of uncertainty explained the differences by class. Our findings indicated that while having financial worries was associated with lower second birth rates, particularly among the female sample, the inclusion of this variable did not change the class patterns. An important methodological question we considered was whether the model results would be robust if timing and quantum effects were differentiated. To this end, we employed cure fraction models. The cure fraction model showed that the age at first childbearing had a very different impact on the timing and the quantum of fertility: i.e., a later age at childbirth reduced the quantum, but it led to a closer spacing of the first and the second child. The model also showed that the class differences were mostly quantum effects.

While our investigation generated novel results on the class-fertility nexus, there are important limitations to this investigation that should be mentioned. *First,* we focused on second births. As the transition to the first birth usually coincides with the phase of life when people are getting established in the labour market, first birth analyses would have required

additional considerations. Moreover, as higher-order births are rare in Germany, we would not have sufficient case numbers to study third- or higher-order births. Thus, while our focus on second births may be justified, our focus on a single transition may still be characterised as a "piecemeal approach" (Heckman and Walker 1990, p. 1416). We cannot rule out the possibility that the patterns for other birth parties are different from the patterns we found for second births. *Second,* we adopted a gender perspective by analysing the male and the female sample separately. Alternatively, we could have adopted a couple perspective, which would have allowed us to also examine whether the woman's class position had an independent effect after the man's characteristics were included (and vice versa). However, as there is strong selection into partnerships that tends to be correlated with class characteristics, we decided against conducting a couple-level analysis. *Finally*, we assumed that social class is a solid and firmly validated indicator of economic uncertainty, economic vulnerability, and long-term life chances. The GSOEP offers various additional variables that indicate different facets of economic uncertainty and economic standing (e.g., labour market earnings, term-limited working contracts, worries about global economic development). Among the many variables that this dataset offers, we picked having financial worries to illustrate how social class correlates with other measures of economic insecurity. We also included this variable in our model, but it did not ultimately explain much of the class differences. The "stepwise procedure" we used may be criticised for failing to sufficiently take into account that other measures of uncertainty may be on the causal path between social class and fertility behaviour. A mediation analysis would have been more suitable here (Kuha et al. 2021). The questions of whether and, if so, how social class relates to other measures and dimensions of uncertainty have to be left for future research.

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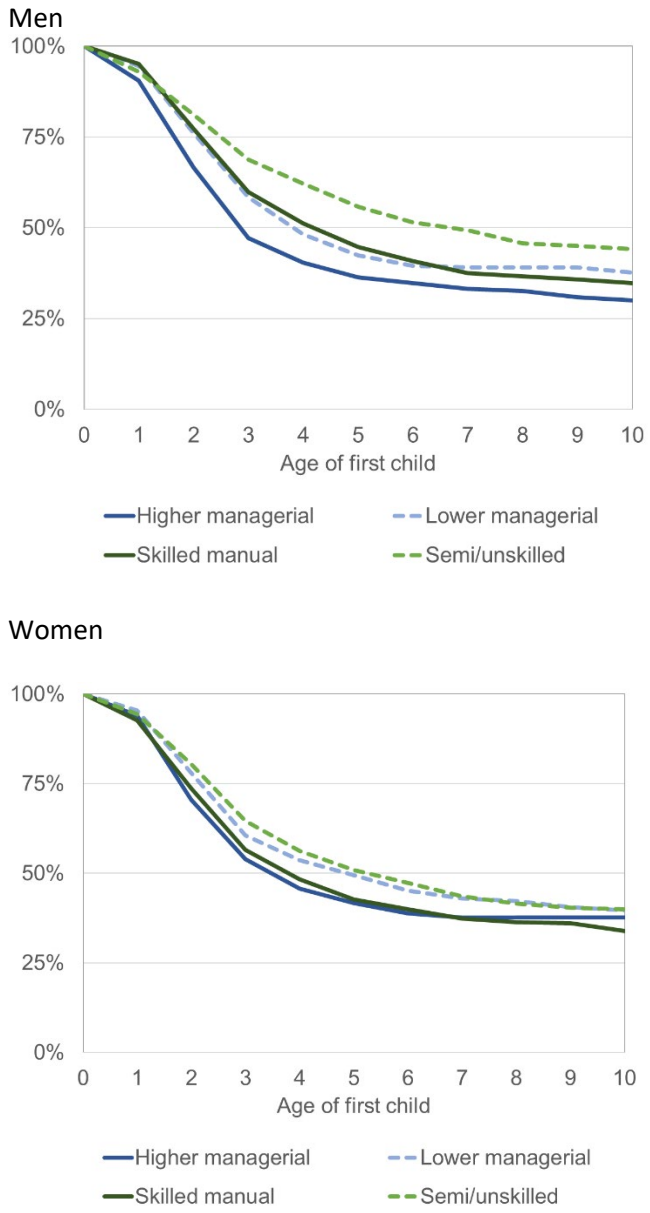
Appendix

Figure A1: Kaplan-Meier survival functions to the second birth by social class at the first birth and gender



Note: It should be noted that the survivals are not weighted. As the GSOEP oversamples certain groups, such as migrant populations and East Germans, caution is advised when considering the descriptive results, as they do not control for migration status and region (as is done in the multiple regression). Individuals who were unemployed when they had their first child are not included, as they represent an only small fraction of the men, and including them would have resulted in unstable estimates of the survival curves.

Source: SOEP, v37, 1990-2020. Own unweighted estimates.

Table A1: Sample statistics, time-constant covariates, column %

	Men	Women
Social class in the year of the first birth		
Higher managerial	19	10
Lower managerial	19	26
Skilled manual	36	24
Semi/unskilled manual	19	23
Not employed	7	18
Migration background		
Native	70	71
Migration background	30	29
Sample size		
Persons	2,283	2,819
Second births	1,161	1,371

Source: SOEP, v37, 1990-2020, unweighted estimates

Table A2: Sample statistics, time-varying covariates by person-months, column %

	Men	Women
Mobility		
Stable	67	38
Upward	9	5
Downward	7	5
Not employed	14	52
Other	2	1
Financial worries		
No worries	20	22
Stable	53	56
Great worries	27	21
Region		
West Germany	78	77
East Germany	22	23
Sample size		
Person-months	108,241	132,384
Second births	1,161	1,371

Note: There are some few (<1%) missings for financial worries.

Source: SOEP, v37, 1990-2020, unweighted estimates