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Fertility data for German-speaking countries
What is the potential? Where are the pitfalls?

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This paper gives an overview of fertility data for Germany, Austria and Switzerland. Particular attention is given to the availability of order-specific fertility data. We discuss the quality of data provided by the Statistical Offices, both birth registration data and censuses or microcensuses. In addition, we explore how social science surveys can be used to generate order-specific fertility indicators, and compare fertility estimates across surveys with estimates from vital statistics. Prior studies have shown that there is a 'family bias' in most surveys, with the fertility of the younger cohorts being overstated, because respondents with young children are easier to reach by the interviewers. Our assessment of various types of surveys from the three different countries does mostly support this notion. However, the 'family bias' is most pronounced in family surveys while all-purpose surveys suffer from it to a lesser extent. Weighting the data does not fully cure the 'family bias', which we attribute to the fact that number of children is not usually considered a factor in calculating sample weights, as provided by the survey agencies and Statistical Offices. The confounding role of migration in the production of reliable and comparable fertility statistics is also discussed.

Keywords: Cohort Fertility, Vital Statistics, Germany, Austria, Switzerland, Survey Data, Census Data, Childlessness

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1 Introduction

1.1 Research question and structure of paper

Fertility measures – such as the total number of children, the share of childlessness or the mean age at childbirth – are key indicators of the demographic behaviour of a population. These indicators are regularly published by the national Statistical Offices and they are also included in international demographic databases, such as those compiled by the Council of Europe, the United Nations Populations Division and Eurostat. Fertility data derived from vital statistics data are assumed to be of high quality as events like births are precisely recorded by official registrars and because they cover the total population. However, the desired level of detail is commonly not covered in vital statistics. This is particularly true for Austria, Germany and Switzerland. These countries have in common that vital statistics did not, until recently, provide order-specific fertility information. As a consequence, important demographic indicators, such as the mean age at first birth or the level of childlessness, could not be generated based on vital statistics data.

Vital statistics have been reformed and the Statistical Offices of Austria, Germany and Switzerland are all now collecting births by biological order. Germany reformed their vital statistics in 2008, Switzerland in 2006, while Austria had already done so in 1984. Despite these improvements of vital statistics data, we still do not have long time series that give us an idea of how order-specific birth behaviour has developed over time. Neither can we derive cohort-specific data from birth registration data, as one needs data for the entire reproductive live of a cohort if one wants to, for example, generate the prevalence of childlessness by birth cohort.

Given these shortcomings of vital statistics, the question arises as to whether survey data are able to provide reliable fertility indicators. Various assessments of surveys for deriving fertility indicators have been made in the past, examining for example the United States fertility surveys (Swicegood et al. 1984); the Italian Fertility and Family Survey (FFS) and Multiscopo (Rendall et al. 1999); the German Generations and Gender Survey (GGS) (Kreyenfeld et al. 2010); the GGS of Bulgaria, Hungary and Georgia (Burkimsher 2009); and FFS data from the 24 participating countries (Festy and Prioux 2002). While these studies have primarily focused on the female

population, also attempts have also been made to validate the responses that males provide in surveys (Rendall et al. 1999). There is some dispute regarding the validity of the responses of unmarried men who seem to underreport children who they do not co-reside with. Nevertheless, a general presumption of these prior studies is that the birth of a child is a hard fact in a person's life. Compared to employment or residential histories, it should therefore be possible to collect fertility histories without much decrement in data quality.

However, fertility indicators derived from surveys still suffer several limitations. In most cases sample sizes are too small and time periods are too short to demonstrate long time trends or to cover many birth cohorts. Furthermore, fertility information is mostly gathered retrospectively. Only respondents that have survived up to the time of interview can be covered in surveys and selection upon survival might bias fertility estimates (Murphy 2009). Surveys invariably disregard the mobile population who have left the country before interview, but do include people who might not have lived their whole reproductive life in the respective country. This means that fertility estimates based on survey data must, by definition, deviate from vital statistics, because the study population differs. Additionally, surveys suffer from unit- and item-non-response. And, most importantly, individuals of certain socio-demographic characteristics may be under-represented or over-represented in the sample. In particular, women with children tend to be over-sampled in social science surveys, because interviewers are better able to reach them as they are at home where they care for their children. This argument was raised by Festy and Prioux (2002) who evaluated the fertility information from the Fertility and Family Surveys. They conclude that

> "(…) married women with children are probably easier to interview than single childless women. The more recent the period, the greater the over-representation of women with children. The clear reason for this is that mothers with newborn children are probably easier to 'catch' than other women, because they spend more time at home where interviewers can reach them" (Festy and Prioux 2002: 23).

These considerations suggest that there tends to be a systematic 'family bias' in survey data. It raises the question as to what extent social science surveys can be used

to provide reliable indicators for fertility research and whether weights are able to correct for this bias. Therefore, a clear validation is important for assessing the degree of reliance that can be put on such survey data.

The chief aim of this paper is to provide an overview of order-specific fertility data that are available from vital statistics and population censuses for the three (mainly) German-speaking countries: Germany, Austria and Switzerland. Moreover, we seek to answer the question: which additional data sources are available to generate order-specific fertility indicators? Do social science surveys provide robust and reliable indicators? Is there systematic bias in the survey data? An introduction to each data set available for each country is presented below. Following this, the specific data available for each country in turn is analysed: Germany, then Austria and finally Switzerland.[1]The final part concludes and evaluates the data situation in the three countries.

1.2 Data, definitions and limitations

1.2.1 Data and definitions

There are essentially three different types of fertility data described below:

1. **Vital statistics data** which include births that were derived from the vital registration system. In order to generate birth rates, these data need to be related to the female population. In the countries considered here, birth counts and population counts are gathered quite independently, and the accuracy of the derived fertility rates is dependent on the quality of both data sets, and the exact equivalence of the observed population.
2. **Survey data**, in which all the population, or a subset of individuals, are questioned regarding their achieved fertility up to interview. Microcensus information is usually collected via surveys. Additionally, various smaller social science surveys exist that provide fertility information. We classify

1 The section of this paper that discusses the German data was written by Michaela Kreyenfeld, the Austrian situation was compiled by Krystof Zeman and Ina Jaschinski. Marion Burkimsher and Krystof Zeman have written the section of this paper that deals with Switzerland.

surveys into ‘family surveys’ and ‘multi-purpose surveys’. We also follow the standard distinction of ‘cross-sectional surveys’ and ‘panel studies’.

3. **Register data** which (ideally) contain complete fertility histories of a population. The German pension registers are an example of this type of data. Also the new German, Austrian and Swiss censuses are register-based and would fall into this category. Unfortunately, the current round of German and Swiss censuses do not contain any fertility information.

Vital statistics data are generally used to calculate period fertility rates, while survey data and other types of register data are typically used for generating cohort fertility indicators. If there is a sufficiently long series of period data from vital statistics, then cohort fertility can be estimated from period observations too. This report covers all three types of fertility data and assesses the best sources of data for each of the countries studied. Many of the data sources are country-specific, but data from some multi-country databases and surveys are also available, as described below.

The **Human Fertility Database** (a joint project of the Max Planck Institute for Demographic Research (MPIDR) in Rostock, Germany and the Vienna Institute of Demography (VID) in Vienna, Austria) aims to collect high quality fertility data, mostly from vital statistics, and store it in a central repository, so that direct country-to-country comparisons can be made. It does not initiate data collection, but accepts data from national statistical offices and compiles it into a single, comparable database.

The **Fertility and Family Surveys (FFS)** programme, organised by the Population Activities Unit of the United Nations Economic Commission for Europe (PAU UNECE), collected during the 1990s individual data on household characteristics, parental home, partnership characteristics and partnership history, children and maternity histories, fertility regulation, views on children, education and educational history, occupational history, and values and beliefs of respondents (FFS 1996). Data were collected in 24 UNECE Member States; these included Germany, Austria and Switzerland, for which country reports were produced and the data made available. Assessments of the FFS data for Austria and Switzerland are made in this report.

The follow-up to the FFS is the **Generations and Gender Survey (GGS),** although fewer countries are currently participating in this than did in the FFS (United Nations

2005). It is planned as a three wave panel survey, with each wave taking place three years apart. Germany has completed the first and second wave and Austria the first wave of data collection for the GGS. The Swiss Federal Statistical Office plans to carry out a Family and Generations Survey in 2013. However, its scope will be more limited than that of the GGS, and the questionnaire is only in the early stages of development. The GGS fertility data for Germany and Austria are evaluated in this report.

The **European Social Survey** (ESS)[2] (Jowell et al. 2007) is a general purpose social survey which takes place every two years; so far just the third wave, that of 2006, has included a question on fertility. Germany, Austria and Switzerland all gathered data in the ESS wave 3. The questionnaire includes two main sections, each consisting of approximately 120 items; a 'core' module which remains relatively constant from round to round, plus two or more 'rotating' modules, repeated at intervals. The core module aims to monitor change and continuity in a wide range of social variables, including media use; social and public trust; political interest and participation; socio-political orientations; governance and efficacy; moral; political and social values; social exclusion, national, ethnic and religious allegiances; well-being; health and security; human values; demographics and socio-economics. Wave 3 included a rotating module on 'The Timing of Life: The organisation of the life course in Europe', developed by Francesco Billari and colleagues. Part of that module was devoted to questions on the timing and spacing of childbearing. The ESS fertility data for Austria and Switzerland are assessed in this report.[3]

1.2.2 Limitations

The scope of this paper is limited. We are mainly concerned with fertility indicators by birth order. We do not address more refined fertility measures, such as fertility by education or migration background. Also, we are only concerned with fertility indicators that summarise the behaviour of women. Male fertility is not addressed.

2 www.europeansocialsurvey.org

3 Compared to the many large surveys that exist for Germany, the ESS sample size is rather small (2,916 respondents in the 2006 wave). Therefore, we decided not to evaluate the German ESS.

Furthermore, we mainly consider live-born children. This means that we disregard adoption, step- or foster parenthood.

2 Germany

The data situation in Germany is rather ambiguous. On the one hand, Germany has carried out a large array of surveys - including several panel studies - that can be used for the analysis of fertility dynamics. However, in contrast to the wide availability of survey data, vital statistics are less encompassing. The following section gives an overview of the data situation for fertility and family researchers in Germany. The section is structured according to types of data.

2.1 Vital statistics and census data

2.1.1 Vital statistics

In the past, fertility and family researchers have particularly suffered from the fact that German vital statistics have not provided birth counts by biological order.[4] This situation has improved recently since the "German Population Statistics Law" (*Bevölkerungsstatistikgesetz*) was changed and prescribed that from 2008 onwards births were to be collected by biological order. Unfortunately, the data quality for 2008 was not sufficiently good so this data has not been released. However, fertility data for 2009 is now available by biological birth order. A valuable feature of the German vital statistics is that data from the birth registers are also available as individual records. Data for the years 2001-2009 can be analysed at the Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder.[5]

Germany is also providing fertility data to the Human Fertility Database (HFD Germany 2010). Due to its specific history, which was marked by significant territorial changes, the data do not cover a long time horizon. For example, age-specific fertility rates are only available since 1952. For the period when Germany was divided into two separate states, two distinct Statistical Offices organised the

4 For the former East Germany order-specific data were also available for the period 1954 until 1988 (HFD Germany 2010).

5 see http://www.forschungsdatenzentrum.de

collection of fertility data and they also applied different definitions, in particularly concerning the age of the mother. The data in the Human Fertility Database (HFD) have been harmonised in a way that fertility indicators of the formerly East and West Germany can be compared directly.[6]

Finally, there is also a monthly "Monitor of Births" available for Germany which is hosted by the Rostock Center for the Study of Demographic Change.[7] This project was launched in 2009. It has two goals: Firstly, it provides early estimations of fertility rates on the basis of preliminary data. Secondly, it estimates monthly fertility rates in order to detect short-term variations in fertility trends. The raw data comes from the birth counts provided by the German Statistical Office. The "Monitor of Births" has used these raw data to generate fertility rates since January 2005 for Germany as a whole, as well as for East and West Germany (Doblhammer et al. 2011).

By and large, the availability and quality of fertility data from German vital statistics have improved tremendously in recent years.[8] In particular, the availability of order-specific fertility data is a landmark change for German birth statistics. However, there is still a lack of long time series to understand order-specific fertility behaviour. For Germany, it is difficult to give a conclusive answer to the question of how the mean

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6 It is, in principle, possible with the HFD to analyse fertility by East and West Germany after 1990, too. However, it needs to be mentioned here that Berlin has not been separated in this database because a regional reform - which came into force in 2001- makes it difficult to divide Berlin along the old territorial borders of the previous two German states. The question arises now as to whether to group Berlin into East Germany or whether to exclude it from the time series. There is no common practice in fertility research yet. However, it needs to be noted that the inclusion of West Berlin into East Germany somewhat affects the East German birth rate (Goldstein and Kreyenfeld 2010).

7 see http://www.zdwa.de/zdwa/artikel/index_dateien/index_0407.php

8 There is, however, a concern regarding the reform of the German Population Statistics Law (Bevölkerungsstatistikgesetz) that is due in 2012. It is possible that data protection concerns will play an important role in the reformulation of this law. The dates of childbirth and date of birth of the mother are sensitive information in the birth statistics and there is reason to believe that this information might no longer be recorded. This would have fatal consequences: it would no longer be possible to calculate age at childbirth. As this is the standard way that births are currently recorded in international statistics, Germany would be unable to provide such type of cross-nationally comparable fertility data.

age at first birth has developed over time. Nor do official birth statistics tell us as yet how the share of childless women has developed across cohorts. This dearth of order-specific fertility data raises the question of how other types of data can be used to fill the gap.

2.1.2 Census data

Germany is about to conduct a census in 2011 (for details, see Eppmann et al. 2006). This census is primarily register-based and will draw on data from the employment registers and the population registers of the municipalities. Although no fertility data will be compiled from the census, it will have implications for fertility researchers as it will provide new estimates of the population size and structure by age and gender. The official population size for Germany for the year 2008 is 82 million (Statistisches Bundesamt 2010a). It is expected that the new estimates will be lower. If the base population decreases, fertility rates based on the new data may be a little higher than previously calculated. However, it is difficult to assess the magnitude of this effect as it is unclear to what degree the population counts will change and how different age groups are affected by it.

Prior censuses of the Federal Republic of Germany, such as the one in 1970, included a question on number of children, but this information was only collected from married respondents. For the German Democratic Republic, data from the census of 1981 provided data on the female population by age and parity[9] [10] irrespective of marital status. Table 1 gives the distribution of births from this census. It shows how childlessness declined for East German women from the beginning of the 20th century. This fits prior research for other countries that has shown that the cohorts born around

9 The East German census from 1971 surveyed only marital births by order.

10 Data from the East German census of 1981 will be made available as a scientific use file by the 'Federal Statistical Office and the statistical offices of the Länder'. Birth counts from this census are available from the HFD Germany (2010). Matching the parity distribution from the census of 1981 with the parity distribution that is available from the East German vital statistics produces some discrepancies. Further investigations are needed to understand the mismatch between the two sets of data.

1900 had relatively high levels of childlessness, because of the adverse conditions they were exposed to during the Great Depression (e.g. Rowland 1998). Nevertheless, the total fertility of the cohorts born between 1900 and 1939 was quite stable. For the East German cohorts born after 1940, however, fertility has declined. This can be seen in Table 2 which shows the fertility patterns for the cohorts 1940-1955. Data for this table comes from the vital statistics of the GDR (HFD Germany 2010). It suggests that, on the one hand, childlessness declined slightly, if one compares the East German cohorts born in 1941, 1945 and 1948. On the other hand, the share of women with three or more children dropped considerably.

Table 1: Number of children by birth cohort of women: results from census 1981 of the GDR

Cohort	Parity proportions				Average Number of Children
	0	1	2	3+	
1902-1909	22%	25%	24%	29%	1.93
1910-1914	17%	25%	27%	30%	2.02
1915-1919	17%	25%	28%	31%	2.03
1920-1924	18%	25%	28%	29%	1.96
1925-1929	16%	25%	28%	31%	2.07
1930-1934	12%	23%	29%	36%	2.28
1935-1939	10%	25%	32%	32%	2.13
1940-1944	9%	29%	38%	25%	1.93

Source: Volkszählung 1981 DDR (data provided by Olga Pötzsch, see also HFD Germany 2010)

Table 2: Number of children by birth cohort of women: estimates based on vital statistics of the GDR

Cohort	Parity proportions				Cohort Fertility Rate
	0	1	2	3+	
1941	10%	28%	36%	26%	1.95
1945	9%	29%	40%	22%	1.85
1948	8%	29%	46%	18%	1.82

Source: HFD Germany (2010)

2.2 Register data

2.2.1 Perinatal statistics

Another source of data that can be used to generate order-specific fertility rates is the Perinatal Statistics database, which includes clinical records of children who were delivered in German hospitals. Data are collected on a federal level, and prior to 2001 these data have primarily been used to analyse order-specific fertility patterns in selected federal states (Voigt and Hullen 2005). Since 2001, the data have been stored in a central register which has opened up the opportunity to use this data for all of Germany.

The Perinatal Statistics contain information on the biological order of children that were born in hospitals. However, some caveats need to be mentioned. First of all, these data do not cover home births which make up about two percent of all births in Germany; these tend to be higher order births. Secondly, the data were not complete in the early years after the centralised database was initiated in 2001, and it is only after 2004 that more than 95 percent of births have been included in the Perinatal Statistics.[11] Despite these shortcomings, this data source is probably the best that is currently available to generate order-specific fertility rates for the period 2001-2008.

Table 3 provides estimates on the mean age at first birth generated from Perinatal Statistics. Additionally, this table uses previous estimations of order-specific fertility rates based on survey data as well as estimates of the mean age at first birth generated from East German vital statistics. If one pieces these different sources of information together, ones gets a rough idea on changes in the age at first time motherhood in East and West Germany. As can be seen from this table, age at first birth has gradually increased in West Germany since the 1970s. In East Germany, age at first birth was rather low before unification, but it has increased towards West German levels thereafter.

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11 Since 2010, the host organisation of the Perinatal Statistics has changed. Whilst the 'Bundesgeschäftsstelle Qualitätssicherung' (BQS) previously monitored this data, the 'Aqua-Institut' is now in charge of it (http://www.aqua-institut.de/). Unfortunately, it is not clear yet whether this data can still be used for scientific purposes.

Table 3: Mean age at first birth in East and West Germany

	1960	1970	1980	1985	2002	2008
West Germany	24.9	23.8	25.0	26.2	27.6	28.7
East Germany	23.0	22.5	22.3	22.3	26.4	27.5

Note: Berlin is included into East Germany for the year 2002 and 2008. The mean age at first birth was generated based on the age-specific fertility rates.

Source: Kreyenfeld (2002); Kreyenfeld et al. (2010); HFD Germany (2010)

2.2.2 Pension registers

Another type of register data that can be used for fertility analysis is the German pension registers. These data are provided as Scientific-Use-Files by the Research data Centres of the German Pension Insurance.[12] Several caveats need to be mentioned in respect to this data. First of all, the data do not include the full population of Germany. Certain sub-populations, such as farmers or lifetime-employed civil servants, are not included. Altogether, the data comprises about 95 percent of the population in Germany, while coverage in the eastern states is a little higher due to the fact that there are fewer civil servants in this part of the country. Fertility information is available for the female population only. Fertility of non-Germans is not very accurate as children that were born outside Germany are not included in these registers (for an evaluation of the data, see Kreyenfeld and Mika 2008).

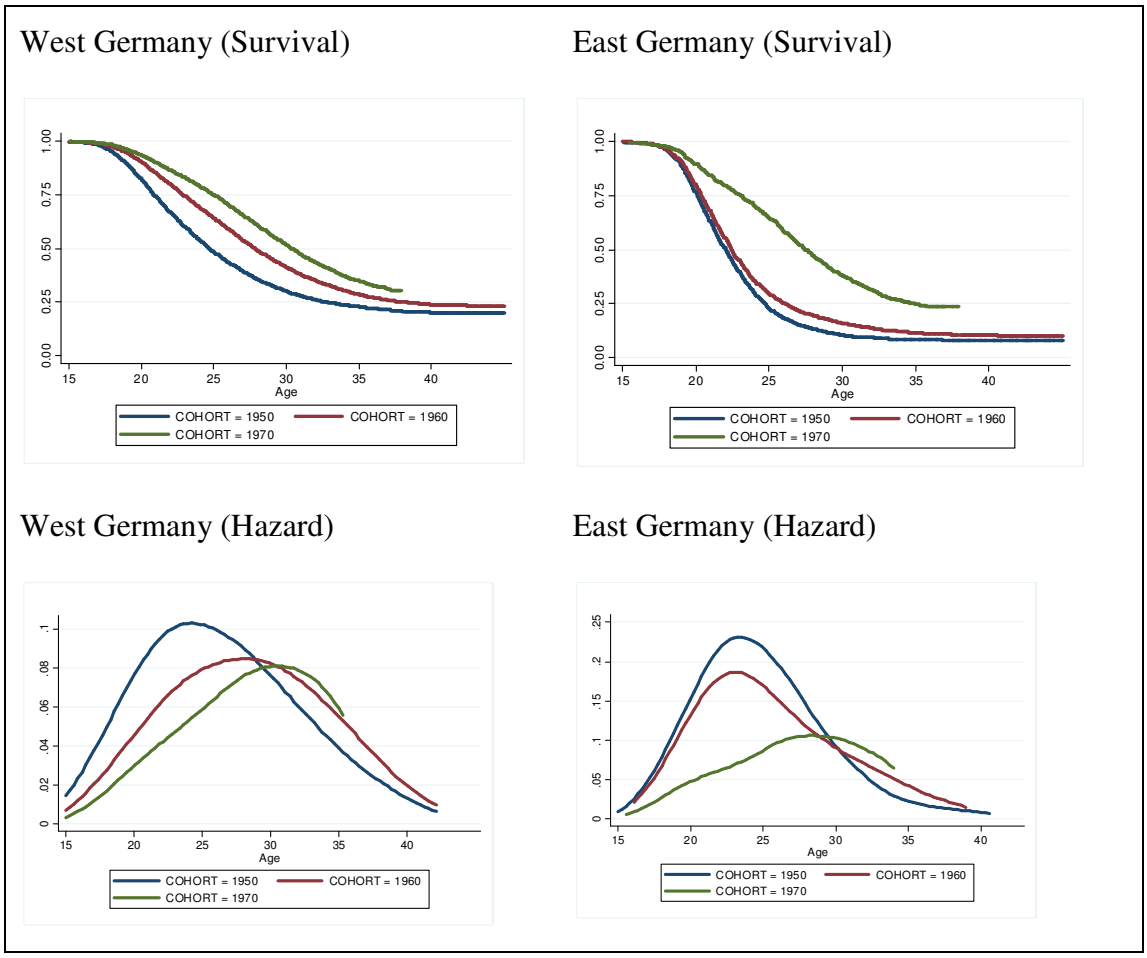
The main file that can be used for fertility analysis is called 'Versicherungskontenstichprobe'. The life histories of individuals are reliable and complete until 'clearance' which is the year when the pension history of a person is first assessed. For fertility analysis, this implies that many of the observations of the younger cohorts are censored which needs to be taken into account in any analysis.

For illustrative purposes, Figure 1 displays some initial results with this data. Panel 1 and 2 show the survival curves to first birth and Panel 3 and 4 the respective hazard rates. It suggests that in West Germany age at first birth has continuously increased over the cohorts born since the 1950s (for West German women with German

12 See www.fdz-rv.de

nationality). Childlessness is approaching 25 percent for the youngest cohorts. The median mean age at first birth for the women born in the 1970s cohort is around 30. In East Germany, the postponement of first birth has mainly affected cohorts born after 1970.

Figure 1: Transition to first birth: estimates based on German pension data



Note: Foreigners are excluded. We define an East German here as a person who has earned most of their pension credits in East Germany (excluding West Berlin). Similarly, a West German is a person who has earned most of their pension points in West Germany (including West Berlin).

Source: Versichertenkontenstichprobe 2002, 2005, 2007

The pension data have not been used very much for fertility research as yet. The great advantage of this data is that it provides micro-level data of persons with and without children alike. This means that it is possible to generate fertility rates by using just one source of data. This is a great advantage over vital statistics which draws the numerator (births) and the denominator (female population) from two different

sources. The other advantage of this data is that exposure rates can be calculated, as the duration since time of last birth is included in this type of data. However, this data is still not a full replacement for vital rates, as it does not include the total population of Germany.

2.3 Survey data

2.3.1 The German microcensus

The major survey data set that provides information on the household structure and household composition in Germany is the microcensus. The microcensus is conducted by the German Federal Statistical Office and it includes one percent of the households in Germany. In the past, the microcensus has not included information on the number of children ever born. Researchers have usually used this survey to generate fertility information by estimating a fertility schedule based on information of the children who live in the household of the respondent at time of interview (see e.g. Duschek and Wirth 2005). The drawback of this procedure has been that children who have died and those who had moved out of the parental home would be discounted.

After the recent reform of the microcensus law, a question on the number of children ever born has finally been included into the microcensus. The law stipulates that fertility information are to be collected every four years for female respondents aged 15-75. The microcensus from the year 2008 is the first one which provided this information. Unfortunately, the birth dates of the children are not surveyed in the microcensus. This information would be highly desirable, in order to generate age-specific fertility rates. Furthermore, if one had the dates of birth of children, the microcensus would provide a sound database to generate fertility indicators of foreigners and migrants, as the questionnaire also includes detailed migration variables (such as the year of migration).

Most of the questions in the microcensus are compulsory, i.e. respondents are required by law to provide information. Unfortunately, the question on the number of children is not among them and the respondent can choose whether or not to answer to this question. Furthermore, the question on the number of children has been placed at the

end of the questionnaire, where it is asked rather out of context. These two aspects taken together might explain that the item non-response for this question is unusually high. About 12 percent of the respondents failed to answer this question in 2008. It is likely that childless respondents more commonly refused to answer this question than others.

The Federal Statistical Office has generated an imputation scheme that tries to correct for the bias in the data (Statistisches Bundesamt 2009; Pötzsch 2010). Table 4 provides the tabulation on the number of children based on the imputed microcensus data. The table suggests that childlessness has been higher in West than in East Germany for the considered cohorts. For the recent ones, it might be worth pointing out that the share of East German women with only one child is relatively high.

Table 4: Proportions of each parity by birth cohort of women: data from the microcensus 2008

	West Germany			**East Germany**		
	1950-54	1955-59	1960-64	1950-54	1955-59	1960-64
Childless	17%	19%	21%	9%	10%	12%
One child	25%	23%	22%	28%	27%	31%
Two children	38%	38%	38%	47%	47%	42%
Three children	14%	14%	13%	12%	12%	11%
Four and more children	6%	6%	5%	4%	5%	4%
Total	100%	100%	100%	100%	100%	100%
Cohort fertility	1.71	1.68	1.61	1.66	1.73	1.77

Note: Berlin is included into East Germany.

Source: Estimates based on data from the microcensus 2008 provided by Statistisches Bundesamt (personal correspondence)

2.3.2 Social science surveys

Germany has several cross-sectional data sets that contain information on the number of children ever born (see Table 5 for an overview). One of the most recent of this kind is the **AID:A** which was launched by the German Youth Institute in 2009. AID:A is a successor to the DJI-Family Survey that was last undertaken in 2000. Unfortunately, the micro data of AID:A are not yet available for broad scientific usage. The **German Birth Survey** ('Geburten in Deutschland') is another recent data source, which contains fertility histories of female respondents (Statistisches Bundesamt 2007; Pötzsch and Emmerling 2008). This survey was conducted by the Federal Statistical Office in 2006. The sample comprises prior respondents of the microcensus.[13] Germany has also participated in the **Generations and Gender Survey** (GGS). The first round of the German GGS was undertaken in 2005. The German GGS also includes an oversample of Turks. This subsample was observed in 2006 (Ruckdeschel et al. 2006). However, an evaluation of the German GGS has been undertaken and major flaws in the fertility histories have been diagnosed (Kreyenfeld et al. 2010; Naderi et al. 2009). The **German Life History Survey** (GLHS) provides complete fertility histories of female and male respondents for selected birth cohorts. A very recent and large data set is a study conducted by the Institute for Employment Research entitled '**Arbeiten und Leben im Wandel'** (ALWA). This survey is primarily geared towards collecting employment careers, but it also includes complete fertility histories of males and females.[14]

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13 The microcensus is organized as a rotating panel. This means that ¼ of the respondents are surveyed four years in a row. After four years, respondents usually leave the study population. The German Birth Survey is an 'access panel', which means that the sample includes respondents who have previously been interviewed in the microcensus four years in a row.

14 Germany has also participated in the Population and Policy Acceptance Survey (PPAS), the Eurobarometer and the European Social Survey (EES). These data sets also contain fertility information; however, sample size are quite small, compared to most of the other data sets mentioned here. There is also the Life Expectancy survey which includes fertility information. However, it was unclear to the authors to what extent this data set can be used for fertility analysis.

Apart from the big family surveys, there are other social science surveys that also include fertility information. All purpose surveys such as the '**Allgemeine Bevölkerungsumfrage der Sozialwissenschaften'** (ALLBUS) provide fertility histories; however, sample sizes are rather small to get robust results. If one aims at reconstructing the fertility histories of the older cohorts, data from the **Survey of Health, Ageing and Retirement in Europe** (SHARE) or the **German Ageing Survey** (DeAS) might be useful (Börsch-Supan et al. 2010; Engstler and Motel-Klingebiel 2010).[15]

Moving on to look at the availability of panel data, the situation for Germany is rather favourable (see Table 6).

The **Socio-Economic Panel (SOEP)**, the first wave of which was launched in 1984, is one of the longest panel studies in Europe and can be used to study the fertility of both males and females (e.g. Schmitt 2004). For fertility researchers, it is also of interest that a subsample (SOEP-FIT) was drawn in 2010 containing about 500 households in which a child has been born since 2007. This data collection has been financed by the German Family Ministry and will become available for scientific use in 2013.

The German **microcensus** is also available as a panel data set. The great advantage of this data set is that sample sizes are high and unit and item non-response are very low. The shortcoming, however, is that fertility histories are not surveyed and need to be reconstructed based on information about the children who still live in the household of the respondent. Another drawback is that a person automatically drops out of this panel when he or she moves into another household (Kreyenfeld et al. 2010).

There has been a whole series of family panels in Germany. Two of the first were the 'Bielefelder family panel', which was launched in the 1980s (Strohmeier 1985), and the 'Bamberger Ehepaar-Panel', which was conducted in the period 1986-2002 (Schneewind et al. 1996). While these early panels comprised rather small sample sizes, the **family panel of the German Youth Institute** was the first large scale family panel in Germany. This data suffered, however, from the fact that the time between panel waves was rather long which contributed to large sample attrition. The same can be said for the **Generations and Gender Survey (GGS),** the first wave of

15 However, the first waves of SHARE only include information on surviving children. It is only in wave 3 that information on ever born children will be collected.

which was conducted in 2005. The second wave followed in 2008; however, only a third of the respondents of the first wave also provided information in the second wave. The **Panel Analysis of Intimate Relationships and Family Dynamics** (**pairfam**), which saw its first wave launched in 2008/2009, is a new and innovative panel study surveying more than 12,000 respondents (Huinink et al. 2010). **DemoDiff** (**Demographic Differences in Life Course Dynamics in Eastern and Western Germany**) complements pairfam with an additional 1,400 East German respondents. Both panels follow an annual rhythm.

Table 5: Summary of selected cross-sectional surveys

Type of Survey	Year	Sample	Sample Size
Family Surveys			
• Aufwachsen in Deutschland: Alltagswelten (AID:A)	2009	Ages 0-55	25,000 households
• Birth Survey	2006	Access panel of microcensus	12,500 women
• Generations and Gender Survey (GGS)	2005	Representative	10,000
• GGS Foreigner Sample	2006	Turks	4,000
• Family Survey of the Youth Institute[1)]	2000	Ages 18-55	8,000
• Fertility and Family Survey (FFS)	1992	German nationals aged 18-38	10,000
Other Surveys			
• Microcensus [2)]	2008	Representative	1% of all households
• ALLBUS [3)]	2008	Representative (East Germany oversampled)	3,500
• Population Policy Acceptance Survey (PPAS)	2003	Representative	4,000
• Arbeiten und Leben im Wandel (ALWA)	2007	Representative	10,000
• Life History Survey (LHS) [4)]	2004	Various cohorts since cohort 1919	Varies by cohorts
• German Ageing Survey[5)]	2008	1911-1968	8,200

1) The Family Survey contains the waves 1988, 1990 East Germany, 1994/95 and 2000.
2) The microcensus is an annual survey which has been carried out since 1957 for West Germany and since 1991 for East Germany, with exception of the years 1983 and 1984. For the years 1973, 1976, 1978, 1980, 1982 and 1985-2008 the Research Data Centres of the Federal Statistical Office and the statistical offices of the Länder have made Scientific-Use-Files available (http://www.forschungsdatenzentrum.de/bestand/mikrozensus/index.asp).
3) The ALLBUS is available for the years 1980, 1982, 1984, 1986, 1988, 1990, 1991, 1992, 1994, 1996, 1998, 2000, 2002, 2004, 2006 and 2008.
4) The LHS contains several sub-surveys of German respondents: LV West I (1981-83; cohorts 1929-31, 1939-41 and 1949-51), LV West II A (1985/86; cohorts 1919-21), LV West II B (1987/88; cohorts 1919-21), LV West III (1988/89; cohorts 1954-56, 1959-61), LV DDR (1991-93) and LV East Panel 1996/97 (cohorts 1929-31, 1939-41, 1951-53, 1959-61), LV East 71 (1996-98; cohort 1971), LV West 64/71 (1998/99; cohorts 1964 and 1971), LV Panel 71 (2004; cohorts 1964, 1971 and 1971 East).
5) The German Ageing Study is a panel study that has been conducted in the years 1996, 2002 and 2008. Since it only includes respondents who are almost or completely past their reproductive ages, the panel can not be used for fertility analysis.
6) SHARE is a panel study that has been conducted in the years 2004, 2006/2007 and 2008/2009 (not available yet) in Germany. Since it only includes respondents who are almost or completely past their reproductive ages, the panel can not be used for fertility analysis.

Table 6: Recent panel studies that can be used for the analysis of fertility dynamics

Type of Survey	Period	Sample	Rhythm	Original Sample
Family Panel				
• **DJI-Family Panel**	1988, 1994, 2000	Representative sample	Every six years	10,000
• **Generations and Gender Survey** [1)]	2005, 2008	Representative sample	Every three years	10,000
• **pairfam**	2008-ongoing	Cohorts 1971-73, 1981-83, 1991-93	Annually	12,000
• **DemoDiff**	2009-ongoing	East German cohorts 1971-73, 1981-83	Annually	1,400
All Purpose Panels				
• **Socio-Economic Panel (SOEP)**[2)]	1984-ongoing	Representative sample	Annually	
• **Microcensus panel**	1996-1999 2000-2004	Representative sample	Annually	One percent of households

1) The BiB who carried out the GGS also surveyed an oversample of Turks in 2006. This subsample is also organised as a panel.
2) The SOEP contains an oversample of certain subpopulations such as foreigners and East Germans. It also includes a special questionnaire for mothers of new born children.

2.4 Comparison of fertility estimates from various sources

Having presented the different types of data, this section addresses the question of how these data can be used to generate fertility indicators and how the estimates compare across surveys. The key indicators that we have used for comparison are: the proportion of childless women and the total number of children by birth cohort. Since the cohorts born in 1965 or later are still of childbearing age, they are omitted from this study. Furthermore, the focus of this comparison is restricted to West Germany. The definition of what constitutes West Germany differs somewhat between the samples. However, this issue should be of minor importance as the exclusion of West Berlin does not affect the West German results markedly. If not noted otherwise, we provide weighted and unweighted estimates. We use the personal weights provided by the survey agencies (for SOEP, GGS) and the ones provided by the German Statistical Office (for the Birth Survey). These weights account for standard socio-economic characteristics (such as age, education and marital status). The number of children is, however, not included in the weights.

2.4.1 Total number of children

Figure 2 to Figure 5 display the mean number of children by female birth cohorts (see Table 7 and Table 8 for the values).[16] The results can be summarised as follows:

The microcensus as well as the pension data follow a similar line to that derived from vital statistics. They suggest that completed fertility has gradually declined in West Germany since the 1930s cohorts. However, both data give a higher estimate of fertility than that derived from birth registrations (apart from the older cohorts of the pension data).

If one turns to the Birth Survey, the pattern is less clear. The Birth Survey gives a different impression of the time trend as the cohorts 1950-59 do not fit into the pattern suggested by the vital statistics. A plausible reason for this bias could be that the cohorts 1950-59 are particularly hard to reach, because their children have already left the parental home and so many of the women of these cohorts have returned to work. However, if one turns to the German Socio-Economic panel (SOEP) - for which the same argument should hold - one gets opposite results: the SOEP seems to overstate the fertility of the cohorts 1950-59.[17]

The Generations and Gender Survey provides a rather odd pattern in the sense that the fertility of the older cohorts is too low while it is too high for the younger cohort. Overall, the GGS does not appear to provide reliable information on fertility trends in Germany at all (for a detailed discussion of this see Naderi et al. 2009; Kreyenfeld et al. 2010).

16 For the microcensus and the pension registers, no confidence bounds are provided because of the large sample size.

17 The SOEP is a representative sample of Germany which consists of several sub-samples (such as a foreigner sample and a high income sample). Weighting is essential for descriptive analysis and unweighted estimates are only provided for consistency.

Table 7: Number of children per woman in West Germany: microcensus, pension registers and vital statistics

Cohort	Microcensus 2008	Pension data	Vital statistics Cohort	
1930-1934	--	--	**1932**	2.20
1935-1939	2.11	2.01**)	**1937**	2.11
1940-1944	1.93	1.91	**1942**	1.85
1945-1949	1.78	1.79	**1947**	1.75
1950-1954	1.71	1.74	**1952**	1.65
1955-1959	1.68	1.67	**1957**	1.60
1960-1964	1.61	1.56	**1962**	1.56

MZ: Microcensus 2008 (provided by Statistisches Bundesamt, own estimates)

Pension Data: Versichertenkontenstichprobe 2002, 2005 and 2007. Results for women who were older than age 44 at "clearance". The sample includes persons of German nationality and who have received most of the pension points in West Germany (including West Berlin). **) cohorts 1936-1939

Table 8: Number of children per woman in West Germany: Birth Survey, SOEP and GGS

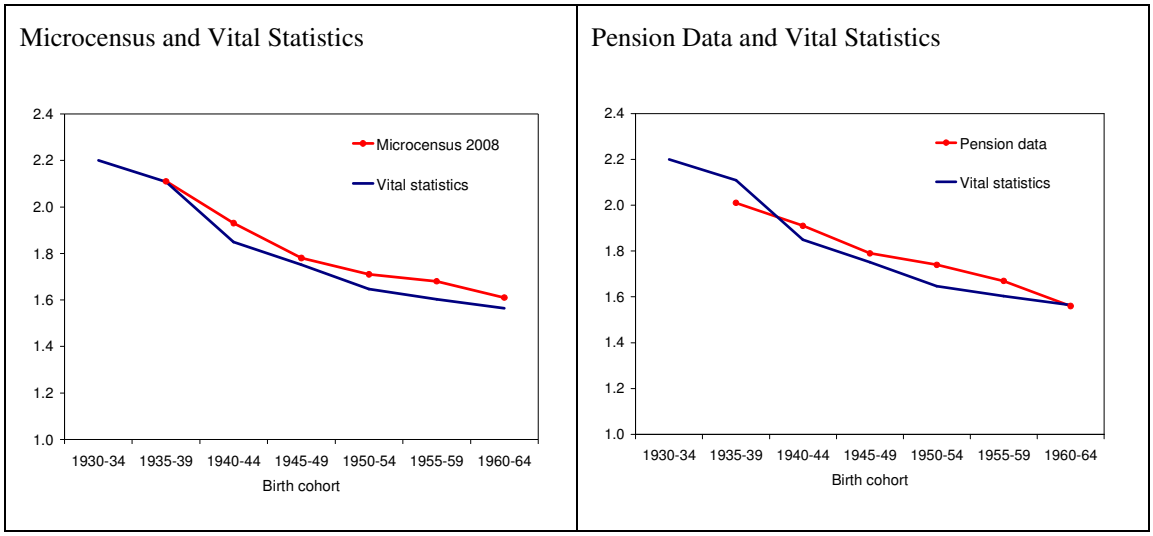
Cohort	Birth Survey 2006		SOEP		GGS 2005	
		weighted		weighted		weighted
1930-1934	2.02*)	1.94*)	1.92	2.16	1.72	1.68
1935-1939	1.89	1.91	1.83	1.95	1.88	1.96
1940-1944	1.81	1.80	1.71	1.84	1.61	1.69
1945-1949	1.71	1.74	1.64	1.79	1.45	1.50
1950-1954	1.50	1.56	1.62	1.71	1.51	1.54
1955-1959	1.59	1.53	1.70	1.73	1.67	1.68
1960-1964	1.62	1.60	1.70	1.60	1.78	1.73

GGS: The sample comprises women who live in West Germany (excluding West Berlin) at time of interview. Weights were applied

Birth Survey: The sample comprises women who live in West Germany (excluding West Berlin) at time of interview. *) cohorts 1931-1934

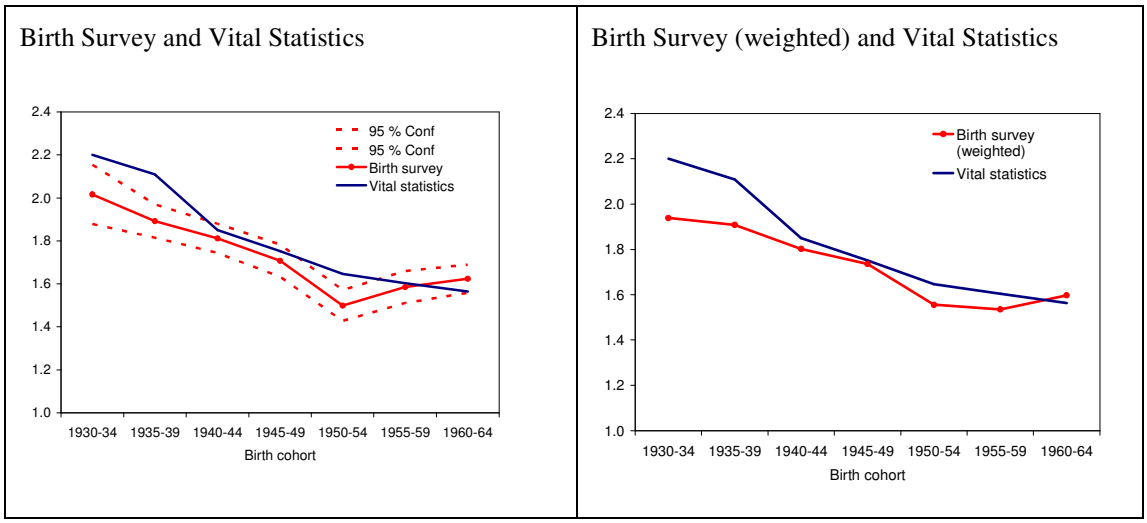
SOEP: SOEP 2009. Only women residing in West Germany (zsampreg=1). The weighting factor "zphrf" was applied

Figure 2: Mean number of children by female birth cohort, West Germany, microcensus and pension registers



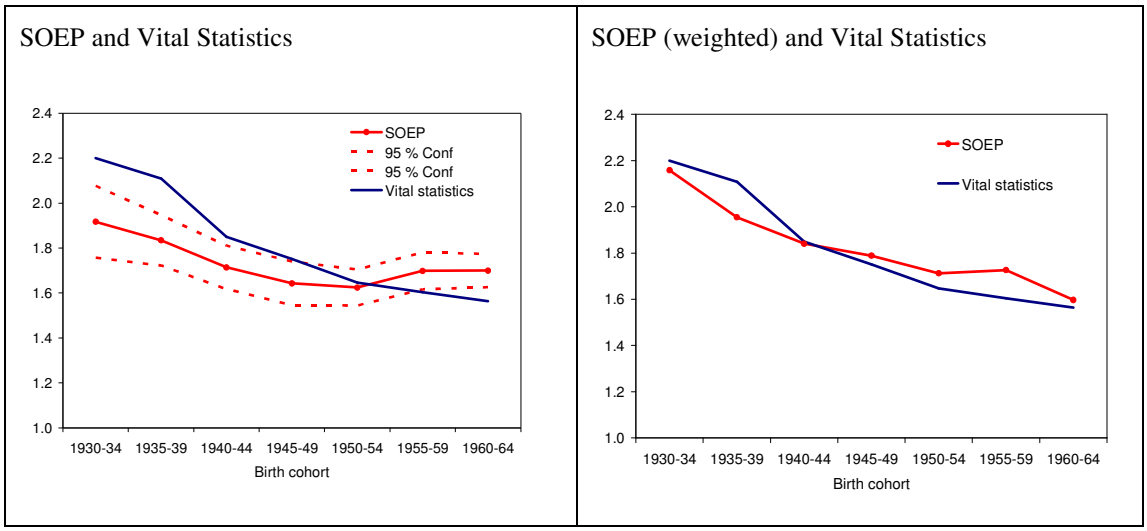
Source: own estimates, see Table 7-Table 8

Figure 3: Mean number of children by female birth cohort, West Germany, Birth Survey



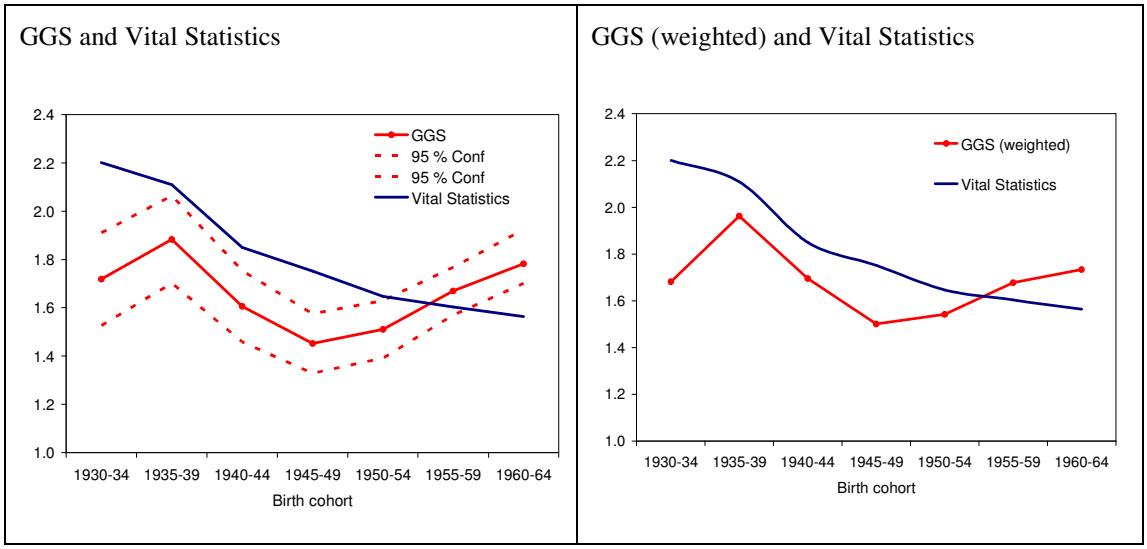
Source: own estimates, see Table 7-Table 8

Figure 4: Mean number of children by female birth cohort, West Germany, SOEP



Source: own estimates, see Table 7-Table 8

Figure 5: Mean number of children by female birth cohort, West Germany, GGS



Source: own estimates, see Table 7-Table 8

2.4.2 Childlessness

If one turns to the trends in childlessness (see Figure 6), one must consider that there is no benchmark (like vital statistics data) to compare estimates to. Against this background, it is even more disturbing to see that the share of childlessness radically differs between the five sources of data. Pension data, microcensus and SOEP suggest that childlessness has increased since the 1940s cohorts. The GGS would suggest that it has declined, while the Birth Survey suggests that it has levelled off recently. However, if one disregards the GGS, one can at least conclude that childlessness has increased since the 1950s cohorts. For the most recent cohorts completing their reproductive life, childlessness is around 20 percent in all of the surveys (apart from the GGS).

Table 9: Childlessness rate of female birth cohorts, West Germany

Cohort	MZ	GGS		Birth Survey		Pension	SOEP	
			weighted		weighted			weighted
1930-34		24%	24%	14%*)	15%*)			
1935-39	11%	21%	20%	15%	14%	19%**)	15%	14%
1940-44	12%	21%	20%	14%	13%	17%	14%	13%
1945-49	14%	22%	21%	14%	13%	17%	14%	13%
1950-54	17%	19%	17%	21%	18%	19%	21%	18%
1955-59	19%	14%	14%	21%	22%	21%	21%	22%
1960-64	21%	14%	15%	19%	20%	22%	19%	20%

MZ Microcensus 2008 (provided by Statistisches Bundesamt, own estimates)

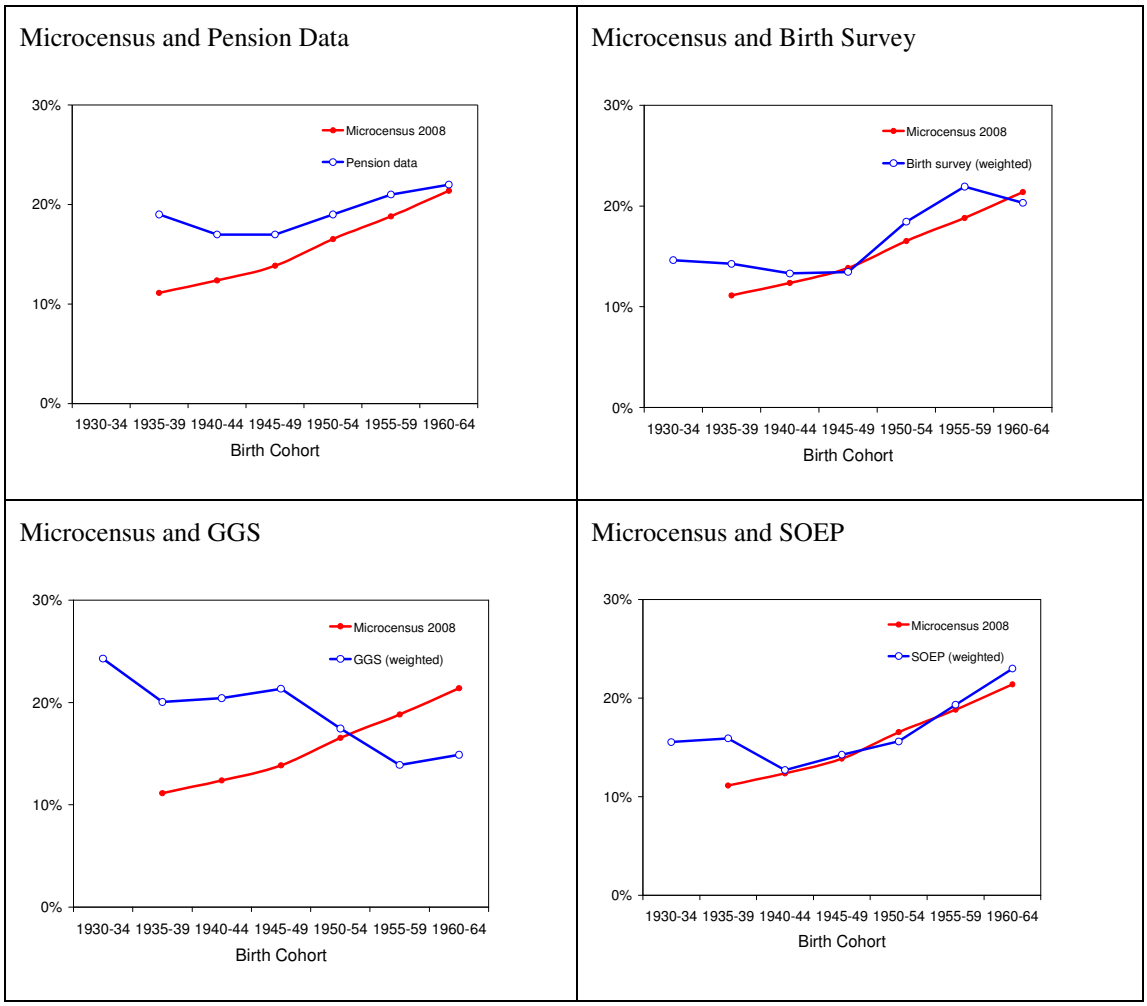
GGS: German GGS 2005. The sample comprises women who live in West Germany (excluding West Berlin) at time of interview. Weights were applied

Birth Survey: Birth Survey 2006. The sample comprises women who live in West Germany (excluding West Berlin) at time of interview. *) cohorts 1931-1934

Pension Data: Results from Kaplan-Meier survival functions. The sample includes persons of German nationality who have received most of their pension points in West Germany (including West Berlin). **) cohorts 1936-1939

SOEP: SOEP 2009. Only women residing in West Germany (zsampreg=1). The weighting factor "zphrf" was applied

Figure 6: Proportion of childless women by female birth cohort, West Germany



Source: own estimates, see Table 9

2.5 Conclusion and recommendations

In this section, we provide an overview of the data situation in Germany. Germany provides a rich set of survey data to choose from. A big strength of the German data is the fact that several high quality panel studies, such as pairfam and the SOEP, are available to study fertility and family dynamics. Also the fertility information from German vital statistics has improved in recent years as order-specific birth information is now collected. Great progress for fertility researchers has also been made in that a question on the number of children born has finally been included in the microcensus of 2008.

However, the question remains as to which is the best order-specific fertility data available. Our comparison of fertility indicators derived from different types of data gives an inconclusive answer. It suggests that it is difficult to provide robust 'structural indicators' on childlessness and mean age at childbirth using social science surveys. These data may be used to depict overall time trends in fertility behaviour, but the absolute values may not be as accurate as one would wish. Register data, such as the pension registers, are not able to fully close the gap as these data do not include the whole German population.

Our conclusion is that the microcensus plays an important role in providing reliable fertility indicators for Germany. Therefore our recommendations mainly centre around the microcensus:

- It would be highly desirable if the question on number of children was integrated into the **compulsory part** of the microcensus. Item non-response is a problematic issue for the fertility question as childless respondents are more likely not to answer this question.
- One must also add that it would be highly desirable to include a question on the **years of birth of children born** in the microcensus. That would allow us to generate age-specific fertility rates for the past.

- If the dates of birth of children were included in the microcensus, this would enable us to generate better **fertility indicators of the migrant population**.[18] This information would be very valuable as the population counts of the foreign population in Germany are rather imprecise and hence vital statistics are unable to provide robust fertility estimates of the migrant population (see also Kreyenfeld and Scholz 2009). [19]
- Microcensus data are also central for generating **survey weights**. Usually, the survey agencies draw on microcensus information when they generate weights. Because fertility information was not available before from the microcensus, this information has not been used when weights were generated. As a result, the standard survey weights are unable to fully correct for any 'family bias' in the survey data. If the microcensus provided reliable fertility estimates, this could thus be a remedy to the family bias in the surveys, too.

18 However, this is, of course, dependent on the migration background and dates of migration also being surveyed in the future.

19 As estimates of the base population are imprecise, then so are fertility rates for non-German citizens (Haug 2009). Furthermore, vital statistics only provide information on the citizenship (of the mother, father and child). No information on whether the parents were born abroad is available.

3 Austria

This section gives an overview of fertility data for Austria. Our general assessment is that the quality of Austrian vital statistics is very high. In contrast to Germany, which only recently reformed its vital statistics, Austria did so in 1984 and has collected order-specific fertility information ever since then. However, the availability of large-scale survey data sets is limited. In regard to panel studies, the data situation in Austria differs substantially from Germany since there are only a few large panel studies that can be used for the analysis of fertility dynamics. However, Austria has taken part in two large survey programmes, the Fertility and Family Survey (FFS) and the Generations and Gender Survey (GGS). These data sets provide comprehensive fertility and partnership histories. The GGS is also organised as a panel data set which provides the scope for longitudinal analysis. The second wave is planned for 2011/12.

In the following, we give an overview on the availability of vital statistics and population censuses for Austria. We also present the *Geburtenbarometer* (VID 2010) which is a system of monitoring period fertility rates. We then estimate standard fertility indicators using individual-level data sets and try to evaluate whether fertility indicators based on surveys differ substantially from those reported in official statistics.

3.1 Vital statistics and census data

3.1.1 Vital statistics and censuses

Data on live births are collected by the central statistical office[20] and have been published ever since 1871 for the present-day territory of Austria. Birth count data by age of mother to generate age-specific fertility rates have been available since 1951. For the period 1951–1983 only the birth order within the current marriage was recorded, and the true, biological order was not registered. With the reform of the

20 Since 2000 the central statistical office is named Bundesanstalt Statistik Österreich, or Statistik Austria for short.

'Personenstandsgesetz'[21] in 1984, a new birth registration system was established. Therefore, for the period since 1984 the number of live births by both biological parity and birth cohort of mother is available and this has made it possible to conduct order-specific fertility analysis (HFD Austria 2010).

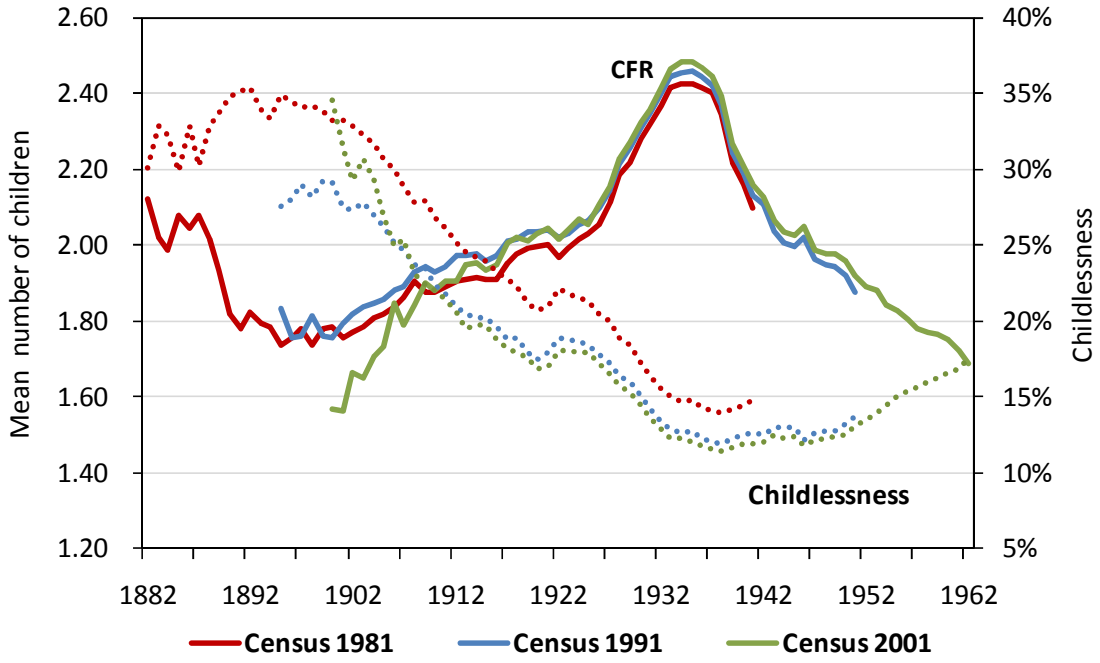
Fertility information for Austria is also available from census data. There have been three censuses that have contained fertility information: 1981 (May 12), 1991 (May 15), and 2001 (May 15). These censuses included a question on the number of children ever born, and this was asked to all women who were older than age 15. This allows obtaining retrospective information on cohort fertility for women born after 1882.

Unfortunately, there are some discrepancies between the censuses. Data from the 1991 and 2001 censuses show a significantly lower proportion of childless women who are past their reproductive age than was recorded in the 1981 census. For women born between 1900 and 1930, the 1991 census suggests that the share of childlessness is lower by 2-6 percent (Figure 7). This could partly be attributed to a change in the questionnaire; however, the slightly higher mortality of older childless women cannot account for such a large difference (Prskawetz et al. 2008: 299). However, these differences do not influence the estimation of the exposure population of women in their reproductive age during 1984–2008 (HFD Austria 2010).[22]

21 Within the new formulation of the 'Personenstandsgesetz' in 1984, the birth statistics were also reformed by directly using the 'Hebammen-Geburtenstatistikverordnung' (HebGSV) in order to collect the total birth order, birth order of live births, and in case of marital birth the birth order within marriage for the birth registration sheet of the 'Personenstandsverordnung' (PStV).

22 There have been attempts to reconstruct age and order-specific data for the period 1952-1983 by Anna Šťastná and Tomáš Sobotka (unpublished data set, 2008). These estimates are based on the 1981 Census (Statistics Austria 1989). They are currently only available by personal correspondence but will be posted online in the Human Fertility Database in the future.

Figure 7: Mean number of children and childlessness by cohort, Austrian censuses



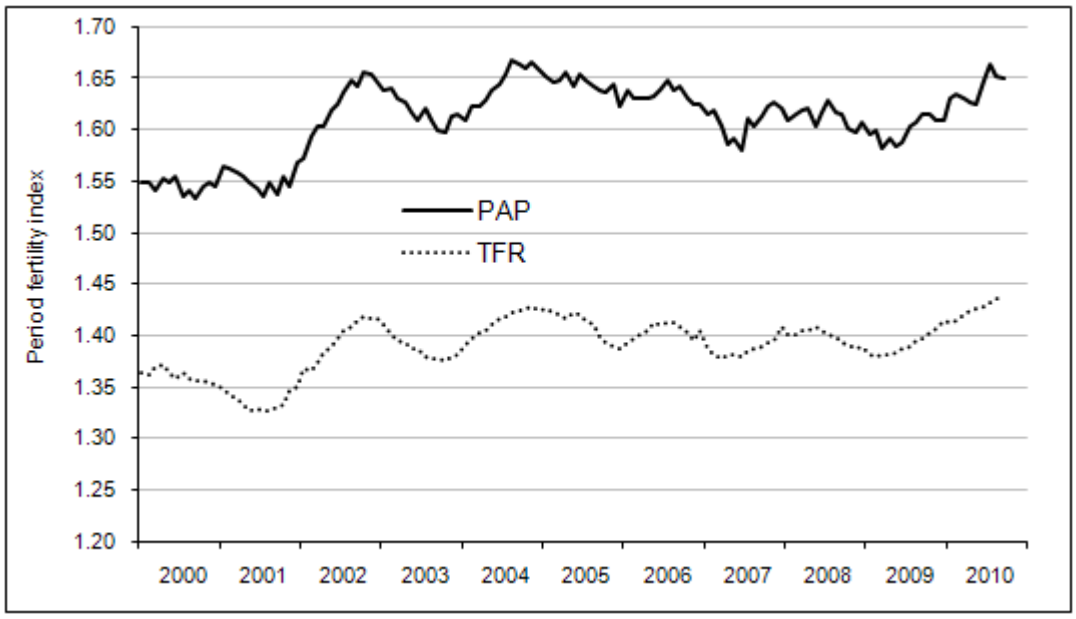
3.1.2 Geburtenbarometer

Another country-specific data feature for monitoring fertility trends in Austria is the 'Geburtenbarometer'.[23] This project was launched in 2005 by the Vienna Institute of Demography (VID), aiming to provide continuous period fertility rates on a monthly basis. The advanced analysis of monthly fertility rates is very useful for studying short-term variations and so be able to associate them with related social and economic changes. The main aim of this project is to provide a set of fertility indicators less affected by changes in fertility timing than the commonly used total fertility rate (TFR). The fertility indicators are computed from the extracts of individual birth records supplied by Statistics Austria. The standard TFR measure as well as the summary indicator "period average parity" (PAP) is computed (Figure 8). The PAP has two major advantages over the standard TFR. First, it is based on parity-specific indicators, and therefore it takes into account the actual parity composition of the female population. Secondly, the PAP is less affected by the ongoing changes in

23 More detailed information is provided at www.oeaw.ac.at/vid/barometer.

the timing of childbearing which have distorted the TFR in Austria since the 1970s. As a result, the PAP better reflects the actual fertility level in Austria, and it also gets closer to estimating the completed fertility rates of the birth cohorts of women having children during a given period of time (Sobotka et al. 2005, Zeman et al. 2010).

Figure 8: Monthly trends in total fertility rates in Austria since January 2000



Source: VID-Geburtenbarometer

In 2010 the 'Geburtenbarometer' was further refined and fertility indicators for just Vienna were provided, too. The 'Geburtenbarometer Wien' shows not only yearly indicators for 1984-2008 and quarterly indicators for 2002-2009, but also compares fertility in Vienna with other provinces of Austria, and analyses the fertility of women born outside Austria and their contribution to the fertility levels in Vienna. Indeed, migrant women in Vienna have a substantial positive effect on the TFR which amounted to around 0.3 in absolute terms between 2002-2008. For the whole country, the net contribution of migrants was much lower, being just 0.12 in 2008 (Zeman et al. 2010: 24).

In sum, the official birth statistics are a valuable data source for fertility analysis in Austria. For more than 25 years, vital statistics have been recording birth by biological order. Furthermore, monthly monitoring of fertility allows the evaluation of

the most recent fertility trends in conjunction with the relevant information on changes in family policies and various socio-economic indicators.

3.2 Survey data

While vital statistics usually only provide data that enable us to describe general fertility trends, survey data sets allow us to analyse how socio-economic and cultural factors determine fertility choices. Austria has undertaken several social surveys that can be used for fertility analysis (see Table 10). However, no major attempts have yet been made to validate the fertility information from this type of data. In the following we try to close this gap and we compare summary indicators from vital statistics with summary indicators that we generated based on survey data.

The **Fertility and Family Survey** (FFS) for Austria was conducted in 1995/96 by Statistics Austria and coordinated by the Austrian Institute for Family Studies (UNECE 1997). It surveyed detailed fertility and family histories, fertility intentions, life biographies, contraceptive use and other socio-economic information among 4,581 female and 1,539 male respondents with an overall response rate of 72 percent. The age range of the respondents was 20 to 54 years at the time of interview, which corresponds to the birth cohorts 1941-1976. The successor study, the **Generations and Gender Survey** (GGS), was conducted in 2008/09. A total of 3,001 females and 1,999 males were surveyed with response rate of 61 percent. One caveat is the rather narrow age range of 18 to 45 which is a problem for investigating long time trends and analysing cohort change.

Austria has also participated in other surveys which might be useful for international cross-country comparisons (Table 10). Due to small sample sizes these data sets probably provide limited scope for fertility analysis. In 2007, the third wave of the **European Social Survey** (ESS) was conducted in Austria which was the only wave which surveyed the number of children. Austria joined the **World Values Survey/ European Values Study** (WVS/EVS) for the second wave in 1990. In all rounds of the survey, the question on number of children was asked. Unfortunately, sample sizes are very small which is problematic for comparisons since the standard errors around the derived indicators are quite large.

Since 1967, Austria has conducted **a microcensus**. Surveying around 22,500 private households, the sample covers 0.7 percent of the Austrian population. As participation in this survey is compulsory, the level of non-response is very low. A special module on fertility intentions was included in 1986, 1991, 1996, 2001 and 2006 (and also in 1976 and 1981 for married women only). The module also contains questions on the number of children ever born.

Table 10: Selected social surveys in Austria

Survey	**Year**	**Sample**		**Age**
		Females	**Males**	**Range**
Fertility and Family Survey (FFS)	1995/96	4581	1539	20-54
European Social Survey (ESS) Wave 3	2007	1287	1118	15+
World Values Survey/European Values Study (WVS/EVS)				
Wave 2	1990	892	568	18+
Wave 3	1999	863	659	18+
Wave 4	2008	854	656	18+
Population Policy Acceptance Survey II (PPA)	2003	1186	809	20-64
Gender and Generations Surveys (GGS)	2008/09	3001	1999	18-45
Microcensus (latest wave)	2006	6135	–	20-60

3.3 Comparison of fertility estimates from various sources

In the following section, we investigate how fertility indicators compare across different surveys. As for Germany, we calculate the mean number of children and the proportion of childless women. We also display the parity distribution of female respondents by birth cohort. We are particularly interested in whether the surveys are able to depict order-specific fertility trends. As a benchmark we use fertility summary indicators derived from vital statistics (numbers of births or fertility rates by age/cohort of mother and birth order) and from the censuses (parity distribution of women by cohort). These indicators are available for Austria in the Human Fertility Database (HFD Austria 2010[24]). Most attention is given to the FFS and GGS data.[25]

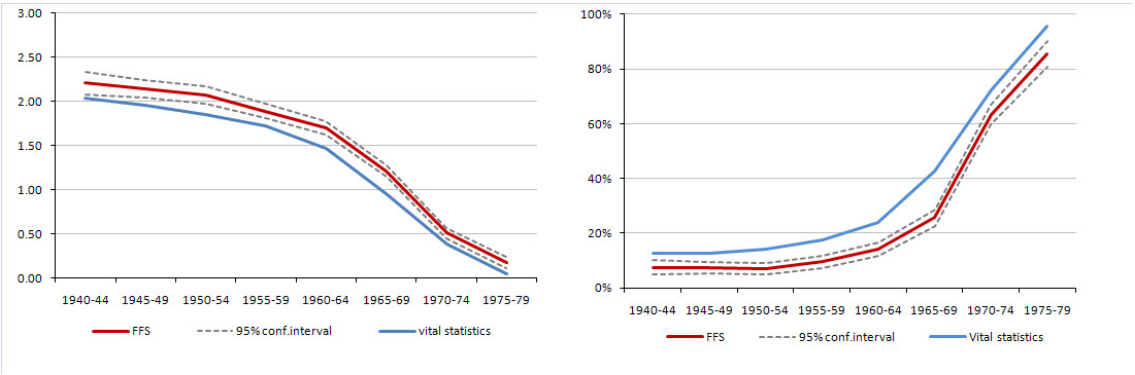
24 For further details please see the website: www.humanfertility.org

However, two of the other multipurpose surveys - ESS and microcensus - are also evaluated. We used the sampling weights provided by the survey institution if not stated otherwise. Like in Germany, these weights take into account major socio-economic characteristics such as age, sex, nationality and region, but do not account for the number of children.

3.3.1 Evaluation of selected survey samples

Figure 9 displays the mean number of children and the share of childless women based on data from the FFS. The comparison with vital statistics data clearly shows that the FFS overestimates fertility. The estimates of the mean number of children over 5-year cohorts are significantly higher while the level of childlessness is too low. These estimates are statistically different from the reference data since the benchmark is not within the confidence interval of the FFS estimates across all cohorts.

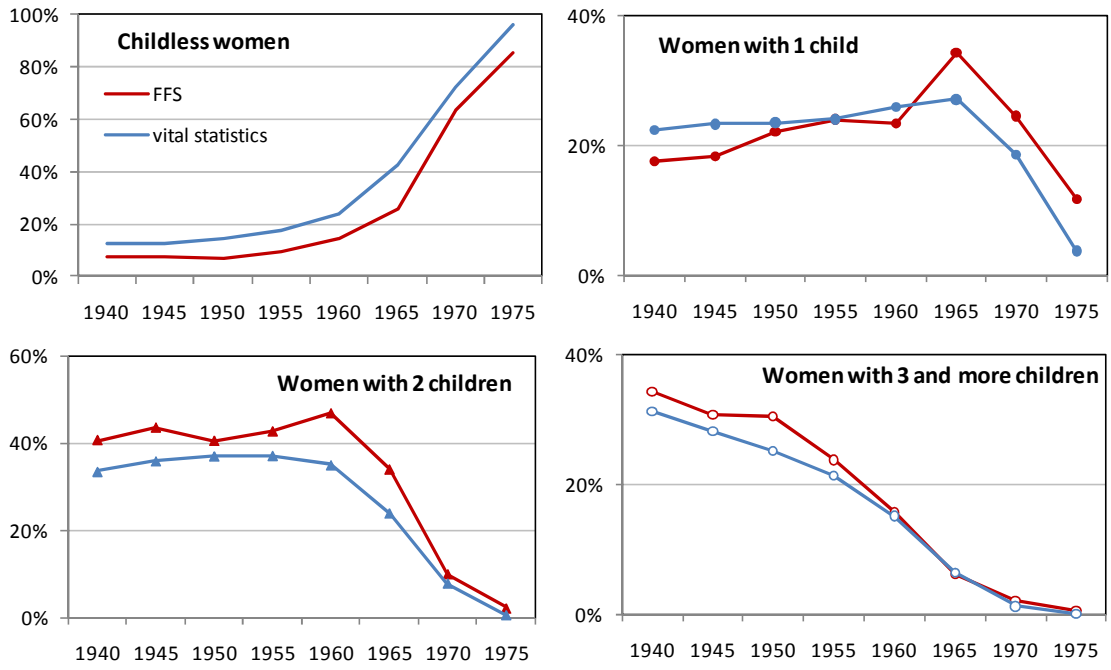
Figure 9: Mean number of children and proportion of childless women by 5-year cohort groups; FFS Austria (wave 1995/96, weighted)



25 The wording of the question on the number of children varies between the GGS and FFS. In the FFS, respondents were given a single simple question on the number of children "How many children have you had altogether?" In the GGS, fertility information is surveyed in a more complex fashion. In order to generate a variable that summarises the number of children, it is required to combine various variables (see also Kreyenfeld et al. 2010).

A more detailed inspection of the parity structure by cohort proves that most of the discrepancies in the mean number of children are driven by the fact that childless women have been under-sampled in general while two-child mothers have been over-sampled. Older women with one child are also underrepresented. Over-sampling for one- as well as for two-child mothers is very pronounced for the cohorts born around 1965. The more recent the period, the greater the level of over-representation, which is more apparent for younger one-child mothers. The possible reason for this is that mothers with newborn children are probably easier to sample than other women, because they spend more time at home where interviewers can reach them. For women with three and more children, a slight overestimation is shown for the older cohorts while for the younger cohorts there is a very good agreement (Figure 10).

Figure 10: Parity distribution by 5-year cohort groups; Fertility and Family Survey Austria (wave 1995/96, weighted)



According to these results, the most common problem is with under-representation of childless women (and over-representation of women with more children), resulting in overestimation of the mean number of children per woman. This is in line with the experience from other FFS countries discussed by Festy and Prioux (2002).

An evaluation of the GGS fertility indicators shows that this sample also suffers from a similar bias. From Figure 11 we can conclude that, in the GGS sample, fertility is overestimated since the estimates differ significantly from those derived from vital statistics. Although the differences are only partly significant, the mismatch is similar to that seen in the FFS. Looking first at the share of childless women, we can see that the weighted GGS data do not fully reflect to the trend found in the vital statistics. A similar observation can be made for the mean number of children. In particular, the estimates for the cohorts 1965-69 and 1970-74 deviate markedly from the benchmark data (Table 11).

It could be expected that the "fertility bias" might be more pronounced in family surveys and less marked for "all-purpose surveys". This can be investigated further by looking at other types of data, such as the ESS and the microcensus. Figure 12 and Figure 13 display the estimates from the ESS and the microcensus[26] (see also Table 12 and Table 13). The figure for the EES shows a similar bias of overestimation of fertility levels as seen in the FFS, particularly for younger cohorts. For the microcensus, the pattern is less clear. Our results show that for older women (ages 32+) the number of children is slightly overestimated and childlessness is underestimated. However, for young women up to their early 30s the opposite holds true. This is in contrast to our expectation that the fertility of younger people is overstated in surveys because those with children are easier to catch. Maybe this is related to the different design of the survey, as participation in the microcensus is compulsory, so the degree of non-response is very low.

Overall, the sample size in the microcensus is much higher than in the other surveys. That is why the confidence interval, compared to other surveys, is rather narrow, so even though the deviations between fertility indicators from the microcensus and from vital statistics are not big, the difference is significant anyway. If we compared just the absolute deviations between indicators based on surveys and vital statistics, the microcensus shows better agreement than the other social science surveys evaluated here (FFS, GGS and ESS).

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26 There are several waves of the Austrian microcensus that survey fertility. We use here the latest wave of 2006 (4th quarter) to evaluate the responses on number of children.

Figure 11: Mean number of children and proportion of childless women by 5-year cohort groups; GGS Austria (2008/09, weighted)

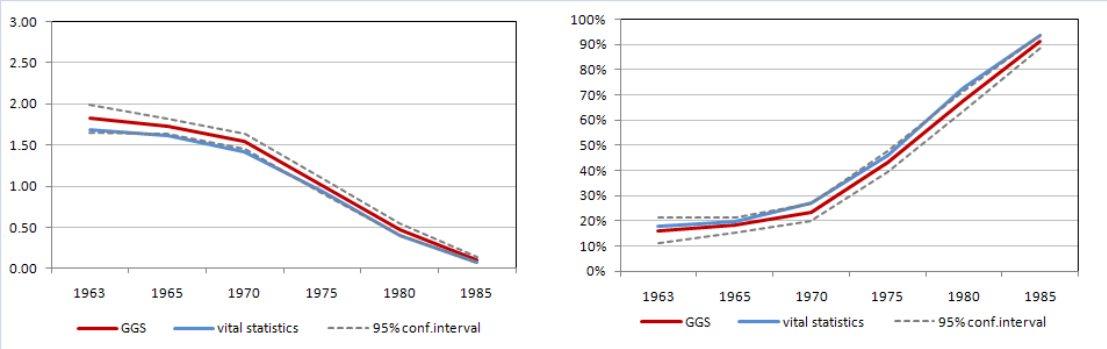


Figure 12: Mean number of children and proportion of childless women by 5-year cohort groups; ESS Austria (wave 3: 2007, weighted)

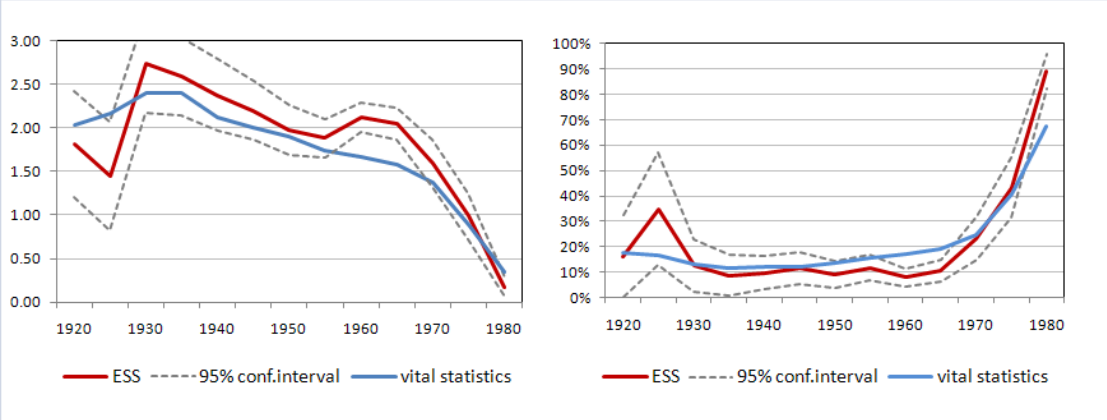


Figure 13: Mean number of children and proportion of childless women by 5-year cohort groups; microcensus Austria (wave 2006, weighted)

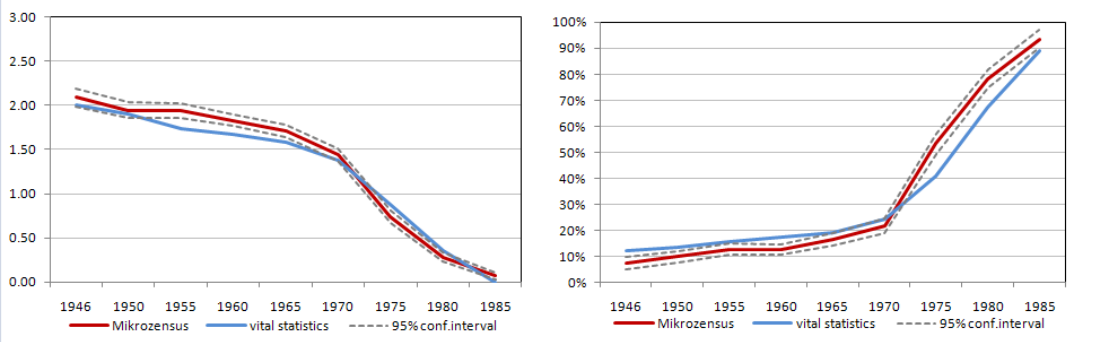


Table 11: Fertility indicators derived from GGS Austria (2008/09, weighted using weights of Statistik Austria), compared with vital statistics

Birth cohort			Childlessness			Mean number of children		
			GGS	Vital stat.	diff.	GGS	Vital stat.	diff.
1963	-	1964	16%	18%		1.82	1.69	
1965	-	1969	18%	20%		1.73	1.62	*
1970	-	1974	24%	27%		1.55	1.42	*
1975	-	1979	43%	46%		1.01	0.94	
1980	-	1984	68%	73%	*	0.48	0.39	*
1985	-	1990	91%	94%		0.10	0.08	

Diff.: * = Survey values significantly different from benchmark at 5% confidence level

Table 12: Fertility indicators derived from ESS Austria (wave 3: 2007, weighted), compared with vital statistics

Birth cohort			Childlessness			Mean number of children		
			ESS	vital stats.	signif.	ESS	vital stats.	signif.
1920	-	1924	16%	18%		1.81	2.04	
1925	-	1929	35%	17%		1.44	2.16	*
1930	-	1934	13%	13%		2.75	2.41	
1935	-	1939	9%	12%		2.59	2.39	
1940	-	1944	10%	12%		2.38	2.12	
1945	-	1949	12%	12%		2.20	2.00	
1950	-	1954	9%	14%		1.98	1.90	
1955	-	1959	12%	16%		1.88	1.73	
1960	-	1964	8%	17%	*	2.12	1.67	*
1965	-	1969	11%	19%	*	2.05	1.58	*
1970	-	1974	23%	25%		1.60	1.37	
1975	-	1979	43%	41%		0.99	0.88	
1980	-	1984	89%	67%	*	0.18	0.35	*

Diff.: * = Survey values significantly different from benchmark at 5% level

Table 13: Fertility indicators derived from microcensus Austria (wave 2006, weighted), compared with vital statistics

Birth cohort			Childlessness			Mean number of children		
			Mikrozensus	vital stat.	signif.	Mikrozensus	vital stat.	signif.
1946	-	1949	7%	12%	*	2.09	2.00	
1950	-	1954	10%	14%	*	1.95	1.90	
1955	-	1959	13%	16%	*	1.95	1.73	*
1960	-	1964	13%	17%	*	1.83	1.67	*
1965	-	1969	17%	19%	*	1.71	1.58	*
1970	-	1974	22%	25%		1.44	1.37	
1975	-	1979	53%	41%	*	0.74	0.88	*
1980	-	1984	78%	67%	*	0.28	0.35	*
1985	-	1989	94%	89%	*	0.07	0.00	*

Diff.: * = Survey values significantly different from benchmark at 5% level

3.3.2 Special weights for correcting the sample bias

Prior analysis has shown that there is a systematic bias in most of the data. This bias can only partially be cured by using weights. The reason might be that the weights usually do not consider information on the number of children. Against this background, the VID team has generated a specific weighting factor for the GGS-data that is particularly designed to account for the fertility bias in the data. It is based on the following observation: if we examine the parity distribution, we see that women with three and more children are over-represented in the GGS. For two-child mothers the level of over-representation is in general less pronounced and holds only for the cohorts born around 1968 (Figure 14). Due to these apparent discrepancies of the parity composition, the special 'VID weight' takes into account the cohort-parity specific distribution. As a benchmark, the data from the Geburtenbarometer 2008 are used (see Buber 2010 for more detailed information). By incorporating the VID weights that adjust (in addition to age, sex, employment status, country of birth and living arrangements) also for the parity of female respondents, we see how the discrepancies change after the application of the VID weights, and the results then do not differ from the vital statistics any more (Figure 15 and Figure 14).

Figure 14: Parity distribution by cohort, using different weights; GGS for Austria (2008/09)

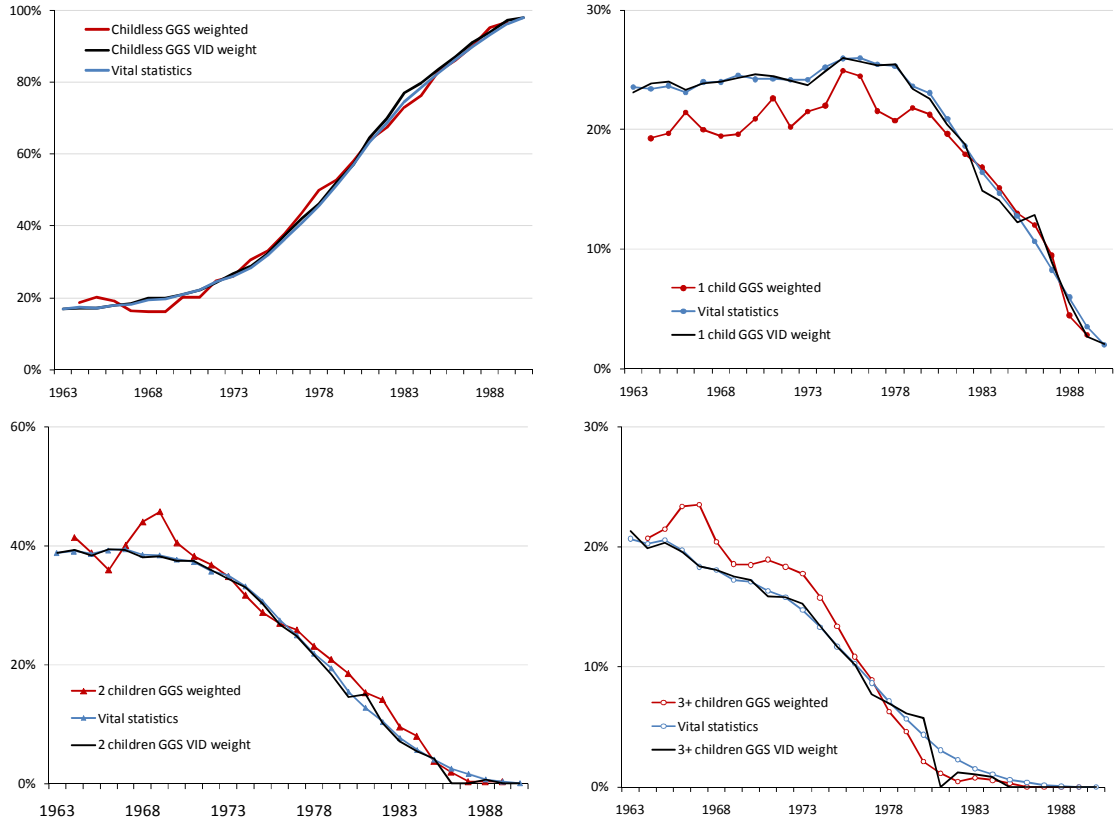
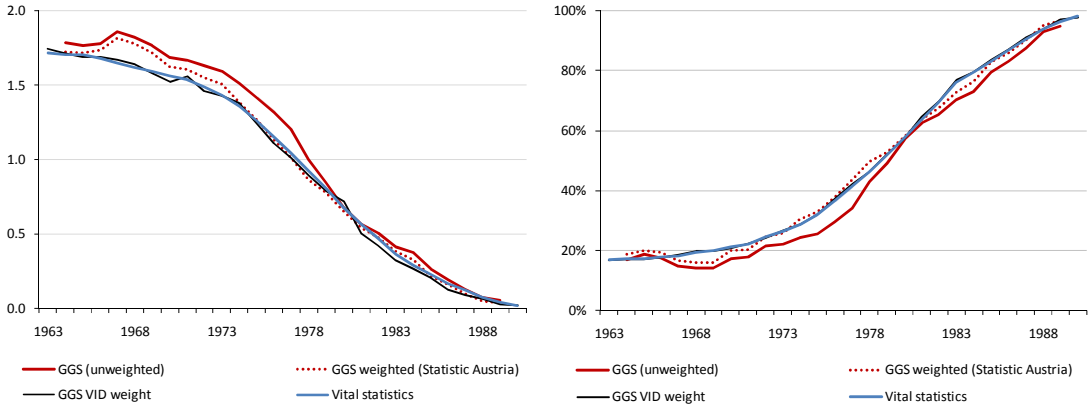


Figure 15: Mean number of children and proportion of childless women by cohort, using different weights; GGS for Austria (2008/09) compared with vital statistics



3.4 Conclusion

To conclude, the evaluation of the Austrian data has shown that using survey data for fertility research is not without flaws. General indicators of fertility behaviour derived from most of the surveys are significantly different from the benchmark obtained from official statistics for at least some of the cohort spread (for an overview, see Table 14). One should be aware especially of the tendency for under-representation of childless women and hence the overall overestimation of fertility. Before computing more detailed fertility indicators, one should evaluate simple summary indicators using high quality vital statistics or census data. Other problems of the Austrian surveys are the rather small sample sizes and the narrow age ranges.

As the FFS conducted in 1996 is already rather dated, we recommend using the GGS 2008/09 with VID weights, which take into account parity distributions, as the best fertility survey available. Using parity-specific weights is the recommended way of correcting biased parity composition of women in surveys. Fortunately, in Austria a high quality birth registration system, which collects parity-specific information, enables the calculation of reliable fertility indicators, which is why researchers do not necessarily have to use information from surveys.

Table 14: Overview of results: Austria

Birth cohort			difference in childlessness (vital statistics minus survey)				difference in mean number of children (vital statistics minus survey)			
			FFS	ESS	GGS	Mz	FFS	ESS	GGS	Mz
			1995/95	2007	2008/09	2006	1995/95	2007	2008/09	2006
1920	-	1924		1%				0.23		
1925	-	1929		-18%				0.72		
1930	-	1934		0%				-0.34		
1935	-	1939		3%				-0.19		
1940	-	1944	5%	2%			-0.17	-0.25		
1945	-	1949	5%	1%		5%	-0.18	-0.20		-0.09
1950	-	1954	7%	4%		4%	-0.21	-0.08		-0.05
1955	-	1959	8%	4%		3%	-0.17	-0.15		-0.21
1960	-	1964	10%	9%	3%	5%	-0.23	-0.45	-0.19	-0.16
1965	-	1969	17%	8%	3%	2%	-0.25	-0.47	-0.15	-0.13
1970	-	1974	9%	1%	7%	3%	-0.13	-0.22	-0.21	-0.06
1975	-	1979	10%	-2%	11%	-13%	-0.13	-0.11	-0.24	0.14
1980	-	1984		-22%	8%	-11%		0.18	-0.12	0.07
1985	-	1989		-6%	5%	-4%		-0.05	-0.05	-0.07

4 Switzerland

4.1 Introduction

The vital statistics for Switzerland are collected and disseminated by the Swiss Federal Statistical Office (SFSO) in Neuchâtel, which was founded in 1860. In addition to the collection of birth registration and population data for generating fertility statistics, the SFSO also included a fertility question in the country's decennial census of 2000. The Swiss Household Panel survey, which includes fertility data on respondents, aims to give a longitudinal perspective on attitudes and behaviour. Finally, several cross-national social surveys, which include fertility questions, have also been carried out in Switzerland, and these can complement the base data on fertility behaviour in the country.

4.2 Vital statistics and census data

Historical vital statistics data for Switzerland have been compiled by Gérard Calot of the Observatoire Démographique Européen (ODE) and Institut National de la Statistique et des Études Économiques (INSEE) (Calot et al. 1998). The publication (released as a CD) includes several indicators: the total number of live births since 1801 – by month of birth since 1871 – and daily numbers since 1926. More detailed records of births by age of mother are available for the period 1944-1985. The data also includes population counts by age and gender for 1861-1997. Data for the most recent years are available in the Human Fertility Database (HDF Switzerland 2010). Data for birth registration data since 1969 are also available in electronic form from the SFSO. [27] Population statistics of the mid-year population of women of reproductive ages are also available from the SFSO to enable the calculation of total fertility rates.[28]

27 See BEVNAT database – Statistik der natürlichen Bevölkerungsbewegung http://www.bfs.admin.ch/bfs/portal/de/index/themen/01/06/blank/data/01.html

28 http://www.bfs.admin.ch/bfs/portal/de/index/themen/01/02/blank/dos/result.html

The statistics record live births to mothers domiciled in Switzerland, but do not distinguish by residence (permanent or otherwise). However, births in Switzerland to women domiciled abroad are not included. Since 1987, births outside Switzerland to women of Swiss nationality domiciled in Switzerland have been included in the statistics. Births outside Switzerland to women of foreign nationality, but domiciled in the cities of Zürich and Berne, and in the canton of Basel-Stadt, are also included in the vital statistics (Calot et al. 1998: 223). Thus, the Swiss data represent the resident population (*de jure*), rather than the *de facto* population. However, births to residents may be underrepresented, especially before 1987, due to incomplete coverage of those residents who have given birth outside Switzerland (Glei 2008).

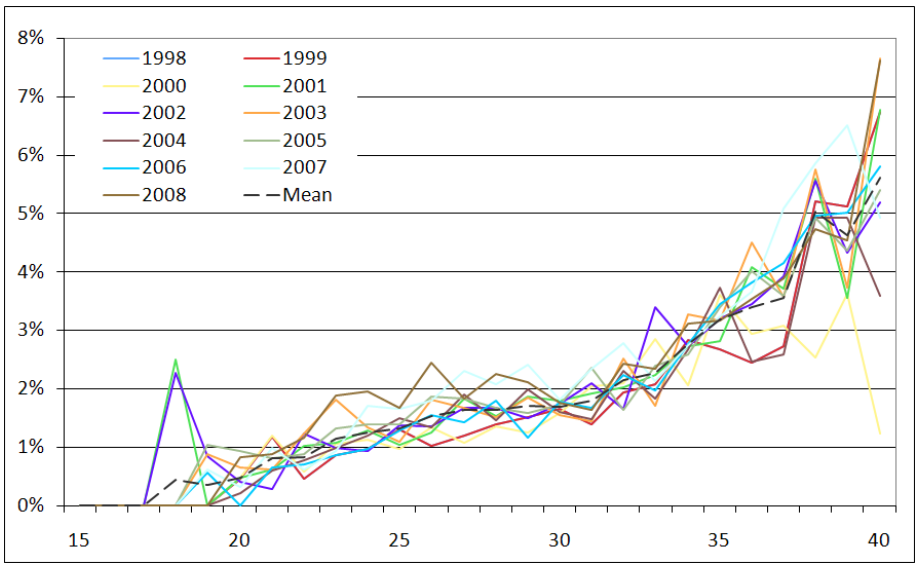
4.2.1 Birth order specific data

As in several other European countries, the information on birth order of a child was, until recently, collected only for married women, meaning that the true 'biological' birth order was unknown. Prior to 1998, birth order was registered as order in current marriage (also taking into account children who were 'legitimised' through marriage). As the proportion of births outside marriage has increased significantly , together with more complex partnership histories (Rossier and Le Goff 2005), there has been an increasing demand for collecting biological birth order. In Switzerland the biological birth order started being collected in 1998, although at first a significant proportion of births were still being recorded as unknown order; therefore, it is only from 2006 that the information has been officially available.

To close the gap in order-specific birth information that was left by vital statistics, Burkimsher (2010) estimated the number of births by order and age for the period 1969-2004. Models of the distribution of biological birth order by age of mother and 'marital birth order' were constructed by drawing on the data for 2005-2008, when both biological order and order in current marriage were comprehensively known. The resulting data allow computing of age-specific fertility rates and summary indicators such as fertility rate and mean age of mother by birth order. From a cohort perspective, the age-specific fertility rates and summary indicators may be computed for women born since 1954. Figure 16 shows, as an example, the results of the

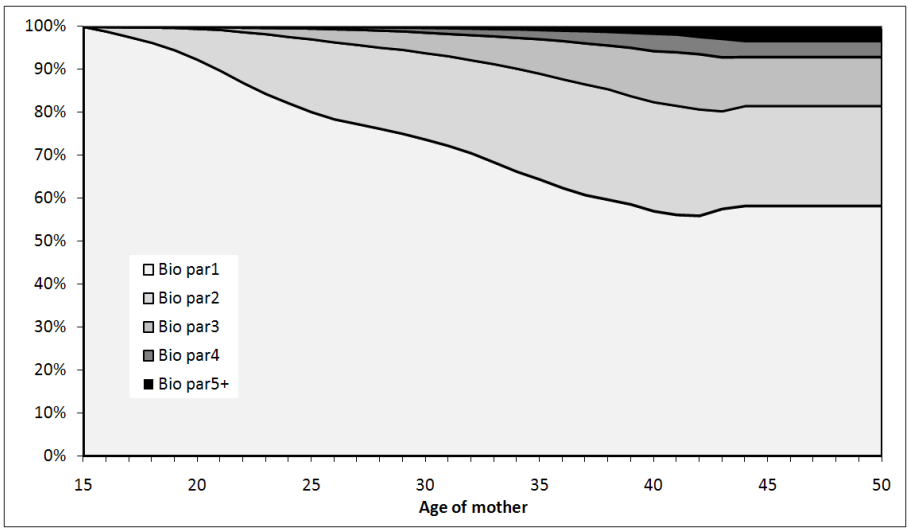
comparison between births of order one in current marriage, which were actually births of biological order two. Also as an example, Figure 17 shows the distribution of births by biological order for non-marital births.

Figure 16: Proportions of births that were classified as first births in current marriage which were second births by biological order



Source: Burkimsher (2010); own estimates

Figure 17: Attribution of births outside marriage to biological order based on 1998-2008 birth registration data



Source: Burkimsher (2010); own estimates

4.2.2 Census 2000

The Swiss Census has been taken every ten years from 1860 up to 2000, with the exception of 1888 and 1941 (Glei 2008). However, only the census in 2000 (as recorded on 5 December 2000) included a question on fertility.[29] All respondents (both male and female) were requested to report the number of (biological) children they have ever had (regardless of civil status)[30].

The data are delimited by year of birth, i.e. cohort, and the number of live-born children, up to the highest recorded case of order 19, plus the category 'unknown'. The data may also be analysed by gender, by education, and by origin (native/migrant population), as well as by any other variables included in the census, such as household characteristics, nationality, educational attainment, religious affiliation (but not practice), etc. The Swiss census does not, however, include 'soft' questions on such things as values, aspirations and personal habits. The population included in the census is the permanently resident population in the sense of civil law domicile.

In the Swiss census 2000, a significant number of respondents failed to declare their number of children (5.9 percent of women in total – HFD Switzerland 2010). The number of women with an undeclared number of children varies with age, and is especially high amongst very young and very old women. We suspect that most of the young women of unknown parity were in fact childless. To deal with this issue, we applied the following logic: for women up to 30, we consider those with an undeclared number of children to be childless, whereas after age 30 we consider only women who stated they had no children as being childless (dashed black line in Figure 18). We therefore probably overestimate to some extent the proportion of

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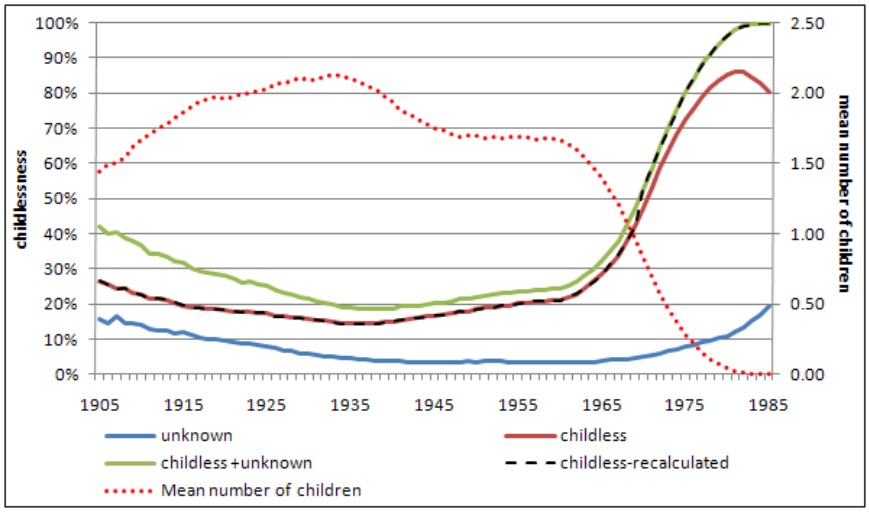
29 As with many other European countries, the method of surveying the whole population is in the process of modernisation. From 2010, it will be based on registration data (residential registers, births, marriages, deaths, etc.), plus an annual structural survey of 200,000 people, five topic-based sample surveys of 10,000-40,000 people, and a small annual omnibus survey of 3,000 people.

30 Census 2000 question 9: Are you father or mother of one or more children? If yes, question 9a) How many children (including adult or dead children); question 9b) Birth year of first four children and (if more than 4) of the last child born.

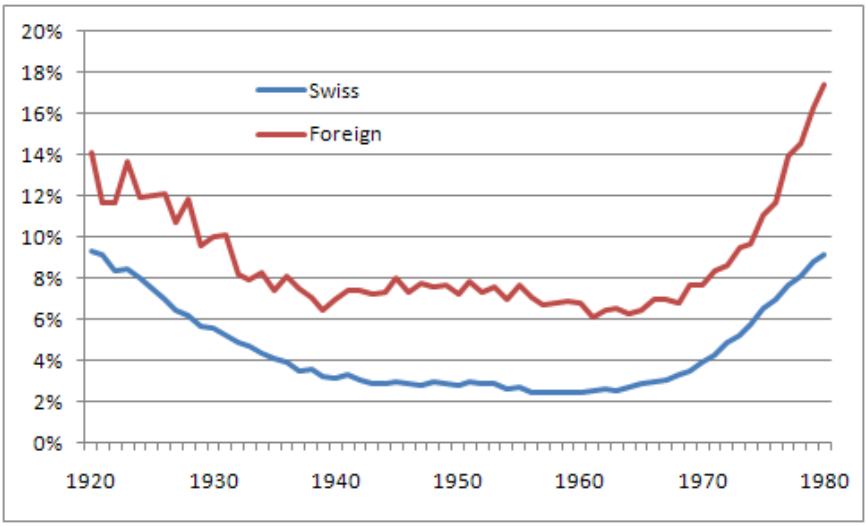
young women who are childless. There is also a significant difference in the proportion of foreign nationality women who did not declare how many children they had had, compared to Swiss women (eg. 3-6 percent for Swiss women born between 1955 and 1970, compared to 7-11 percent for the same cohorts of foreign women – see Figure 19).

Figure 18: Proportion of childless women and those with an unknown number of children, and the mean number of children by cohort, census 2000



Source: own estimates

Figure 19: Proportion of women who did not declare their number of children, by cohort and citizenship, census 2000



Source: own estimates

4.3 Survey data

The main survey data set that was specifically designed to focus on the fertility history of women and men in Switzerland was the Fertility and Family Survey from 1994/95. A number of other social surveys that have included a question on number of children have also been carried out in Switzerland (for an overview, see Table 15).

The FFS was conducted in Switzerland in October 1994 to May 1995 when 3,881 women of age 19-49 (1945-1975 cohorts) responded to the question: "How many children have you had altogether?" Although the information from the FFS is now quite dated, this is the best information on many fertility questions and attitudes that is available for Switzerland. Looking to the future, the Swiss Federal Statistical Office plans to carry out a Family and Generations Survey in 2013. However, its scope will be more limited than that of the Generations and Gender Survey (GGS).

The Swiss Household Panel (SHP) started in 1999, with consecutive waves being performed each year. It contains a wide range of questions on social and economic issues and also on fertility intentions. The principal aim of the SHP is to observe social change, in particular the dynamics of changing living conditions of the population of Switzerland. It is a yearly panel study following a random sample of households in Switzerland over time, interviewing all household members. Data collection started in 1999 with a sample of 5,074 households containing 12,931 household members. In 2004, a second sample of 2,538 households with a total of 6,569 household members was added. The SHP database currently holds information from the years 1999 to 2008.

Table 15: Selected social science surveys in Switzerland

Survey	**Year**	**Sample**
Fertility and Family Survey	1994/95	3,881 females and 2,083 males aged 20-49
Swiss Household Panel	yearly since 1999	about 4,000-5,000 households (see text)
European Social Survey wave 3	2006	988 females and 815 males aged 15 and over
World Values Survey	1989, 1996 and 2007	757F/643M, 602F/610M, 674F/567M respectively
European Values Study	2008	685 females and 586 males

4.4 Comparison of fertility estimates from different types of data

For evaluation purposes, we have calculated fertility indicators from various surveys. The key indicators that have been used are proportions of women by parity (especially the share of childless women), and the average number of children by birth cohort. These have been compared with the values obtained from vital statistics: age-specific fertility indicators for 1944-2008 obtained from the Human Fertility Database, age and order-specific fertility indicators for 1969-2008 (HFD Switzerland 2010), and data on the order-specific fertility patterns obtained from the census 2000. The mean number of children was obtained from the HFD data by cumulating the age-specific fertility rates (from a cohort perspective). The proportion of women by parity (0, 1, 2, 3+) was obtained from the census 2000, and then subtracting or adding the corresponding age and birth-order-specific rates to get the parity composition at the time of the survey. The census 2000 was conducted on 8 December; the census data are thus regarded as corresponding to 01/01/2001. The SHP 2000 was conducted during period September 2000 - March 2001, so this is compared directly with the census data. The FFS was conducted in October 1994 – May 1995 and is compared with the vital statistic data as at 01/01/1995. The ESS was conducted in August 2006 – April 2007 and is compared with vital statistics data as at 01/01/2007. We did not perform an evaluation of the EVS/WVS data, because their samples are rather small and the survey design is targeted to social aspects other than demographics. In all cases we have used the survey weights provided.

4.4.1 Cohort fertility as obtained from vital statistics and census data

Birth registration data are generally used to calculate period fertility measures. However, with a sufficiently long period of data, to cover the majority of a cohort's reproductive life, then cohort measures can be calculated. Using the SFSO's database of births since 1969, cohort fertility can, therefore, be calculated for cohorts going back to those born in 1954. These values can then be compared to other cohort measures such as those obtainable from the Swiss census data and sample surveys. See Table 16 for a comparison of cohort fertility derived from birth registration data

and from the census 2000; this shows a remarkable level of agreement. The reason why the agreement is not perfect is because the structure of the population changed quite dramatically between the period when these cohorts were in their main reproductive period (1980s-1990s) and 2000, when the census was taken: there have been large net immigration flows. For example, the 1960 cohort of women grew from about 47,000 in 1960, when they were aged around 20, to 58,000 in 2000, an increase of 23 percent. More recent cohorts have expanded to an even greater extent: for example, the 1975 cohort grew by 42 percent between 1990 (the start of their potential reproductive life) and 2009. Because immigrants have significantly different fertility patterns to Swiss natives, then this will cause differences between fertility statistics derived from birth registration and those from subsequent censuses and sample surveys. If we look at the share of childlessness calculated from birth registration data and from the census data, then some small differences become apparent. It should be noted, however, that the parity distributions shown here are estimates derived based on the method explained in section 4.2.1. We cannot tell whether the disparities are due to weaknesses of the modelling procedure or because of changes in the structure of the population mainly because of immigration.

Table 16: Comparison of mean number of children and childlessness by cohort, as derived from vital statistics and census 2000

Birth cohort	Mean number of children			Childlessness		
	vital	Census	difference	vital	Census	difference
1930 - 1934	2.19	2.11	0.08	NA	15%	-
1935 - 1939	2.16	2.04	0.12	NA	14%	-
1940 - 1944	1.98	1.85	0.13	NA	16%	-
1945 - 1949	1.83	1.72	0.11	NA	17%	-
1950 - 1954	1.77	1.69	0.08	NA	19%	-
1955 - 1959	1.75	1.68	0.07	18%	21%	-3%
1960 - 1964	1.67	1.58	0.09	21%	23%	-3%
1965 - 1969	1.29	1.20	0.09	35%	35%	0%
1970 - 1974	0.67	0.60	0.08	62%	64%	-2%
1975 - 1979	0.20	0.17	0.03	87%	87%	-1%
1980 - 1984	0.02	0.02	0.00	NA	99%	-

4.4.2 Survey data

In this section we evaluate three of the surveys conducted in Switzerland which have included fertility questions, namely the FFS, SHP (wave 2000) and ESS (wave 3, 2006).

From the **FFS data** set we derived the mean number of children and parity composition by 5-year cohort groups (cohorts 1945-49 to 1970-74). Figure 20 plots the mean number of children by female birth cohorts for the FFS data. In contrast to the Austrian FFS and German GGS that broadly overestimate fertility, the Swiss FFS slightly underestimates the completed fertility rate, but not significantly within the 95-percent confidence interval (Table 17). However, the commonly observed problem of under-sampling childless women in surveys does not appear to be the case in the Swiss FFS. The summary indicators of fertility from the FFS sample seem to be in excellent agreement with those derived from vital statistics. Almost all differences are within the 5 percent significance band. From the graphs of parity composition it is, however, apparent that slight over-sampling of women with 1 and 2 children is counterbalanced by under-sampling of women with 3 or more children (Figure 21).

Figure 20: Mean number of children and proportion of childless women by 5-year cohort groups; Fertility and Family Survey Switzerland (1995/6)

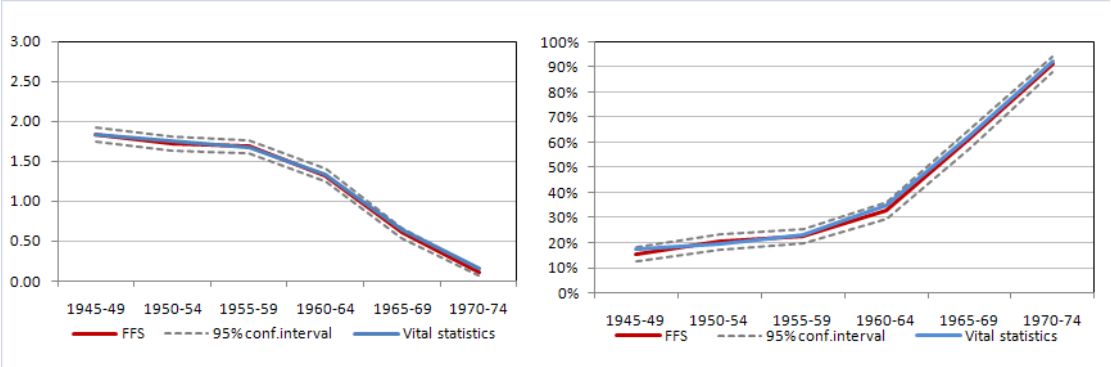


Figure 21: Parity distribution by 5-year cohort groups; Fertility and Family Survey (1995/6)

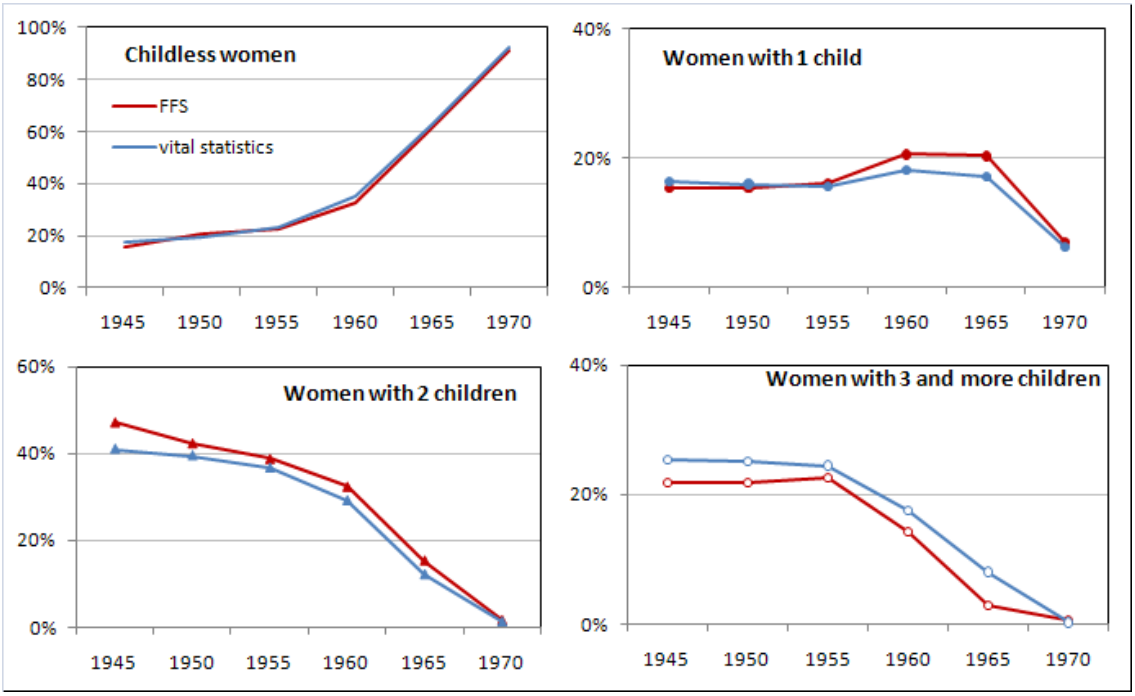


Table 17: Fertility indicators derived from FFS Switzerland (wave 1994/5, weighted), compared with vital statistics

Birth cohort	Childlessness			Mean number of children		
	FFS	vital stats.	signif.	FFS	vital stats.	signif.
1945 - 1949	16%	17%		1.83	1.83	
1950 - 1954	20%	19%		1.72	1.76	
1955 - 1959	22%	23%		1.69	1.68	
1960 - 1964	33%	35%		1.32	1.34	
1965 - 1969	61%	63%		0.60	0.65	
1970 - 1974	91%	92%		0.12	0.16	*

Diff.: * = Survey values significantly different from benchmark at 5% level

In a similar manner, we compare the **Swiss Household Panel (SHP)** to the census 2000 data. Wave 2000 of the SHP provided responses from 3,967 women of birth cohorts 1908-1997. Retrieving the number of children was not as straightforward as in the case of the FFS or ESS, because given the design of the household panel, we needed to associate own co-resident children to mothers based on household ID, then adding own children not living in the household. From the resulting data set we derived the mean number of children and parity composition by 5-year cohort groups (cohorts 1910-14 to 1980-84). The results are given in Figure 22 and in Table 18 and Figure 23. The estimates of the mean number of children for 5-year cohort bands are significantly lower for the older cohorts and slightly higher for the younger ones. Similar patterns are seen for the indicator of childlessness, which is too high for the older cohorts and slightly too low for women born in the 1960s and later.

From Figure 23 we observe that childless women have been over-sampled in general while women with three or more children have been under-sampled. Both mismatches are very pronounced for the older cohorts. The best agreement is for one-child mothers. Contrary to the more usual tendency for under-sampling of childless women in surveys, for the Swiss Household Panel the results showed the opposite: under-estimation of mean number of children and mixed results for childlessness. This might be due to a different design of the panel, which is focused primarily on households. However, for the youngest cohorts, the proportion of childless women followed the more usual pattern of being under-represented.

Figure 22: Mean number of children and proportion of childless women by 5-year cohort groups; Swiss Household Panel (Wave 2000)

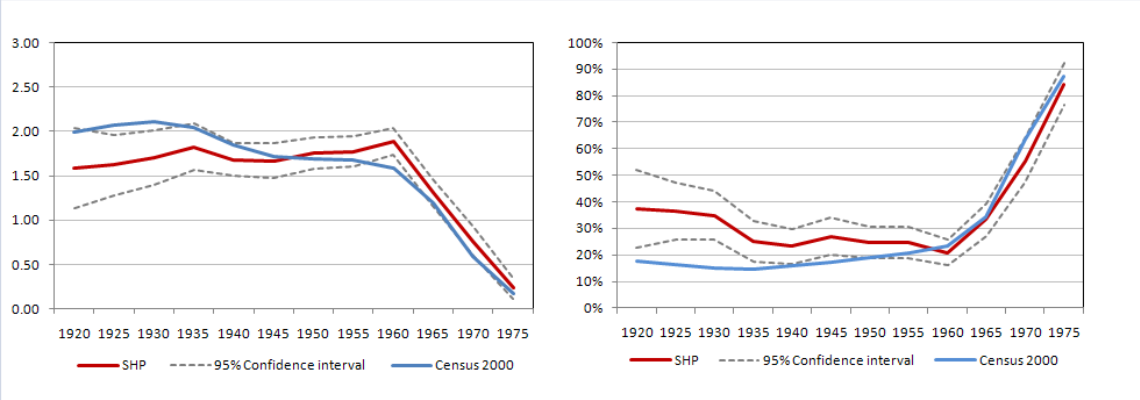


Figure 23: Parity distribution by 5-year cohort groups; Swiss Household Panel (Wave 2000)

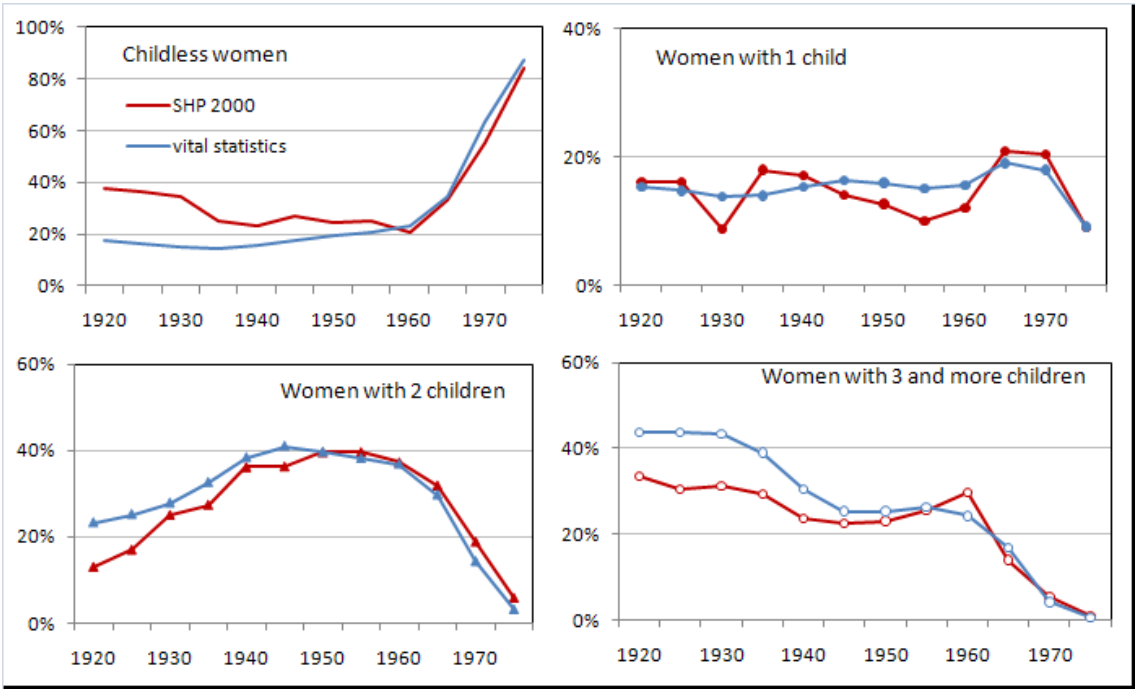


Table 18: Fertility indicators derived from the Swiss Household Panel (wave 2000, weighted), compared with Census 2000

Birth cohort	Childlessness			Mean number of children		
	SHP	Census	signif.	SHP	Census	signif.
1910 - 1914	52%	21%		1.15	1.75	
1915 - 1919	23%	19%		1.71	1.93	
1920 - 1924	37%	18%	*	1.59	1.99	
1925 - 1929	37%	16%	*	1.62	2.07	*
1930 - 1934	35%	15%	*	1.70	2.11	*
1935 - 1939	25%	14%	*	1.83	2.04	
1940 - 1944	23%	16%	*	1.68	1.85	
1945 - 1949	27%	17%	*	1.67	1.72	
1950 - 1954	25%	19%		1.76	1.69	
1955 - 1959	25%	21%		1.77	1.68	
1960 - 1964	21%	23%		1.89	1.58	*
1965 - 1969	33%	35%		1.31	1.20	
1970 - 1974	56%	64%		0.76	0.60	
1975 - 1979	84%	87%		0.23	0.17	
1980 - 1984	66%	99%	*	0.77	0.02	

Source: Swiss Household Panel (SHP)

Diff.: * = Survey values significantly different from benchmark at 5% level

Finally we evaluated the **European Social Survey**, wave 3, conducted in August 2006 – April 2007. Here we have responses from 988 women aged 14-94 years (cohorts 1912-1991) from the question on number of children, from which we derived the mean number of children and childlessness by 5-year cohort groups (cohorts 1910-14 to 1980-84). The results are given in Figure 24 and in Table 19. Because of the limited sample size, we did not derive party compositions of women with children.

As with the FFS and SHP, the Swiss ESS also reflects reality very satisfyingly. Except for very young cohorts, the sample of childless women has the same proportion as in general population, and the same is true for the mean number of children.

Figure 24: Proportion of childless women and mean number of children by 5-year cohort groups; European Social Survey (Wave 3/2006-7)

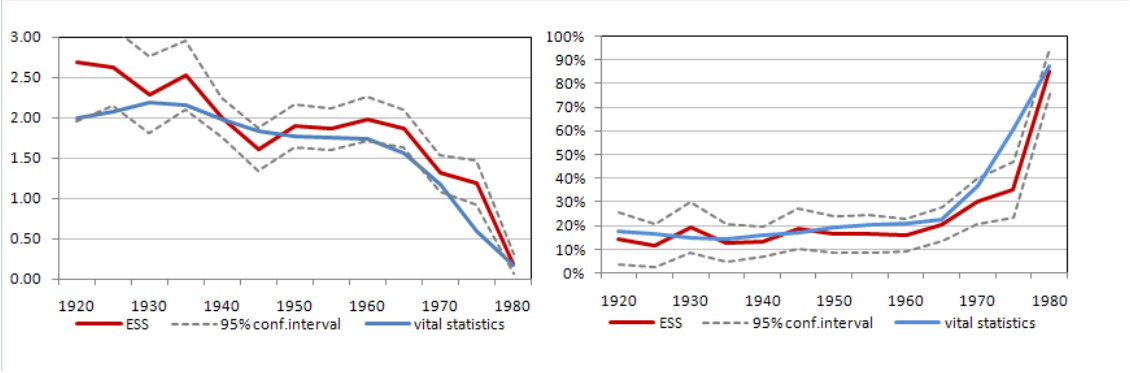


Table 19: Fertility indicators derived from ESS Switzerland (wave 3: 2006/7, weighted), compared with vital statistics

Birth cohort	Childlessness			Mean number of children		
	ESS	vital stats.	signif.	ESS	vital stats.	signif.
1915 - 1919	27%	19%		2.11	1.93	
1920 - 1924	15%	18%		2.69	1.99	
1925 - 1929	12%	16%		2.63	2.07	*
1930 - 1934	19%	15%		2.29	2.19	
1935 - 1939	13%	14%		2.53	2.16	
1940 - 1944	13%	16%		2.00	1.98	
1945 - 1949	19%	17%		1.61	1.83	
1950 - 1954	16%	19%		1.90	1.77	
1955 - 1959	17%	20%		1.87	1.75	
1960 - 1964	16%	21%		1.98	1.73	
1965 - 1969	21%	23%		1.87	1.56	*
1970 - 1974	30%	37%		1.31	1.17	
1975 - 1979	35%	61%	*	1.19	0.59	*
1980 - 1984	85%	88%		0.18	0.18	

Diff.: * = Survey values significantly different from benchmark at 5% level

4.5 Conclusion

This section has provided an overview on the various types of data that can be used for fertility analysis in Switzerland. In social surveys generally, there is commonly a problem with the under-representation of childless women (and over-representation of women with more children), resulting in overestimation of the mean number of children (Festy and Prioux 2002: 23). In particular, young childless women often have higher non-response rates than women that are home with the children. However, for the Swiss Household Panel (2000 wave) the results showed the opposite: an underestimation of the mean number of children and mixed results for childlessness, depending on cohort group. However, the general pattern of young childless women being underrepresented still held true in the SHP. Among older cohorts, childless women were, on the contrary, slightly overrepresented. The FFS and ESS results were not significantly different from the benchmark vital statistics data. We may conclude that surveys conducted in Switzerland are of very high quality in respect of sample representativity of fertility histories of female respondents.

5 General conclusion

This paper had two objectives. Firstly, we discussed the availability of order-specific fertility information in the vital statistics of Germany, Austria and Switzerland. Secondly, we gave an overview of the survey data that can be used to generate fertility indicators. Thirdly, we compared fertility estimates across surveys to evaluate the reliability of survey-based fertility indicators.

In order to assess the quality of fertility data in social science surveys, we have compared fertility estimates across various types of data. The key indicators that we have used for validation are the mean number of children and the level of childlessness by birth cohorts of women. We assumed that a 'family bias' tends to be inherent to social science surveys. The reason is that women with small children are usually easier to reach for interviewers than childless respondents or respondents who have older children (Festy and Prioux 2002). Therefore, cohort trends in childlessness derived from surveys risk being biased, because the fertility of younger cohorts is overstated. For family surveys one additionally needs to consider that respondents with young children are likely to be more interested in participating in the survey, which will create an additional bias.

Our investigation of data from the three different countries gives some support to this hypothesis, as we find a 'family bias' in the Austrian GGS, FFS and ESS. Weighting the data did not cure much of the bias, which we attribute to the fact that the standard weights do not control for number of children. It is also worth noting that the bias was particularly strong in the family surveys, but all-purpose surveys, such as the Swiss Household Panel and the Austrian microcensus, did not suffer from it to the same extend. From this we concluded that unit-non response is more selective in family surveys than in all-purpose surveys, as childless respondents might be less interested in participating in these types of surveys.

While unit-non response is a particularly issue in social science surveys, selective item non-response turned out to be a critical issue in the German microcensus and Swiss census. In censuses, respondents are obliged to participate by law, which results into a low unit non-response. However, item non-response was high for the question

on number of children and it is considered probable that childless respondents were more likely than others to refuse to provide an answer. Given the major importance of the microcensus, it seems highly desirable to make a stronger effort to obtain reliable fertility information. This would not only guarantee that we get trustworthy 'structural indicators', it is also important for the social science surveys which rely on the microcensus to generate their weighting factors.

This paper has left several issues unresolved. We have compared survey data with vital statistics, but the effect of migration, which blurs the comparison, has only been mentioned in passing, but not explored sufficiently. Fertility indicators derived from survey data, compared to those derived from vital statistics, must differ because they consider different populations, particularly for the older cohorts. On the one hand, surveys and censuses do not include respondents who have died or emigrated, and selection upon survival will bias any estimates of childlessness for the older cohorts. On the other hand, surveys and censuses include respondents who have moved into the country. If we use births and the exposure population from different sources then we are dependent on excellent estimates of the total exposed population to calculate fertility rates. As young childless women are the most mobile, both nationally and internationally, then accurate estimates of their numbers over time, even with compulsory registration, is difficult. Full population registers that contain fertility as well as migration histories would be remedy of this problem. The Austrian register-based census might be a move into this direction. However, for Switzerland, and particularly for Germany, the future availability of such type of data is rather unlikely. Surveys that contain fertility and migration histories will remain the most realistic option for the time being. However, sampling mobile, young, childless women remains a challenge to survey analysis. Taking into account the effects of migration in fertility analysis is likely to be a growing challenge in the future for research based on survey data, as well as on vital statistics.

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