The Influence of Qualification on Women's Childlessness in West Germany: Age and Cohort Effects

Analyses with the German Microcensus

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Abstract

Even though there is a growing concern about a socially selective pattern of childlessness among women and the implications for policy and the economy in Germany, there have been no comprehensive studies to analyse the extent of childlessness. This can be put down to the fact that the available data to study this issue are rather insufficient. Using official microdata, the aim of the present paper is to provide an initial overview of the structure of childlessness depending on qualification, age and birth cohort of women in West Germany. Since most theories explain childlessness of women in modern societies in terms of their increasing labour force participation, the changes in female labour force participation over the last 30 years are described, too. The analyses are based on the population census 1970 and the microcensus 1989 to 2001. Though the census and the microcensus have some advantages over social surveys, there are some limitations when studying family patterns based on official microdata. These methodological issues will also be addressed in the paper.

Zusammenfassung

Bislang gibt es kaum Studien, welche die Entwicklung und das Ausmaß von Kinderlosigkeit in Deutschland in umfassender Weise empirisch untersuchen. Ein wesentlicher Grund hierfür dürfte die unzureichende Datenlage sein. Der vorliegende Arbeitsbericht beschreibt auf Basis von Mikrozensusdaten die Entwicklung der bildungsspezifischen Kinderlosigkeit von deutschen Frauen in Westdeutschland für die Geburtskohorten 1951 bis 1968. Neben dem Bildungsniveau werden auch die Erwerbsbeteiligung und der Familienstand von Frauen als zentrale Erklärungsfaktoren von Kinderlosigkeit herangezogen. Der Vorteil des Mikrozensus ist zweifellos der im Vergleich zu wissenschaftsbasierten Erhebungen sehr große Stichprobenumfang, der auch die Betrachtung von eher kleinen Subpopulationen erlaubt. Allerdings stößt die Analyse von Kinderlosigkeit mit Mikrozensusdaten auch auf zentrale Beschränkungen. Diese Beschränkungen werden im vorliegenden Papier gleichfalls thematisiert und in Hinblick auf die Konsequenzen für die Analyse diskutiert.

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1   Introduction[1]

It is well known that Germany has - even by European standards - a remarkably low birth rate. While in the 1960s the total fertility rate was about 2.5 it dropped to 1.4 in the 1970s and has remained there for the last 30 years. The consequences of a fertility rate far below replacement level, such as an over-aging population, funding problems of social security systems, as well as in the future, a shortage of manpower[2], have been a topic for discussion among politicians for some years. Only recently a new aspect has been introduced into the discussion. It seems that Germany is going to face a polarized pattern of fertility with a growing proportion of lifetime childless women on the one hand and women with children on the other. Moreover this pattern seems highly socially selective: In particular women with an academic degree are likely to refrain from having children, whereas women with lower qualifications will very likely have at least one child. Given that in West Germany there is positive assortative mating by education (Wirth 2000), in the long run such a development of polarized parenting may give rise to a growing social inequality between households and families:[3] The socially less advantaged individuals, that is to say persons with lower educational degrees and thus lower labour market incomes, will have to bear the additional costs of raising children, in terms of both time and money. Whereas the socially most privileged individuals, that is to say highly educated persons, are mainly engaged in the labour market and employment careers, prioritising personal and material well-being over children.

The question is important because of the increasing qualification level of women. But before discussing any consequences of an educational bias in the childlessness of women, a sound information basis is needed. Even though there is a growing concern about the problem, studies providing empirical evidence for socially selective childlessness in Germany and its change over time are hard to find. This is mainly due to data limitations. The present paper therefore aims primarily at filling in this gap by providing some facts about the extent and the educational structure of childlessness among woman in order to provide an empirical basis for further studies on social inequality. The analyses are based on the German Census (Volkszaehlung) 1970 and the German Microcensus 1989 to 2001.

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[1]   The present paper is based on Wirth/Dümmler (2004) and Wirth (2005).

[2]   As illustrated by a recent empirical study, firms so far have at best rudimentarily adjusted their policy to the challenges of an aging society (Klee et al. 2004).

[3]   Or as Esping-Andersen (2002: 32) put it: "The weak bundle together with the weak, the strong with the strong. Therefore, we are far more likely to see a concentration of vulnerability and of success as individuals form partnerships and households. And this will reinforce not only the individual's life chances but also those of their offsprings."

The paper is organized as follows. In the first part the data sets used and the specific methodological issues are described. Then a short description of the educational classification used in this paper as well as the educational distribution of women over the last 30 years is given. Next the association between the qualification level and the postponement of childbearing is analysed, since the timing of motherhood is one of the main problems using microcensus data for the analysis of childlessness. Whether we observe only a postponement of motherhood or whether highly qualified women refrain more and more from motherhood is the subject of the following section. Further on, a more detailed analysis of the change over the last decade is provided by comparing the labour market participation and the marital status of different educational groups as one explanation for different fertility patterns. The primary interest of this paper is in the structures of childlessness, not yet an explanation of them. Nevertheless the paper ends with a brief summary of the findings and feasible explanations for the observed differences.

2   Data and Methodological Issues

As mentioned before there only a few empirical studies addressing the variation of childlessness depending on the qualification of women in Germany (Dorbritz/Schwarz 1996; Grünheid 2003). This is mainly due to the data situation, which could be better. There are a number of social surveys (such as ALLBUS, SOEP, the German Welfare Survey, the German Life History Study, and the Family and Fertility Survey) covering most of the information needed to conduct studies on childlessness. Unfortunately, the sample sizes of these surveys (between 3.000 and 20.000 persons) are not always sufficient to examine highly diverse social groups. Once researchers start focusing on childless women by education and age, the count numbers drop rapidly.[4] Limiting factors become obvious, too, when slowly developing trends of small population groups are the issue. Because of the limited number of observations quite often the sampling error in social surveys is larger than the amount of change.

Moreover the participation in social science surveys is not obligatory. As a consequence the data can be affected by non-response. In fact, the response rates for common sample surveys of the population are quite low in Germany.[5] In particular one-person households are strongly under-represented (Hartmann/Schimpl-Neimanns 1992; Däubler 2002). Partly because people are not willing to respond in social surveys, this problem concerns especially elderly people. Partly, because it is more difficult to get hold of people living in a one-person household than

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[4]   As a consequence researchers sometimes aggregate subpopulations, which are quite heterogeneous, such as East and West German women, or use very large age cohorts. This might bias the findings as was recently shown by Scharein and Unger (2005).

[5]   In many instances below 60 percent.

people living in a household with two or more members. This concerns in particular younger and medium aged persons who are working. For this reason it is very likely that childless persons - such as unmarried women, who as a rule are working - are under-represented in social surveys.

However, there are also no official register data that could be used to study the extent of childlessness in Germany. Even though there is a birth register, it includes only information about age, family status and nationality of a woman. The crucial information about a mother's educational attainment and employment status is not gathered. Above all the birth register - as the name suggests - contains only information about women with children but no information at all about women without children.

In order to give a first impression about the structure of childlessness depending on the education of women in this paper, therefore, a one-percent subsample of the population census 1970 and the scientific-use-files of the microcensus 1989[6] to 2001 are used.

The microcensus (first carried out, in 1957) collects at regular intervals information on basic demographic characteristics, labour market activities, income and its sources, educational attainment, vocational training, various aspects of social security, health, and other aspects.[7] A sample of one per cent of the population in Germany, more than 800,000 persons in about 350,000 households, is surveyed each year.[8] Respondents are under a legal obligation to provide information in the census, so the non-response rate is quite low.[9] The microcensus as well as the population census are household surveys, which collect data for all persons living in a household. The data can be used for labour market and broader socio-economic analyses, as well as for analyses of household and family patterns (Schimpl-Neimanns 2002).

The large sample size,[10] low sample bias and the fact that information is provided by all persons living in the same household are the specific strengths of the data. A shortcoming is that no information is included for children not living in their parent's household, nor on the final number of children born to a woman. However as known from other studies, children

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[6]   The gap between 1970 and 1989 is caused by the fact, that microcensus data collected before 1989 are not available as scientific-use-files. Even though the German Microdata Lab at ZUMA possesses microcensus data for the period 1973 to 1987, some important information (such as children under 18 years) are missing, because of anonymisation. Therefore the data are not used in the present paper.

[7]   The topics covered by the census are defined by law.

[8]   The scientific-use-files are a 70 percent subsample of the microcensus, that is a 0.7 percent sample of the population in Germany (see Müller et al. 1995).

[9]   About 3 percent.

[10] Table 1a (Appendix) shows the count numbers for the subpopulation (German women, West Germany) by age group and data set.

aged under 18 are most likely to live in their parent's households (Figure 1). Therefore, most studies draw on whether there are children or no children aged less than 18 years living in the household as a proxy for lifetime childlessness. This could raise a problem insofar, as a woman even if she has a child, shows up as statistically childless if her child has already left home. In particular older women therefore would show up as lifetime childless.

Figure 1:   Proportion of children by age living in their parent's household (Microcensus 1997)
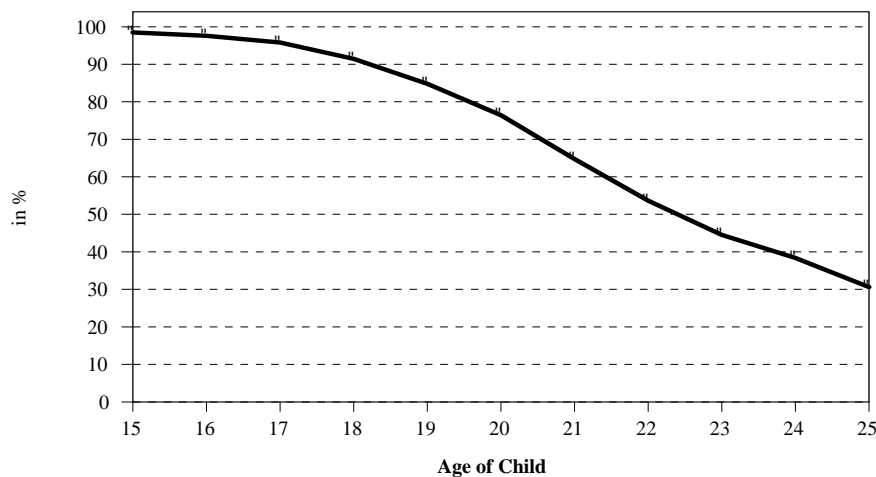
Source: Schimpl-Neimanns (2002: 7)

To solve this problem certain age restrictions are set for the women under consideration. As a rule studies based on microcensus data concentrate on women in the age bracket 35 to 39. It is assumed that women in this age group will very likely have completed their reproductive life and that their children, if they have any, are still living at home (Engstler 1998: 96). In the present paper this indicator is used as a starting point, too. However, as will be shown later on, this age line might not be appropriate, when the research is focused on lifetime childlessness by education.

The following analyses concentrate on German women living in West Germany. East Germany is excluded in the present paper, because of its specific historical situation and the resulting differences in policy[11], which come along with still different family and working patterns of East German women even more than one decade after the reunification.

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[11]   For details see e.g. Trappe (1996) or Kreyenfeld (2004).

3   Educational Classification

To measure the educational level of women the CASMIN[12] Educational Classification, which is based upon two primary classification criteria, is used. The first criterion refers to educational credentials according to hierarchical level, in terms of the length of educational experience, the required intellectual abilities or rather the curricular contents and the labour market value of the educational certificate achieved. The second criterion distinguishes between 'general' and 'vocational-oriented' education.

With respect to the general education, the classification distinguishes between (1) elementary, (2) secondary and (3) tertiary level of education (Table 1).

Table 1:   Educational classification (based on the CASMIN classification)

Elementary Level		
1b(*)	HS(**)	(Compulsory) elementary education *[Hauptschule]*
1c	HSM	(Compulsory) elementary education **and** vocational qualification *[Hauptschule mit Berufsausbildung]*
Secondary Level		
2b	MR	Intermediate general qualification *[Mittlere Reife]*
2a	MRM	Intermediate general qualification **and** vocational qualification *[Mittlere Reife mit Berufsausbildung]*
2c_gen	ABI	General maturity certificate *[Fachhochschulreife, Abitur]*
2c_voc	ABIM	General maturity certificate **and** vocational qualification *[Fachhochschulreife, Abitur mit Berufsausbildung]*
Tertiary Level		
3a	FH	Lower tertiary education *[Fachhochschule]*
3b	UNI	Higher tertiary education *[Universität]*
(*) Shortcuts according to the CASMIN classification (**) Shortcuts as used in this study		

The 'elementary level' [*Hauptschule*] corresponds to the social minimum of education that every individual is expected to reach in a society. This level can be achieved by following up the least demanding courses of education until reaching the legally fixed age for terminating compulsory schooling.

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[12] **C**omparative **A**nalyses of **S**ocial **M**obility in **I**ndustrial **N**ations. The CASMIN classification has been constructed for studying the links of education with processes of social mobility in European societies. It has been used in many studies in comparative social mobility and labour market research (Braun/Müller 1997; Brauns/Steinmann 1999).

On the secondary level a distinction is made between intermediate [*Mittlere Reife*] and full secondary certificates [*Abitur, Fachhochschulreife*]. Full secondary qualification implies the successful passing of those exams that mark the completion of the secondary schooling.

The highest qualification level refers to certificates reached in the tertiary sector of education. 'Lower tertiary education' is characterized by a shorter length of study and more practically oriented study programs [*Fachhochschulen: Universities of Applied Sciences*]. 'Higher tertiary education' [*Universität*] requires the successful completion of a traditional, academically oriented university education (Braun/Müller 1997: 175ff.).

Within the elementary and the secondary level the classification distinguishes furthermore whether an individual has attained only a general education or in addition has completed a vocational education.[13] As has been shown by many studies there is a strong effect of qualification on the labour market chances, earning potentials, unemployment risks etc. in Germany (Shavit/Müller 1998). On the level of elementary and secondary education, a completed vocational training is a crucial precondition for achieving a skilled occupation. In this sense a general maturity certificate (Abitur) without any vocational training is less valued in the labour market than an intermediate general *and* vocational training (Mittlere Reife mit Berufsausbildung). Table 2 breaks down the proportion of women aged 35 - 39 who fall into these types of education and shows the changes over the last 30 years.

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[13] In Germany the vocational training traditionally takes place within the apprenticeship training system, where the teaching of occupational skills is coordinated between firms and vocational schools, the so-called dual system.

Table 2: ***The educational distribution of German women aged 35-39, 1970 to 2001. West Germany***

Qualification Level:	Women aged 35-39 in the year					
	1970	1976	1982	1989	1995	2001
	Column %					
Elementary Level:						
Elementary education	57.4	37.8	22.4	17.2	12.0	9.5
Elementary education **and** vocational qualification	22.8	34.9	41.2	42.5	32.0	23.8
Secondary Level:						
Intermediate general qualification	3.1	4.5	4.3	2.9	3.0	3.2
Intermediate general qualification **and** vocational qualification	13.2	15.0	19.2	21.6	30.9	35.3
General maturity certificate	0.5	0.9	0.9	0.9	1.4	1.9
General maturity certificate **and** vocational qualification	0.7	1.9	2.7	3.7	8.0	14.0
Tertiary Level:						
Lower tertiary education	0.0	1.5	1.9	2.5	4.1	4.1
Higher tertiary education	2.3	3.5	7.5	8.7	8.7	8.3
Totals	18,341	12,337	11,320	11,133	12,760	14,315

Data Source: Population Census 1970, Microcensus 1976, 1982, 1989, 1995, 2001.

As Table 2 indicates the educational distribution of women has considerably changed over the last 30 years. In 1970 about 80 percent only achieved education at the elementary level, mainly (58%) without vocational qualification. In 2001 the proportion of women with only elementary education dropped to one-third (about one quarter with a vocational qualification). At the same time we observe a strong increase in the secondary level, mainly for the groups with vocational qualification. The proportion of women with an intermediate general and vocational qualification has almost trebled (1970: 13%; 2001: 35%), the proportion of females with maturity and vocational qualification has risen from less than one percent to 14 percent. Likewise we observe an increase of women with a tertiary degree (1970: 2%; 2001: 12%). However as Table 2 documents, too, during the last decade the proportion of females with tertiary education rather stagnated, while there is still an increase at the secondary level and a decrease at the elementary level.

Even though vocational training at the elementary and secondary level is highly important for the allocation of persons to jobs, previous analyses (not shown here) indicate that with respect to childlessness a vocational qualification of a woman is a less important factor than the level of general education. Thus in this paper, for the elementary and secondary level, only the findings for women with a vocational qualification are presented.

4   Highly qualified women postpone motherhood

The level of lifetime childlessness can easily be studied if there is a question in a survey, which asks each woman aged 15 years and over the number of children she has ever had. For political reasons such a question has not been asked in the microcensus up to now and will not be asked in near future.[14] Researchers, therefore, have to use a proxy variable to study social patterns of childlessness in Germany. As mentioned in section 2, by default the most often used indicator is, whether a woman aged 35-39 has at least one child under 18 years living in her household. In this section it is shown, why this age line might be too narrow and, therefore, the findings misleading.

Figure 2 displays the proportion of childless women in a specific age group for the year 1997. Looking at the distribution, it becomes obvious, why researchers concentrate on women aged 35-39. We are observing a U-shaped distribution: At the age 25-29 more than two-thirds of the women are still childless. This proportion falls to 40 percent in the age group 30-34 and reaches its low (28%) within the age bracket 35-39. At the age 40 and over it is rapidly increasing again. However, this increase is not caused by a higher proportion of real childlessness among older women, but rather indicating statistical childlessness, because children of women aged 40 and over are increasingly leaving the parental home.

Figure 2:   Percentage of childless women by age, West Germany, 1997
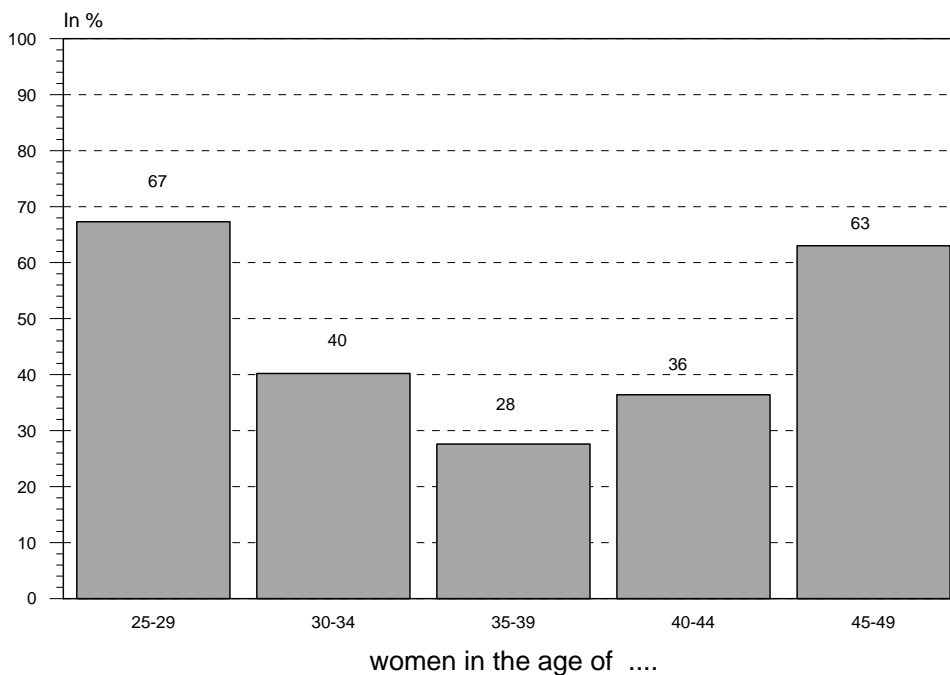
Source: Microcensus 1997 Scientific-Use-File; German women in private households

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[14]   Only recently the Federal Council of Germany refused to include this question in the new microcensus for privacy reasons (Bundestags-Drucksache 15/2543: 18).

This pattern is even more pronounced when looking at low-qualified women (Figure 3; Panel A): The proportion of childless women falls from 53 percent (age 25-29) to 22 percent (35-39), whereas it is increasing in the older age groups. However a different pattern or rather a postponement is found, when looking at women with an academic degree (Figure 3; Panel B). At the age 35-39 about 43 percent are still childless, the low is reached in the age group 40-44 (32%). Only at the age 45 and over an increasing proportion of (statistical) childlessness is observable.

Figure 3: **Percentage of childless women with an elementary versus a tertiary educational qualification by age, West Germany, 1997**
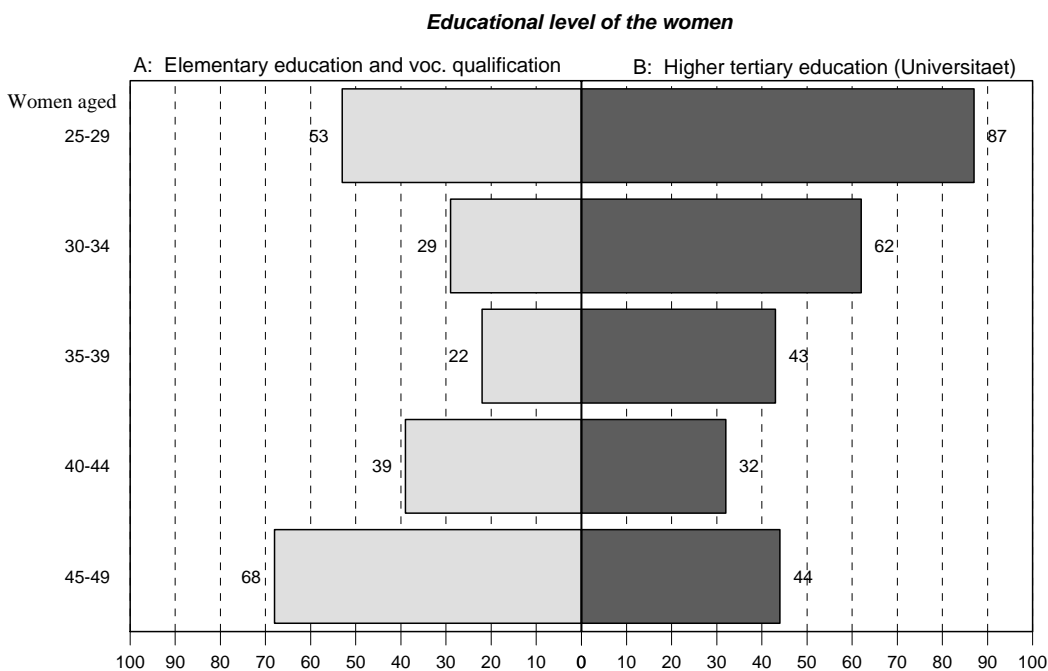
Source: Microcensus 1997 Scientific-Use-File; German women in private households

The findings in figure 3 bring up the question which age limits should be used when studying childlessness by education. The age group 35-39 might be a good indicator for low-educated but not for highly qualified women. Vice versa the age group 40-44 might be appropriate for the highly qualified but obviously not for women with a low level of education nor for women on average.

The question is not easy to answer because there are no other data, which could be used as reliable references (see section 2). Thus we need to explain the differences between the two age groups. Why is the proportion of childlessness for highly qualified women aged 40-44 more than 10 percentage points lower than for women aged 35-39? There are at least two

explanations. First the findings refer to different age groups at one point in time (1997). The age groups, therefore, are representing different birth cohorts, which may in fact differ in their fertility behaviour. This aspect and its implications will be discussed in detail in the next section.

Second, one has to consider that education takes time. The higher the qualification the longer the time a person spends in educational institutions. Moreover, there are strong normative expectations in (West) Germany not to have children until one's training is finished. In addition, after finishing school it takes some time to get a job and establish a professional career. As a consequence the decrease in childlessness of women with a higher tertiary degree might be due to a postponement of motherhood until their late 30s or early 40s.[15] This becomes more evident by using as an indicator, whether a woman has 'children under 6 years' (Figure 4).

Figure 4:   Proportion of women with children under 6 years by Education and Age, 1997, West Germany
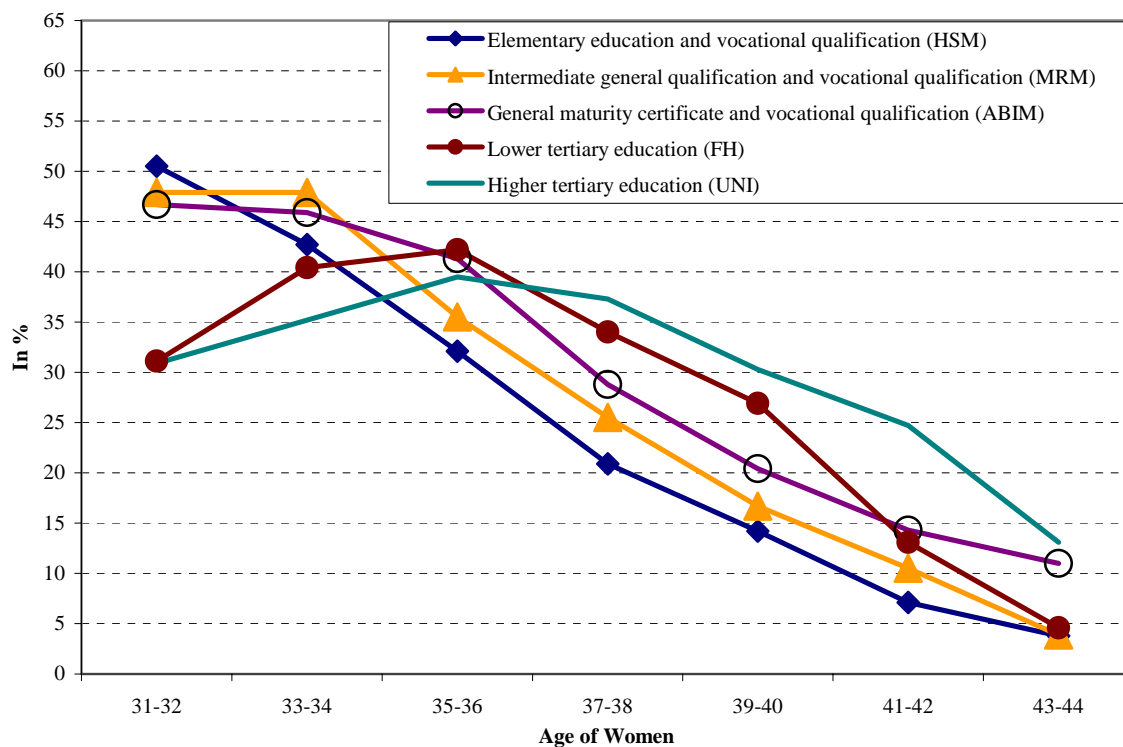
Data Source: Microcensus 1997 Scientific-Use-File; German Women in private households

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[15]   Postponement of motherhood is a phenomenon observed in a large variety of modern societies for highly qualified women (Billari 2004; Franklin/Tueno 2004; Amuedo-Dorantes/Kimmel 2003).

Looking at the elementary and secondary educational groups (HSM, MRM, ABIM), the peak is already reached when the women are in their early 30s. Thereafter the percentage of women with children under 6 years sharply declines for these educational levels. In contrast, at the tertiary level (FH, UNI) the proportion of women with a child before school age only starts increasing in the early 30s and reaches its peak in their mid-thirties, and the following decline is much flatter than for less educated women. In particular the differences between the educational groups aged 41-42 are remarkable: In case of a university degree (UNI) one out of four (25%) women has at least one child younger than 6 years, whereas in all other educational groups the corresponding rate is below 15 percent. In sum, these findings indicate a strong interaction between qualification and timing of motherhood, which should be taken into account when analysing lifetime childlessness based on microcensus data.

5   Age and cohort effects with respect to lifetime childlessness

5.1   Higher tertiary and lower tertiary education

Even though we observe an age-effect, that is a distinct postponement of motherhood for the group of highly qualified women, the findings refer to one point in time. Thus the different age groups are representing different birth cohorts. Hence one cannot conclude in a simple way that the younger women will catch up on motherhood in their late thirties or early forties. Rather one has to take into consideration that lifetime childlessness of highly qualified women in fact may increase over time, meaning that the younger generations are more likely to refrain from having children than earlier generations. In this case the remarkable difference of a more than 10 percentage points lower childlessness in the group of women with a university degree aged 40-44 compared to the age group 35-39, as displayed in Figure 3, might be caused mainly by a cohort effect.

Although the microcensus data give only a cross-sectional look at childlessness, we do have longitudinal data[16] (1989 to 2001), which enables us to construct a 'synthetic' picture in the distribution of childlessness by educational level for given birth cohorts (1951 to 1968) at different ages (31 to 44). Thus it is possible to distinguish between age and cohort effects. Regrettably, for legal reasons, there are yet no scientific-use files available for microcensus data gathered before 1989 (Lüttinger/Wirth 2004) and at the time this paper was prepared the scientific-use files for the year 2002 and following were still underway. Due to these limitations data are not available for all age groups listed in Table 3. For example the age group 31-36 is not covered for women born in 1951-1952. For the younger cohorts the older

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[16] In fact the microcensus is an implicit panel survey. Each sampling district is surveyed four times and then replaced. However the panel data are not yet available.

age groups are not yet observable. Table 3 displays the percentage of childless women with a tertiary degree by year of birth and age. The columns show the proportion of childless in a given cohort at different ages. The rows display the proportion of childless women in a specific age group for different cohorts.

Table 3: Proportion of childless women with tertiary educational qualification by birth cohort and age, West Germany

Age	Year of Birth								
	1951-1952	1953-1954	1955-1956	1957-1958	1959-1960	1961-1962	1963-1964	1965-1966	1967-1968
Higher tertiary education (UNI)									
31-32				54	52	60	61	66	69
33-34			37	47	47	52	54	54	56
35-36		36	33	44	43	49	45	48	
37-38	28	28	34	35	41	46	45		
39-40	31	29	28	34	31	39			
41-42	30	31	29	34	41				
43-44	32	35	30	38					
Lower tertiary education (FH)									
31-32				53	49	54	54	66	64
33-34			45	35	44	50	47	51	59
35-36		32	34	36	38	40	45	44	
37-38	33	30	28	38	37	38	41		
39-40	30	33	29	31	36	36			
41-42	35	31	35	37	37				
43-44	35	40	41	38					

Source: Microcensus 1989; 1991; 1993; 1995; 1997; 1999; 2001. German women in private households

First, the age effect in terms of a delayed entering into motherhood, as already suggested by Figure 4, is obvious. Around 36 percent of academic women born 1953 - 1954 were childless by the age of 35-36, but only 28 percent aged 37-38. Moreover, within not yet a decade the tendency of delayed childbearing has increased considerably. In the cohort 1959-1960 about 41 percent of the women with a university qualification were childless by the age of 37-38, this falls to 31 percent in the age bracket 39-40 (1961-1962: 46% vs. 39%).

At the same time table 3 reveals a strong cohort effect. Taking the low point (cells marked grey) as an indicator of the proportion of females being lifetime childless, one has to assume that about 29 percent of academic women born in the early 1950s will have no children at all during their life. This already sizeable proportion increases to 34 percent for women born 1957-58 and rises to considerable 39 percent for the cohorts 1961-1962. The cohort 1961-1962 hasn't reached the end of their reproductive life at the latest survey (2001) used here, thus there may be some 'catch up' of motherhood at a later point in time. But, when comparing the percentage of childless women aged 37-38 and 39-40 for the cohort 1961-1962

to the corresponding proportion of earlier born cohorts at the same age groups, it doesn't seem very realistic to expect a 'catch-up'. With respect to the women born 1963 and later it is too early to talk about lifetime childlessness. However, by comparing the available age specific figures with those of cohort 1961-1962, a likewise high level of lifetime childlessness is to be expected. Without going into detail a similar pattern of increasing childlessness over cohorts is found for women with a lower tertiary degree.

5.2   Secondary and elementary qualification

According to diffusion models, social change can occur as a result of particular ideas and behaviour spreading from one social group to another. In a simplistic way, the development of female labour force participation in West Germany could be described as a kind of diffusion process, in which behaviour patterns of highly qualified women have been adopted by women with lower educational level.

Figure 5:   Labour market participation of women (aged 35-39) by education;
West Germany; 1970 - 2001

Source: Population Census 1970; microcensus1989, 1995, 2001; German Women in Private Households;
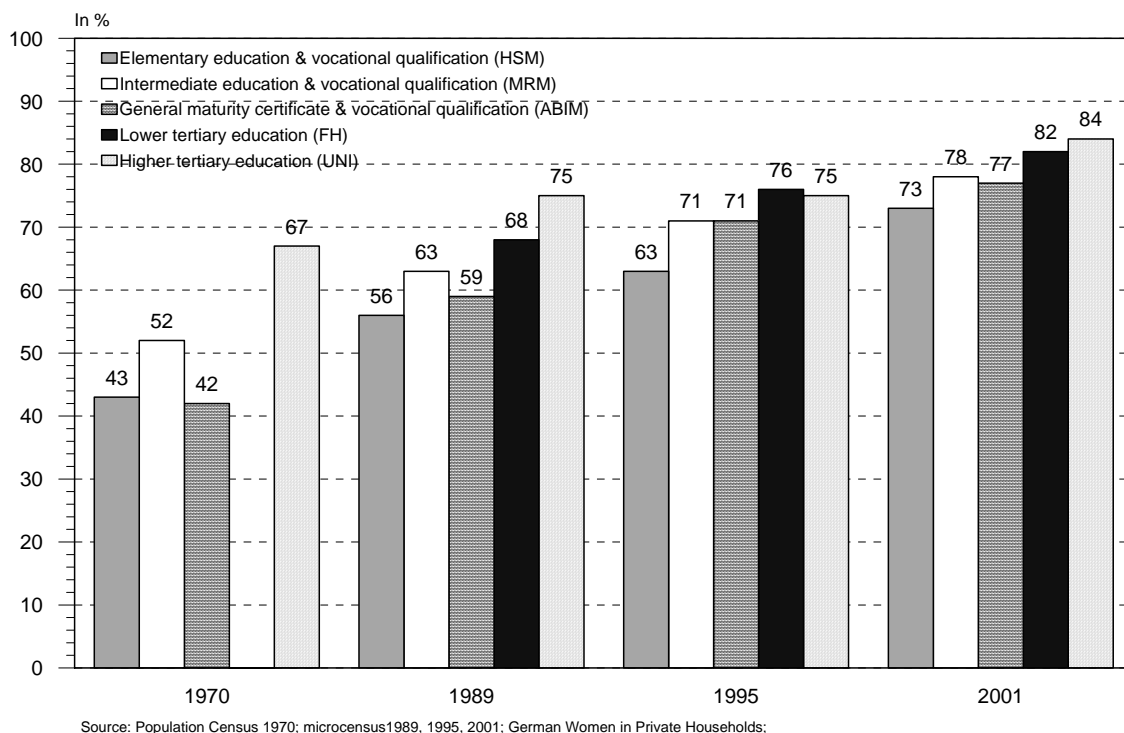
As shown in Figure 5 the economic activity rate of women with a university degree was already sizeable in the early 1970s. Even though it has still been increasing over the last 30 years, the more interesting development is the 'make up' in paid employment of the less educated women. The large gap in the activity rates of women depending on qualification in

1970, which was still considerable at the end of the 1980s, has nearly vanished in the present. Since labour market participation is considered as one of the main reasons for women to refrain from having children, one might expect that women with a lower education would also show a tendency towards an increasing childlessness.

Table 4: *Proportion of childless women with secondary and elementary educational qualification by birth cohort and age, West Germany*

Age	Year of Birth								
	1951-1952	1953-1954	1955-1956	1957-1958	1959-1960	1961-1962	1963-1964	1965-1966	1967-1968
General maturity certificate **and** vocational qualification									
31-32				39	41	49	47	48	53
33-34			35	29	36	41	41	43	44
35-36		32	39	25	37	36	33	37	
37-38	35	25	31	29	33	31	29		
39-40	33	35	28	29	29	30			
41-42	28	33	36	30	32				
43-44	34	34	34	34					
Intermediate education **and** vocational qualification									
31-32				33	34	35	36	40	43
33-34			27	26	25	29	30	34	35
35-36		25	26	26	24	25	26	27	
37-38	27	25	24	25	24	24	24		
39-40	28	27	28	26	25	26			
41-42	31	35	30	29	28				
43-44	40	40	36	36					
General education **and** vocational qualification									
31-32				26	23	27	28	31	30
33-34			22	21	22	23	25	25	26
35-36		20	19	20	22	22	24	28	
37-38	22	23	21	21	20	22	21		
39-40	28	27	26	26	23	25			
41-42	37	35	35	33	33				
43-44	47	46	42	41					

Source: Microcensus 1989; 1991; 1993; 1995; 1997; 1999; 2001. German women in private households

However as the findings in Table 4 indicate, such an adoption of behaviour hasn't taken place up to now. Looking at women with a full secondary qualification the proportion of childlessness varies between 25 and 30 percent, thus is considerably high. But yet the figures don't suggest a shift towards an increase. The same is true for women with an intermediate or elementary qualification. The proportion of lifetime childlessness for women with an intermediate qualification is about 25 percent, for women with an elementary about 20 percent. These proportions have been quite stable over the last decade. In sum, the results show a quite strong effect of women's educational level on the extent of childlessness, the higher the qualification the higher the probability of a woman refraining from motherhood. Moreover, it seems that the social selectivity of childlessness is augmenting. While in the

cohorts born in the early 1950s the odds of being lifetime childless for women with a university degree were about 1.45 times higher than for women with an elementary education, for the cohorts 1961-1962 it is almost twice as high.

6 Declining popularity of marriage: Childlessness and Marriage

In order to explain the dramatic increase in the proportion of childless among the younger cohorts of highly qualified women more detailed analyses are needed. Based on the findings in the present paper, one can only assume that the increasing labour market participation is not a sufficient explanation for the current increase, since the birth cohorts 1951 to 1961 do not differ very much in this regard. More likely changing attitudes towards marriage and family may be a crucial point.[17] In this context one has to consider that even though the proportion of births outside marriage has increased over the last 30 years, childbearing in West Germany is still very highly associated with marriage,[18] or rather marriage comes along with children. This applies in particular to highly qualified women. Thus in the year 2000 only about 13% of the never married women (aged 35-39) with a university degree had children (1970: 3%), whereas about 79 percent of the married women (1970: 80%) had at least one child (Table 5).

Table 5: ***Proportion of women (aged 35-39) with children by marital status and qualification, West Germany. 1970 to 2000***

Qualification:	Never-married Women with children (%)				Married* Women with Children			
	1970	1989	1995	2000	1970	1989	1995	2000
Elementary education **and** vocational qualification	13	16	18	24	87	82	85	85
Intermediate general qualification **and** vocational qualification	9	11	19	20	84	81	84	85
General maturity certificate **and** vocational qualification	-**	11	18	14	88	78	79	83
Lower tertiary education	-**	28	10	16	-**	78	81	80
Higher tertiary education	3	10	14	13	80	80	81	79

Source: Population Census 1970; Microcensus 1989, 1995, 2000; German women in private households.
* Incl. divorced and widowed women
** Not shown because number of observations too small.

The observed increase in childlessness, therefore, is not caused by a growing number of childless marriages, rather it correlates with a rapid decline in the popularity of marriage

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[17] Needless to say, that the social mechanisms that lead to changing attitudes should be of central concern.

[18] This does not apply for East Germany (see Huinink/Konietzka 2003).

among highly qualified women in West Germany (Wirth/Schmidt 2003).[19] This can be demonstrated by plotting the proportion of childless women by cohort and age (according to Table 3 and 4) versus the corresponding percentage of never married women (Table 2a, appendix) for each educational group (Figure 6 - 10).

Figure 6:   Higher tertiary education: Proportion of never-married women versus childless women by birth cohort and age; West Germany
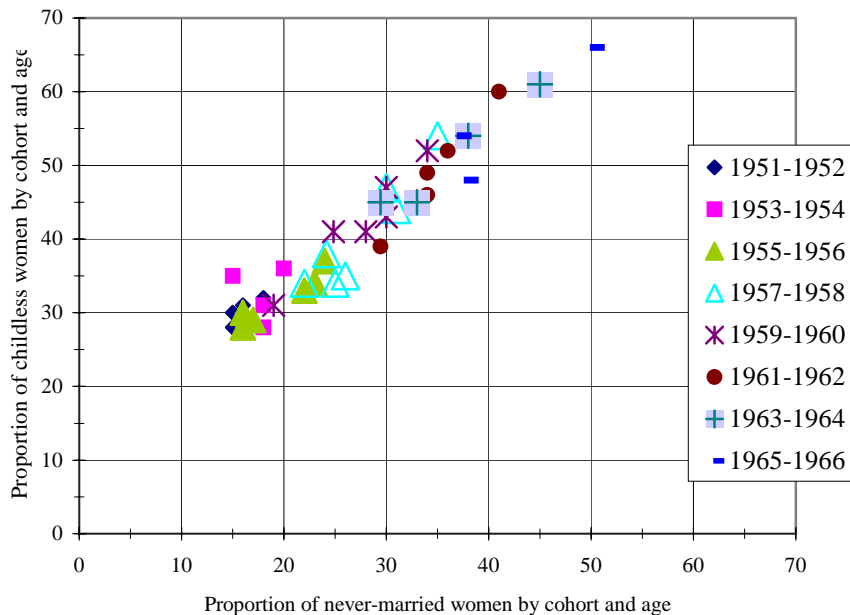
Source: Microcensus 1989-2001; based on Table 3; Table2a (appendix).

As shown in Figure 6, the relationship between the proportion of childlessness and the proportion of never married among women with a university degree is almost perfectly linear. The higher the percentage of never-married women the higher the extent of childlessness. Moreover, the tendency of being not married is increasing considerably over the birth cohorts, coming along with a steady increase in childlessness. A similar pattern albeit less distinct is found for women with a lower tertiary degree (Figure 7).

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[19]   To be sure the declining popularity of marriage is not the cause of the increasing childlessness, rather it caused by the latter.

Figure 7: *Lower tertiary education: Proportion of never-married women versus childless women by birth cohort and age; West Germany*
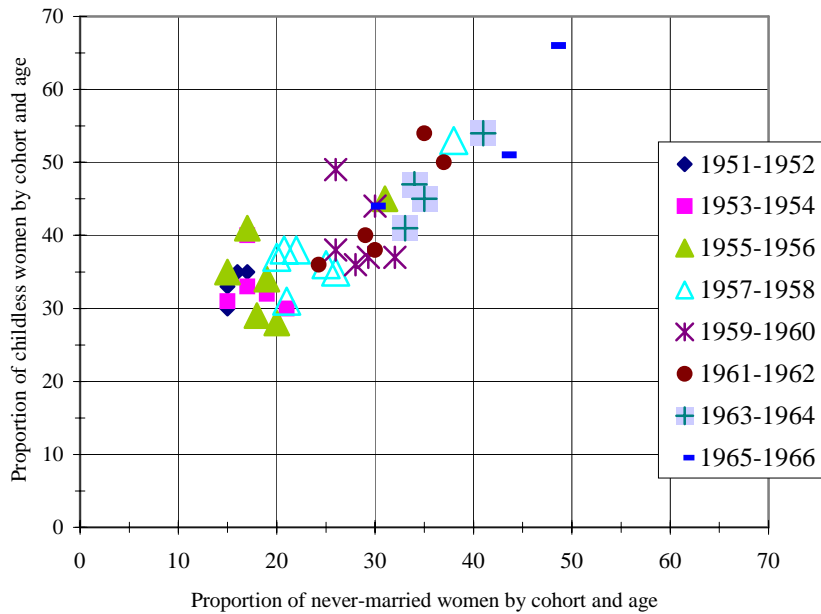

Source: Microcensus 1989-2001; based on Table 3; Table2a (appendix).

Figure 8: *General maturity certificate and vocational qualification: Proportion of never-married women versus childless women by birth cohort and age; West Germany*
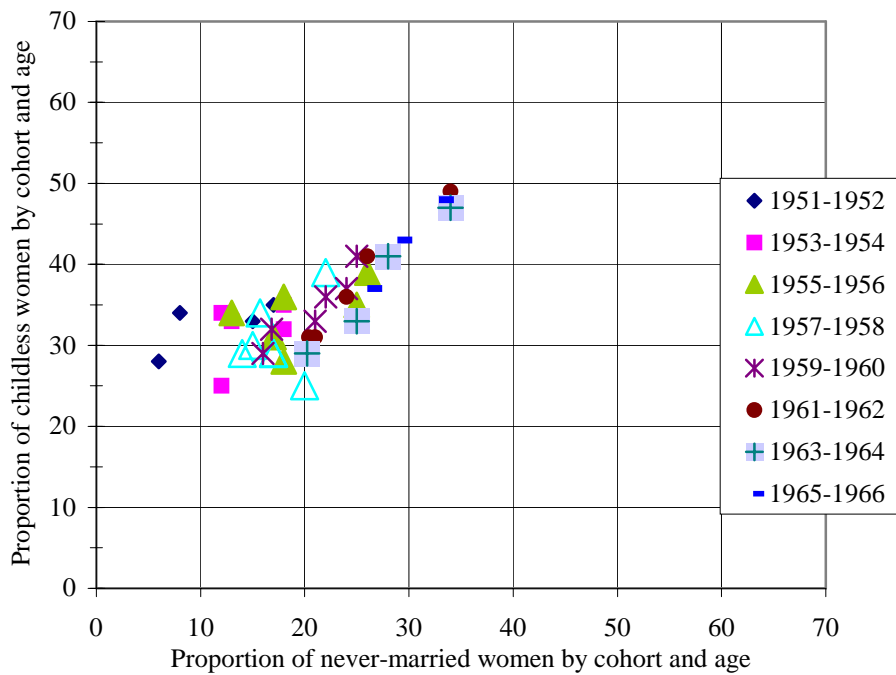
Source: Microcensus 1989-2001; based on Table 4; Table2a (appendix).

The picture slightly changes, when looking at women with a maturity certificate (Figure 8). The differences between the cohorts with respect to the never-married population are much smaller than for the higher qualified women. This corresponds with the quite stable proportion of permanent childlessness in this educational group as described in the section above.

Even less changes over cohorts are found for women with an intermediate (Figure 9) or elementary education (Figure 10). In none of the birth cohorts under consideration is the proportion of never-married women at a given age higher than 30 percent. This is reflected in a corresponding low proportion of childlessness in these educational groups. However, the relationship between marital status and childlessness has changed. Instead of a linear relationship between martial status and childlessness as displayed for the higher qualified women, a U-shaped curve is found. That is, a 'high' percentage as well as a low percentage of never-married women comes along with a 'high' level of childlessness. This, at the first glance somewhat surprising result, is again caused by the limitation of the census data mentioned before. The marital status of less qualified women is highly associated with age. That is elder women are more likely to be married than younger women. On the other hand, as shown in section 3, less qualified women tend to have their children earlier than higher qualified women and therefore the children leave the parental home at a younger age of the mothers. Since the census contains only information about children living in the parental household, mothers with a lower education show up as statistically childless already in their late 30s and early 40s, which explains the U-shaped curve in Figure 9 and 10.

Figure 9:   Intermediate education and vocational qualification: Proportion of never-married women versus childless women by birth cohort and age; West Germany
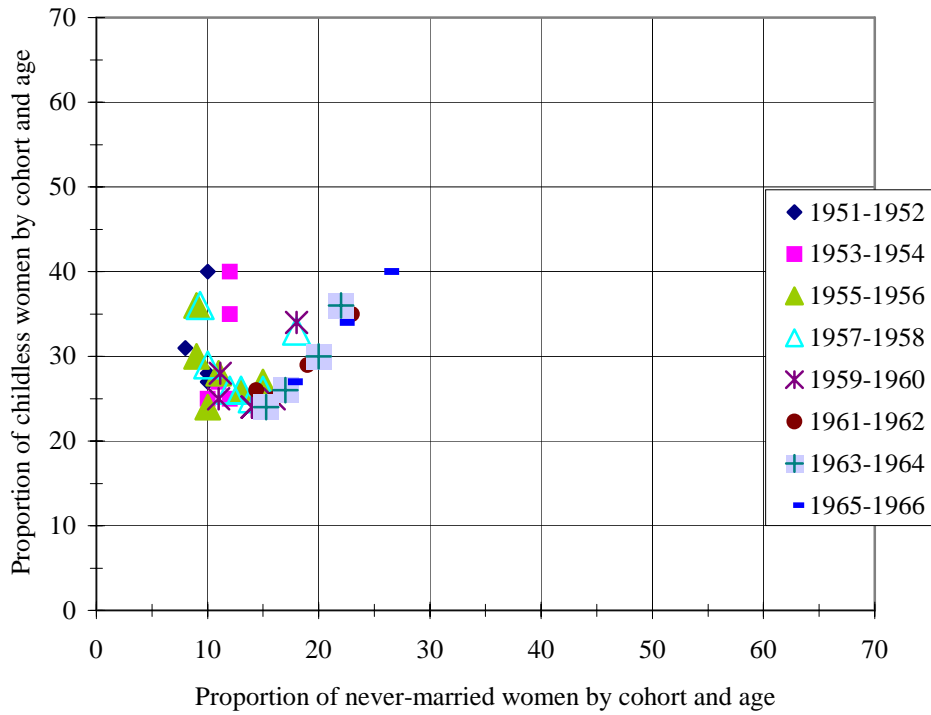
Source: Microcensus 1989-2001; based on Table 4; Table2a (appendix).

Figure 10: Elementary and vocational qualification: proportion of never-married women versus childless women by birth cohort and age; West Germany
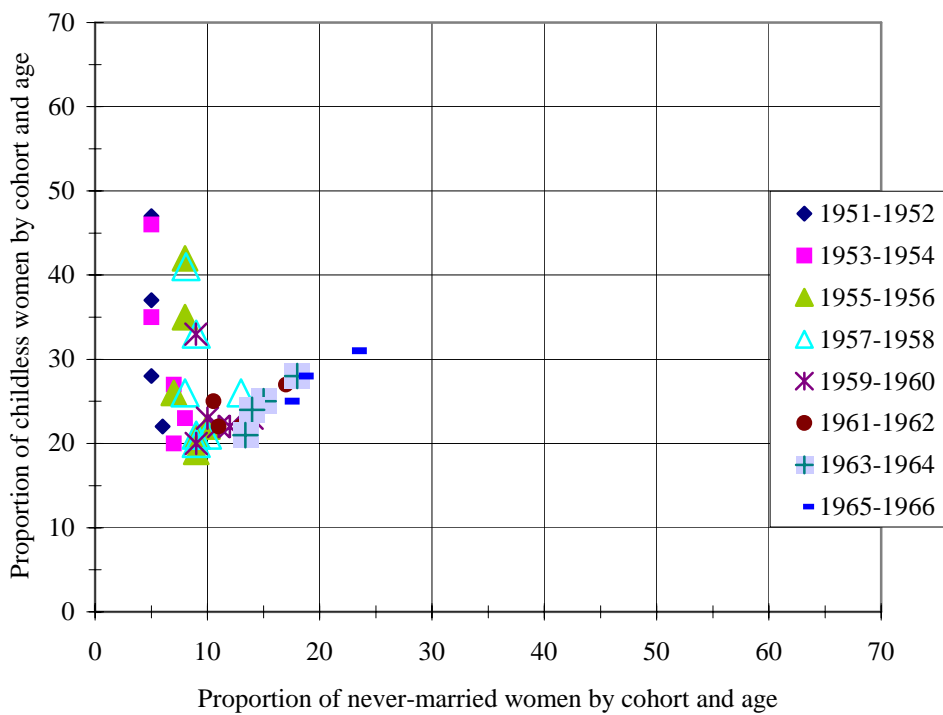
Source: Microcensus 1989-2001; based on Table 4; Table2a (appendix).

7   Conclusions

Based on the findings of the present paper one can conclude that the extent of lifetime childlessness of women in West Germany, though in general high, is highly correlated with the educational attainment of a woman. The highest proportion of childlessness with about nearly 40 percent is found for women with a tertiary degree. Likewise a high proportion of childlessness (about 30%) can be observed for women with a maturity certificate. Keeping in mind, that these educational groups in the present represent about 28 percent of the women aged 35-39 in West Germany and are still increasing (at least at the maturity level), the question of childlessness and its consequences will become an even more important issue in the future. Moreover it seems that the social selectivity of parenting has been increasing for women born in the 1960s and later.

What we don't know and can't examine with microcensus data is, whether highly qualified women are simply choosing not to have children or whether it is due to life circumstances, in particular problems combining labour market activity and motherhood. However the results presented, indicate a strong correlation between childlessness and marital status. It seems that women with a tertiary degree have a growing tendency not to get married and, whether intended or not, refrain from having children. Up to now the analyses have been focusing on women. In further analyses the household context will be included, because being unmarried doesn't mean necessarily being single. Most of these women are more likely living in cohabitation. Thus 'childlessness' of highly qualified women might also come along with a dual-earner couple.

Moreover, the labour market participation of women as such, is not a sufficient indicator to explain the variation of childlessness by education. In further analyses the socio-economic-status, working conditions (full-time; part-time, etc.) as well as the income situation of women and couples will be looked at in more detail. These factors do vary by education und thus might explain some of the differences in childlessness of women.

The present paper aimed at an exploration of the structure of childlessness depending on education not at an explanation of the underlying mechanisms. Furthermore, the paper focused on describing some of the difficulties, which arise when using official microdata to study the issue of childlessness in Germany. As expected, the lack of information about children not living at their parent's is a crucial insuffenciency of the data, because of the interaction between the timing of motherhood and the educational level of a women. According to the findings, the age groups most adequate for the analyses, would be 35-38 for women with an elementary or intermediate education and 39-42 for higher qualified women.

However, one must also consider the possibility of cohort effects, therefore, analyses based on age groups only, are not sufficient. Thus in further analyses the interaction between cohort, age and educational attainment should be included in the statistical model (e.g. Hagenaars 1990; Andreß et al. 1997).

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Appendix:

Table 1a: Number of observations by Age Group and Data Set(*); German Women in Private Households; West Germany

Data Set	Age Group							Totals
	31-32	33-34	35-36	37-38	39-40	41-42	43-44	
Population census(**)								
1970	9611	8540	8227	6656	7312	7628	7796	55770
Microcensus (***)								
1989	4988	4715	4608	4358	4640	4150	3409	30868
1991	5698	5250	5244	4904	4874	4959	4523	35452
1993	5754	5542	5283	5149	4937	5026	4980	36671
1995	6079	5909	5657	5302	5145	4977	4987	38056
1996	5988	5980	5809	5541	5393	5112	4966	38789
1997	5951	6114	5849	5756	5456	5262	5014	39402
1998	5867	6076	5892	5771	5597	5248	5156	39607
1999	5854	5934	6072	5877	5752	5449	5318	40256
2000	5507	5860	6086	6088	5740	5578	5497	40356
2001	5257	5753	6020	6319	5953	5867	5556	40725

(*)   Unweighted Ns
(**)   1%-Subsample
(***)   0,7%-Subsample (Scientific-Use-Files)

Table 2a: Proportion of unmarried women by qualification, birth cohort and age, West Germany

Age	1951-1952	1953-1954	1955-1956	1957-1958	1959-1960	1961-1962	1963-1964	1965-1966	1967-1968
				Year of Birth					
				Higher tertiary education (UNI)					
31-32				35	34	41	45	50	50
33-34			24	30	30	36	38	37	39
35-36		20	22	31	30	34	33	38	
37-38	15	18	23	26	28	34	29		
39-40	16	16	16	25	19	29			
41-42	15	18	17	22	25				
43-44	18	15	16	24					
				Lower tertiary education (FH)					
31-32				38	26	35	41	48	49
33-34			31	26	30	37	34	43	45
35-36		19	19	25	26	29	35	30	
37-38	15	21	20	22	32	30	33		
39-40	15	17	18	21	28	24			
41-42	17	15	15	20	29				
43-44	16	17	17	21					
				General maturity certificate **and** vocational qualification					
31-32				22	25	34	34	33	37
33-34			25	17	22	26	28	29	33
35-36		18	26	20	24	24	25	26	
37-38	17	12	17	17	21	21	20		
39-40	15	18	18	14	16	20			
41-42	6	13	18	15	17				
43-44	8	12	13	16					
				Intermediate education **and** vocational qualification					
31-32				18	18	23	22	26	28
33-34			15	15	16	19	20	22	24
35-36		12	13	13	14	16	17	17	
37-38	10	10	10	14	14	15	15		
39-40	10	11	11	12	11	14			
41-42	8	12	9	10	11				
43-44	10	12	9	9					
				General education **and** vocational qualification					
31-32				13	14	17	18	23	21
33-34			10	10	12	14	15	17	20
35-36		7	9	9	11	13	14	18	
37-38	6	8	9	9	9	11	13		
39-40	5	7	7	8	10	11			
41-42	5	5	8	9	9				
43-44	5	5	8	8					

Source: Microcensus 1989; 1991; 1993; 1995; 1997; 1999; 2001. German women in private households