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Fertility and the influence of women's industries

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Luxembourg Income Study Working Paper Series

Working Paper No. 434

Fertility and the Influence of Women's Industries

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Luxembourg Income Study (LIS), asbl

Fertility and the influence of women's industries

The influence of the working life of women on their number of children has been widely discussed among demographers (Kreyenfeld, 2001, gives a good overview of the discussion). Already in 1979, Butz and Ward demonstrated a negative correlation between the fertility and workforce participation of women in the US. Since then many researchers have gathered evidence of a negative correlation, even though the concrete impact of the different factors on each other remains unclear (Becker, 1993, 144; Bernhardt, 1993, 30ff.; Gutiérrez, 1996; Hirschman, 1994, 219ff.). Whereas there are no indications of a correlation between the employment and fertility of men, researchers believed that women with higher wages had fewer children than women with lower wages (Heckman / Walker, 1990). Recent studies, however, indicate the opposite. They show a positive correlation between fertility and labour force participation of women for some countries and even present evidence that women with higher wages have more children than women with lower wages (Ahn / Mira, 1999; Andersson, 2001, 303; Buber, 2001; DeWit / Ravanera, 1998, 60ff.; Kreyenfeld, 2001, 55ff.; Sleebos, 2003, 23f.). Therefore, it becomes more and more apparent that the correlation between women's fertility and employment is not a constant but that the institutional context of the state has a major influence on the fertility decision of women. Moreover, institutional factors also have an impact on the occupational arrangement mothers choose (Hülskamp / Seyda, 2005). Other factors which play into the fertility decision are the professional training of the mother, the attitude of the surrounding society on the compatibility of motherhood and work or the role of the father. The institutional arrangements of childcare or job conditions also seem to play a major role in the decision for or against a child (Brewster / Rindfuss, 2000, 290f.)

Bearing these recent findings in mind, the influence of the concrete occupational field on fertility seems to be an interesting study. The compatibility of motherhood and working life can obviously differ greatly in regard to a specific profession, even if the mothers have the same degree of qualification. On the one hand, a teacher in the German school system, characterized by classes taking place normally in morning

sessions, can work several hours at home and will therefore have fewer difficulties in finding a care arrangement for her child. A sabbatical to take care of her baby will not damage her career prospects, as these are mainly linked to age. An academically trained scientific researcher, on the other hand, will have more trouble and probably impair her career prospects, if she stays at home for a longer period. It has been empirically proven, that women who can determine their working hours freely and whose careers depend very little on their job performance, have their children earlier and return to their work place sooner than other women (Desaj / Waite, 1991; Lauterbach, 1994; Ranson, 1998, 526). Studies finding a positive correlation between women's employment and fertility in Sweden point out that most Swedish mothers are employed in the public sector (Hoem, 2000; Hoem / Hoem, 1989). Specific studies of the correlation between working in a specific industry and the fertility of women are hard to find, however. This study aims at making first steps to fill this gap.

In order to study the influence of the profession on the fertility decision of women, cohort panel data would be desirable. Unfortunately, no such data are available for cross-national comparisons. The findings are therefore based on cross-sectional household data, collected in 2000 and provided by the Luxembourg Income Study (LIS). A specific age group had to be selected in order to compare couples with and without children. Statistically, children are only counted if they are under the age of 18 and still live in the household of their parents. Without an age restriction of the selected group therefore, households with older children are statistically childless. This study aims at a comparison between couples with and without children in the active family phase and therefore selected married or cohabiting couples, with women aged between 30 to 42. To explore overall and country specific correlations, data was chosen from Germany, the US, Canada and the United Kingdom. Originally Sweden and Finland were also included, but later dropped due to restrictions in the available data (see table 2).¹ The ratio between childless couples and families are very similar in the countries (see table 1). 17 to 19 percent of the selected couples are (still) childless, 81 to 83 percent have a family. When focussing on couples with a working woman, the share of couples without children increases slightly to 20 to 24 percent. As expected from official data, Germany has the highest share of childless couples among the selected countries.

¹ Only roughly fifty percent of Finish women and 22 percent of Swedish women name a concrete industry, which does not correspond to the high level of working life participation of Swedish and Finish women and furthermore leads to very few cases in some occupational groups.

Table 1: Motherhood and Employment

– Women aged 30 to 42 living together with a male partner in 2000 in four countries in percent of all women in the group –

	All women		Women in employment	
	Childless	Mothers	Childless	Mothers
Germany	17	83	24	76
US	18	82	21	79
Canada	18	82	20	80
United Kingdom	19	81	23	77

Data: LIS

In order to compare the working situation of women and the number of children they have, femal persons were sorted into eleven occupational groups, consistent with the top aggregation level of the international ISCO-classification structure as used in the Canadian data. Other countries provide much more detailed data, so that some subjective decisions had to be made in order to group the selected persons correctly. Testing different groupings assured the validity of the results. Table 2 presents an overview of the selected group and demonstrates the data restrictions for Sweden and Finland.

Table 2: Distribution of women to industries

– number and percentage of women aged 30 to 42 in 2000 in different industries in six countries –

	Germany	US	Canada	UK	Sweden	Finland
Agriculture and Forestry						
number of women in the occupational group	20	101	170	19	16	233
<i>percentage of all women in employment</i>	1.4	1.4	3.8	0.6	3.4	21.2
Manufacturing						
number of women	224	529	521	431	175	200
<i>percentage</i>	15.4	7.6	11.5	12.6	37.3	18.2
Trade						
number of women	289	641	655	497	85	185
<i>percentage</i>	19.8	9.2	14.5	14.5	18.1	16.9
Accommodation and Food Services						
number of women	47	502	289	166	0	0
<i>percentage</i>	3.2	7.2	6.4	4.8	0.0	0.0
Transportation						
number of women	30	124	115	75	25	49
<i>percentage</i>	2.1	1.8	2.5	2.2	5.3	4.5
Scientific and Technical Services						
number of women	5	198	244	13	0	14
<i>percentage</i>	0.3	2.8	5.4	0.4	0.0	1.3
Health Care						
number of women	267	1025	936	757	0	0
<i>percentage</i>	18.3	14.7	20.7	22.0	0.0	0.0
Educational Services						
number of women	109	768	486	416	0	156
<i>percentage</i>	7.5	11.0	10.7	12.1	0	14.2
Information / Culture and Recreation						
number of women	41	162	149	108	40	26
<i>percentage</i>	2.8	11.0	10.7	12.1	0.0	14.2
Public Administration						
number of women	136	242	270	224	0	0
<i>percentage</i>	9.3	2.3	3.3	3.1	8.5	2.4
Other Services						
number of women	288	2701	691	728	128	234
<i>percentage</i>	19.8	3.5	6.0	6.5	0.0	0.0
Women in employment	1456	6993	4526	3434	469	1097
Women without data concerning employment	898	2032	1138	1008	1725	1185
<i>percentage of all women</i>	38.1	22.5	20.1	22.7	78.6	51.9
All women	2354	9025	5664	4442	2194	2282

Data: LIS

Industries and average number of children

An overview of the average number of children points to the fact that in all four countries women who do not name a specific industry – mostly housewives – have more children than women who specify an industry. Women without employment have an average of two or more children in all four countries and therefore easily reach the politically desirable level of generational replacement. This demonstrates the fact that family formation is the main reason for women to stay home. Working

women, on the other hand, have an average of only 1.34 children in Germany, 1.46 in the United Kingdom and 1.65 in the US and Canada (table 3). Note that the difference between the average fertility level of the selected groups and the official total fertility rate of the country is due to the age restriction and the focus on children living with their parents in contrast to birth rates.

Table 3: Average number of children and industry of mother
– children per woman in four countries, 2000 –

	Deutschland	US	Canada	UK	West Germany	East Germany
Agriculture and Forestry	-	2.01	2.15	-	-	-
Accommodation and Food Services	1.43	1.71	1.55	1.70	1.58	-
Transportation	1.40	1.51	1.72	1.20	1.46	-
Health Care	1.39	1.73	1.70	1.68	1.45	1.24
Other Services	1.30	1.54	1.56	1.32	1.33	1.16
Information / Culture and Recreation	1.29	1.36	1.52	1.51	1.28	1.31
Trade	1.29	1.71	1.59	1.68	1.28	1.32
Educational Services	1.27	1.84	1.63	1.69	1.17	1.45
Manufacturing	1.25	1.72	1.56	1.30	1.29	1.13
Public Administration	1.05	1.38	1.47	1.31	1.03	1.09
Scientific and Technical Services	-	1.29	1.31	-	-	-
Average of employed women	1.34	1.65	1.65	1.46	1.37	1.23
Average of women naming no industry	1.91	2.18	1.99	2.20	1.94	1.79
Average of all women	1.53	1.67	1.68	1.67	1.57	1.38

Data: LIS
results based on cells with $n < 30$ are left out and marked by a dash

To provide for an easier comparison of the results of the four countries, in a second step the original data set was transformed to an overall index. There are several approved ways of doing this. The one chosen here does not react inappropriately to extreme values in the data set (Hülkamp / Koppel, 2005, 13f.; Mattes / Schröder, 2004, 7ff.; EIS, 2003, 3f.). The original data values (x_i^j) are transformed to values between 0 to 100 according to the following equation:

For all $j=1, \dots, m$ applies the transformation

$$I_i^j = 100 * \frac{x_i^j - \min\{x_i^j \mid i = 1, \dots, n\}}{\max\{x_i^j \mid i = 1, \dots, n\} - \min\{x_i^j \mid i = 1, \dots, n\}}$$

In this case I_i^j stands for the single indicator of value i for country j , and thus for the average number of children of women by industry. The numerator measures the difference between the actual value x_i^j and the country j to the lowest value for all countries. This difference is measured against the greatest difference of values found in the data set and multiplied by 100. The highest value of the dataset is thus transformed to 100, the lowest to 0. Values between 0 and 100 point to the position of the country in relation to other countries. To adhere to statistical standards, only cells with more than 30 cases were included in the final evaluation.

The overview shows a level effect of fertility within countries (table 4). The fertility in Germany is much lower than in the United States. The transformed values for Germany therefore never reach more than one-third of the values of the United States. A closer look reveals that East Germany has an even lower fertility than West Germany. The level of fertility reflects the overall conditions for families in each country so that the low fertility in Germany cannot be interpreted as a specific preference of the economy or of German women for certain industries.

Table 4: Cross-national comparison of children and industries of women
 – Standardized differences to overall maximum and minimum in four countries 2000 –

	Germany	US	Canada	UK	West Germany	East Germany
Agriculture and Forestry	-	87	100	-	-	-
Accommodation and Food Services	34	60	46	60	48	-
Transportation	32	42	61	14	38	-
Health Care	31	62	59	58	36	18
Other Services	22	45	47	25	26	10
Information / Culture and Recreation	22	29	43	42	21	24
Trade	22	60	49	57	21	25
Educational Services	20	72	53	58	11	36
Manufacturing	19	61	46	23	22	7
Public Administration	0	30	38	24	-2	4
Scientific and Technical Services	-	22	23	-	-	-

Data: LIS
results based on cells with $n < 30$ are left out and marked by a dash

The United Kingdom and Canada are more similar to the US but differ in the fertility level in specific industries. Apart from this level difference there are indeed some industries which employ more mothers than others. First of all women working in the agricultural industry have significantly more children than other women. Their level of fertility is very similar to that of women who do not name a specific industry. Women working in the field of educational services or health care also have significantly more children than others. Women with low fertility are found in the scientific and technical services – even if there are too few cases to evaluate them for Germany and the UK – and in the public administration as well as in the sector of information, culture and recreation.

Comparing industries with outstanding values points to the influence of the industry on the fertility level of women: Women working in the field of agriculture normally have a relatively short training and enjoy great freedom in organizing their daily working life. They work around their home and can combine care for children and work quite easily. There might also be a predominance of conservative values as a bias for women who chose to work in the agricultural area, which could also lead to a higher fertility in this industry. On the opposite, an industry with outstanding low fertility are the scientific and technical services. Women here work in a highly competitive field. They have to leave their homes in order to reach their work place and risk losing significant technical knowledge if they leave work for an extended time period. This could prevent women from having more children. Astonishingly, women working in the public administration also have few children. Given the relatively high job security as a civil servant, this is unexpected. It underscores the fact, that all explanations of the observed differences in the fertility level by industry remain speculative until they are supported by sociological micro studies.

Childlessness and industry of women

Apart from analyzing the average number of children of woman by industry a closer look at the poles emerged to be interesting, i.e. women without children and women with big families, in this case, four or more children. As the data underlying this study are taken from cross-sectional interviews, there might be a significant timing effect influencing the results. Childless women at the age of 30 are likely to have their first child later in life. Therefore the number of childless women is probably be overestimated in this study, while the number of women with four or more children is underestimated for the same reason. But as there are no panel data available for cross-national comparisons, there seems to be no other way to deal with this predicament.

A closer look at the distribution of childless women reveals a strong level effect: German and British women are much more often childless than women in Canada or the US (table 5). The lowest level of childlessness is around 17 percent in the two European states, while it is 15 percent in the US and 8 percent in Canada. There are also much greater differences between the childlessness in specific industries in Europe than in America. In the UK nearly 70 percent of women – aged 30 to 42 and living with a male partner – who work in the field of information, culture or recreation are childless. This is also the industry with the highest childlessness among female employees in Germany, Canada and the US. Women working in the agricultural section or in the health care sector are much less likely to be childless at this age. Germany reveals an extreme difference between working and non-working women. While one quarter of all working women are (still) childless, only 7 percent of the women who do not state to work in a specific industry are childless. In all four countries working women are more often childless than women without employment. This again points out, that family formation is still a strong reason for exiting the labour market.

Table 5: Childlessness and industries

– Percentage of childless women per industry in four countries 2000 –

	Germany	US	Canada	UK	West Germany	East Germany
Agriculture and Forestry	-	15.8	8.2	-	-	-
Accommodation and Food Services	26.3	20.0	19.2	27.8	27.3	-
Transportation	23.2	19.3	20.8	17.5	26.6	-
Health Care	17.0	20.1	21.1	17.5	12.1	28.6
Other Services	30.0	25.8	20.0	36.0	30.8	25.0
Information / Culture and Recreation	40.0	29.8	28.3	69.2	33.3	50.0
Trade	21.3	17.9	18.2	18.1	21.8	20.3
Educational Services	22.9	15.0	17.3	18.8	29.6	10.5
Manufacturing	22.0	25.9	21.5	18.5	28.0	12.5
Public Administration	31.6	24.0	23.3	26.8	33.3	27.9
Scientific and Technical Services	-	22.5	19.4	-	-	-
Average of employed women	24.4	21.5	19.7	27.8	25.6	20.4
Average of women naming no industry	6.7	10.8	10.5	8.2	6.4	8.0
Average of all women	22.9	20.6	19.0	26.1	24.0	19.4

*Data: LIS**results based on cells with $n < 30$ are left out and marked by a dash*

After transforming the original values into a cross-national comparison, the already observed structures of industries becomes quite clear (table 6): women working in agriculture or educational services are seldom childless, women working in information, culture and recreation as well as in public administration and other services are more likely to remain childless. Nevertheless, there are some differences in the results taken from the average number of children of woman per industry. Women working in the scientific and technical services have few children, but they are not particularly likely to remain childless. Comparing West and East Germany reveals some interesting facts: women in West Germany are significantly more often childless than their counterparts in East Germany. While only 10.5 percent of east German women working in the educational services are childless, the same is true for nearly 30 percent of west German teachers. In health care, the picture is different: nearly 30 percent of East German women are childless, while only 12 percent of west German women are childless in this industry. East German women who work in the information, culture and recreation sector are more likely to remain childless: 50 percent of women in the dataset have no children.

Table 6: Cross-national comparison of childlessness and industries of women

– Standardized differences to overall maximum and minimum in four countries 2000 –

	Germany	US	Canada	UK	West Germany	East Germany
Agriculture and Forestry	-	12	0	-	-	-
Accommodation and Food Services	30	19	18	32	31	-
Transportation	25	18	21	15	30	-
Health Care	14	19	21	15	6	33
Other Services	36	29	19	46	37	27
Information / Culture and Recreation	52	35	33	100	41	68
Trade	21	16	16	16	22	20
Educational Services	24	11	15	17	35	4
Manufacturing	22	29	22	17	32	7
Public Administration	38	26	25	30	41	32
Scientific and Technical Services	-	23	18	-	-	-

*Data: LIS**results based on cells with n<30 are left out and marked by a dash*

Working Women with big families

Looking at the other side of fertility, women with four and more children, might reveal specific industries with favourable surroundings for families. First of all, the results for East Germany are striking. None of the 376 women in the data set who name a distinct industry has four or more children (table 7). Although the dataset is fairly small, this result is surprising. A comparison with official data for east German household types backs these findings: East German women hardly ever have more than two children and the lack of big families is the main reason for low fertility in East Germany, while the high childlessness is the reason in West Germany. In all countries the highest percentage of big families per industry is again found in agriculture and forestry. 15 percent of women in this sector have four or more children, compared to an average of 4.5 to 6.4 percent of all working women in Canada and the United States. Germany and the UK have fewer women with big families: only around 2 percent of working women have four or more children. Women without employment more often opt for bigger families, between 6 percent in Germany and 14 percent in the UK and the US.

Table 7: Big families and industries of women

– Percentage of women with four or more children per industry in four countries, 2000 –

	Germany	US	Canada	UK	West Germany	East Germany
Agriculture and Forestry	-	15.8	15.3	-	-	-
Accommodation and Food Services	1.8	8.3	2.7	1.6	2.3	-
Transportation	1.0	6.4	4.7	4.0	1.4	-
Health Care	2.1	8.2	2.1	4.2	3.0	0.0
Other Services	6.7	6.5	8.7	1.3	7.7	0.0
Information / Culture and Recreation	0.0	4.0	2.0	0.0	0.0	0.0
Trade	1.9	5.9	4.1	4.0	2.6	0.0
Educational Services	1.8	5.7	3.5	3.4	2.8	0.0
Manufacturing	2.4	3.1	0.7	3.7	4.0	0.0
Public Administration	0.0	2.5	2.2	1.3	0.0	0.0
Scientific and Technical Services	-	4.3	3.2	-	-	-
Average of employed women	2.3	6.4	4.5	2.4	3.0	0.0
Average of women naming no industry	5.8	14.2	9.2	13.6	6.0	4.4
Average of all women	2.6	7.1	4.9	3.3	3.3	0.4

*Data: LIS**results based on cells with n<30 are left out and marked by a dash*

Transferring the data to a cross-national comparison again helps to reveal industries with a favourable or non-favourable context for families. Apart from agriculture there are several big families in transportation and other services as well as in health care and manufacturing – the last does not hold true for Canada. In contrast, women rarely have four or more children if they work in the field of public administration or information, culture and recreation. There is a strong level effect between the American and the European countries: there are many more women with four or more children in the US and Canada than in Germany and the UK.

Table 8: Cross-national comparison of big families and industries of women

– Standardized differences to overall maximum and minimum in four countries 2000 –

	Germany	US	Canada	UK	West Germany	East Germany
Agriculture and Forestry	-	100	97	-	-	-
Accommodation and Food Services	11	53	17	10	14	-
Transportation	7	40	30	25	9	-
Health Care	13	52	13	27	19	0
Other Services	42	41	55	8	49	0
Information / Culture and Recreation	0	26	13	0	0	0
Trade	12	37	26	25	16	0
Educational Services	12	36	22	21	18	0
Manufacturing	15	19	4	23	25	0
Public Administration	0	16	14	8	0	0
Scientific and Technical Services	-	27	20	-	-	-

*Data: LIS**results based on cells with $n < 30$ are left out and marked by a dash*

The case of women working in the field of scientific and technical services is interesting. Despite the low average number of children for women in this sector, there are no peaks in the extremes. Working women in this area are relatively seldom childless and there is a fair share of women with big families. Since they have a relatively high level of education the mentioned timing effect might be strong. After spending a long time in education those women will tend to delay family formation so that the dataset is biased in this regard. On the other hand it could be that women in this area tend to have rather small families, e.g. one child. To get a closer look on the influence of the educational level of women, this variable is included in the following evaluation of childless women.

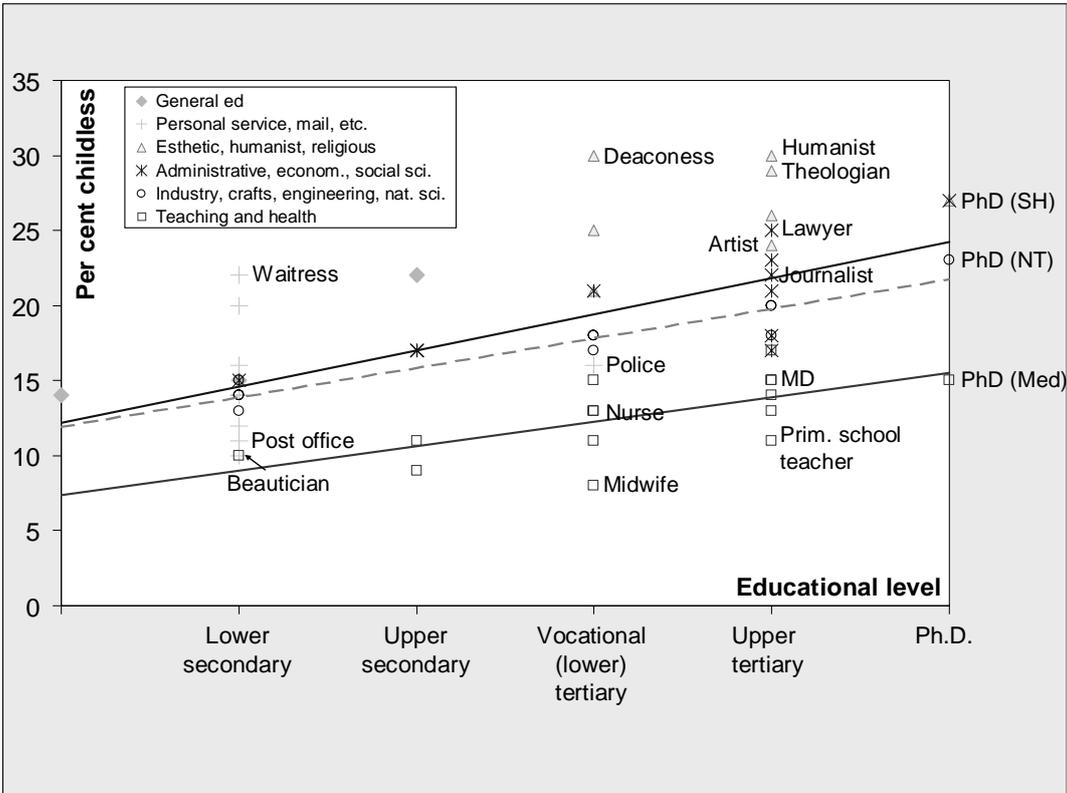
Childlessness, education and industry of women

The percentage of childless women might be a good indicator whether circumstances in an industry are unfriendly or welcoming for families. A comparatively high percentage might point to lacking possibilities to reconcile work and family life. But it could also be an indicator for a high percentage of very well educated women, who tend to have their children later in life or generally have fewer children than less

educated women. To isolate the specific influence of the profession of women, Hoem et al. took cohort data from the Swedish registration office and educational register and combined the level and field of female education and the percentage of childlessness. Note that the results are not based on the actual work place arrangements but on the formation of women. Nevertheless they hint at specific fertility patterns for certain professional fields (chart 1). Women who chose training in the field of health care or education are significantly less likely to remain childless even if educational level is high. On the opposite are women with an education in the religious or humanistic field. The chart shows that there are occupational fields with a higher level of childlessness in all three levels of education than in other fields. This could be due to specific conditions in the education system or the professional environment as well as to a special mindset of women who are interested in certain fields. Again, sociological micro studies are needed to shed more light on this situation.

Chart 1: Childlessness, education and industry of Swedish women

– percentage of childless women of all women born in 1955 to 1959 in percent of the educational level



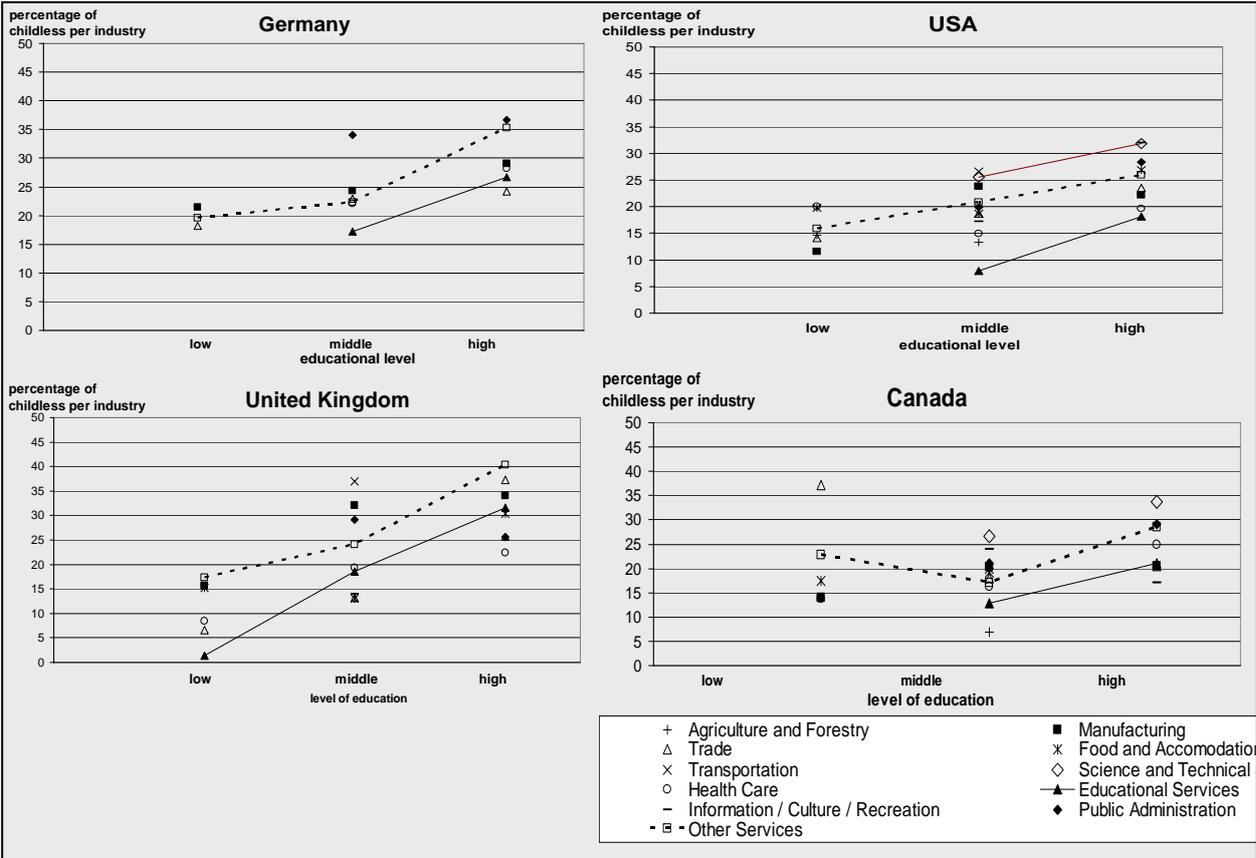
Source: Hoem et al., 2005

Using the LIS data set, we can confirm these findings for other countries. Our data lack the cohort aspect but are easier to interpret in regard to reconciling work and

family life because we do not take educational fields but actual professional surroundings into account. Since the combination of educational level and industry splits the data set in rather small pieces, many cells dropped out of the evaluation, containing less than 30 cases. Nevertheless, there are fine examples of the relevance of the industry for childlessness among working women (chart 2).

Chart 2: : Childlessness, educational level and industry of women

– percentage of childless women aged 30 to 42 of all women working in a specific industry according to their educational level in four countries, 2000 –



Data: LIS
results based on cells with n<30 are left out

In the UK women with a low educational level and working in the field of other services are only slightly less often childless than women with a high educational degree in the field of health care. The line shows that women in the field of other services are in all countries significantly more often childless in every level of education than women who work in the educational sector. The same holds true for women working in the fields of transportation or public administration, who are more often childless than women working in agriculture or health care.

Conclusion

The influence of women's industry on their level of fertility is a relatively new area of research. Despite problems of interpretation due to the cross-sectional data set, preliminary results presented here are interesting enough to encourage further research in this field. First of all the data indicate a level difference of fertility in the four countries under investigation. Germany and the UK generally have a lower level of fertility with fewer families with four or more children and significantly more childless women than in the US or Canada. Second, the results suggest a timing effect linked to the educational level of women. Women with a higher level of education tend to have their children later in life than women with lower education. This leads to lower fertility observations in this cross-sectional data set. Both effects support already known results from other studies. The third finding, however, is rarely mentioned and points to the fact, that the occupational field of women has a significant influence on their fertility behaviour. Apart from their educational level, women who work in the field of scientific or technical services, other services, transportation or public administration have generally spoken fewer children and are childless more often than women working in the sector of health care or educational services. The occupational field seems to have a relatively strong influence, as women with a low level of education tend to be childless as often as highly educated women if the first work in low fertility occupations and the latter in high fertility occupations. The explanation for these patterns remains unclear, however. It could be that "low fertility occupations" are hard to combine with a family life in terms of career expectations, working hours or flexibility of hours worked. It could also be that women who are certain to have children later in life tend to work more often in the sector of education or health care than other women. To explore these patterns in more depth further sociological investigations would be highly desirable.

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