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Female Education and the Second Child: Great Britain and Western Germany Compared

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Abstract

This paper compares the determinants of the transition to the second child in western Germany and Great Britain, using data from the German Socio-Economic Panel (SOEP) and the British Household Panel Survey (BHPS). We test a number of explanations for the positive effect of educational attainment on second birth risks; this effect has been reported for both countries. Owing to differences in the welfare state context, we expect that the factors responsible for the positive education effect differ between the two countries. Our findings, however, provide only partial support for this expectation.

JEL Classifications: J13, J22

1. Introduction

The standard assumption has long been that higher levels of female education are associated with lower fertility (G. S. Becker 1993, Hirschman 1994). Assuming that employment is largely incompatible with bringing up children, one would expect the disincentive to having children to rise with women's income. Assuming that education is a good predictor of labor-market income, the effect of women's education on childbearing should be a negative one. Extensive research has shown that women's higher education indeed defers or inhibits family formation (e.g., Blossfeld and Huinink 1991). However, empirical findings on higher-order fertility provide a picture that is more diverse. Most empirical studies show that women's level of education has a positive effect on higher-order birth risks[1] (e.g., Hoem et al. 2001, Kravdal 2001, Oláh 2003).

The aim of this paper is to compare the transition to second births in western Germany and Great Britain. We focus in particular on explaining the posi-

[1] Throughout the paper, we employ the technical term "birth risk" to indicate the rate of transition to the next parity. In the empirical part of the paper, we present models of determinants of second birth risks estimated by having used event-history techniques. Synonymous terms for "risk" are "hazard rate" or "transition rate".

tive effect of higher levels of education on second birth risks; an effect that we find for both countries and that has previously been reported, for example by Smallwood (2003) for England and Wales, and by Kreyenfeld (2002) for western Germany. The paper is organized as follows. In Section 2, we develop our major hypotheses on the determinants of second birth risks. There follows in Section 3 a discussion of the data sources for the empirical investigation. We use data from the German Socio-Economic Panel (SOEP) and the British Household Panel Survey (BHPS). Section 4 provides the results of piecewise constant event-history models for the transition to second births. The last section draws together the main findings.

2. Theoretical Considerations on the Determinants of Higher-Order Birth Risks

Differences in *welfare state* institutions can lead one to expect differences in the mechanisms that explain the positive effect of educational attainment on second birth risks in Great Britain and western Germany. In the German welfare regime, a number of institutions support the traditional division of labor in the family. The system of income splitting gives generous transfers to couples with very unequal incomes, providing extensive "housewife bonuses" (Sainsbury 1997: 186). No other country offers higher transfers to non-working wives (Sainsbury 1997: 195, Dingeldey 2001, 2002). Parental leave can be taken for up to three years. The leave period is rather generous, but parental leave benefits are more restrictive: They only cover two of the three years of the leave period. They are income tested and provide a payment of 450 euros per month at highest. Virtually no childcare arrangements for children under three years of age exist. Thereafter, part-time care is provided. But even then, it has been assumed that inflexible opening hours of public daycare centers make it difficult to hold a regular part-time job (Spieß und Büchel 2003, Hank and Kreyenfeld 2003). Since the 1980s, part-time employment of mothers has become increasingly common (Pfau-Effinger 1996). Nevertheless, only few women return to full-time work after childbirth.

In a regime where women tend to withdraw from the labor market after first birth, male income and employment characteristics must play an important role in the decision to have a larger family. When studying the effect of women's education on fertility, it is important to account for the education level of the partner as well, when educational homogamy is high – as in Germany (Wirth 1996). If the education levels of the partners are strongly correlated with each other, the positive effect of women's level of education on higher-order birth risks may be due to the omitted characteristics of the partner.

In the British welfare state, women have greater opportunities to return to work after childbirth, provided they are also able to arrange daycare. Unlike

the German childcare system, childminders and private daycare centers play a significant part in the provision of childcare (Department for Education and Skills 2001). However, reliance on formal care arrangements is strongly positively correlated with household income (Woodland et al 2004). A particular need to purchase childcare also arises from the very short overall duration of maternity and parental leave (Kamerman 2000, Deven and Moss 2002).[2] In Britain, therefore, women's income should be decisive as to the ability to afford adequate quality daycare and it may be important for decisions to have a larger family. In a context where mothers continue to work, other employment-related factors may also play an important role. For example, better *job conditions,* such as better job security, or greater employee flexibility may influence fertility decisions positively (Glass and Estes 1997). Women with higher education are more often employed in the public sector, which offers better job security and working conditions (R. Becker 1993). A positive effect of women's education may therefore be related to job characteristics omitted.

Another important aspect concerns the specific modeling of fertility transitions in event-history models. The dependent variable in event-history models is the rate of occurrence of an event in the life course of individuals. A great drawback of the "rate" is that it mixes the probability of an event occurring with the speed by which it happens (Bernardi 2001). The positive effect of education on higher-order birth risks may be mainly a timing effect. Educational participation usually defers family formation (Hoem 1986, Blossfeld and Huinink 1991). This results in highly educated women being older at first birth than their less educated counterparts. Because of their higher age, they have less time at their disposal to have more children before they reach the biological limits of fertility. A perceived *time squeeze* may accelerate transitions to higher-order births for highly educated women.

In the following empirical section, we test these different hypotheses for Great Britain and western Germany. We expect that the partner characteristics omitted are particularly important in explaining the positive effect of female education on second birth risks in western Germany. In Britain, women more often return to work after childbirth, but daycare is often difficult to afford. We therefore expect that female income and job conditions are important determinants of second birth risks in Great Britain.

[2] Prior to 2000, maternity leave was 14 weeks only (European Commission 2002a) and until 1999 there was no additional parental leave. Leave durations have since become considerably more extensive, amounting to a combined maximum duration of 65 weeks (European Commission 2000b; Department of Trade and Industry 2002).

3. Data, Variables, and Method

For this study, we use data from the German Socio-Economic Panel (SOEP) and the British Household Panel Survey (BHPS)[3]. The SOEP and BHPS data cover the period 1984 to 2002 and 1991 to 2001, respectively. We use the respondents of the "West German sample" (sample A), the "foreigner sample" (sample B) of the SOEP, and the original sample of the BHPS. The analysis is restricted to women aged 17 – 45 and at risk of second birth during the observation period (i.e., they had a first child). We omit respondents with incomplete or implausible fertility histories. This leaves the West German sample with 1,824 respondents having given birth to 784 second children and 798 in the British sample having borne 363 second children.

We apply event-history techniques to the analysis of second pregnancy risks (Yamaguchi 1991, Blossfeld and Rohwer 2001). The process time is the duration between first birth and second conception, measured in months.[4] A case is censored when a respondent drops out of the sample or at the last date of interview. The baseline hazard is modeled as a piecewise constant function. When $ln\,h(t)$ is the natural log of the intensity of the event, $h_0(t)$ the baseline hazard, $x(t)$ a time-varying covariate and β the parameter estimate, one yields the following general relationship:

$$ln\,h(t) = h_0(t) + \beta x(t) \ .$$

In order to construct the independent variables, we utilize the information that the respondents provided at the date of interview. We assume that this information has been constant over the last and the following six months. One of the key independent variables is a time-varying covariate for the *educational level* of the respondent. We distinguish a university degree, a vocational training certificate, and respondents without a degree. We control for *age at first birth* and *calendar period.* In the British sample, we distinguish between respondents born in Britain and *foreign-born respondents.* In the West German sample, we distinguish between foreigners (respondents surveyed in the "foreigner sample") and Germans (respondents surveyed in the "West German sample").[5] Furthermore, we take into account the *employment status.* We dis-

[3] The BHPS data used in this publication were made available through the ESRC Data Archive. The data were originally collected by the ESRC Research Centre on Micro-social Change at the University of Essex (now incorporated in the Institute for Social and Economic Research). Neither the original collectors of the data nor the Archive bear any responsibility for the analyses or interpretations presented here.

[4] In order to construct the date of pregnancy, we backdate the date of birth by nine months. The reason for using the date of pregnancy instead of birth is to avoid reversed causation, which particularly concerns the effect of employment on fertility. In the description of the results, we employ the term *birth* risks although we actually deal with *conception* risks.

tinguish full-time employment, part-time employment and non-employment. For the full-time employed, we take into account the *monthly labor-market income*. In the SOEP, the labor-market income is the self-reported monthly gross wage in deutschmarks. We deflated it by using the consumer price index provided by the German Statistical Office, using 1995 as the base year (Statistisches Bundesamt 2001). Finally, we classified the monthly gross wages into low (less than 2000 deutschmarks per month), medium (2000 deutschmarks – 4000 deutschmarks per month), and high income (more than 4000 deutschmarks per month). In the BHPS, the monthly gross wage is a derived variable constructed by the BHPS group. The respondents were asked to report their last gross wage, along with the reference period to which it applies. We deflated the wages, using the consumer price index provided by the Office for National Statistics. Monthly gross wages were finally classified into low (less than 900 pounds), medium (900 – 1400 pounds) and high income (over 1400 pounds). Another labor-market indicator is whether a person is working in the *private or public sector*. We also take into account the *partnership status* and distinguish between singles (or rather, single mothers), married women, and cohabiting couples. Divorced and widowed women are grouped into one category. For women living together with their partner, we take into account the partner's educational characteristics; these were constructed along the same lines as the women's characteristics.

4. Results

Tables 1 and 2 report the results from a stepwise model for Germany and Great Britain, respectively. Apart from women's education, the model includes some standard control variables, like nationality, calendar period, and marital status. Let us first turn to the effects of the control variables:

There is a bell-shaped effect of duration since last birth on second birth risks. Birth risks are highest between one and three years after first birth and they gradually level off thereafter. Foreigners (and foreign-borns in Britain) display higher second-birth fertility. This effect is, however, non-significant.[6] There are no major changes in second birth risks over time, neither in western Germany nor in Britain. The marital status has the expected effect. Second birth risks are highest for married couples and lowest for single mothers. In western Germany, however, there is no significant difference in second birth

[5] The "West German sample" (sample A) also contains a few respondents who are of foreign nationality. Vise versa, the "foreigner sample" (sample B) also contains respondents with German nationality. For example, the foreigner sample includes respondents who were naturalized during the panel period and now hold a German passport.

[6] A model with only nationality shows positive and significant effects on second birth risks. This effect vanishes after the inclusion of marital status.

fertility between marital and non-marital unions. In general, one would expect higher fertility for married couples. That we do not find significant results can presumably be attributed to the small numbers of non-marital couples at risk of second birth.

The effect of education is similar to that reported in other studies. In Britain and western Germany, second birth risks are highest for women with a university degree. Compared to women with vocational training, second birth risks for university graduates increase by more than 30 percent. This result is very much in accordance with other findings (see above). It also agrees with our theoretical argumentation that various mechanisms lead to a positive effect of women's education on higher-order fertility. The critical question is, Which are the "true" mechanisms that contribute to this effect on second birth risks?

Is there a time squeeze?

A "time squeeze" may be one reason for elevated second birth risks of university graduates. As argued earlier, university graduates are usually older at first birth and thus may accelerate their transition to the second child. In order to look into this aspect, we insert age at first birth into the model (Model 2). There is a very strong negative relationship between age at first parenthood and second birth risks. Compared to teenage mothers, second birth risks are cut by half for women who had their first child at ages 31–35. For women aged 35 and above at first parenthood, second birth risks are reduced by roughly 80 percent. This result suggests that there is only little support for the "time-squeeze hypothesis". After the inclusion of this variable into the model, the positive effect of women's education on second birth risks increases[7]. Compared to women with vocational training, second birth risks are now roughly 50 percent higher for university-educated women in both countries.

How does female employment influence second birth fertility?

According to the "income effect hypothesis", women employed full-time have higher second birth risks, as they generally earn higher incomes. However, the hypothesis does not seem to apply in either of the two countries. The results for women's employment status are fairly similar for the two countries (Model 3). Women who are not working or who are in part-time employment encounter significantly higher second birth risks than the reference category of their full-time employed counterparts.

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[7] Since more highly educated women are older at first birth, controlling for the negative effect of age at first birth reveals a stronger net positive effect of higher education on second birth risks.

Do working conditions matter?

In Great Britain, work characteristics affect the transition to the second child. Working in the public sector has a strong positive impact on second birth risks (Model 4). It increases second birth fertility by more than 35 percent. The inclusion of work characteristics in the model also decreases the positive effect of women's university education on second birth risks. In western Germany, there is no impact of women's employment characteristics on second birth risks. Whether the woman works in the private or in the public sector does not seem to matter at all for the decision to have a second child.

Is there an income effect?

Given that neither a time squeeze nor work characteristics explain the positive effect of women's education on second birth risks, does this provide support for the "income effect hypothesis"? Using the SOEP and BHPS data, the "income effect" hypothesis can be tested to greater detail, since labor-market wages are available in this data set. For the full-time employed, we distinguish between a low, medium, and high monthly gross wage, and add these to the regression (Model 5). In western Germany, there is no significant effect of female income on second birth fertility. This result is explained in part by the very low numbers of women returning to full-time work after first birth. In Britain, there is a U-shaped relationship between women's income and second birth fertility, with lower and higher income groups experiencing higher second birth risks. This result is also only weakly significant.

What about the partner's characteristics?

The positive effect of women's university education on second birth fertility in Germany is rather surprising. Omitted partner characteristics possibly provide an explanation for this result. Educational homogamy is high and women with a university degree often live with partners who have similar characteristics (Wirth 1996). There is indeed a strong positive effect of partner's education on second birth risks (Model 6). Compared to women with partners who have an education lower than a university degree, second birth risks increase by 40 percent. After including the characteristics of the partner, the coefficient for women's education on second birth risks becomes smaller, but still is significant. As to Great Britain, a slight positive gradient of the partner's education on second birth risks is noted. However, this effect is weaker than in western Germany, and it is insignificant. The inclusion of additional partner employment variables (labor-market income and the sector of the economy) did not provide any deeper insight either.

Table 1

Relative risks of the transition to second pregnancy – Western Germany

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age of first child*)						
Age 0 – 1	0.009	0.014	0.012	0.012	0.011	0.011
Age 1 – 2	0.020	0.031	0.023	0.023	0.022	0.022
Age 2 – 3	0.021	0.033	0.025	0.024	0.023	0.024
Age 3 – 4	0.015	0.024	0.018	0.018	0.017	0.017
Age 4 – 6	0.011	0.017	0.013	0.013	0.013	0.013
Age 6 – 8	0.005	0.008	0.006	0.006	0.006	0.006
Age 8 – 10	0.004	0.006	0.005	0.005	0.004	0.005
Age 10+	0.001	0.001	0.001	0.001	0.001	0.001
Nationality						
Native	1	1	1	1	1	1
Foreign / foreign born	1.13	1.00	1.02	1.02	1.03	1.07
Calendar period						
1984 – 1990	1	1	1	1	1	1
1991 – 1995	1.02	1.06	1.03	1.03	1.03	1.04
1996 – 2000	0.86	0.94	0.91	0.91	0.89	0.90
Partnership status						
Married	1	1	1	1	1	1
Non-marital partnership	0.79	0.75*	0.77	0.77	0.77	0.81
Single	0.38***	0.34***	0.35***	0.35***	0.35***	0.43***
Divorced / widowed	0.69**	0.67**	0.70**	0.70**	0.70*	0.81
Education						
No degree	1.04	0.95	0.93	0.92	0.92	0.92
Vocational degree	1	1	1	1	1	1
University degree	1.35**	1.53***	1.56***	1.56***	1.52***	1.39**
Age at first birth						
Age 15 – 20		1	1	1	1	1
Age 21 – 25		0.72***	0.73***	0.73***	0.72***	0.72***
Age 26 – 30		0.64***	0.66***	0.66***	0.66***	0.64***
Age 31 – 35		0.48***	0.48***	0.48***	0.47***	0.43***
Age 35 – 45		0.17***	0.17***	0.17***	0.17***	0.16***
Employment						
Not employed			1.36**	1.36***	1.42**	1.40**
Employed part-time			1.38***	1.42***	1.48**	1.47**
Employed full-time			1	1	1	1
Sector						
Public sector				1	1	1
Private sector				1.03	1.04	1.04
Wage						
low					1.10	1.10
medium					1	1
high					1.52	1.51
Partner's education						
No degree						0.93
Vocational degree						1
University degree						1.42***

Flag variables for missing information were also added to the regression.
*: $p \leq 0.01$ – **: $0.01 \leq p \leq 0.05$ – ***: $0.05 \leq p \leq 0.10$.

Source: SOEP 2002.

Table 2

Relative risks of the transition to second pregnancy – Great Britain

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Age of first child*)						
Age 0 –1	0.013	0.027	0.021	0.025	0.018	0.017
Age 1 –2	0.032	0.063	0.051	0.060	0.044	0.041
Age 2 –3	0.030	0.059	0.049	0.057	0.043	0.041
Age 3 –4	0.025	0.048	0.040	0.047	0.035	0.034
Age 4 –6	0.015	0.030	0.025	0.030	0.022	0.021
Age 6 –8	0.007	0.014	0.012	0.014	0.010	0.010
Age 8 –10	0.006	0.011	0.009	0.011	0.008	0.008
Age 10+	0.001	0.002	0.002	0.002	0.001	0.001
Nationality						
Native	1	1	1	1	1	1
Foreign / foreign born	1.15	1.08	1.12	1.15	1.14	1.12
Calendar period						
1984 – 1990	–	–	–	–	–	–
1991 – 1995	1	1	1	1	1	1
1996 – 2000	0.84	0.88	0.90	0.90	0.91	0.93
Partnership status						
Married	1	1	1	1	1	1
Non-marital partnership	0.68**	0.54***	0.53***	0.53***	0.53***	0.55***
Single	0.42***	0.30***	0.28***	0.28***	0.28***	0.30***
Divorced / widowed	0.37***	0.34***	0.33***	0.33***	0.33***	0.34***
Education						
No degree	0.92	0.90	0.88	0.90	0.89	0.87
Vocational degree	1	1	1	1	1	1
University degree	1.31*	1.55***	1.59***	1.53**	1.47**	1.39*
Age at first birth						
Age 15 – 20		1	1	1	1	1
Age 21 – 25		0.61**	0.63**	0.65**	0.66**	0.69*
Age 26 – 30		0.54***	0.56***	0.57***	0.58***	0.59**
Age 31 – 35		0.41***	0.43***	0.43***	0.44***	0.45***
Age 35 – 45		0.22***	0.24***	0.23***	0.24***	0.25***
Employment						
Not employed			1.35**	1.12	1.49*	1.49*
Employed part-time			1.18	1.20	1.62**	1.62**
Employed full-time			1	1	1	1
Sector						
Public sector				1	1	1
Private sector				0.76*	0.74**	0.74**
Wage						
low					1.59*	1.62*
medium					1	1
high					1.47	1.44
Partner's education						
No degree						1.17
Vocational degree						1
University degree						1.22

Flag variables for missing information were also added to the regression.
*: $p \leq 0.01$ – **: $0.01 \leq p \leq 0.05$ – ***: $0.05 \leq p \leq 0.10$.

Source: BHPS 2001.

5. Summary

In this paper, we investigated explanations for the positive effect of education on second birth risks in Great Britain and western Germany. We hypothesized that the positive effect of women's university education is due to different factors in the two countries. For western Germany, we assumed that the effect is the result of omitted partner characteristics. Nevertheless, our results provided only partial support for this hypothesis, since a positive effect remained even after controlling for partner characteristics. However, in contrast to the results for Germany, the effect of the partner's education was weaker and insignificant for Great Britain. This lends some support to the idea that the institutional context in Germany, i.e. the tax splitting system and insufficient childcare provision, render male employment more important in the decision to have further children than in Britain. For Great Britain, we hypothesized that omitted job characteristics or an "income effect" was more important. Women with higher education have higher incomes and therefore have an earning capacity large enough to afford a larger family. They are better able to afford daycare, which is more readily available in Britain than in Germany, though at a higher cost. Britain has a labor market that is more deregulated than that of Germany; greater employment security provided by the public sector therefore may be especially important. There is some support for the hypothesis that more stable working conditions in the public sector positively influence second birth risks. However, we did not find large evidence that high female labor-market income matters for second birth transitions.

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