

# **The influence of the partner's education on fertility**

A life course perspective on the impact of educational constellation and partnership characteristics on family formation

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## **Abstract**

A review of existing sociological literature on the relation between educational attainment and fertility decisions reveals that most empirical studies focus on characteristics of the female spouse. The role of the partner is neglected for the most part. Yet, most children are fathered and raised in an existing relationship. Hence, we assume that the influence of both partner's education has to be regarded as an important determining factor for childbirth. From a theoretical perspective using bargaining models family formation can be seen as a collective decision mutually agreed upon by both spouses and therefore characteristics, resources and attitudes of both partners have to be considered. In our paper, we use this approach to examine fertility decisions, taking into account both partners as actors and couples as the unit of analyses. Hence, we look at each partner's educational attainment and the couple's educational constellation, i.e. if both partners have the same educational level or if one partner is higher educated than the other.

Furthermore, from a life course perspective we apply a dynamic perspective. Regarding education, we are interested in both, in educational attainment and as well as the time since having left the educational system. In particular we are interested in how these individual characteristics are mediated by the partner's and how these develop with the partnership's duration. We thereby combine aspects of the individual life course of women and men with couple's life course characteristics.

Our empirical analysis is based on the German Socio-Economic Panel (GSOEP) that allows us to model partnership formation and duration as well as childbirth simultaneously.

**Keywords:** education, educational homogamy, fertility, family formation, spouse, couple, partnership

**Word count:** 8315

## **1 Introduction**

A review of existing sociological literature on the relation between educational attainment and fertility decisions reveals that most empirical studies focus on characteristics of the female spouse as explanatory factors, e.g. women's education or employment. A well known finding of these studies is that highly educated women postpone childbirth and more often remain childless than less educated women (Brüderl and Klein 1991, Brüderl and Klein 1993, Blossfeld and Jaenichen 1992). Part of this phenomenon was attributed to the educational system influencing timing of first births as women postpone childbirth until they have left education (Blossfeld and Huinink 1991). Since higher educated women are older when they complete education, biological limits reduce the 'exposure time' and, as a consequence, high educational levels can even accelerate family formation at a certain age (Kreyenfeld and Konietzka 2007). Studies examining childlessness of men show similar effects: Family formation is postponed during education, but because the reproductive time period lasts longer, less pressure leads to an even stronger postponement of first births (Schmitt 2005).

Comparing the relation of education and timing of family formation on the basis of individual data is problematic if the partnership context differs. Most children are fathered and raised in an existing relationship. From a theoretical perspective using micro economic theory and bargaining models family formation can be seen as a decision and realisation that requires both spouses and therefore characteristics of both partners have to be considered. Hence, the influence of both partner's education has to be regarded simultaneously. Furthermore, even taking the partner's characteristics into account, there might still be differences between individuals in couples due to processes of partnership formation and duration, for example differences between educationally homogamous vs. heterogamous couples and differences due to the partnership's stability and duration. That is, with individual data it is possible to depict the impact of education on fertility, but differences due to partnership processes are ignored. In this paper we apply a perspective on couples as the central unit of analyses for fertility, and we take into account both individual characteristics as well as characteristics of the couple. As the processes of partnership formation, its duration and fertility decisions might overlap, a life course perspective is necessary to disentangle the impact of the individual's education from these partnership effects. Combining the individual and couple's perspective for empirical analyses we apply a life course perspective and examine several relevant dimensions of time, namely one partner's age and the partnership's duration. The underlying fertility decision of couples is perceived as a process that entails these two distinguishable dimensions of time. We thereby combine aspects of the individual life course of women and men with couple's life course characteristics.

Our empirical analysis is based on the German Socio-Economic Panel (GSOEP), a wide-ranging representative longitudinal study of private households in Germany that includes

characteristics of all members living in the household. The longitudinal structure of the data allows us to examine the life course of individuals as well as partnership formation and duration simultaneously and how these interact for childbirth.

## **2 Education and fertility: theoretical considerations and empirical evidence**

### **2.1 Previous research on education and family formation**

There has been considerable research on the interrelation between education and fertility, both on the macro level comparing e.g. literacy rates and total fertility rates in different countries as well as on the individual level (Kreyenfeld and Konietzka 2008, United\_Nations 2004). Being different in scope and approach almost all of these studies focus mainly on women. Besides the 'mere' relation of education and fertility other several studies have taken other social dimensions into account, e.g. historical changes of this relation or the impact of the institutional settings. In our short review of empirical results of previous research we will concentrate on selected studies covering education and fertility in Germany. Regarding the timing of first births, it has been shown that women with higher educational attainment are more likely to postpone family formation. For example, by comparing women with different educational levels and the timing of first birth, Blossfeld and Huinink (1991) could demonstrate that for university educated women born between 1939 and 1951 first motherhood is quite unlikely before age 27 as only about 20 percent have a first child earlier. In contrast, low educated women often start getting a first child even before age 20, and about 70 percent had at least one child at age 27. Women with a medium educational level (upper secondary school qualification but no training) start getting a first child usually not before age 20. However, some catching up can be observed as women with higher education end up with more or less the same number of children. After leaving school or university, the transition rate to motherhood increases with the women's educational level, pushing the proportion of childless women with university degree under the proportion of childless women with low or medium education (Blossfeld and Huinink 1991). More recent studies demonstrate that the postponement of motherhood even increases over time among women with university education: For example, Schaeper (2007) examines several cohorts graduating between 1989 and 2001 in Western Germany and finds that about 60 percent of women who received their university degree in 1989 or 1993 were childless at age 32. A few years later, only about 30 percent of university graduates were mothers at this age (cohort 1997). The most recent cohort, leaving education in 2001, remained childless at age 32 at the highest level of about 80 percent (Schaeper 2007). Additionally, education also relates to permanent childlessness. Higher educated women have a greater probability of remaining childless: In Germany, the percentage of permanent childlessness among female university graduates is estimated

between 25 and 40 percent (see Duschek and Wirth (2005) for a discussion of data limitations for estimation).

A few recent studies have also examined men's fertility: Regarding the impact of education, for example Schmitt (2005) finds that in Germany in particular low educated men remain childless. Similar to the female pattern high educated men postpone childbirth until they have left education. Schmitt and Winkelmann (2005) point out that postponement of family formation during education and labour market integration is even stronger for men than for women.

## **2.2 (Individual's) education and fertility**

Theoretically, several aspects of education and its correlates have been identified that contribute to this pattern of educational attainment and postponed or foregone family formation. Some of these have different impact on men and women, they may change with age or their impact changes over time. For example, prolonged education delays the transition to employment and economic independency but also influences the timing of parenthood in a number of indirect ways, through a less traditional or family-centred value orientation, increased career opportunities, or increased ability to process information and use contraception. These interactions of education, labour market prospects, family-related values and attitudes make it difficult to disentangle the 'pure' effect of education. Having said this, in the following we concentrate on education and labour market prospects using a microeconomic background.

Micro economic theory emphasizes two mechanisms to link education and family formation: an 'income effect' and a 'price effect' (Pollak and Watkins 1993, Liefbroer and Corijn 1999). The central assumption of the New Home Economics is that family formation entails benefits and costs (Becker 1973, Becker 1974, Becker 1981, Leibenstein 1974, Easterlin 1975). In particular the costs can be related to education and educational attainment. Generally speaking, the income effect is based on the assumption that children are a costly good whereas the price effect refers to foregone earnings due to family duties. To bear the costs of children the availability of some economic resources is a precondition for family formation. From this assumption it can be hypothesized that timing of first birth is strongly influenced by waiting until one can 'afford' to have children. As being in education usually implies a lack of (financial) resources students postpone family formation until they have left the educational system. The postponement of family formation during education is also called the 'institutional effect' of education. Empirically, several studies have illustrated that enrolment actually strongly reduces the risk of having a first child (see e.g. Blossfeld and Huinink 1991, Rindfuss et al. 1988). Besides enrolment, educational attainment also influences family

formation via the income and the price effect: The income effect implies that better educated individuals generally have better labour market prospects and higher earnings, and therefore will be more able to bear the costs of having children than less educated. From this a positive effect of educational attainment on having children can be derived. On the other hand, the 'price effect' implies that having children not only causes direct costs but also opportunity costs because people will have less time to be spend in the labour market. Therefore, the price effect would predict a negative effect of educational attainment on family formation as opportunity costs are higher for the better educated than for others.

The second important assumption of the New Home Economics is the existence of a (sex-specific) division of labour within the family leading to specialization gains of the household (Becker 1981). In its ideal-type - the male-breadwinner model - men specialize on paid work as their labour market prospects and wages are on average higher than their partner's and the female partner specializes in household work and childcare. Combining these mechanisms, it becomes clear that the income effect is expected to dominate the relationship between education and fertility among men whereas the price effect is expected to dominate the relationship of women.

These considerations lead us to the general hypotheses on *gender differences in the relation of education and family formation*: Enrolment leads to postponement of family formation and in consequence higher educational attainment is related to late childbirth for both, men and women. Due to different opportunity costs of men and women by (temporal) withdrawal from the labour market after childbirth, we expect strong gender differences once the educational system is left: Family formation is supported by the men's educational level but reduced as the women's education increases.

### **2.3 Fertility of couples**

Recent research has pointed out several shortcomings of this approach: Not individuals decide on fertility but couples. For example, Thomson and Hoem (1998) have found out that both partners' childbearing plans influence couples' childbearing. As childbearing plans and their realisation may depend on resources, both partner's education has to be taken into account. Additionally, other characteristics of the couple like the partnership's stability should be included in a theoretical framework on couples' fertility decisions. In the following we discuss the impact of both partner's education, the educational constellation of a couple and the stability of the partnership as important couple-related characteristics influencing a couple's decision to have children.

(1) As already explained above, micro economic theory explicitly applies a perspective on households resp. couples: Family formation is a household decision. Both partner's education and labour market potential are evaluated for the capability to bear direct costs and opportunity costs in case of childbirth. Although the theoretical perspective is on couples, most empirical research has focused on one partner and her or his education only. Educational effects of one partner might not be independent from partnership status and from the other spouse's (educational) characteristics. Corijn et al. (1996) discuss that educational attainment of both spouses has different effects and conclude that any pure individual perspective would disregard the joint decision making process. Though, some recent studies have included partner's education as 'control' variable: Kreyenfeld (2002) examines fertility of women using the data from the Mikrozensus 1997. Vocational training has a negative effect on first birth but a positive on second births that becomes insignificant when including the partner's (vocational) education. Based on SOEP data Kreyenfeld and Konietzka (2008) find that being in education significantly reduces the transition to a first child, but the effect is smaller for those with a partner if the partner's education is added in the model. Regarding higher order birth, the effect of women's education is also reduced in the model that includes characteristics of the partner. Also using SOEP data, Kurz (2005) analyses family formation of men. She finds that for those men who actually have a partner the transition rate to fatherhood does not vary significantly with their own education and employment status. Similarly, Brüderl and Diekmann (1994) report that men's educational attainment is negatively related to fertility in more recent cohorts but this effect disappears once the educational level of the wife is controlled for. Using cross-sectional data of couples, Bauer and Jacob (2008) can show that in particular the education of the female partner matters within couples. Taking into account the partner's education differences between women with different educational attainment remain and the impact of the female spouse prevails.<sup>1</sup>

Hence, our first hypothesis has to be modified for the *partner's education*. The impact of education on family formation depends on characteristics of the partner. The positive effect of male educational attainment decreases once the female partner's education is taken into account as (female) price effect overlaps the (male) income effect. For women, the partner's education has only a small decreasing effect as their opportunity costs of withdrawing (temporarily) from the labour market is independent from their partner's education.

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<sup>1</sup> There is large variation in the effect of (female) education across countries (e.g. Blossfeld 1995) as well as in the effects of spouses that often is explained by the kind of 'family system' in a given society (cf. Esping-Andersen 1999 for the concept of 'de-familiarization' ). For example, in Sweden, Andersson et al. (2005) point out that labour force participation and income of men and women have quite independent effects, i.e. resources of both partner matter with regard to transitions to the second and third child. The authors interpret their finding of independent effects as a result of the Swedish provision of childcare that allows men and women to make life course decisions on the basis of their own (material) situation.

(2) Besides each partner's own educational level, the educational constellation as a characteristic of the couple might also be important for family formation (cf. Bauer and Jacob 2008). Classical theories of family economics suggest that educational asymmetries between partners encourage parenthood as opportunity costs of the partner that specializes in family tasks are relatively low and specialization gains are high. In contrast, for highly educated homogamous couples opportunity costs in case of specialisation are rather high leading to higher share of childlessness among these couples. Only a few recent studies have examined the impact of the couple's educational constellation empirically. The analyses of (Wirth 2007) focus on couples with at least one partner that has graduated from tertiary education. She shows that couples with a high educated male partner and a less educated female spouse are less likely to remain childless than homogamous high educated couples of couples with a higher educated female partner. (Corijn et al. 1996) also include the educational constellation of the couple in their empirical analyses. They find that couples with two low educated partner are most likely to have children early. If the women has a higher educational level than the male spouse, family formation is least likely. Bauer and Jacob (2008) extent these analyses by a distinction of general and vocational education. Hypergamous couples, i.e. couples with a higher educated male spouse are not per se most likely to have children but only in the case of higher vocational training of the male spouse. On average, couples with the same general and vocational education are the most likely to have children – although the variation between high and low educated homogamous couples is quite high.

These considerations lead us to the formulation of a hypothesis on the *couple's educational constellation*: Regarding the impact of the partner's education on family formation, economic theories suggests that educational asymmetries may encourage parenthood due to greater gains from specialization. For homogamous couples the mechanism is more complex. As gains to specialization are low when both partners hold a similar educational degree, opportunity costs should then be the prominent factor explaining fertility. Therefore we expect high educated homogamous couples to be more often childless than homogamous low educated couples.

(3) Previous research reporting postponement of family formation often used age at which women give birth to their first child as a measure of first birth timing. From a life course perspective other dimensions of time are possible that might be related to age having their own theoretical justification and empirical relevance. By placing family formation within the appropriate context of couples, the life course perspective highlights the circumstances of joint decision making within an existing partnership. Hence, both individual resources and constraints as well as those that are related to the couple as a unit of action have to be considered. In consequence, the focus on age of one partner is obviously too narrow. If so, not (only) the biological age of actors matters, but the time of partnership formation marks the

begin of the decision process on family formation. Although finding a partner might be driven by family attitudes and the desire for children, the realization of (planned) family formation is necessarily following partnership formation. Hence, looking at age only, the different processes of partnership formation, stabilization and family formation clearly overlap. For example, to distinguish if the observed postponement of family formation of high educated women is an effect of education only or if postponement can in part be explained by delayed partnership formation (preceding childbirth) a perspective on couples is necessary. Furthermore, if a partnership is a prerequisite for family formation, the ‘time at risk’ of any individual begins with the beginning of the partnership. Building on this theoretical considerations on partnership duration as a crucial dimension of time, Klein (2003) analyses the German Familiensurvey 2000 comparing age and partnership as two different time axes. He points out that in terms of age, women of younger cohorts postpone the first child whereas in terms of partnership duration there is no difference of fertility among women of different cohorts. As his analyses only compares cohorts, it remains an open question if the observed age differences between educational groups might also be due to differences in partnership formation.

This leads us to our last hypothesis on the impact of *partnership duration* on family formation: Looking at partnership duration we expect that differences between educational groups are reduced when using the partnership’s duration as the ‘time at risk’. That is, we expect that women (and men) with different educational level differ less in childbirth behaviour when using the partnership as the relevant time axis for fertility decisions.

### **3 Data and estimation**

Our empirical analysis is based on the German Socio-Economic Panel (GSOEP)<sup>2</sup>, a wide-ranging representative longitudinal study of private households in Germany that includes characteristics of all members living in the household. The longitudinal structure of the data and the household sampling allows us to examine the life course of individuals as well as their partner’s simultaneously and how these interact for childbirth. For estimation we use all waves of the GSOEP from 1984 to 2007. We restrict our sample to partnerships that have begun during these panel years as only in these cases we have information on the parents. Furthermore, we excluded women that already had a first birth before the current partnership began and couples that had existed before the household entered the panel as in these cases births before panel entry can only be attributed to the mother and not the father. That leaves

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<sup>2</sup> The data used in this paper was extracted using the Add-On package PanelWhiz for Stata. PanelWhiz (<http://www.PanelWhiz.eu>) was written by Dr. John P. Haisken-DeNew ([john@PanelWhiz.eu](mailto:john@PanelWhiz.eu)). See Haisken-DeNew and Hahn (2006) for details. The PanelWhiz generated DO file to retrieve the data used here is available from us upon request. Any data or computational errors in this paper are our own.

us with 1265 couples and 637 first births between 1984 and 2007. Using person-period data format our analyses are based on 4770 couple-years.

Our central variable of interest is the birth of the first child within an existing couple. As we use couples as unit of analyses all effects of individual education have to be interpreted in the partnership context, i.e. they refer to individuals living with a partner only. For modelling timing of first birth we use two time axis: First, we look at the female spouse's age as the relevant time axis as fertility of a couple is limited by the female's fertile phase (age 15 to age 45). Second, we use the partnership's duration as process time. The beginning of the partnership is measured by entering cohabitation as in the SOEP data partners have to live in the same household to be interviewed.

As we are interested in effects of education our central variable is educational attainment of both partners. We use both, general and vocational education as two different dimensions of education. Our previous research has shown that the impact of general and vocational education on fertility differs and that also the educational constellation of the couple has to be differentiated to general and vocational education (Bauer and Jacob 2008). We use a simple dichotomous distinction: General education is operationalised by having attained higher secondary schooling (*Abitur*) vs. all other lower general schooling degrees (no *Abitur*). Vocational education is a dichotomous variable as well comparing those with no vocational training to individuals with vocational training (including tertiary education). For the educational constellation we use for general and vocational constellation two times four groups each: hypergamous general education (male partner holds *Abitur*, female partner has not), hypogamous general education (female holds *Abitur*, male has not), homogamous high (both partners hold *Abitur*) and homogamous low (both partners have no *Abitur*). The four constellations of vocational education are defined analogously.

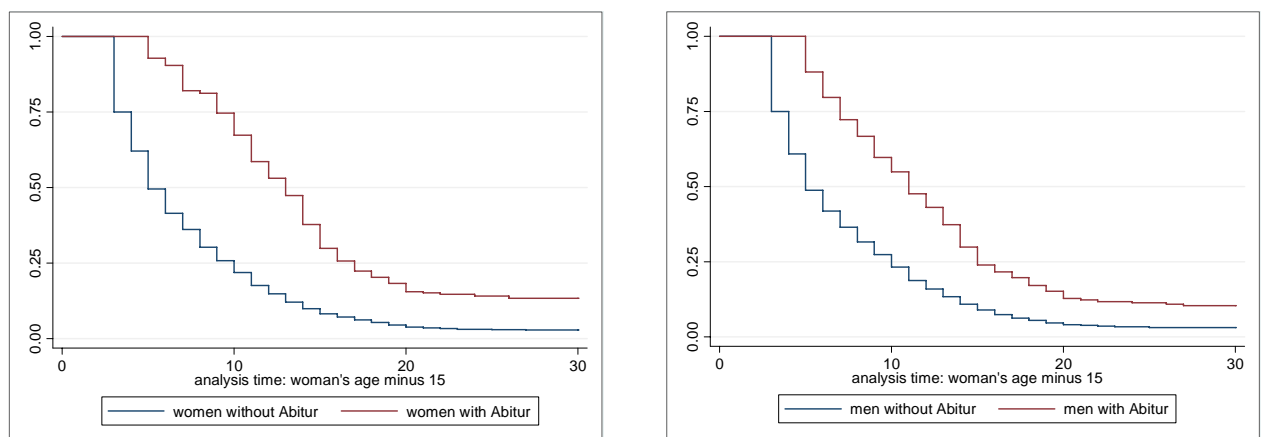
In our analyses we apply event history models. This group of models is adequate for analyzing events – here first birth – and right-censored observations. For most of the respondents resp. couples we know if and when they had a child whereas for those that did not have a child until the end of observation time it is possible that a child will be born in the future as well. Event history models take this possibility into account and control not only for state change and censored episodes, but also for the waiting time until the transition occurs or for the time until the last observation takes place. Due to the availability of yearly data only, we decided to apply discrete time logit models (for details cf. Yamaguchi 1991).

## 4 Empirical results

### 4.1 Individual's and partner's education and first birth

We first look at the relation of education and first births by some descriptive graphs. Figure 1 and figure 2 show survivor curves of family formation for women and men with different levels of general and vocational education. Women with *Abitur* postpone family formation and are more likely to remain childless at age 45 (Figure 1, left graph). At age 45, less than 3 percent of women in a partnerships that are low generally educated remain childless. About 14 percent of women with *Abitur* did not (yet) give birth to a child at this age. Postponement of family formation can also be found for women living with a partner that holds *Abitur* compared to women living with a less educated male partner (Figure 1, right graph). The proportion of ever lasting childless women then amounts to a total of 10 and 3 percent, respectively. As the differences in fertility between women with and without *Abitur* are greater than differences in family formation according to the partner's education this indicates the female partner's education is more important for fertility decisions and timing of first birth in an existing partnerships than the male partner's.

**Figure 1** General education and timing of first birth, female partner's age (Kaplan-Meier estimation)

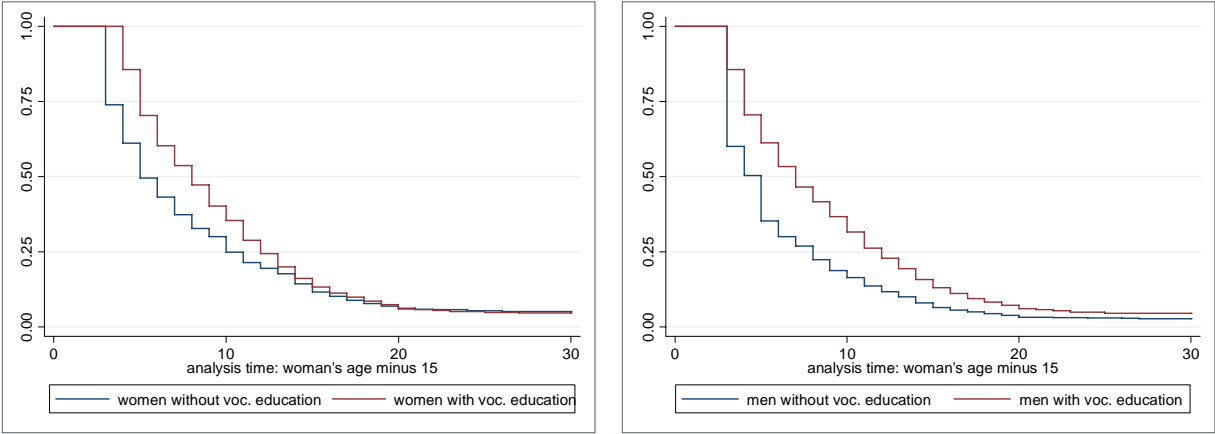


Source: GSOEP 1984-2007, own calculations

Figure 2 gives the same picture, but now looking at vocational training of the female spouse and the impact of vocational training of the male partner. Women without vocational training are entering motherhood earlier than those with vocational training, but the latter are catching up later. The curves overlap from age 30 on and finally there are no differences in permanent childlessness. For men the pattern is nearly the same. Women living with a male partner without vocational training are the earliest to build a family. In this group of couples with a very low educated male spouse in nearly all cases family formation has been realized by age 35 of the female partner as we observe only very few first births afterwards.

Comparing figure 1 and figure2 we see that differences between different levels of general education are larger than differences between individuals with or without vocational training. In particular *Abitur* postpones entry into motherhood.

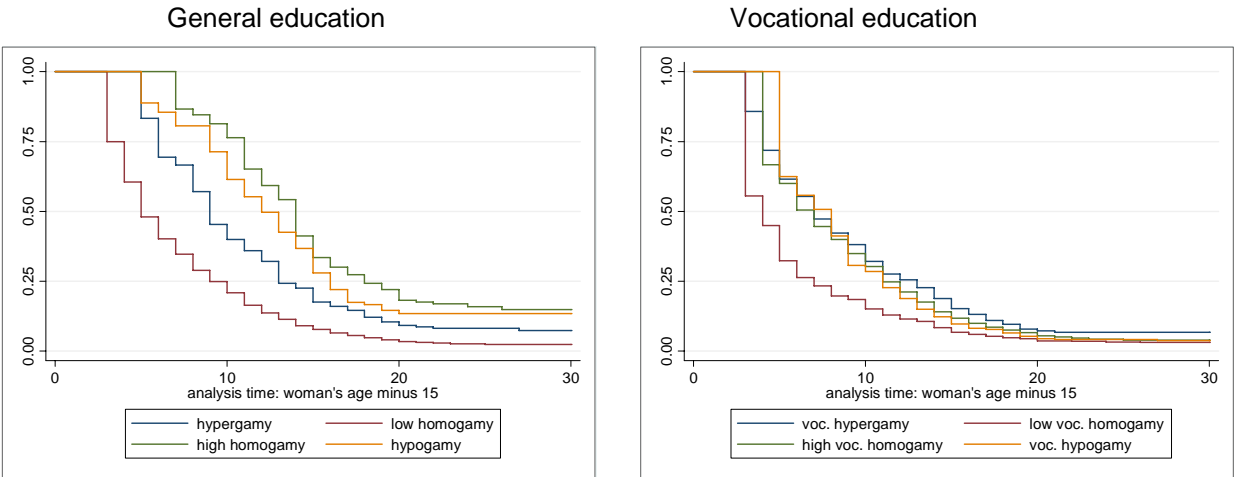
**Figure 2 Vocational education and timing of first birth, female partner’s age (Kaplan-Meier estimation)**



Source: GSOEP 1984-2007

In our theoretical considerations we have pointed out that the differences of educational groups might change when looking at both partner’s education simultaneously. Figure 3 shows survivor curves for first births distinguishing the educational constellation of the couple i.e. if both partner have the same educational level of if there is an educational asymmetry. In the left graph educational constellation regarding general education is shown, in the left graph shows constellations of vocational education.

**Figure 3 Educational constellation and timing of first birth, female partner’s age (Kaplan-Meier estimation)**



Source: GSOEP 1984-2007, own calculations

In particular fertility behaviour in the homogamous couples differs a lot, the curves of the two asymmetric constellation are in-between (left graph). Homogamous couples without *Abitur*

are the most likely to have children and the females in these couples are entering motherhood comparatively early. In contrast, if both partners hold *Abitur* (homogamous high) they are postponing first birth at most. Women in hypergamous couples, i.e. she has no *Abitur* but the partner has, are entering motherhood earlier than women that are higher educated than their partner in hypogamous couples.

Differences due to the educational constellation are less pronounced when looking at the vocational constellation of the couple (right graph): Low educated women that are living with a low educated partner begin family formation the earliest compared to all other combinations. All other constellations do not differ much.

Summing up our descriptive analyses, in accordance with previous studies we find a strong relation between educational attainment and the age when a women living with a partner has her first child. High educated women postpone childbirth and they are more likely to remain childless than less educated women. We find the same pattern for general education of the male spouse: family formation of women that are living with a high educated men occurs later than for those living with a less educated partner. At first glance that contradicts the assumption that high educated (men) can afford a family. But taking into account that couples do not differ much in age, here the institutional effect of the male partner, i.e. postponement of birth during education; might be the reason for their female partner's late motherhood. For vocational training, the pattern is similar – postponement of the higher educated – but these differences are less marked.

Combining educational levels of both partners we find remarkable differences between couples with different constellations of general education. In particular for the effect of the women's education on fertility, the partner's education matters: Women with low education are much more likely to become mothers early when they live with a low educated partner than those living with a higher educated partner. Women with higher educated differ less, but here also the partner makes a differences as homogamous couples with *Abitur* are the most likely to postpone childbirth.

## **4.2 Multivariate Analyses**

### **4.2.1 Education of both partners and the female partner's age at first birth**

#### Individual's education

The results of our multivariate analyses on the impact of education on the female spouse's age at first birth are presented as follows: First, effects of general and vocational education on first births for women and men are described (Table 1, Model 1 and 2). Second, changes of these effects are discussed when including both partner's education simultaneously (Table 1, Model

3). In all models an interaction term of education and process time (here: age of the female spouse) is included.

**Table 1 The effect of general education and vocational education on timing of first births, female partner's age (discrete-time logit model)**

	(1)	(2)	(3)
	Transition to first birth		
<i>Abitur</i> wife <sup>+</sup>	-1.19 <sup>***</sup>		-1.13 <sup>***</sup>
<i>Abitur</i> wife * time	0.06 <sup>**</sup>		0.06 <sup>**</sup>
Vocational education wife	-0.94 <sup>**</sup>		-0.91 <sup>*</sup>
Vocational education wife * time	0.09 <sup>**</sup>		0.08 <sup>**</sup>
<i>Abitur</i> male partner		-0.57 <sup>*</sup>	-0.18
<i>Abitur</i> male partner * time		0.02	-0.00
Vocational education male partner		-0.83 <sup>*</sup>	-0.75 <sup>*</sup>
Vocational education male partner * time		0.06 <sup>*</sup>	0.06 <sup>*</sup>
Analysis time: wife's age	-0.37 <sup>***</sup>	-0.28 <sup>***</sup>	-0.43 <sup>***</sup>
Analysis time: wife's age (log)	3.02 <sup>***</sup>	2.24 <sup>***</sup>	3.24 <sup>***</sup>
Intercept	-4.69 <sup>***</sup>	-3.77 <sup>***</sup>	-4.43 <sup>***</sup>
<i>N</i> (couple-years)	4770	4770	4770
<i>N</i> (couples)	1264	1264	1264
<i>N</i> (events)	637	637	637
$\chi^2$	88.60	71.64	96.68

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: GSOEP 1984-2007, own calculations

Notes: <sup>+</sup> For simplicity we use the term wife although we are also looking at cohabiting couples.

As expected, female education has a significant negative effect on fertility (Model 1). Higher educated women postpone first motherhood. The chances of women with *Abitur* that are living with a partner of giving birth to a first child are only 0.30-times the chances of women without *Abitur* ( $e^{-1.19}=0.3$ ). Vocational training has also a negative but less strong effect. Comparing women with vocational or tertiary education to those without, they are 0.40 times less likely to become mothers early. These 'main effects' have to be interpreted together with the interaction effects: The interaction term shows that educational differences in family formation do not remain constant over time but decrease significantly. This implies that the decelerating effect of education decreases with increasing age of the women.

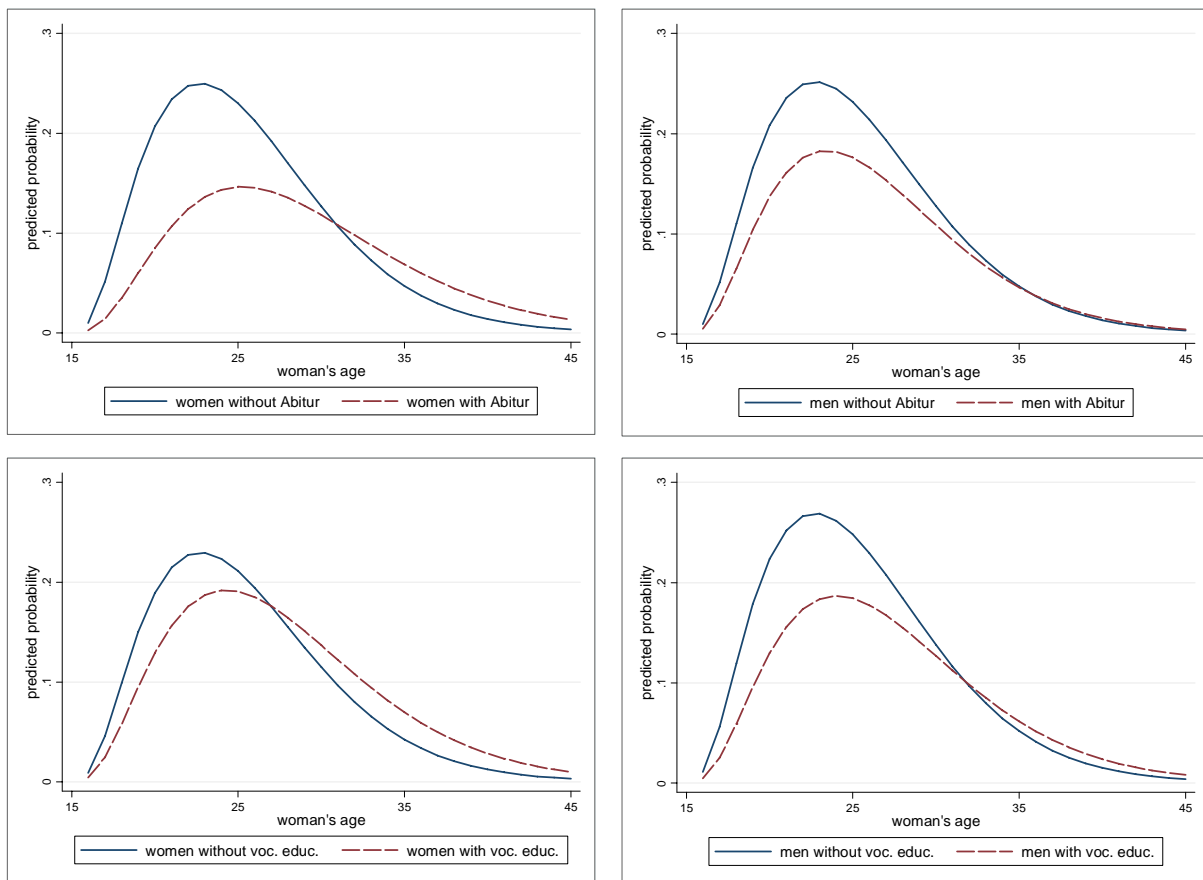
The effect of the male's spouse general education on their partner's fertile behaviour is lower and less significant than the female effect (Model 2). The same pattern can be seen for vocational education. The interaction term is significant for vocational education only, i.e. the impact of the male partner's vocational education decreases with increasing age of the female partner.

Looking at education of both partners simultaneously (Model 3), the female effects are not altered much whereas the coefficients of male education decrease markedly. This supports our

second hypotheses on changes of the relation of individual education and fertility once the partner's education is taken into account, in particular for men that presumably play a 'minor' part in timing of first births.

In figure 4 we illustrate these findings by predicted probabilities of first birth over the female spouse's age. We vary our educational variables setting all other effects to the mean.

**Figure 4** The female and male partner's general and vocational education and first birth (all other effects set to mean), predicted probabilities, analysis time: female partner's age



Source: GSOEP 1984-2007, own calculations

Women without *Abitur* have the highest probability to become mothers in their early and mid-twenties whereas women with *Abitur* are less likely to enter motherhood at that age but later in their life course. The curves by men's general education differ less although female partner's of higher educated men are also less likely to enter motherhood early. Differences between different levels of female's vocational education are relatively small but we also see for those with vocational education a more widespread phase of family formation until the end thirties. Women with a partner without vocational training show the highest probability of early motherhood.

### Educational constellation

In the next step of our analyses we look at the educational constellation of the couple (Table 2). In the first model we concentrate on general education (Table 2, Model 1), in the second we examine vocational constellation (Table 2, Model 2) and in the third we include both dimensions of education into our estimation (Table 2, Model 3).

**Table 2 The effect of educational constellation on timing of first births, female partner's age (discrete-time logit model)**

	(1)	(2)	(3)
	Transition to first birth		
<i>General Homogamy (low level)</i>	<i>ref.</i>		<i>ref.</i>
General Hypergamy	-0.35		-0.31
General Hypergamy * time	0.01		0.00
General Homogamy (high level)	-1.13**		-1.22**
General Homogamy * time	0.053*		0.055*
General Hypogamy	-1.26**		-1.24**
General Hypogamy * time	0.07*		0.06*
<i>Vocational Homogamy (low level)</i>		<i>ref.</i>	<i>ref.</i>
Vocational Hypergamy		-0.83	-0.84
Vocational Hypergamy * time		0.06	0.06
Vocational Homogamy (high level)		-1.43**	-1.66**
Vocational Homogamy * time		0.12*	0.14*
Vocational Hypogamy		-0.82	-1.07
Vocational Hypogamy * time		0.08	0.09
Analysis time: wife's age	-0.24***	-0.35***	-0.43***
Analysis time: wife's age (log)	2.27***	2.52***	3.20***
Intercept	-4.30***	-3.77***	-4.32***
<i>N (couple-years)</i>	4770	4770	4770
<i>N (couples)</i>	1264	1264	1264
<i>N (events)</i>	637	637	637
$\chi^2$	83.53	66.54	97.61

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

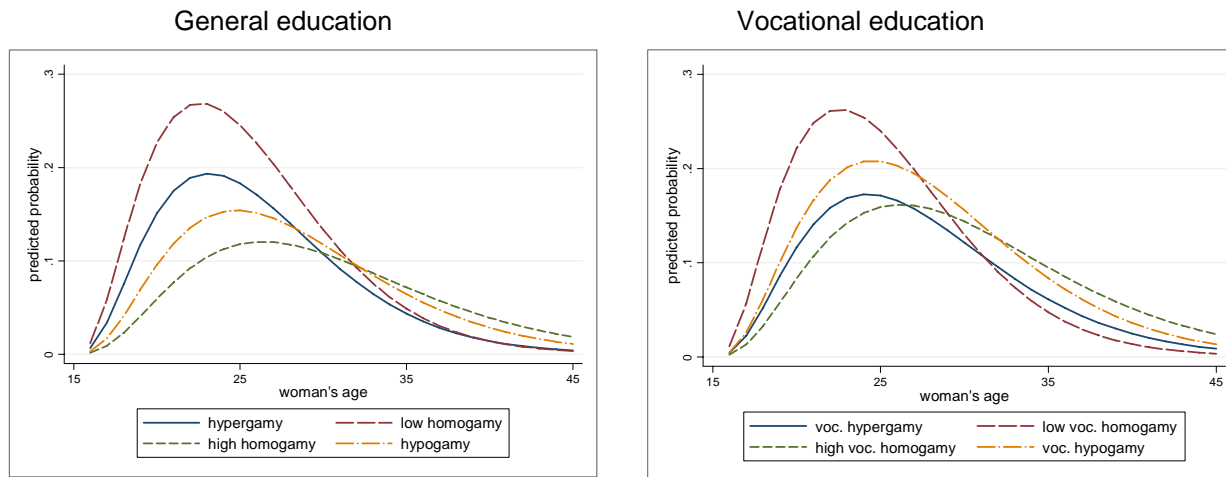
Source: GSOEP 1984-2007, own calculations

Looking at general education, only hypo- and homogamous high educated couples differ significantly from homogamous low educated couples. Hypogamous couples with a female partner that is higher educated than the male partner are 3.5-times more likely to postpone family formation than a low educated couple. The same can be found for homogamous high educated couples with an odds ratio of 3.1 compared to the reference category of homogamous low educated couples. Though, in both cases we observe a significant decrease of the effect over the women's age.

Regarding vocational constellation only couples of two vocationally educated partners differ significantly from couples without any vocational training. In this case first births are

decelerated by 4.3-times. Once one partner is without vocational education there is no difference to the reference category of low educated homogamous couples .

**Figure 5 Educational constellation and first birth (all other effects set to mean), predicted probabilities, analysis time: female partner's age**



Source: GSOEP 1984-2007, own calculations

The probability to enter motherhood in the early twenties is the highest for women without *Abitur* that are living with a partner that also has no *Abitur*. In hypergamous couples the probability of early motherhood is higher than in couples with high educated female partners supporting a male-breadwinner hypothesis. Surprisingly, hypergamous couples enter parenthood earlier than equally homogamous high educated couples. Looking at vocational constellation, the women in the ‘no vocational education’ combination become mothers early. But also vocationally educated women living with a partner without vocational training are more likely to become early mothers than their counterparts with a vocationally educated partner.

#### 4.2.1 Family formation and the partnership's duration

We now turn to the partnership's duration as relevant process time as it determines the ‘exposure time’ of individuals for fertility decisions. The beginning of a partnership is dated to the first year of cohabitation, as the GSOEP does not contain retrospective partnership biographies.

##### Individual's education

As expected in our hypothesis on partnership's duration we find that educational attainment of both partners has no significant effect (except general education of the female spouse) once we apply a strict partnership's perspective and look at timing of first birth after the partnership has begun (table 3). Neither female vocational education nor male general education and

vocational education matter for the timing of first births of couples. But once the partners live together in a joint household, the educational level has no significant effect on the timing of first births. Taking a couples' life course perspective therefore leads to other results than educational effects on family formation against the background of individual life courses.

A possible explanation for the diminishing effects of education on family formation might be that cohabitation might be confounded with the educational level reached. i.e. partners with tertiary education may delay marriage and cohabitation - compared to lower educated couples.

**Table 3** The effect of general and vocational education on timing of first births, partnership duration (discrete-time logit model)

	(2)	(3)	(4)
	Transition to first birth		
Age of wife <sup>+</sup> at beginning of partnership	-0.03 <sup>***</sup>	-0.03 <sup>**</sup>	-0.03 <sup>**</sup>
<i>Abitur</i> wife	-0.55 <sup>***</sup>		-0.50 <sup>**</sup>
<i>Abitur</i> wife * time	0.06		0.06
Vocational education wife	0.11		0.15
Vocational education wife * time	-0.00		-0.01
<i>Abitur</i> male partner		-0.31	-0.11
<i>Abitur</i> male partner * time		0.01	-0.01
Vocational education male partner		-0.35	-0.35
Vocational education male partner * time		0.08	0.08
Partnership duration	-0.20 <sup>**</sup>	-0.26 <sup>***</sup>	-0.27 <sup>**</sup>
Partnership duration (log)	0.43 <sup>**</sup>	0.44 <sup>**</sup>	0.44 <sup>**</sup>
Intercept	-0.73 <sup>**</sup>	-0.53	-0.54
<i>N</i> (couple years)	4770	4770	4770
<i>N</i> (couples)	1264	1264	1264
<i>N</i> (events)	637	637	637
$\chi^2$	61.70	54.59	66.69

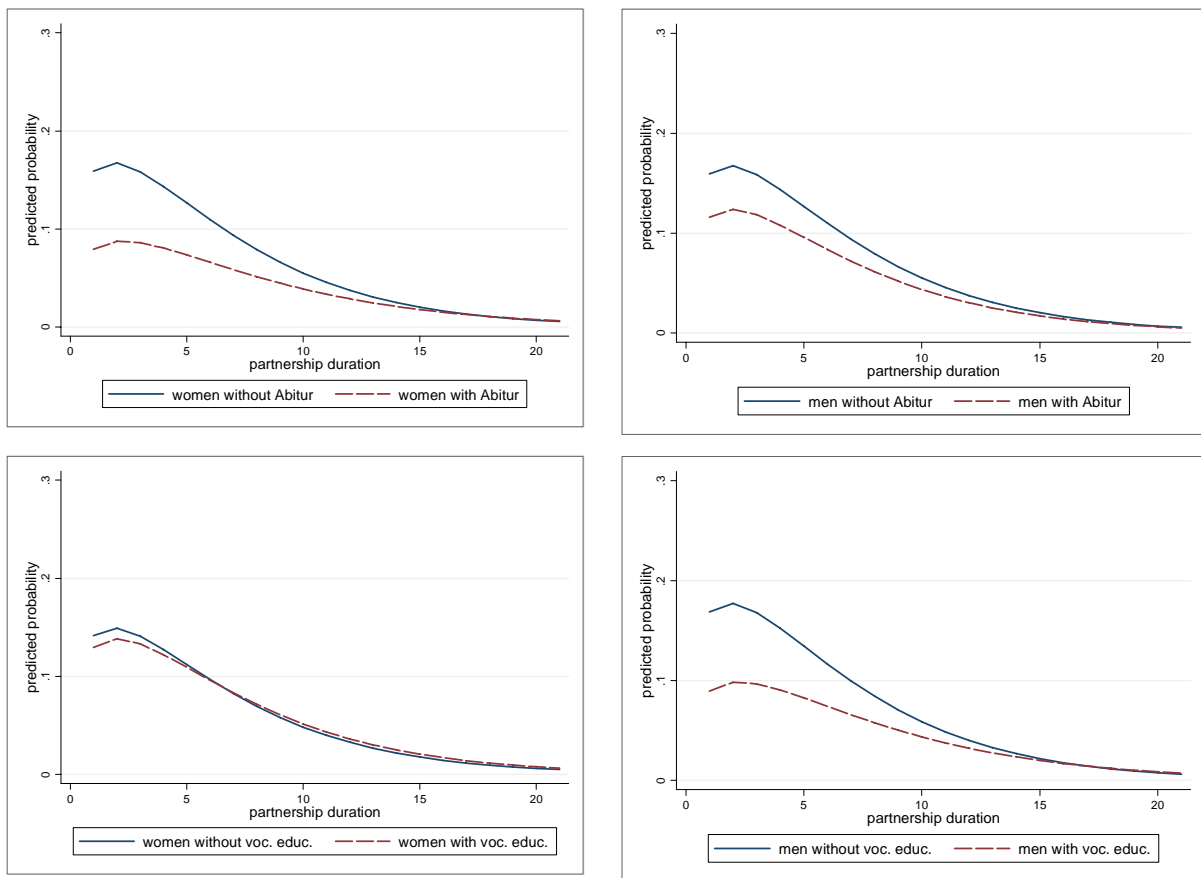
\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: GSOEP 1984-2007, own calculations

Notes: <sup>+</sup> For simplicity we use the term wife although we are also looking at cohabiting couples

In our regression models, we additionally control for the age of the wife at the beginning of the partnership. The negative logit coefficient indicates that the older the wife is when starting to live together with her spouse, the lower is the probability for a first child. Hence, there are no 'rush' effects with a new partner even if the remaining fertile phase is short. The coefficients of women's and men's general and vocational education is again illustrated by predicted probabilities in figure 6. Only the effect of female general education is significantly negative (upper left graph).

**Figure 6** The female and male partner’s general and vocational education and first birth (all other effects set to mean), predicted probabilities, analysis time: partnership duration



Source: GSOEP 1984-2007, own calculations

### Educational constellation

In table 4 and figure 7 we show the estimation results of educational constellations on family formation and again use the partnership duration as relevant process time. Theoretical considerations again suggest that the educational effects (here: of constellations) should be weaker as compared to the ones presented in the previous section. Indeed, the negative effect of vocational (high-level education) homogamy we have observed using the women’s age as ‘time at risk’ now dilutes to a non-significant level. Vocational constellations, altogether, make no contributions to the explanation of couples’ first births when the analysis time is the partnership duration.

On the other hand, couples with different general educational constellations have unequal probabilities to establish a family. Compared to the reference constellation (homogamous low educated couple, i.e. both partners do not have the *Abitur*), both constellations with highly educated women and therefore high opportunity costs of childbearing postpone parenthood

significantly. The analyses reveal negative effects for high educated partners and for hypogamy i.e. when the female spouse is higher educated than the male.

**Table 4** The effect of educational constellation on timing of first births, partnership duration (discrete-time logit model)

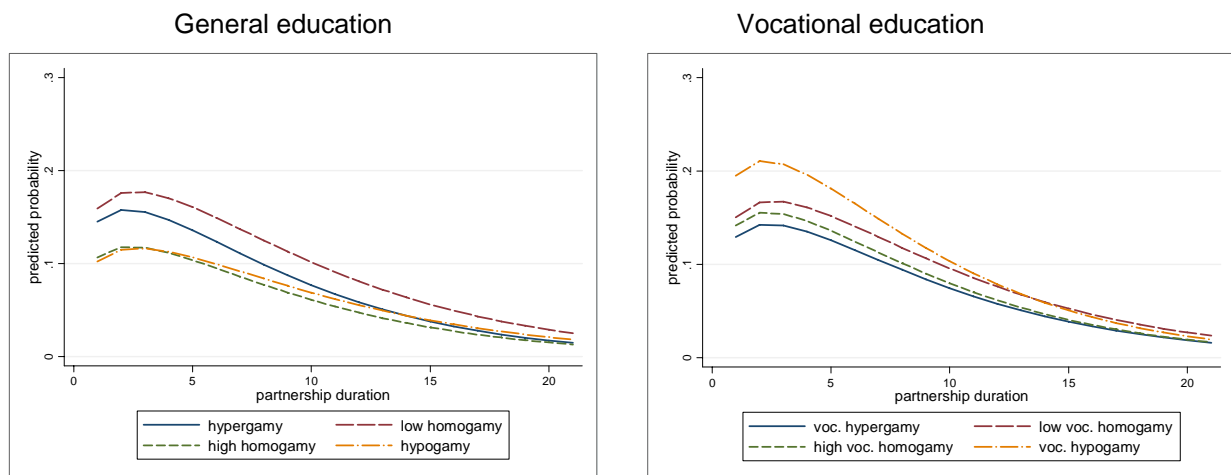
	(2)	(3)	(4)
	Transition to first birth		
Age of wife at beginning of partnership	-0.03**	-0.04***	-0.03**
<i>General Homogamy (low level)</i>	<i>reference</i>		<i>reference</i>
General hypergamy	-0.32		-0.31
General Hypergamy * time	0.02		0.01
General Homogamy (high level)	-0.54**		-0.54**
General Homogamy * time	0.05		0.04
General Hypogamy	-0.73**		-0.70**
General Hypogamy * time	0.10		0.10
<i>Vocational Homogamy (low level)</i>		<i>reference</i>	<i>reference</i>
Vocational Hypergamy		-0.47	-0.47
Vocational Hypergamy * time		0.07	0.06
Vocational Homogamy (high level)		-0.23	-0.24
Vocational Homogamy * time		0.05	0.05
Vocational Hypogamy		0.02	-0.01
Vocational Hypogamy * time		-0.02	-0.03
Partnership duration	-0.21***	-0.23*	-0.25*
Partnership duration (log)	0.44**	0.41*	0.44**
Intercept	-0.73**	-0.43	-0.44
<i>N (couple-years)</i>	4770	4770	4770
<i>N (couples)</i>	1264	1264	1264
<i>N (events)</i>	637	637	637
$\chi^2$	64.64	49.81	70.16

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Source: GSOEP 1984-2007, own calculations

The catch-up effect in later years is again positive but now insignificant. The plotted predicted probabilities of getting a first child (figure 7) do not or only slightly intersect. Each year living together with the partner further reduces the (already slight) difference between the constellations. After 10 to 15 years, the probabilities differ only marginally by the couples' constellations. But also the strong pent-up demand for children in homogamous high-level constellations we have observed in the previous section diminished. This is not surprising because the difference between the groups is already much smaller in early years when the partnership duration is taken as analysis time compared to women's age as 'time at risk'.

**Figure 7 Educational constellation and first birth (all other effects set to mean), predicted probabilities, analysis time: partnership duration**



Source: GSOEP 1984-2007, own calculations

## 5 Summary and conclusion

In this paper, we focused on the impact of characteristics of both partners on family formation. Using German panel data, we observed cohabiting couples and estimated timing of first birth to disentangle male and female educational effects as well as couples' educational characteristics, i.e. educational constellations. Against our theoretical background of family economics and bargaining approaches, we expected that the women's educational attainment would have a stronger effect on the timing of first birth than the males's. Additionally, educational asymmetries should encourage parenthood as these asymmetries lead to greater gains from specialisation (breadwinner/homemaker). Furthermore, we have argued that the impact of education and combinations of general and vocational degrees would vary depending on the analysis time selected.

Using women's age as analysis time, we concluded that women's education has stronger impact on (women's) timing of first birth than their partner's educational attainment. For women, both general education (whether she holds the German *Abitur*) and vocational education (whether she finished some form of vocational training or graduated) postpone childbirth. When only male education is regarded, both *Abitur* and vocational degree also delay the transition to parenthood, but these effects are almost completely insignificant when women's education is taken into account. On the other hand, female spouses' effects remain almost unaffected when including the men's characteristics into the model. We therefore conclude that women's educational attainment has by far more impact on the couples' fertility decision. Corjin et al (1996) speak of 'sphere of interest' to explain the stronger impact of female characteristics on fertility as women are more affected e.g. by pregnancy, (temporary) withdrawal from the labour market etc. (cf. Bauer and Jacob 2008). This also means that for

those men that have found a partner, neither own resources nor own preferences matter much for their female partner's timing of first births.

Scrutinizing on educational constellations, we could show that homogamous low educated couples get children early and that this group remains less often childless than any other educational constellation. In theoretical terms this is a remarkable result: Although the direct costs of children are hardest to bear for this group they are the most likely to have children. Here, the male partner's education makes the difference for the timing of first birth of low educated women. This is also supported by the other extreme: Homogamy with two high educated partners. They show the strongest postponement of childbearing, although direct costs should be no problem for them but at the same time opportunity costs are maximal and gains from specialisation are minimal for these partnerships. Hyper- and hypogamous couples have medium probabilities in early years (when the wife is below 30) but tend to catch up afterwards.

In the last section of this paper, we choose partnership duration as 'time at risk'. The data support our hypothesis that differences between educational groups are reduced when using the partnership's duration as analysis time. Once a couple cohabits, individual educational features as well as those of constellations do not significantly contribute to the explanation of fertility behaviour. From a sociological perspective this results shows that individual characteristics are mediated by social context: here the partnership. The well known effect of postponement of family formation of higher educated women is not found in the same striking way as the birth of the first child does not differ between educational groups any more once a partnership exists. As most previous research has used the age of the female spouse to elaborate timing of first birth we would point out that it is less the women's age but differences in timing of cohabitation between educational groups that are responsible for the well known and often debated differences in fertility behaviour. In further research the different overlapping processes of partnership formation, partnership stability and fertility have to be examined simultaneously in more detail as all these processes are related to education. Last but not least family policies to encourage (high educated) women to have the first child earlier would fail if mating and timing of partnership formation and cohabitation remain unchanged.

## 6 References

- Andersson, G., Duvander, A.-Z. & Hank, K. (2005) Erwerbsstatus und Familienentwicklung in Schweden aus paarbezogener Perspektive. In A. Tölke & K. Hank (Eds.), *Männer – Das „vernachlässigte“ Geschlecht in der Familienforschung*. (pp. 220-234), Wiesbaden: VS Verlag für Sozialwissenschaften.
- Bauer, G. & Jacob, M. (2008). Familiengründung im Partnerschaftskontext. Eine Analyse der Bedeutung der Bildungskonstellation von Paaren für eine Elternschaft anhand des Mikrozensus 1996-2004. *Mannheimer Zentrum für Europäische Sozialforschung, Arbeitspapier*, **109**.
- Becker, G. S. (1973). A Theory of Marriage: Part I. *Journal of Political Economy*, **81**, 813-846.
- Becker, G. S. (1974). A Theory of Marriage: Part II. *Journal of Political Economy*, **82**, 11-26.
- Becker, G. S. (1981). *A Treatise on the Family*., Cambridge: Cambridge University Press.
- Blossfeld, H.-P. & Huinink, J. (1991). Human capital investment or norms of role transition? How women's schooling and career affect the process of family formation. *American Journal of Sociology*, **97**, 143-168.
- Blossfeld, H.-P. & Jaenichen, U. (1992). Educational expansion and changes in women's entry into marriage and motherhood in the Federal Republic of Germany. *Journal of Marriage and the Family*, **54**, 302-315.
- Brüderl, J. & Diekmann, A. (1994). Bildung, Geburtskohorte und Heiratsalter: Eine vergleichende Untersuchung des Heiratsverhaltens in Westdeutschland, Ostdeutschland und den Vereinigten Staaten [Education, Birth Cohort, and Marriage]. *Zeitschrift für Soziologie*, **23**, 56-73.
- Brüderl, J. & Klein, T. (1991). Bildung und Familiengründung: Institutionen- versus Niveaueffekt. *Zeitschrift für Bevölkerungswissenschaft*, **17**, 323-335.
- Brüderl, J. & Klein, T. (1993) Bildung und Familiengründungsprozess deutscher Frauen: Humankapital und Institutioneneffekt. In A. Diekmann & S. Weick (Eds.), *Der Familienzyklus als sozialer Prozeß. Bevölkerungssoziologische Untersuchungen mit den Methoden der Ereignisanalyse*. Berlin: Duncker & Humblot.
- Corijn, M., Liefbroer, A. C. & Gierveld, J. d. J. (1996). It Takes Two to Tango, Doesn't It? The Influence of Couple Characteristics on the Timing of the Birth of the First Child. *Journal of Marriage and the Family*, **58**, 117-126.
- Duschek, K.-J. & Wirth, H. (2005). Kinderlosigkeit von Frauen im Spiegel des Mikrozensus. Eine Kohortenanalyse der Mikrozensus 1987 bis 2004. *Wirtschaft und Statistik*, **2005**, 800-820.
- Easterlin, R. A. (1975). An Economic Framework for Fertility Analysis. *Studies in Family Planning*, **6**, 54-63.
- Haisken-DeNew, John P. and Markus Hahn (2006) "PanelWhiz: A Flexible Modularized Stata Interface for Accessing Large Scale Panel Data Sets", mimeo (<http://www.PanelWhiz.eu>).
- Kreyenfeld, M. (2002). Time-squeeze, partner effect or self-selection? An investigation into the positive effect of women's education on second birth risks in West Germany. *Demographic Research*, **7**, 15-48.
- Kreyenfeld, M. & Konietzka, D. (2007) Die Analyse von Kinderlosigkeit in Deutschland: Dimensionen - Daten - Probleme. In D. Konietzka & M. Kreyenfeld (Eds.), *Ein Leben ohne Kinder: Kinderlosigkeit in Deutschland*. (pp. 11-41), Wiesbaden: VS Verlag für Sozialwissenschaften.

- Kreyenfeld, M. & Konietzka, D. (2008) Education and fertility in Germany. In I. Hamm, H. Seitz & M. Werdinger (Eds.), *Demographic change in Germany: the economic and fiscal consequences*. (pp. 165-187), Berlin: Springer.
- Kurz, K. (2005) Die Familiengründung von Männern im Partnerschaftskontext. In A. Tölke & K. Hank (Eds.), *Männer – Das „vernachlässigte“ Geschlecht in der Familienforschung*. (pp. 178-197), Wiesbaden: VS Verlag für Sozialwissenschaften.
- Leibenstein, H. (1974). An Interpretation of the Economic Theory of Fertility. Promising Path or Blind Alley? *Journal of Economic Literature*, **12**, 457-479.
- Liefbroer, A. C. & Corijn, M. (1999). Who, what and when? Specifying the impact of education attainment and labour force participation on family formation. *European Journal of Population*, **15**, 45-75.
- Pollak, R. A. & Watkins, S. C. (1993). Cultural and Economic Approaches to Fertility: Proper Marriage or Mésalliance? *Population and Development Review*, **19**, 467-496.
- Rindfuss, R. R., Morgan, P. S. & Swicegood, G. (1988). *First Birth in America. Changes in the Timing of Parenthood.*, Berkeley: University of California Press.
- Schaeper, H. (2007) Familiengründung von Hochschulabsolventinnen. Eine empirische Untersuchung verschiedener Examskohorten. In D. Konietzka & M. Kreyenfeld (Eds.), *Ein Leben ohne Kinder. Kinderlosigkeit in Deutschland*. (pp. 137-166), Wiesbaden: VS Verlag für Sozialwissenschaften.
- Schmitt, C. (2005) Kinderlosigkeit bei Männern – Geschlechtsspezifische Determinanten ausbleibender Elternschaft. In A. Tölke & K. Hank (Eds.), *Männer – Das „vernachlässigte“ Geschlecht in der Familienforschung*. (pp. 18-43), Wiesbaden: VS Verlag für Sozialwissenschaften.
- Schmitt, C. & Winkelmann, U. (2005). Wer bleibt kinderlos? Sozialstrukturelle Daten zur Kinderlosigkeit von Frauen und Männern. *DIW Berlin Discussion*, **473**.
- Thomson, E. & Hoem, J. M. (1998). Couple Childbearing Plans and Births in Sweden. *Demography*, **35**, 315-322.
- United Nations (2004). *World Population Monitoring 2003. Population, education and development.*, New York: United Nations.
- Wirth, H. (2007) Kinderlosigkeit von hochqualifizierten Frauen und Männern im Paarkontext – Eine Folge von Bildungshomogamie? In M. Kreyenfeld & D. Konietzka (Eds.), *Ein Leben ohne Kinder. Kinderlosigkeit in Deutschland*. (pp. 167-199), Wiesbaden: VS Verlag für Sozialwissenschaften.