Is Marriage a Protective State?
A Longitudinal Study of Families' Demand for Health Care

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Abstract

Married people show lower mortality, lower morbidity and better health than their unmarried counterparts. However, most of the existing evidence is of a rather suggestive nature due to lack of adequate data and limitations of methods. Moreover, the mechanism through which marriage might protect individual's health is not clear. The authors try to identify causal pathways for the link between marriage and health by looking at changes of health care usage after entry into first marriage. Using German panel data (GSOEP), the frequency of visits to a doctor and the probability of hospitalization are analyzed in a fixed-effects estimation framework. Results indicate that marriage may prevent serious illness by increasing regular contact to the health system. Once they are married, people go to the doctor more often. For women, health benefits arise mainly through child birth while men may profit more directly from support and control of a spouse.

Keywords: marriage, health, fixed effects poisson, fixed effects logit.

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Introduction

The family is more than just a collection of people, it is "an economic unit bound together by emotional ties" [Ross *et al.*, 1990]. As a social network, therefore, the family is associated with the health status of its members. In particular, some previous researches show a positive link between being married and enjoy good health [e.g. House *et al.*, 1988; Seeman, 1996]. However, the lack of adequate data and methods of analysis in past studies raise necessary some questions about this general conclusion. Marriage might not provide better health; rather, it might be marital disruption to provoke health worsening. Although this latter result has been found more often in relation to mental health, some suggestions can be applicable on physical health's studies as well. Moreover, early cross-sectional evidence could not isolate the true causal influence of marriage on health as it was not able to disentangle the confounding influences of selection into marriage of the healthier individuals. The need of proper analysis about the association between marriage and health and the still numerous open research questions on this topic motivate us in conducting the present study.

Although there is not a single way to define health, there is a general agreement on the WHO definition of health as a state of complete physical, social and mental well-being and not merely the absence of disease and infirmity [WHO, 1946]. Still, measuring health is rather complicated due to the multidimensionality of such a concept. The impact of the transition into marriage on health in this work is examined by two indicators of health service use: the number of visits to the doctor over the three months before the interview and the overnight stays in hospital in the year of interview.

We test a specific causal pathway for the link between first marriage and health: we expect marriage to affect health directly by providing support and enforcing health monitoring and indirectly by fostering investments in children's health and promoting healthy behaviours of the spouses. By having both a short-term and a long-term perspective in our analyses of the indirect effect, we cope with a lack in the available literature. The analysis is run separately for men and women as a common conclusion of the existent literature asserts that marital benefits are larger for men than for women [a pioneering study was done by Gove *et al.*, 1983].

This paper contributes and extends the existing research by employing nationally representative longitudinal data from the German Socioeconomic Panel (SOEP) 1984 to 2006. Fixed-effect regressions allow us to keep fixed the effects of all the constant variables that might have an influence on the dependent variables analysed.

Background

Studies of marital status differentials in health show a wide range of benefits for marriage. Other than improvements in individuals' economic well-being and well-being for the children [Lerman, 2002; Ross *et al.*, 1990; Waite and Gallagher, 2000; Wilson and Oswald, 2005], evidence suggests that married people have lower mortality, lower morbidity, better health and reported happiness than their unmarried counterparts[1] [Anson, 1989; Goldman, 1993; Hemstrom, 1996; Hu and Goldman, 1990; Lillard and Waite, 1995; Murphy *et al.*, 1997; Rogers, 1995; Zick and Smith, 1991; see also Umberson and Williams, 1999 and Waite and Gallagher, 2000 for a review].

Already Farr in the second half of the 19th century wrote that "marriage is a healthy estate" [Farr, 1859]. After him, Durkheim [1951] found that marriage (as well as parenthood) reduces the risk of suicide and argued that this is due to the sense of obligation and constrain that married individuals feel. Following these initial studies, a first branch of interest tried to understand the association between marital status and different measures of health. A second strand of literature has afterwards developed by taking into account the effects of multiple social roles on health conditions, especially for women (i.e. marriage, parenthood and employment). There have been found interactive influences between family, work and health in terms of economic, demographic, cultural and political factors [Brunner and Marmot, 1999; Verbrugge, 1983].

However, the crucial issue of how well-being and marital status are interconnected is still not fully clear, due also to the limitations of some previous researches in terms of data and methods. Initially, the positive effects found of marriage on health were justified on the base of the hypothesis that living with someone provides a network and therefore a source of support. Although this might be part of the explanation, formal marriage seems to matter: non-married cohabiters[2] do not report the same positive effect as their married counterparts [Ross et al, 1990].

The mechanisms through which marital status is likely to impact on individual's health can be identified in three main theories [Murphy *et al.*, 1997]:

- the **marriage selection** theory suggests that, especially in the past, people who did not marry were those without resources and/or with some health problems [Brown and Giesy, 1986]. People

[1] In turn, never married people score better in these terms than the divorced, separated and widowed [see for an extended literature review Wilson and Oswald, 2005].

[2] Prevalence and patterns of cohabitation have been well documented, still very little is known about the relationship between non-marital cohabitation and health. Most of the literature about it refers to mental health, suggesting that cohabitors' average depression scores fall between those of married and singles [MacDonald *et al.*, 1992] or not finding any significant difference between married and cohabitors [Ross, 1995]. Recently, some more attention has been given to the comparison of cohabitation versus marriage [Kurdek, 1991; Ross, 1995; Brown, 2000]. Having someone who can help in times of need might increase the individual well-being as people feel safer and this can be true for both cohabitors and married. However, cohabitors have shown higher levels of depression than their unmarried counterparts, net of socio-demographic factors, likely to be explained by their higher relationship instability relative to those of married people.

perceived as more desirable partners are more likely to get married and to stay married [Wood *et al.*, 2007]. Hence, better health could be a cause of marriage, rather than a consequence of it;

- the **social causation** argument implies a number of dimensions. The so called **marital resource model** suggests a protective effect of marriage, which itself leads to improved physical and mental health [Ross *et al.*, 1990; Umberson, 1992]. Marriage could improve health outcomes in several ways, providing better access to material resources and offering social support: marriage provides higher real income per partner, allows economies of scale and improves the economic well-being of those who marry [Lerman, 2002; Ross, 1995; Smock *et al.*, 1999]. The previous mechanism, in turn, has an effect on health as economic well-being increases access to health care. Poorer standards of living are also correlated with mental health problems, depression and stress [Berkman, 1988; Kessler and Essex, 1982; Ross *et al.*, 1990]. Marriage can then provide emotional support: feelings of attachment and belonging are likely to affect mental health as they provide satisfaction in terms of social connections' needs and in turn affect physical health as well [House *et al.*, 1988]. Emotional support may act as a buffer against harmful effects of stress [Berkman, 1988]. Some also speculate that society stigmatizes single people; therefore marriage satisfies some cultural norms and provides benefits in terms of social acceptance [De Paulo and Morris, 2005]. The guardian role theory suggests that a spouse might also monitor and encourage healthy behaviours as well as discouraging unhealthy ones [Power *et al.*, 1999; Ross *et al.*, 1990; Umberson, 1987]. Married people, therefore, are likely to act differently from single people, by engaging less in risky behaviours: research provides evidence of, for example, less alcoholism [Horwitz and White, 1991; Joung *et al.*, 1995; Layne and Whitehead, 1985] among married rather than non-married people. Especially for men, the partner operates a protective effect by increasing good health habits and promoting better access to services. An unconscious sense of duty of taking care of each other for early symptoms of illness might explain this mechanism;
- finally, a third theory argues a negative relation between marriage breakdown and health: the **crisis or stress model** suggests that marital disruption creates stress during the transition to widowhood or divorce because of the lack of support [Bowling, 1987; Booth and Amato, 1991] other than the event itself. Recent studies explain marital differences in health results from the substantial but transient strains of marital dissolution [Williams and Umberson, 2004]. This means that the strains of marital dissolution might undermine health and well-being more than the resources of marriage protect it [see Umberson and Williams, 1999 for a review].

A number of early studies on the topic have tried to estimate the relative importance of marriage selection and marriage protection effects on health status. Still, often the results cannot be reliable [Goldman, 1993]. Consequent analyses of prospective adequate data have provided evidence for the marriage protection role, with a change from single to married and from married to unmarried

found to have a significant impact on the health status and the health behaviours of the individual [Umberson, 1992; Mineau *et al.*, 2002; Iwashyna & Christakis, 2003]. A recent work on the German Socioeconomic Panel Study [Brockmann and Klein, 2004] points out that people today are more likely than in the past to move in and out of different unions over the life course, implying the need of taking into account family biographies.

The literature is vast, mostly coming from the USA and Britain and it is often based on cross-sectional analyses. A review of the most recent and reliable studies can be found in Wilson and Oswald [2005] and in Wood *et al.* [2007]. Irrespective of whether we look at the association between marital status and health [Gove, 1973; Hu & Goldman, 1990], marital status and morbidity [Verbrugge, 1979; 1989] or marital status and health service use [Morgan, 1980], the general thrust of research findings points out that the married are healthier than the others [Gijsbers van Wijk *et al.*, 1995; Verbrugge, 1979; Wyke and Ford, 1992; see also recent studies such as Pienta *et al.*, 2000; Schoenborn, 2004]. The central challenge is disentangling the influences of selection and protection and to do this we focus on the analysis of the first marriage.

The gender issue and the effect of parenthood

Traditionally, attention has been posed on gender differences in the relation between marriage and health. Early researches as well as later findings supporting the marital resource model were interpreted as meaning that marriage provides more benefits for men than for women.

Although the research by Mookherjee [1997] on perceptions of well-being and that of Kohler Riessman and Gerstel [1985] on morbidity rates do not provide support for this hypothesis and no major gender differences have been found also in the effect of marriage on hospital choice or quality of hospital care, most of the literature points to a gender-specific effect for several measures of health outcomes. The effect of marriage on length of stay in hospital, for example, has been found stronger for men than for women. The study by Iwashyna and Christakis [2003] shows that for men the effect of marriage on length of hospital stay is similar in size to the effect of being seven years younger; while married women have the same average length of hospital stay as widowed women who are three years younger. Moreover, in terms of number of doctor visits, "women tend to use more medical care than do comparable men" because they are more "socialised to accept medical intervention" [Johnson-Lans and Bellemore, 1997, p.194] and also because, as possible mothers, they are more used to interact with doctors for either themselves or their children.

Theoretical explanations for the apparent contradictions (higher morbidity rates and health service use with lower mortality rates among women than men) focus on biological differences, socio-economic roles and health-reporting behaviour [for a discussion of these theories, see Gijsbers

van Wijk *et al.*, 1995; Macintyre *et al.*, 1996; Verbrugge, 1985]. In terms of emotional support, women seem to be more likely to develop social networks also outside marriage and take from them already valuable support [Shumaker and Hill, 1991]. While, it seems that men need "guardian wives" to behave according to a healthy lifestyle.

Given the still evident gender-specific division of the roles in the family, it is likely that parenthood, other than marriage, had a different impact on women and men's health. Although the literature about marital status and well-being, health, morbidity and mortality is vast, there is not enough focus on the association between parenthood and health outcomes. Marriage and parenthood are clearly closely linked. Still, most of the studies do not disentangle the two effects, resulting in confounding analyses. In one of the most influential works about marital status and health, Gove [1973] found that marital status disparities were mostly concentrated in the age group 25 to 44. In this range of time families tend to enlarge (having young children). He followed Durkheim's argument [1951], arguing that having children might provide a form of protection through their effect on the concerns and behaviour of parents.

Most of the studies on this topic focus on the mother rather than the father and on health practices during pregnancies (meant as inappropriate behaviours such as drinking alcohol or smoking cigarettes) [see Gochman, 1997; and Kendig *et al.*, 2007 for a review]. Some recent analyses on mortality rates in later life show that nulliparous have a higher risk of adverse health outcomes in old age rather than parous women [Grundy and Tomassini, 2005]; while evidence for men is quite mixed [see Grundy and Tomassini, 2008]. Only a limited number of studies based on longitudinal analysis did not find any association between individual well-being and children [for example Clark and Oswald, 2002].

Economic and rational-choice theories of the family tend to assume that individuals derive utility from both the union formation and the fertility behaviour [see for example Becker, 1981]. Studies considering this utility as the individual well-being, in terms of happiness [Frey and Stutzer, 2002; Kohler *et al.*, 2005; Layard, 2005] show a U-shaped trend explained by levels of worries, anxiety and depression [McLanahan and Adams, 1987; Nomaguchi and Milkie, 2003]. Satisfaction declines from the birth of the child until about the teenage years, to then rise again to the initial levels after the child leaves home. In contrast, Easterlin [2005] suggests that the setpoint of happiness is determined by personality and genetic traits and it is modified only temporarily by life events. The three main strands of literature are here considered before formulating our hypotheses: theorising about reproductive history and mortality rates; the multiple role theory; and the impact of social networks on health.

Looking at the relationship between parity and mortality, a U-shaped pattern has been found: women with children tend to have lower mortality rates than their childless counterparts; however,

high-parity women show mortality rates similar to the childless ones. The high mortality rates in childless women can be explained with a selection process. As for marriage, the healthier women are more likely to give birth to children. Moreover, the hormonal protection against sex-specific cancers that is provided by pregnancy is supposed to explain the excess mortality of childless women. The high mortality rates in high-parity women are likely to be due to adverse physiological effects of multiple pregnancies. Taking an evolutionary framework as starting point, the trade-off found between longevity and high-parity reproduction has been further explained arguing that reproduction consumes body resources that could be used for maintaining and repairing cells in later life (for further details on the literature about these three theories, refer to Kendig *et al.*, 2007).

Multiple roles (employment, marriage and motherhood) might, on one side, create conflict as people try to juggle with several responsibilities. This means that being married, having children and maybe also participating into the labour market would increase the stress level and lead to poor health of the individual. However, on the other side, it has been argued that every role provides people with an amount of social support, resources, self-esteem, social ties and obligations that might enhance health in a cumulative way [Benzeval, 1998].

Last but not least, the presence of children might provide higher rates of social support and recent findings of this association encourage a growing body of research. The pathways by which social relationships might affect health are multiple [Berkman *et al.*, 2000]. Children serve several of these functions in their parents' lives: social support, social companionship, social control, providing access to resources and playing the "guardian role" that spouses do for each other.

Research questions and hypotheses

The research in this field has often examined the effects of marital status on health at one point in time, without really considering any transition process. Limitations remain, therefore, due to several reasons. First, in the majority of studies, health has been defined by a **single indicator**, although it has been recognized that health measures are subject to a range of methodological errors. Second, a **data limitation** has to be underlined here: with few exceptions, previous studies have adopted a time-specific approach, often due to the availability only of cross-sectional data. Still, even when a variety of comparable (albeit cross-sectional) data sources were available, the long-term relationship between marital status and health has not been analysed properly. Often there has been a failure to distinguish between marital status at one point in time and marital transitions [Williams and Umberson, 2004]. Third, **gender** has not been examined enough in detail.

Mindful of previous studies' limitations, in this paper we will address the question *what is the impact of first marriage on the demand for health services?*. This means that we test whether the marital resource theory is actually proved by using appropriated data (longitudinal) and methods (fixed-effect). If previous studies were reliable, we should expect that, once disentangled the selection effect, married people experience some protection effect. Cohabiters are likely to experience physical health benefits from their union, however we do not expect these to exceed married people's benefits.

Given the results from previous studies showing a role of marriage in shaping the health care use [see for example Johnson-Lans and Bellemore, 1997; or for a review Wood *et al.*, 2007], we expect to improve the research in this field by working on panel data, allowing us to control for marital selection effect. We use two indicators of health outcomes: number of doctor visits over the three months before the interview and number of overnight stays in hospital during the year of interview. Based on the theoretical and analytical framework provided, our hypotheses are modelled as in Figure 1 and formulated as follows:

- Marriage might have a direct effect on people's health by providing support and control. This is measured in our data by an increase of doctor visits, used here as an indicator of health monitoring. The Grossman model [1972] suggests that a demand for more health requires, ceteris paribus, higher "investments" in health. Assuming that medical care is an input for the production function of health [Johnson-Lans and Bellemore, 1997], we argue that a higher frequency of doctor visits means monitoring the health conditions and preventing some serious diseases. Therefore, we expect to find married people having a higher frequency of doctor visits than their unmarried counterparts. Spouses can help the partner to find the appropriate and high-quality care and can also provide basic social support services (such as transportation to doctors' appointments, whose lack might be a reason to skip controls for the non-married). This result is likely to be stronger for men, since women have usually more often contact with physicians than men. Moreover, wives might take care of their husbands' health and push them towards more often controls, acting according to their –so far defined- "guardian role"; they are also more likely to offer them informal postoperative care after medical procedures. The best evidence in the association between marriage and preventive health services comes from a recent study by Lee *et al.* [2005], which finds that transition out of marriage increases women's odds of skipping regular breast cancer screening. The limited number of available reliable studies in this area suggests this issue to be a crucial research topic;
- The same direct causal pathway should be evident by looking at the number of nights spent in hospital. We argue that fewer nights per year spent in hospital reflect higher investment in health, as overnight stays in hospital are likely to be associated to more severe illnesses. Given the previous hypothesis (married people go more often to the doctor and prevent serious diseases), we expect married people to report a lower number of overnight stays in hospital. This assumption is reinforced

by the fact that married people might have shorter average hospital stays because the spouse can provide informal care at home. Such effect of marriage on reducing the number of overnight stays in hospital is expected to be valid especially for men. Indeed, despite the convergence of gender roles, women keep assuming more frequently parental and household responsibilities than men do [Lennon and Rosenfield, 1994; Williams and Umberson, 2004]. This makes them more likely than husbands to provide the types of informal home care necessary to shorten the length of hospital stays of their spouse [Wood *et al.*, 2007]. A recent study by Iwashyna and Christakis [2003] finds that married people have shorter average hospital stays compared to widows and that gender differences in the effect of marriage on length of hospital stay are significant (as discussed before). The interpretation of the results from this study, together with those from Wolinsky and Johnson [1992], suggests that spouses affect hospital care more by influencing the type and length of care received when in need rather than by reducing the occasional need for such care. However, except for the cited studies, little evidence exists that marriage affects the frequency of hospital stay [i.e. Prigerson *et al.*, 2000; Wolinsky and Johnson, 1992];

- the effect of marriage on health, according to our model, might follow also an indirect path through promoting investments in children's health. This, in turn, might provide healthy behaviours of the married couples as a side-effect. The literature suggests that married people might view keeping in good health as part of their overall commitment to marriage [Wood *et al.*, 2007]. We argue that parents do feel a sense of commitment toward their children as well as they feel it towards each other. This is likely to be translated also in the need of taking care of themselves and of their own health to be fit and healthy for their children. Moreover, when children are older, they provide to their parents an additional source of social support. This, together with the higher exposure of parents to contact with doctors because of child-care, lead to the expectation that parents are more likely to have doctor visits and less likely to stay overnight in the hospital than childless people[3]. Because of the gender-specific roles in the family, we expect this path to benefit health of females in the first place; while the two effects of the direct path explained above are expected to be more important in the explanation of males' health service use.

Estimation strategy

It has been widely acknowledged that longitudinal analyses are a necessary condition for causal inference with regards to the health benefit of marriage. With longitudinal data, many have hoped, we are able to estimate the effect of marriage on health outcomes net of the distorting impact

[3] Of course for women we expect a higher number of nights in hospital when they have a child, given that nowadays the majority of women choose to give birth in hospital.

of unobserved heterogeneity. In fact, there has recently been an upsurge of longitudinal studies claiming that event history or panel data provide reliable estimates of the marriage protection effect. However, it has also been acknowledged that the self-selection problem is still not easily solved. Consequently, the predominant approach to estimation of the causal marriage effects is to control for initial health conditions as far as possible.

A major problem of this approach is that self-reported measures of initial health conditions do not seem to be accurate enough to net out the selection effect [Baker et al., 2004]. Furthermore, our knowledge about the precise mechanism driving selection is limited, and so is the universe of health variables available in survey data. Essentially, inference is still based on rather strong and untestable theoretical assumptions about the selection process. This is also true for studies relying on instrumental variables estimators, hence, on arguments for independence of the outcome and instruments [Brockmann and Klein, 2004, Lillard and Panis, 1996]. And it is true even for studies using even more informative panel data together with random effects models because these models assume independence of regressors and unobservable effects [e.g. Geil et al., 1997]. Clearly, longitudinal data alone do not guarantee validity of causal interpretations.

What is needed in addition is an appropriate statistical model that yields consistent estimates of the parameters in the presence of unobservables. In this sense, an appropriate model does not rely on theoretical assumptions about the relationship of observed and unobserved variables. In practice, fixed-effects models for panel data approach this ideal very closely. The crucial condition for consistency is strict exogeneity of the regressors,

$$\mathrm{E}\left[y_{it} \mid \alpha_i, \mathbf{x}_{i1}, ..., \mathbf{x}_{iT} \right] = g\left(\alpha_i, \mathbf{x}_{it}, \beta\right), i = 1, ..., N; t = 1, ..., T.$$

In our case, the mean of the outcome measuring health care demand of person i at time t, $y_{it,}$ is specified by some regression function $g(.)$ such that y_{it} depends on a random scalar, α_i, which contains time-constant individual health conditions, and on a vector of time-varying variables including marital status, $\mathbf{x}_{it}$. The effect of regressors on the outcome is denoted by the vector of parameters $\boldsymbol{\beta}$. Strict exogeneity implies that regressors affect the outcome only contemporaneously: health care utilisation at time t depends on marital status at time t, but not on marital status at time s. However, no assumption at all is needed concerning the impact of unobservables. In a fixed-effects framework, selection effects based on time-constant health increments are ruled out. In the linear case, unobserved individual heterogeneity is removed by inclusion of person dummies or by within-transformation of the data matrix. In general, neither approach can be applied in non-linear settings. (They do work, however, for some multiplicative-effects models such as the poisson model.)

Nevertheless, with binary and count outcomes the parameters can be estimated consistently in a fixed-effects framework.

In our analyses, we make use of these methods. We analyse the probability of consulting a doctor and the frequency of doctor visits as well as the probability for hospitalization and the frequency of hospital stays. We examine demand for health care over the family cycle using logit and poisson individual-specific unobserved effects models.

Let d_{it} be a binary indicator which equals one if person i has visited a doctor at least once in period t and is zero otherwise. The conditional probability of consulting a doctor is assumed to follow the logistic distribution, $\Lambda(.)$. Hence, the model is

$$\Pr\left[d_{it} = 1 \mid \mathbf{x}_{it}, \alpha_i \right] = \Lambda\left(\alpha_i + \mathbf{x}'_{it} \boldsymbol{\beta} \right), i = 1,...,N; t = 1,...,T.$$

The parameters of the model are estimated by conditional maximum likelihood (CML). The joint density of doctor visits of any person, $\mathbf{d}_i$=($d_{i1},..., d_{iT}$), conditional on $\mathbf{X}_i$, α_i and $\boldsymbol{\beta}$, depends on α_i. However, the unobserved effect can be „conditioned out" by conditioning further on a sufficient statistic (Chamberlain 1980). For the panel logit model, this statistic is the total number of positive outcomes for person i, $\Sigma_t d_{it} = c_i$. Conditioning on the sufficient statistic gives

$$f\left(\mathbf{d}_i \mid \sum_t d_{it} = c_i \right) = \frac{\Pr\left(\mathbf{d}_i, \sum_t d_{it} = c_i \right)}{\Pr\left(\sum_t d_{it} = c_i \right)} = \frac{\Pr\left(\mathbf{d}_i \right)}{\sum_{\mathbf{w} \in \mathbf{B}_c} \Pr\left(\mathbf{w} \right) d_{it} = c_i} = \frac{\exp\left(\left(\sum_t d_{it} \mathbf{x}'_{it} \right) \boldsymbol{\beta} \right)}{\sum_{\mathbf{w} \in \mathbf{B}_c} \exp\left(\left(\sum_t d_{it} \mathbf{x}'_{it} \right) \boldsymbol{\beta} \right)},$$

where $\mathbf{B}_c = \{\mathbf{w} \mid \Sigma_t d_{it} = c_i\}$ is the set of possible sequences of 0s and 1s for which the total number of positive outcomes equals c_i (Cameron and Trivedi 2002: 798f.). Since the density no longer depends on α_i, the $\boldsymbol{\beta}$ vector can be consistently estimated by maximization of the conditional log-likelihood function $\ln L_{cond}(\beta) = \Sigma_N \ln f(\mathbf{d}_i | \mathbf{X}_i, \boldsymbol{\beta}, c_i)$.

Interpretation of the estimates in terms of marginal effects on the response probability is not possible in the way it is done in the cross-sectional or pooled logit model because the probability depends not only on $\mathbf{x}_i$, but also on α_i. However, the coefficients can be transformed to odds ratios and interpreted as discrete effects on the odds. For significance tests, we use standard errors that are robust to heteroskedasticity and serial correlation.

To analyse the count variables of the number of doctor visits and the number of hospital stays, we use fixed-effects poisson models. The conventional estimation approach starts from a poisson distribution of the outcome conditional on $\mathbf{x}_i$ and α_i, together with serial independence of the

outcome and strict exogeneity of the regressors. However, Wooldridge [1999] has shown that the first two assumptions of the fully distributional model are not necessary to obtain consistent estimates. In particular, the equidispersion condition (equality of mean and variance of the outcomes of person i) and the assumption of serial independence can be violated as long as the conditional mean is specified correctly.

Following this reasoning, our poisson model assumes the exponential function exp(.) and multiplicative unobserved effects. Let nd_{it} denote the count of doctor visits (or of hospital stays) of individual i in period t. Then, our model of the conditional mean is

$$\mathrm{E}\left[nd_{it} \mid \mathbf{x}_i, \alpha_i\right] = \alpha_i \exp\left(\mathbf{x}_{it}'\boldsymbol{\beta}\right), \quad d = 0,1,2,...$$

Parameters are estimated by quasi-CML. Unobserved health conditions are eliminated by conditioning on the total number of doctor visits of person i, $\Sigma_t nd_{it} = s_i$. The joint density of $\boldsymbol{nd}_i$ given s_i, $\mathbf{x}_i$ and α_i follows the multinomial distribution and does not depend on α_i [Hausman et al., 1984]. Hence, the vector of interest can be estimated by maximization of the conditional log-likelihood function $\ln L_{cond}(\beta) = \Sigma_N \ln f(\mathbf{nd}_i|\mathbf{X}_i, \boldsymbol{\beta}, s_i)$. For interpretation, we report exponentiated coefficients, that is, the (multiplicative) discrete effects on the expected count (also known as incidence rate ratios). As already mentioned, overdispersion (which is clearly present in our data) and serial dependence do not invalidate estimation of the parameters in large samples. Nevertheless, standard errors need to be adjusted. We compute fully robust standard errors using the Stata program xtpqml.ado [Simcoe, 2007].

Using the methods just described allows testing hypotheses concerning the impact of family formation on demand for health care without imposing further restrictive assumptions on the unobserved effects. Our focus is on interpretation of fixed effects regressions. However, we also provide additional findings from pooled logit and poisson models in order to assess the direction and magnitude of the bias resulting from selection effects.

Data

Our analyses draw on German Socioeconomic Panel (GSOEP) data. The GSOEP traces the life-course of women and men for up to twenty-three years. From 1984 to 2006, respondents were asked to report on measures of health care utilization in every, but two years. (The exceptions are 1990 and 1993.) Furthermore, detailed information on marital status, cohabitation and fertility has

been collected prospectively from the same individuals. The data are thus ideally suited for the estimation framework we proposed in the last section.

We constructed four dependent variables. In each interview, respondents were asked whether they had visited a doctor in the last three months. From this information, we constructed a dummy variable (1=doctor visit, 0=else). Furthermore, the study asked how often respondents had gone to a doctor during the same period. Using this information, we were able to derive a count variable for doctor visits. Regarding hospitalization, survey participants reported whether they were ever admitted to a hospital for at least one night during the last year, and how often they had to stay for at least one night. Building on their answers, we generated an indicator variable (1=overnight hospital stay, 0=else). Our final dependent variable is the frequency of hospital admission. Since information on hospitalization always refers to last year we used the lead of the hospital indicator and count variables in order to maintain the correct temporal order of cause and effect. As a consequence, information given in the first interview of any respondent could not be used, and the observation pertaining to the last interview always had to be excluded. Therefore, analyses of hospitalization are for the years 1984 to 1988, 1990, 1991 and 1993 to 2005, using data on hospital stays collected in the next year.

The independent variables of main interest are marital status and fertility. We measure current marital status by distinguishing seven exclusive states during the process of family formation and dissolution: never-married single (the reference category), cohabitation before first marriage, first marriage, separation or divorce, widowhood, cohabitation after first marriage, and remarriage. Additional analyses use the duration of first marriage, computed as the annualized and rounded difference between the interview month and the month of first marriage.

The impact of fertility is captured by three variables. An indicator for current pregnancy (for males: expecting a child) and a dummy for child birth are constructed to factor out the transitory effects of child birth on demand for health care. To get clean estimates of the effects, we had to compute the variables separately for analyses of (a) doctor visits and (b) hospitalization because the dependent variables refer to different periods. Accordingly, we assigned value 1 to the pregnancy dummy if (a) a nine-month episode before child birth overlapped with the three months preceding the current interview month (for which respondents reported doctor visits), or (b) with any month of the current survey year (for which respondents gave information on hospitalization). If there was no overlap, the pregnancy indicator has been set to 0. The child birth dummy equals 1 if a child was born within three months from the interview date or during the current survey year, respectively (and equals 0 else). In contrast, the number of (ever born biological) children of respondents is used to capture the long-term effect of parenthood on demand for health care. The variable refers to the time of the interview, and it is non-decreasing. For men, GSOEP data include full information on children born before entry into the panel only if there has been an interview in 2000 or later. For other male

respondents, we had to recover the values of the three variables from prospective information on the birth dates of children.

All our models were estimated including further control variables. Most importantly, we specify age effects to have a baseline life course against which we can single out the effect of family formation. Year effects are added to net out the potentially distorting impact of policy change and other macro conditions. Since our main interest is in the ways in which family structure as such determines health behavior, we try to abstract from the influence of concurrent changes in the economic situation of a family. Therefore, we control for changes in family income. For this purpose, we used last year's income because current health status strongly determines working days, and therefore yearly labor earnings. From this measure, we constructed individual equivalence income, dividing total household income by the square root of the number of household members (and taking logs). In addition, we take into account changes in labor force status, distinguishing between states working, not working, parental leave, unemployment, education and military service. Finally, we control for educational careers using information on highest school degree and further vocational qualification.

From the GSOEP, we draw samples of women and men. We exclude person-years with missings on any of the independent variables used in the analysis. Furthermore, we drop persons with inconsistent information on marital status as well as persons which ever reported their husband or wife lives abroad. From the remaining observations, we selected separate samples for our analysis of doctor visits and hospital admissions where we additionally required valid information on the respective dependent measures. In addition, we required two years per person as we focus on intra-individual change. The size of the samples is then further reduced because we selected only persons never-married (single or cohabiting) when giving all relevant information for the first time. This way we are able to compare a “treatment group” of persons which get married later on to a “control group” of persons which stay unmarried in order to obtain clean estimates of the effect of entry into first marriage. Although the GSOEP contains slightly more women than men, exclusion of the (initially) married, divorced and widowed reduces the female sample much more than the male sample.

The resulting sample for doctor visits consists of almost 5,900 women and more than 6,600 men. For hospitalization, numbers are 5,000 (women) and 5,700 (men). (Precise numbers for all samples are given in the appendix (Table A1).) In the analyses we refer to these samples as “full samples”. We used them for descriptive results and for estimation of pooled logit and poisson models.

Our main samples for fixed effects estimation, however, have been further restricted. In particular, estimation of the models we proposed results in further sample restrictions. The fixed effects poisson model relies on at least one nonzero outcome per person. This affects mainly the estimation sample for the number of hospital stays since many people (in particular those with few person-years) have never been admitted. The fixed effects logit model is even more demanding since persons without variation on the outcome (persons with either zeros or ones in all years) do not contribute to the likelihood. As a result, the sample size for analysis of the probability of doctor visits and of hospitalization is considerably reduced.

Note that the restrictions applied to the estimation samples primarily reduced the size of the control group because there were fewer observation per person than in the married group, hence less within-variation of the outcomes. Moreover, women's higher demand for medical care during pregnancy and at the time of birth implies stronger variation than for men. Hence, a large fraction of men had to be excluded, and this is most pronounced for the hospitalization samples.

Results

Descriptive findings

Figure 2 gives an overview of health care utilization in our subsamples of persons observed to marry for the first time. The curves show how each of our four dependent variables changes over the life course of males and females in the years before and after marriage.

The first striking result concerns the large gender differences. The proportion of women which have seen a doctor within three months is larger by ten to 15 percent. This difference is fairly stable around the time of marriage. In contrast, the gender difference in the number of doctor visits is greatest during the first ten years of marriage. Five years after marriage, wives have on average one visit more than husbands. Most likely, this pattern is due to married women getting pregnant and giving birth. For men, we also see an increase in the probability of consultation (from 45 to 55 percent) over time, and there is a jump (of three percent) in the first two years after marriage. However, we cannot tell from this figure if this is due to marriage. In order to single out the effect of marriage, we need to compare the life course to our control group of the never-married.

We also see marked gender differences with regards to hospitalization. Within the estimation samples (solid lines), the proportion of wives admitted to hospital within a year as well as the number of admissions increase strongly at entry into marriage, have a peak at two to three years after

marriage, and then decreases afterwards. Again, the temporary increase certainly is due to child birth. However, in the long run, hospitalization drops below the level from before marriage. This also seems to apply to husbands where we see decreasing probability of admission and number of hospital stays. In later years of first marriage, there seems to be an increase again. This may be a divorce effect since person-years after separation are included.

Note also that, for men and women, hospitalization is much lower in the full samples (dotted lines) due to the fact that the estimation samples are in a sense "high risk samples" including only persons which have been to hospital at least once. Samples for doctor visits are much less selective. Therefore, we see hardly any difference between full samples and estimation samples.

In sum, descriptive results show an increase in the probability of doctor visits after first marriage, but a decrease in the probability to stay in hospital overnight. While the first result may indicate increasing health investment, it may also result from depreciating health capital due to ageing. Nevertheless, the second finding can hardly be interpreted as an effect of ageing. It might indicate that the married change their health behaviour. In the following, we conduct more reliable, multivariate analyses to see whether these results are corroborated.

[Figure 2]

Multivariate results

Table 1 presents results from multivariate fixed effects regressions explaining the probability as well as the frequency of doctor visits over the family cycle. The most striking result is the stable result of a positive effect of entry into first marriage. The logit models show that the transition to marriage is associated with an increase of the probability of consulting a practitioner. For women, the odds of going versus not going to a doctor increase by 18 percent. For men, the odds increase even by 23 percent as they become husbands. After marriage, men also seem to change their behavior (more than women do) with regards to the number of doctor visits. According to the poisson model, men increase the frequency of consultations by 18 percent. For women, the effect is smaller (7 percent) and not significant the 5 percent level. Thus, marriage promotes regular contact to the health system, but more for males than for females.

There is also some evidence it is really marriage that makes the difference, not living with a partner. Compared to being never-married and single, entry into cohabitation (prior to first marriage) raises the probability and frequency of doctor visits only slightly (and not significantly). For men, but

not for women, the positive effects associated with first marriage are significantly greater than the effects of a „trial marriage“. The corresonding test statistics are chi2=6.35 (p=0.012) for equality of the cohabitation and marriage effect in the logit model, and chi2=4.15 (p=0.042) in the poisson model. This also points to important changes of health behavior when becoming a husband.

The results for further marital transitions do not fit into this picture. Contrary to expectations, divorce does not decrease the probability or frequency of doctor visits. However, due to construction of the sample, estimation of the coefficients is based on few observations in this case. To examine the impact of divorce, it would be necessary to draw a different sample containing all persons initially married. For the same reason, we do not interpret the effects of widowhood, or of „higher order“ cohabitation and marriage. We focus on first marriage and prior cohabitation instead where a sufficient number of transitions is observed in our sample. For these events, findings are in line with the argument that husband's health behavior is monitored by a „nagging wife“. So far, the evidence is consistent with the view marriage has a gender specific protective effect.

As we have argued, however, pregnancy and child birth may encourage women to change their health behavior dramatically. Table 1 shows clearly that this actually is the case. Being pregnant increases the odds of consulting relative to not consulting a doctor by 171 percent. Giving birth leads to an increase of the odds by another 146 percent. A similar picture emerges for the number of doctor visits. Women go more often to the doctor when they expect a child. According to the model, the frequency of doctor visits is 74 percent higher if a woman has been pregnant during the last three months. Recent child birth additionally raises the count by 93 percent. These results are not very surprising. Nevertheless, they show that getting children leads to strong temporary shifts of the demand for medical care during the life course of young females. This fact not only points to mothers' heavy biological investment. Maintaining close contact to the health system for several months (once or even repeatedly) also might stimulate further investment.

The most interesting question at this point therefore concerns the long-term consequences. Does motherhood induce more doctor visits in the long run, and does the effect increase as a woman gets a second and third child? Looking at the estimation results, our first answer to the question is „no“ because the effect of the number of children is very small and even negative (though insignificant). After child birth, mothers seem to return to their behavior from before pregnancy.

For obvious reasons, the effect of fatherhood on medical care utilization is much smaller than effect of motherhood. However, it is interesting to note men are less likely to go to the doctor and they go less often when a child is born. If a child is born within the last three months of the interview, the odds of going relative to not going are 35 percent lower, and the number of visits is 26 percent lower. Since there are also small negative effects during the time their partner is pregnant the

transitory effect of fatherhood is negative. This result may point to time restrictions during times where their partner needs support. Fathers may cancel or postpone an appointment with the doctor because they are busy with housework and shopping – the daily work that usually she takes care for. Although the effects for men are the opposite sign than the effects for women, they are temporary in both cases. After a child is born, men seem to behave much the same way as before, as indicated by the absence of any substantial effect of the number of children.

In sum, the results presented in this section show that marriage affects demand for health care in the expected way. As men marry, they go to the doctor more often. This positive effect is temporarily offset by a negative effect of child birth. While women also are more likely to visit a doctor after marriage, the main effect we observe for them is a strong positive demand shift during pregnancy and child birth.

[Table 1]

We now turn to the estimation results for hospitalization – a process that is arguably often driven by poor health status. (This is obvious in emergency cases. Quantitatively, the major exception to this rule is treatment due to child birth. But this special case can be controlled for.) Hospital admission generally is decided upon by doctors. Therefore, given two persons with equal health conditions, the person with higher regular contact to the health system should be more likely to be admitted.

This argument carries over to a two-period model. A person with time-constant health status should be more likely to be admitted to hospital if she regularly consults a doctor. Consequently, the only situation in which this person would spend fewer nights in hospital compared to the person without regular doctor visits is when her health conditions improve. (Of course, when the work of the doctor is successful, the health status of this person should improve over time, thereby endogeneously decreasing the probability of admission.) As a result, if marriage increases regular examinations (as we have just shown) it may decrease the likelihood of admission only if it improves health conditions.

As Table 2 shows, the effect of entry into first marriage on the probability of hospital admission is positive for women, but negative for men. Although both coefficients are insignificant, their different sign highlights the differential process at work. With regards to the number of admissions, the results reveal a clear negative and significant effect for men: making the transition to first marriage is associated with a drop in the year-round number of hospital stays by one third. For

women, the effect is virtually zero. These findings further substantiate the result that husbands benefit more directly from a marriage.

In contrast, health care of women is determined mainly by the process of reproduction. In the logit model, pregnancy leads to an increase in the odds of admission to hospital by 69 percent. Child birth increases the odds further by more than 800 percent, pointing to the fact that the overwhelming majority of women choose to give birth in a hospital. Likewise, the frequency of yearly hospital stays increases by 64 percent due to pregnancy and, additionally, by nearly 500 percent in the birth year of children. In contrast to the foregoing analysis of doctor visits, we find now also a strong long-term effect. According to the estimate of the coefficient of the number of children, getting one child decreases the odds of admission to hospital versus non-admission by 21 percent, having two children by 38 percent, and getting three children by 51 percent. Furthermore, the expected count of hospital stays per year is reduced as well (by 10 percent for one child, 20 percent for two children, and by 28 percent for the third child). The long-term effect of raising children thus counters the small direct effect of marriage. This is not the case for men which seem to be less likely to be admitted in the year a child is born. This effect, however, is not significant, and there is no substantial long-term effect of fatherhood.

[Table 2]

Further results

In the remainder, we address the issue of estimation of the effect of family formation on health care demand by simply pooling observations of our panel data sets. The question is: do we get similar or very different results compared to using fixed effects models?

Figures 3 and 4 summarize the main results of our analysis of medical consultation and hospitalization. Our primary interest was in the marriage protection effect and the long-term effect of parenting. We discussed effects estimated by fixed effects methods (depicted as shaded bars). For comparison, the figures show estimates obtained with pooled logit and poisson regressions (light bars). In figure 3, we can see that we would underestimate the positive effect of marriage on medical consultation by men if we applied cross-sectional methods to our panel data. In contrast, we would overestimate the marriage effect for women. (The bias is very small for the number of doctor visits, however.) The negative children effect for women is much stronger (and significant) in the pooled models.

[Figure 3]

Figure 4 shows that the negative marriage effect on hospitalization of men would be underestimated by the pooled regressions. Results on the marriage effect for women differ also across models, but not in a systematic way. Finally, the effect of number of children on odds of admission is much smaller if estimated by a pooled logit model based on our full sample. Taken together, the comparison across models shows that cross-sectional methods can invalidate inference even when applied to longitudinal data.

[Figure 4]

Conclusion

In this study, we examined demand for health care of males and females as they entered first marriage. Following the literature, we expected to find a marriage protection effect. We argued that there are two causal pathways along which marriage makes people healthier. Married men, we argued may benefit from a direct effect of marriage inducing them to change health behavior once they are subject to control and support by their wife. Married women, in contrast profit indirectly from marriage, through the lasting effect of parenthood within marriage. We analyzed German panel data (GSOEP) on health care utilization using fixed effects logit and poisson models to rule out any bias resulting from selection effects.

Our results partly confirm hypotheses. Most importantly, we found that men go more often to the doctor once they get married. However, over time they are less often admitted to hospital, pointing to a positive effect of marriage on men's health. For women, marriage also increased regular medical consultations, but less than for men. However, the probability of being admitted to hospital

decreases in the long run as a woman gets children. This also may point to improvement of women's health within marriage.

In the long run, mothers' investment in the health of their offspring pays off through lower rates of hospitalization. While men seem to benefit more directly from marriage than women, these effects are relatively small. Marriage may thus produce gender specific health differentials because it increases fertility which promotes healthy behavior among women.

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Tables and Figures

Figure 1: A causal model of the link between marriage on health

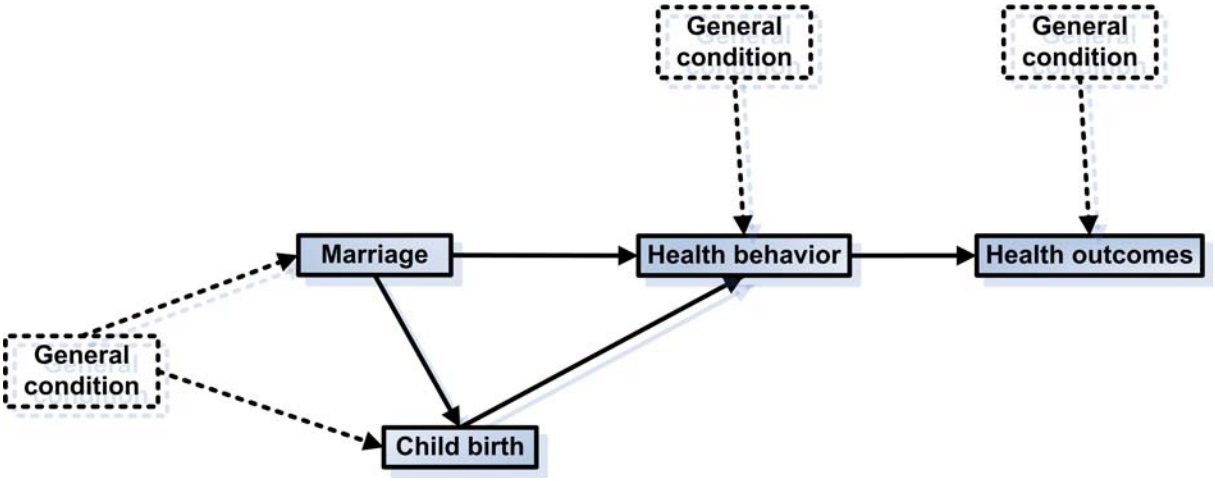


Table 1: Fixed effects estimates of the effect of first marriage on doctor visits in Germany

	Women		Men	
	Indicator doctor visit	Number of doctor visits	Indicator doctor visit	Number of doctor visits
Independent variable	OR	IRR	OR	IRR
Cohabitation before 1st marriage (ref.: never-married, single)	1.091	1.026	1.058	1.070
	(0.061)	(0.030)	(0.056)	(0.047)
First marriage	1.177*	1.072+	1.231**	1.178**
	(0.081)	(0.042)	(0.076)	(0.062)
Separation / divorce	1.152	1.053	1.233	1.182
	(0.171)	(0.097)	(0.214)	(0.125)
Cohabitation after 1st marriage	1.072	1.207	1.241	1.353*
	(0.202)	(0.144)	(0.225)	(0.196)
Remarriage	0.816	1.134	1.031	0.776
	(0.163)	(0.160)	(0.198)	(0.195)
Widowhood	5.128**	1.185	0.868	1.518
	(2.232)	(0.305)	(0.381)	(0.878)
Pregnancy within last three months	2.712**	1.738**	0.935	0.943
	(0.214)	(0.054)	(0.056)	(0.043)
Birth of a child in last three months	2.455**	1.933**	0.650*	0.744*
	(0.488)	(0.143)	(0.110)	(0.095)
Number of biological children	0.953	0.974	1.028	0.964
	(0.042)	(0.024)	(0.039)	(0.027)
Log. equivalence income	0.946+	0.954**	1.031	0.980
	(0.028)	(0.016)	(0.034)	(0.024)
Age group 16-25 (ref.: 26-35)	1.198**	1.040	1.131*	1.128**
	(0.065)	(0.031)	(0.054)	(0.045)
Age group 36-45	0.934	1.007	1.018	0.970
	(0.067)	(0.040)	(0.057)	(0.042)
Age group 46-55	1.020	1.177*	1.340*	1.116
	(0.173)	(0.098)	(0.166)	(0.108)
Age group 56-65	1.389	1.116	3.161**	1.159
	(0.532)	(0.182)	(0.747)	(0.211)
Age group 66-75	2.209	1.410+	6.385**	1.396
	(1.151)	(0.273)	(2.388)	(0.355)
Age group 75-86	5.717**	1.505+	39.302**	2.672**
	(3.598)	(0.343)	(26.495)	(0.921)
Number of person-years	36,892	43,205	45,305	48,282
Number of persons	4,164	5,456	5,152	5,859

Source: GSOEP 1984-2006, own calculations.

Note: OR: odds ratio, exp(β), estimated by fixed effects logit regression; IRR: incidence risk ratio, exp(β) estimated by poisson fixed effects regression. Standard errors (in parentheses) are robust to heteroskedascity and serial dependence. Models further include (coefficients not shown): indicators for survey year (19 dummies, reference: 1984), level of schooling (six dummies, ref.: no degree), vocational training and university degree (two dummies, ref.: no training), labor force status (six dummies, ref.: working). ** p<0.01; * p<0.05; + p<0.10.

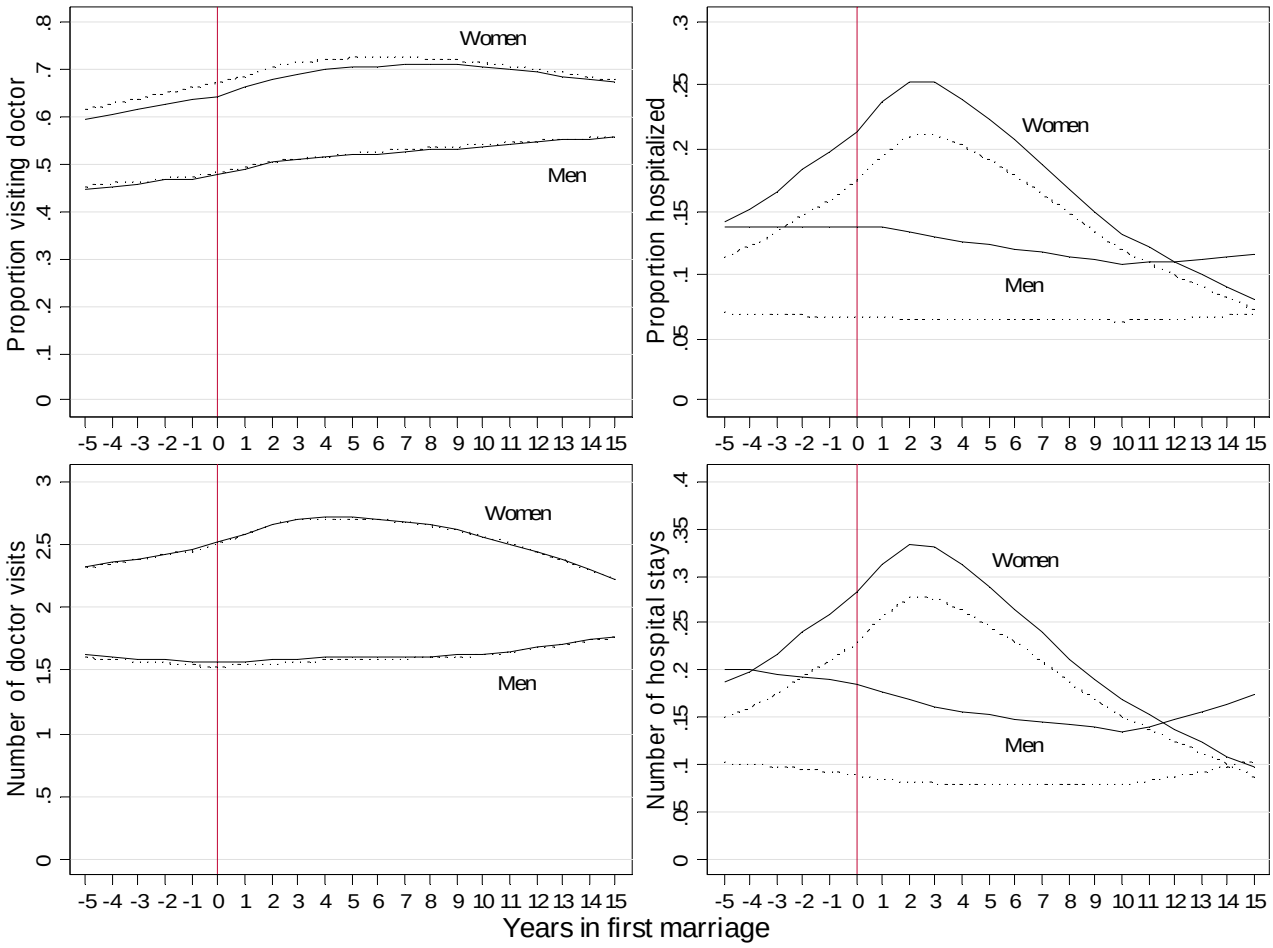
Table 2: Fixed effects estimates of the effect of first marriage on hospitalization in Germany

	Women		Men	
	Indicator hospital stay	Number of hospital stays	Indicator hospital stay	Number of hospital stays
Independent variable	OR	IRR	OR	IRR
Cohabitation before 1st marriage (ref.: never-married, single)	0.986	0.906	0.831+	0.828
	(0.094)	(0.075)	(0.090)	(0.095)
First marriage	1.167	1.054	0.852	0.666**
	(0.129)	(0.097)	(0.108)	(0.093)
Separation / divorce	1.373	1.306	0.953	1.125
	(0.343)	(0.295)	(0.295)	(0.318)
Cohabitation after 1st marriage	1.143	1.002	0.797	0.586
	(0.396)	(0.238)	(0.307)	(0.264)
Remarriage	1.536	1.463+	0.952	0.935
	(0.423)	(0.302)	(0.313)	(0.261)
Widowhood	1.322	0.579	0.847	1.843
	(0.716)	(0.321)	(1.213)	(1.976)
Pregnancy during current year	1.692**	1.635**	0.999	0.968
	(0.171)	(0.158)	(0.138)	(0.142)
Birth of a child in current survey year	93.481**	6.892**	0.840	0.838
	(15.169)	(0.671)	(0.144)	(0.144)
Number of biological children	0.787**	0.897*	1.003	1.027
	(0.053)	(0.049)	(0.076)	(0.083)
Log. equivalence income	1.009	0.977	1.057	1.136*
	(0.050)	(0.044)	(0.070)	(0.073)
Age group 16-25 (ref.: 26-35)	1.113	1.070	1.222*	1.314*
	(0.107)	(0.086)	(0.125)	(0.158)
Age group 36-45	0.726**	0.722**	1.000	0.911
	(0.089)	(0.086)	(0.113)	(0.116)
Age group 46-55	0.904	1.005	1.169	1.124
	(0.276)	(0.257)	(0.289)	(0.288)
Age group 56-65	0.892	1.282	2.749**	2.056*
	(0.415)	(0.579)	(1.033)	(0.753)
Age group 66-75	1.954	2.950*	8.410**	4.307**
	(1.085)	(1.541)	(4.525)	(2.023)
Age group 75-86	1.630	2.545	17.121**	7.389*
	(1.091)	(1.518)	(16.143)	(6.005)
Number of person-years	22,375	22,460	17,754	17,788
Number of persons	2,205	2,237	1,746	1,760

Source: GSOEP 1984-2006, own calculations.

Note: OR: odds ratio, exp(β), estimated by fixed effects logit regression; IRR: incidence risk ratio, exp(β) estimated by poisson fixed effects regression. Standard errors (in parentheses) are robust to heteroskedascity and serial dependence. Models further include (coefficients not shown): indicators for survey year (19 dummies, reference: 1984), level of schooling (six dummies, ref.: no degree), vocational training and university degree (two dummies, ref.: no training), labor force status (six dummies, ref.: working). ** p<0.01; * p<0.05; + p<0.10.

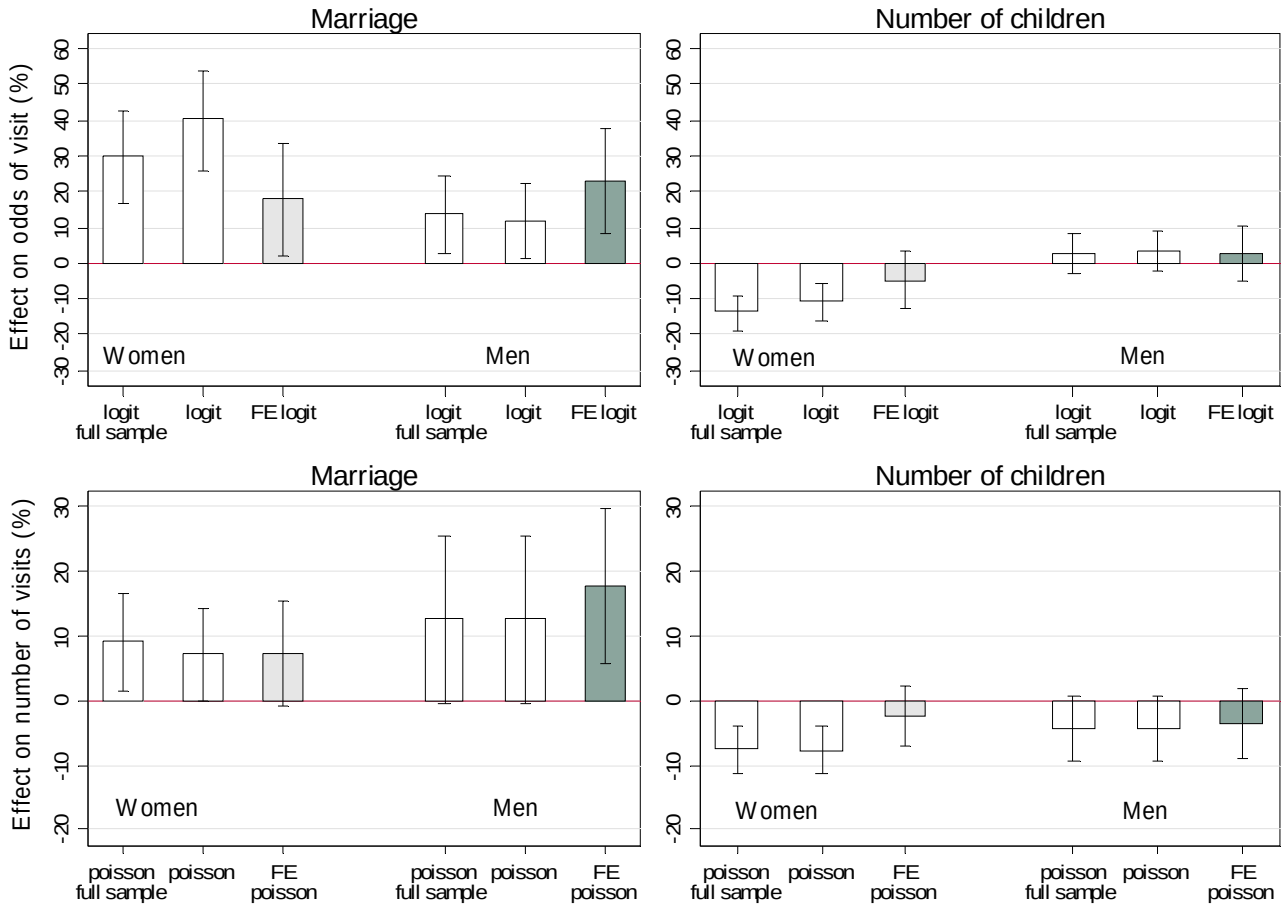
Figure 2: Women's and men's demand for medical care before and after marriage



Source: GSOEP 1984-2006, own calculations.

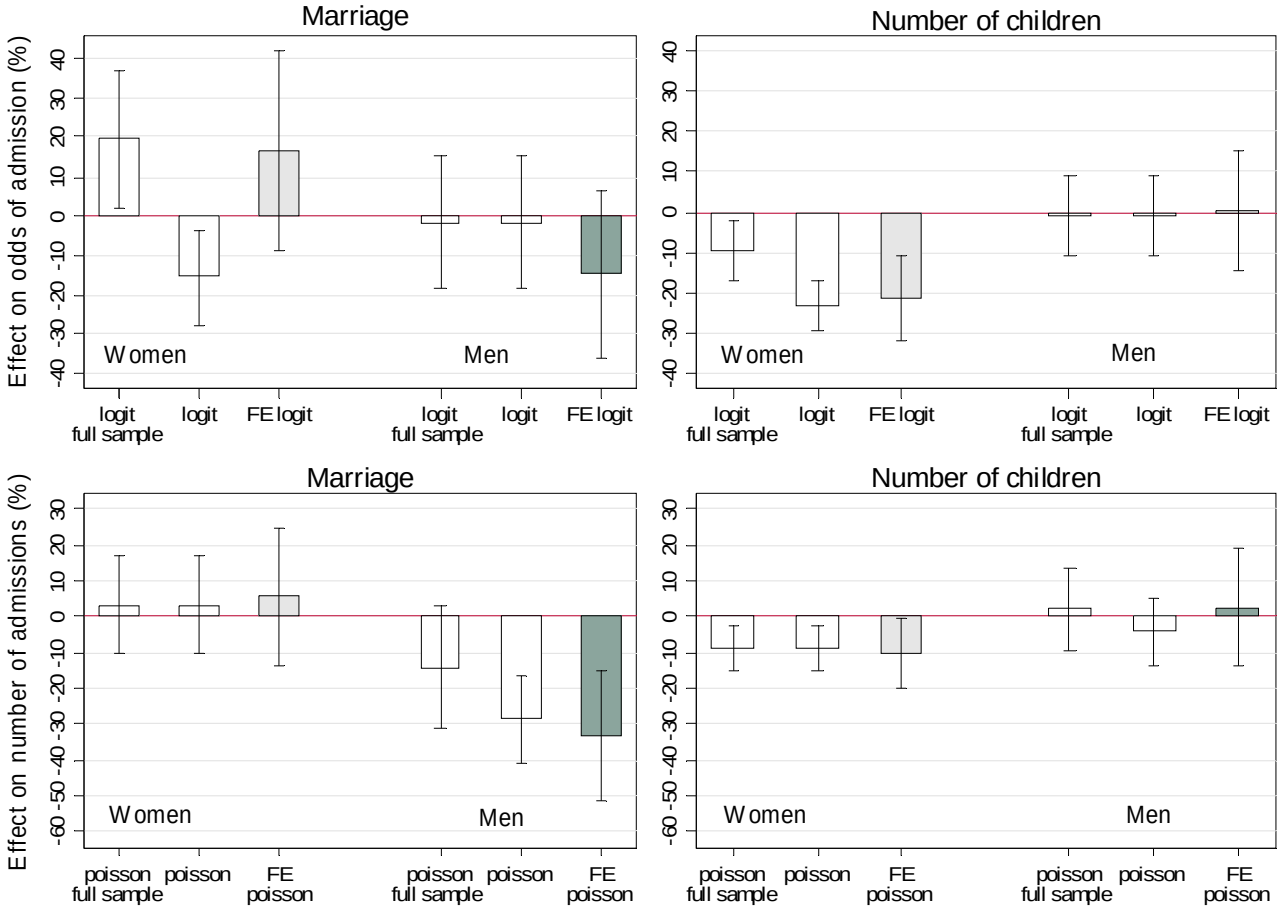
Note: Non-parametric estimates using Locally Weighted Scatterplot Smoother (LOWESS); two stage procedure, first smoothing individual's outcomes and second smoothing values from stage one within samples. Solid lines are estimates for estimation samples, dotted lines for full samples.

Figure 3: Gender specific effect of family formation on odds and frequency of doctor visits



Source: GSOEP 1984-2006, own calculation.

Figure 4: Gender specific effect of family formation on odds and frequency of hospital admission



Source: GSOEP 1984-2006, own calculation.

APPENDIX

Table A1: Description of samples

	Women			Men		
	Married	Never-married	Total	Married	Never-married	Total
	Doctor visits					
Full sample						
Number of persons	1,618	4,240	5,858	1,590	5,038	6,628
Number of person-years	19,398	25,138	44,536	20,299	31,134	51,433
Estimation sample (fixed effects logit)						
Number of persons	1,410	2,754	4,164	1,471	3,681	5,152
Number of person-years	17,930	18,962	36,892	19,459	25,846	45,305
Estimation sample (fixed effects poisson)						
Number of persons	1,597	3,859	5,456	1,532	4,327	5,859
Number of person-years	19,309	23,897	43,205	19,940	28,342	48,282
	Hospitalization					
Full sample	1,414	3,599	5,013	1,392	4,319	5,711
Number of persons	16,470	20,848	37,318	17,239	26,054	43,293
Number of person-years						
Estimation sample (fixed effects logit)						
Number of persons	1,116	1,089	2,205	622	1,124	1,746
Number of person-years	13,777	8,598	22,375	8,833	8,921	17,754
Estimation sample (fixed effects poisson)						
Number of persons	1,122	1,115	2,237	623	1,137	1,760
Number of person-years	13,792	8,660	22,460	8,835	8,953	17,788

Source: GSOEP 1984-2006, own calculation.