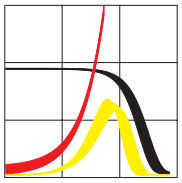

Max-Planck-Institut für demografische Forschung
Max Planck Institute for Demographic Research
Doberaner Strasse 114 · D-18057 Rostock · GERMANY
Tel +49 (0) 3 81 20 81 - 0; Fax +49 (0) 3 81 20 81 - 202;
http://www.demogr.mpg.de

MPIDR WORKING PAPER WP 2002-027
JUNE 2002

The Differential Influence of Women's Residential District on the Risk of Entering First Marriage and Motherhood in Western Germany

Karsten Hank (hank@demogr.mpg.de)

This working paper has been approved for release by: Hans-Peter Kohler (kohler@demogr.mpg.de)
Head of the Research Group on Social Dynamics and Fertility.

The Differential Influence of Women's Residential District on the Risk of Entering First Marriage and Motherhood in Western Germany

Karsten Hank[⋆]

Abstract: This paper investigates the role of women's residential district in the process of family formation in western Germany during the 1980s and 1990s. Our analysis of the transition to first marriage and motherhood is based on the German Socio-Economic Panel (GSOEP), which we merge with a rich set of district-level data. The estimated multilevel discrete-time logit models suggest that (1) basically all regional heterogeneity in women's entry into parenthood is due to differences in the respondents' marital status, while there is (2) a constant and significant regional variation in women's first marriage probabilities, which cannot be explained by population composition or structural contextual effects. Thus, regional influences on fertility behavior do not have an autonomous quality, but are merely mediated through a latent contextual effect on women's risk of entering first marriage, which we attribute to regional socio-cultural milieus.

Keywords: family formation; multilevel analysis; Germany

⋆ *Author's correspondence address:* Max Planck Institute for Demographic Research, Doberaner Str. 114, 18057 Rostock, Germany. Telephone: +49-381-2081-163. Fax: +49-381-2081-463. Email: hank@demogr.mpg.de.

I am greatly indebted to Johannes Huinink and Hans-Peter Kohler for many helpful comments and suggestions. Kind support of the GSOEP-Team during a research visit at the DIW Berlin is gratefully acknowledged.

The views expressed in this paper are the author's views and do not necessarily reflect those of the Max Planck Institute for Demographic Research.

1. Introduction

In recent years, contextual effects on family-related events have gained considerable attention in the demographic literature (e.g., Billy and Moore 1992; South 2001; South and Crowder 2000; Teachman and Crowder 2002). However, with the exception of a few fertility studies in Scandinavian countries (Hoem 2000; Kravdal 1996; Kravdal 2002), there has so far barely been any such research for the European setting. This paper contributes to filling in the gap, focussing on the process of family formation in western Germany.

Although social scientists' attention in post-unification Germany has been attracted primarily by the rapid fertility decline in eastern Germany and by the question of whether fertility levels in East and West will converge over time, two studies were conducted lately, which began to investigate whether regional differentials in reproductive behavior within both parts of the country persist, once individual characteristics are controlled for in the analysis. While Kopp (2000) uses data on seven selected *Kreise* (i.e. districts) from a regionalized survey, Hank (2002a) links individual-level data from the German Socio-Economic Panel with information on western German *Raumordnungsregionen*, i.e. 75 spatial units defined for the analysis of regional disparities and developments. These studies suggest that much of the variation in childbearing patterns between German regions (see Hank [2001] for details) is due to differences in the respective population composition, particularly regarding age, education, and marital status. An analysis of the geographic context of male nuptiality, though, finds support for the hypothesis that in western Germany increasing economic independence of women at the regional level results in slower transition rates to

marriage. It furthermore indicates that men's propensity to marry might be influenced by the regional socio-cultural milieu they live in (cf. Hank 2002b).

Continuing this research, the present paper employs multilevel discrete-time logit models to estimate – for the first time – contextual influences on western German women's probabilities to enter first marriage *and* motherhood during the 1980s and 1990s. Given the close relationship between the two events (e.g., Billari and Kohler 2002; Konietzka and Kreyenfeld 2002), such a joint consideration within a single analytical framework is highly desirable. We use the German Socio-Economic Panel (GSOEP) as an individual-level data source. The social context is operationalized at the level of 328 *Kreise*, which represent the smallest regional units for which data are available.

2. Individual and contextual determinants of family formation

To avoid committing what Hauser (1974) calls the 'contextual fallacy', researchers carefully need to consider what might be important 'controls' for the individual's background, and through which processes aggregate-level effects operate on individual behavior. Jencks and Mayer (1990: 113), for example, distinguish among epidemic (or contagion) models, collective socialization (or social control) models, and institutional models of contextual effects. Hank (2002a) argues that regional opportunity structures as well as local patterns of social interaction and culture may translate into parameters that directly affect individual decision-making.

In the following, a set of hypotheses is proposed that briefly describes our key assumptions about the relationship between regional social contexts and women's

family formation decisions. The choice of relevant regional variables is partly determined by the availability of data for a subsequent empirical analysis. Since the individual-level control variables have been shown in prior studies to influence fertility and marital behavior, they will not be discussed in greater detail.

Individual characteristics

An individual's *age* clearly is the most important biosocial determinant of her position in the life-course. A non-monotonic effect is assumed, i.e. women's propensity to enter marriage and motherhood should first increase with age, but decrease at later stages of her life course.

The influence of an individual's *human capital characteristics* on the process of family formation has been analyzed extensively not only within the framework of the 'new home economics' (e.g., Becker 1993: Chapter 5), but also from the perspective of sociologists (e.g., Blossfeld and Huinink 1991) and demographers (e.g., Rindfuss et al. 1996). Due to higher investments in human capital, more highly educated women (i) gain economic independence *and* face higher opportunity costs of childrearing than their less educated counterparts, but at the same time (ii) they are more attractive partners on the marriage market *and* have a greater economic potential to support a family. Thus the direction of the level-of-education-effect on the individual's propensity to form a family cannot be predicted unambiguously. In any case, a woman's risk of entering marriage and/or parenthood should be lowest, as long as she is enrolled in education.

Finally, having a *child* (being *married*, respectively) as well as having a *foreign* background[1] is supposed to increase a woman's probability to enter marriage (motherhood, respectively).

Regional characteristics

One of the main determinants of the living conditions in an individual's environment are local opportunity structures. These should be reflected in part by the *degree of urbanization*. Since urban areas generally offer more alternatives to traditional family formation and provide a less appropriate environment for rearing children than rural areas, it is assumed that women exhibit a decreasing propensity to marry and have a child, if the population density of their residential district increases (e.g., Huinink and Wagner 1989; Lichter et al. 1991).

A shortage in the *number of desirable partners* on the marriage market, e.g. due to an imbalanced sex ratio, often leads to relatively high proportions unmarried or to a delay of marriage. Hence, it is generally predicted that women encountering numerous men in the local marriage market will have high marriage rates (e.g., South and Lloyd 1992a; 1992b).

Access to *children's day care* plays a crucial role for the compatibility of childrearing and female employment and therefore becomes a central element of a region's opportunity structure. Since the availability of adequate child care reduces the opportunity costs of childrearing for women who want to participate in the labor force, a

[1] In western Germany, so called 'guest workers' – mainly from southern Europe and Turkey – and their descendants account for the largest share of the foreign population. These citizens are likely to have more traditional values than their native German counterparts.

woman should be more likely to have children if the public provision of day care increases (e.g., Kravdal 1996; see also the discussion in Hank and Kreyenfeld 2002).

The *availability of jobs in the tertiary sector* is frequently considered to favor women's career prospects (e.g., Blossfeld 1987), which should increase women's economic independence and the opportunity costs of motherhood. Thus it is assumed that a woman's probability of getting married and having a child decreases, if the share of jobs in the service sector increases.

The direction of an effect of the regional *unemployment rate* on fertility is difficult to predict (see Kravdal [2002: Section 3] for a discussion). Since the labor supply of women partly depends on the demand for labor, a woman's probability to have a child is supposed to move in step with the unemployment rate, because (at least in the short run) this would reduce the opportunity costs of cutting down or giving up market work for starting a family. On the other hand, the local labor market situation is an indicator of a community's socio-economic status and the economic situation in general. Thus women are expected to be more likely to have a child if unemployment decreases, since children might be considered as being more affordable, if economic prospects are evaluated positively (e.g., Hoem 2000: Section 5).

The regional unemployment rate may also have an ambiguous influence on women's entry into marriage. If the labor market situation is perceived as difficult, women could seek economic security in a marriage, where they pool their income with the partner's earnings. However, high unemployment also reduces the number of economically attractive partners on the marriage market, which might result in delayed marriage (e.g., Lichter et al. 1991).

The total effect of the *aggregate female labor force participation* on family formation is unclear, too (cf. Brewster and Rindfuss [2000] for a recent review). Female employment rates clearly mark the degree to which women are expected and able to constitute economic independence from a husband's support. Since the motivation to work in the market (and delay or even forgo traditional family formation) is supposed to be positively affected by the role model of other women, a woman's propensity for having a child and contracting a marriage should decrease with an increasing female labor force participation rate. However, a high labor force participation of women could also induce favorable changes in the interplay between the family and labor market institutions, which might eventually account for the needs of working mothers. Thus a woman's probability to have a child may even increase with a growing participation of women in the labor market.

Finally, actors are likely to be influenced by behavioral expectations and actual behavior they witness in their social environment. South and Crowder (2000: 1069), for example, point out that socially dislocated areas might "lack successful marital role models that signal the benefits of marriage and provide the normative expectations to marry." Moreover, there is accumulating evidence suggesting the existence of age- and sequencing-norms related to a variety of family transitions (e.g., Blossfeld and Huinink 1991; Settersten and Hägestad 1996). Since 'conservative' cultural forces are assumed to have a stronger effect in homogeneous social contexts, a woman's propensity to form a family is supposed to be higher in areas characterized by high marriage rates (birth rates, respectively) and a single predominant *ideational orientation*, which may be expressed by denominational affiliation or by support for a political party (e.g., Lesthaeghe and Surkyn 1988).

3. Data and methods

3.1 Data, variables, and description of the samples

The individual-level data used in this paper were made available by the German Socio-Economic Panel Study (GSOEP) at the German Institute for Economic Research (DIW Berlin) (see SOEP Group [2001] for a description of the data set). This longitudinal micro-database provides socio-economic information on currently more than 7,000 households (including an oversample of foreign-headed households) and 14,000 individuals in eastern and western Germany. The survey was started in the western states of Germany and is conducted annually since 1984. The full marital history and birth biography of all women who participate in the survey is provided with the data. Only the transition to the first marriage and to the first child will be considered here.

The GSOEP can be linked to *Kreise*, i.e. district-level data. The population size of *Kreise* ranges from roughly 50,000 to around 700,000, averaging at about 200,000 (cities of one million or more inhabitants excluded). Among the 328 western German *Kreise* (including West-Berlin), it is possible to distinguish between urban *kreisfreie Städte* and rural *Landkreise*. The latter cover on average about 30 municipalities, while the former usually consist of a single urban municipality only.

The observation period covers the years 1984 to 1999. Unfortunately, information on the regional variables of interest is mostly available for two points in time only. The 'DJI Regionaldatenbank' provides regional indicators at the *Kreis* level for the second half of the 1980s (see http://www.dji.de for further information), while regional information for the mid-1990s is drawn from the 'Statistik regional' database

(Statistische Ämter des Bundes und der Länder 1999). The observation period is therefore divided into two halves, from 1984 to 1991, and from 1992 to 1999, respectively. Time-varying contextual variables are assumed to be time-constant within each of the two periods, and are allowed to vary only between the two periods defined above.

Table 1 provides an overview of the individual-level and contextual variables that will be used in the empirical analysis.

[Table 1 about here]

Only respondents from the two original GSOEP subsamples are included in the analysis, i.e. western Germans and foreigners from Greece, Italy, Spain, Turkey, and former Yugoslavia, who already lived in Germany in 1984. Individuals who move during the study period from one *Kreis* to another are followed to their new place of residence. The sample for the *analysis of first marriages* is restricted to 2,266 never-married women, who are observed from age 20 onwards, unless this age was reached before the first year of observation. The upper age limit is 35 years. Since each individual is allowed to contribute multiple observations, this leads to 10,077 individual records, nested within 288 *Kreise* (out of 328 *Kreise* in the population). The number of observed first marriages in the period 1984 to 1999 is 746. The sample for the *analysis of first births* consists of 2,892 women aged 20 to 35 who live in 300 *Kreise*. This results in 13,537 individual records and 1,025 events. See Table 2 for further descriptive sample statistics.

[Table 2 about here]

3.2 Methods

This study uses discrete-time multilevel models to estimate a woman's risk of entering first marriage (motherhood, respectively) within a one-year interval in the observation period (see Barber et al. [2000] for a thorough methodological discussion). A common choice to specify how the discrete-time hazard rate is determined, is the logistic regression function. The logit model provides a good approximation to the continuous time proportional hazards model, if the conditional probabilities that an event occurs at time *t*, given that it has not already occurred, are sufficiently small (Yamaguchi 1991).

The discrete-time logit model estimates the effect of a number of covariates on the log of the odds of an event. However, if individuals are clustered within the same context, the standard assumption of independent disturbances is violated. This may result in inefficient estimates of the macro-level parameters and downwardly biased estimates of their standard errors. Hierarchical generalized linear models – as an extension of random coefficient models – can be used to overcome these problems. They allow the application of multilevel logistic regression models for the analysis of discrete dependent variables (see Guo and Zhao [2000] for an overview). In these models, coefficients may be fixed or random, where the choice between the two alternatives can be made separately for each coefficient in the equation. In the analysis performed here, all regression coefficients other than the intercept are constrained to be fixed across the regional units, i.e. we assume that the effect of the explanatory variables does not differ between contexts ('random intercept model'; see Snijders and Bosker [1999: Chapter 4]).

In the present case, the log odds that a woman experiences the event under consideration (i.e. first marriage or first birth) within the one-year interval *t* is

$$\log[p_{ijt}/(1-p_{ijt})] = b_0 + b_1 x_{ij} + b_2 z_{ijt} + b_3 v_j + b_4 w_{jt} + u_{0j}$$

where p_{ijt} is the probability of individual i in region j to marry (give birth, respectively) in year t, x_{ij} and v_j are vectors of individual- and macro-level time-constant explanatory variables, and z_{ijt} and w_{jt} are vectors of time-varying explanatory variables at time t. The random intercept's fixed component b_0 – which is constrained to be equal across all years – and the slopes b_1 to b_4 are the parameters of the equation. The macro-level error term u_{0j} is the regional-level random coefficient, where the same u_{0j} applies to all observations in a particular region. It indicates that the intercept may vary over contexts, i.e. u_{0j} measures the deviation of each context from b_0 ('between-context variance'). This captures otherwise unobserved regional effects and accounts for the correlation between individuals nested within the same context. The macro-level disturbances u_{0j} are assumed to be normally distributed, with the expected value 0 and the variance σ_u^2. If the variance of u_{0j} turns out to be statistically significant from zero, context effects are present. Since the entry into first marriage or motherhood is a non-repeatable event, no individual-level unobserved heterogeneity factor can be identified.

Discrete-time logit models use multiple observations for each individual in the sample, i.e. each time unit during which an individual is observed contributes a separate and independent observation to the input data. For each of these observations, the dependent variable is coded 1 if the event occurs, 0 otherwise.

4. Regression results

The results of the multivariate analysis are presented separately for first marriages and first births. Since our main interest is on contextual effects, the findings for the

individual-level coefficients are only briefly reported. The final models are build-up in several steps, starting from an 'empty model' with just the intercept and the regional random effect (*Model 1*). The individual-level control variables are introduced in *Models 2* to *4*, and the district-level contextual variables are eventually added in *Models 5* to *7*. The regression results for the analysis of women's entry into first marriage are displayed in Table 3, while the results for women's entry into motherhood are shown in Table 4. The analysis is performed using the software package *aML* (see Lillard and Panis [2000]).

Entry into first marriage

The coefficients of the *individual-level control variables* come out as expected. In addition to a non-monotonic age effect (*Model 2*), educational enrollment strongly reduces the propensity to enter first marriage (*Model 3*). Terminating education without degree is also found to reduce a woman's marriage risk, but the respective coefficient becomes statistically significant only after it is controlled for the presence of a child (*Model 4*). This indicates that the lower marriage propensity of *women without degree* is underestimated, if one does not account for their higher risk of unmarried childbearing, which subsequently leads to a higher probability to marry among *mothers with no degree*. Inclusion of the 'child' dummy substantially improves the overall model fit and has the anticipated strong and positive impact on the dependent variable. Finally, being a foreigner increases a woman's probability to contract a marriage (*Model 4*), although the coefficient is significant at the 10 per cent level only.

With regard to *contextual influences*, there is no statistically significant effect of any of the district-level variables introduced in *Models 5* and *6*. The coefficient of our

ideational homogeneity index in *Model 7* turns out to be weakly significant, however, with an unexpected *negative* sign. This points to the presence of unobserved confounding socio-cultural factors, which are captured by the regional random effect (σ_u). The initial value of σ_u is not reduced by any of the individual-level or contextual variables and remains highly significant throughout all models, which indicates that the intercept, i.e. the 'baseline log-odds' of entering first marriage, varies across *Kreise*.

Similar results are obtained, when *men's* entry into marriage is considered, yet Hank (2002b) additionally finds a negative effect of high female labor force participation on male transition rates to marriage.

[Table 3 about here]

Entry into motherhood

The direction of the effects of the *individual-level control variables* on the probability to enter motherhood is generally the same as in the 'nuptiality analysis' and thus consistent with our theoretical expectations. The risk of married western German women to experience a first birth is found to be many times higher than for their unmarried counterparts (*Model 4*). Including a woman's marital status in the analysis not only results in a substantial improvement of the model's fit, but also leads to a clear reduction in the initial size of the other individual-level coefficients. This extraordinarily strong impact is consistent with other research indicating a clear tendency towards 'child oriented' marriages in western Germany (e.g., Konietzka and Kreyenfeld 2002).

Turning to the *contextual variables*, we find a highly significant regional random effect on women's risk of entering motherhood in the 'empty' *Model 1*. As can be seen

from *Models 2* and *3*, the contextual effect remains after age and education are controlled for. However, once the marital status is entered into the regression, σ_u virtually disappears (*Model 4*). Adding the 'rural-urban' variables nevertheless leads to a weakly significant improvement of the fit in *Model 5*. The coefficient of the dummy variable indicating residence in a rural *Kreis* is statistically significant, and the direction of the effect is consistent with our hypothesis that women in less urbanized areas have a higher propensity of having a child. However, this effect becomes weaker and insignificant in *Models 6* and *7*, where additional regional variables are included in the analysis. None of these has an own measurable impact on a woman's first birth risk, though.

These findings are in line with results reported in Hank (2002a), where larger *Raumordnungsregionen* were used as regional context. This suggests that basically all regional heterogeneity in women's transition to parenthood should be due to differences in marital behavior, independent of the spatial definition of the context. If *Model 7*, for example, is run without controlling for the marital status (not shown here), we find significant coefficients for the 'rural' dummy (positive) and the female labor force participation rate (negative); the size of σ_u then remains in the same order of magnitude as in models without any direct regional-level indicators.

[Table 4 about here]

5. Discussion

There are two main results of the multivariate analysis. *First*, we do not find evidence for a persistent autonomous influence of characteristics of the residential district on a

woman's first birth risk. Consistent with a recent study that operationalizes the social context at a higher level of spatial aggregation (Hank 2002a), basically all regional heterogeneity in women's transition to parenthood appears to be due to differences in the respondents' marital status. *Secondly*, the multilevel discrete-time logit models for women's entry into first marriage show a constant and significant variation of the regression intercept across *Kreise*, which cannot be explained by population composition or structural contextual effects (see also Hank 2002b).

Regional differences in union formation, for which our measure of the crude marriage rate is apparently unable to account, are likely to be embedded in broader and probably longstanding socio-cultural contexts. An examination of the age at marriage and control of marital fertility in a variety of geographical settings indicates that at least in pre-transitional societies "the social context in which late marriage is the norm is one in which women have more autonomy and are freer to adopt control over their childbearing." (Coale 1992: 340) Although the historical structural circumstances that originally fostered later marriage in some areas (e.g. specific inheritance rules) may have changed, local subcultures that evolved in the demographic domain often turn out to be extremely stable across time (e.g., Lesthaeghe and Neels 2001; Reher 1998: 212ff.). The persistence of spatial differentials in family formation patterns should depend increasingly on variations in the spread of broader *value orientations* (e.g., Lesthaeghe and Moors 2000) and "*internalized norms* about age-appropriate behavior, age-graded events and transitions, and age-sequential rules […] as societal regulation became more lenient." (Heckhausen 1999: 35; italics not in the original)

In the western German society, it is commonly expected that women complete education before marriage (e.g., Blossfeld and Huinink 1991), and marry before

entering parenthood (e.g., Billari and Kohler 2002).[2] Although longer enrollment in education leads to a *general* postponement of family formation, controlling for women's education in our analysis cannot explain regional *variations* in their probability of entering first marriage and motherhood. Neither are differentials in women's experience of premarital childbearing able to account for the observed district-level differences in marriage risks. Women's marital behavior, on the other hand, absorbs virtually all regional heterogeneity in their propensity to have a first child during the observation period. This, and the absence of structural contextual effects, suggests the existence of *regional socio-cultural milieus*, which might differ with regard to the commonness of premarital cohabitation or regarding collective expectations concerning the timing of marriage, for example. Hank (2002b) argues that variations in the degree of secularization may be considered as an underlying cause of regional heterogeneity in the propensity to contract a marriage. Eventually, this results in corresponding differentials in the birth of first and possibly subsequent children. Thus, regional influences on fertility behavior do not have an autonomous quality, but are merely mediated through a direct contextual effect on women's risk of entering first marriage.

Despite the insignificance of the regional child care and labor market indicators, one should not conclude that regional opportunity structures do generally not matter for an individual's family formation behavior. However, for the contemporary western German setting – and in spite of specific structural profiles of high- and low-fertility areas (see Hank 2001) – the overall degree of socio-economic development in all

[2] The situation in *eastern Germany* is entirely different. In 1989, every third child was born out-of-wedlock, and ten years later the share of non-marital births even increased to 50 per cent (Konietzka and Kreyenfeld 2002).

districts is apparently too high (and the variations therein too low) as to induce sizeable differentials in the costs and benefits of children for their parents.

Unfortunately, our analysis could reveal only indirect evidence concerning the nature of the relationship between regional social contexts and family formation behavior in western Germany. We are not able to distinguish, for example, between local customs (that women *will* marry at a certain age) and local norms (that women *should* marry at a certain age) (see Marini [1984] for a critical discussion). However, the identification of behaviorally relevant characteristics of regional socio-cultural milieus requires richer data than those that are usually available from social science surveys. Researchers should therefore make an effort to collect more qualitative data – possibly through ethnographic observation – that allow comparative studies of behavioral expectations, value orientations, etc., in a variety of spatial and social units.

References

Barber, J.S., S.A. Murphy, W.G. Axinn, and J. Marples. 2000. "Discrete-time multilevel hazard analysis." Pp.201-235 in *Sociological Methodology*, vol. 30, edited by M.E. Sobel and M.P. Becker. Washington: Blackwell Publishers.

Becker, G.S. 1993. *A Treatise on the Family* (Enlarged Edition). Cambridge: Harvard University Press.

Billari, F.C. and H.-P. Kohler. 2002. "The impact of union formation dynamics on first births in West Germany and Italy: Are there signs of convergence?" Forthcoming in *Comparative Research on Fertility and the Family in Contemporary Europe: Findings and Lessons (Vol.2),* edited by E. Klijzing and M. Corijn. New York and Geneva: United Nations.

Billy, J.O. and D.E. Moore. 1992. "A multilevel analysis of marital and nonmarital fertility in the U.S." *Social Forces* 70: 977-1011.

Blossfeld, H.-P. 1987. "Labor-Market Entry and the Sexual Segregation of Careers in the Federal Republic of Germany." *American Journal of Sociology* 93: 89-118.

------ and J. Huinink. 1991. "Human Capital Investments or Norms of Role Transition? How Women's Schooling and Career Affect the Process of Family Formation." *American Journal of Sociology* 97: 143-168.

Brewster, K.L. and R.R. Rindfuss. 2000. "Fertility and Women's Employment in Industrialized Nations." *Annual Review of Sociology* 26: 271-296.

Coale, A.J. 1992. "Age of Entry into Marriage and the Date of the Initiation of Voluntary Birth Control." *Demography* 29: 333-341.

Guo, G. and H. Zhao. 2000. "Multilevel Modeling for Binary Data." *Annual Review of Sociology* 26: 441-462.

Hank, K. 2001. "Regional Fertility Differences in Western Germany: An Overview of the Literature and Recent Descriptive Findings." *International Journal of*

Population Geography 7: 243-257.

------ . 2002a. “Regional Social Contexts and Individual Fertility Decisions: A Multilevel Analysis of First and Second Births in Western Germany.” *European Journal of Population* 18: forthcoming.

------ . 2002b. “The Geographic Context of Male Nuptiality in Western Germany During the 1980s and 1990s.” Mimeo. Max Planck Institute for Demographic Research: Rostock.

------ and Kreyenfeld. 2002. “Modes of Childcare and the Difficult Compatibility of Childrearing and Employment in (Western) Germany.” *Materialien zur Bevölkerungswissenschaft* 105: forthcoming.

Hauser, R.M. 1974. “Contextual Analysis Revisited.” *Sociological Methods & Research* 2: 365-375.

Heckhausen, J. 1999. *Developmental Regulation in Adulthood. Age-Normative and Sociostructural Constraints as Adaptive Challenges*. Cambridge: Cambridge University Press.

Hoem, B. 2000. “Entry into motherhood in Sweden: the influence of economic factors on the rise and fall in fertility, 1986-1997.” *Demographic Research* [Online] 2, available http://www.demographic-research.org/Volumes/Vol2/4.

Huinink, J. and M. Wagner. 1989. “Regionale Lebensbedingungen, Migration und Familienbildung.” *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 41: 669-689.

Jencks, C. and S.E. Mayer. 1990. “The Social Consequences of Growing Up in a Poor Neighborhood.” Pp.111-186 in *Inner-City Poverty in the United States*, edited by L.E. Lynn and M.G.H. McGeary. Washington: National Academy Press.

Konietzka, D. and M. Kreyenfeld. 2002. “Women’s Employment and Non-Marital Childbearing: A Comparison of East and West Germany in the 1990s.” *Population* 57: forthcoming.

Kopp, J. 2000. “Geburtenentwicklung in Ost- und Westdeutschland.” Pp.83-135 in *Solidarität, Lebensformen und regionale Entwicklung*, edited by H. Bertram et al. Opladen: Leske+Budrich.

Kravdal, Ø. 1996. “How the local supply of day-care centers influences fertility in Norway: A parity-specific approach.” *Population Research and Policy Review* 15: 201-218.

Kravdal, Ø. 2002. “The impact of individual and aggregate unemployment on fertility in Norway”. *Demographic Research* [Online] 6, available http://www.demographic-research.org/Volumes/Vol6/10.

Lesthaeghe, R. and G. Moors. 2000. “Life course transitions and value orientations: selection and adaptation.” *Interuniversity Papers in Demography WP 2000-7*, available http://www.vub.ac.be/SOCO/IPDWP2000-7.pdf.

Lesthaeghe, R. and K. Neels. 2001. “From the First to the Second Demographic Transition: An Interpretation of the Spatial Continuity of Demographic Innovation in France, Belgium and Switzerland.” Paper presented at the Euresco Conference on ‘The Second Demographic Transition in Europe’, Bad Herrenalb, June 23-28.

Lesthaeghe, R. and J. Surkyn. 1988. “Cultural Dynamics and Economic Theories of Fertility Change.” *Population and Development Review* 14: 1-45.

Lichter, D.T., F.B. LeClere, and D.K. McLaughlin. 1991. “Local Marriage Markets and the Marital Behavior of Black and White Women.” *American Journal of Sociology* 96: 843-867.

Lillard, L.A. and C.W.A. Panis. 2000. *aML Multilevel Multiprocess Statistical Software*, Release 1.0. Los Angeles: EconWare.

Marini, M.M. 1984. “Age and Sequencing Norms in the Transition to Adulthood.” *Social Forces* 63: 229-244.

Reher, D.S. 1998. “Family Ties in Western Europe: Persistent Contrasts.” *Population and Development Review* 24: 203-234.

Rindfuss, R.R., S.P. Morgan, and K. Offutt. 1996. “Education and the Changing Pattern of American Fertility: 1963-1989.” *Demography* 33: 277-290.

Settersten, R.A. and G.O. Hägestad. 1996. “What’s the Latest? Cultural Age Deadlines for Family Transitions.” *The Gerontologist* 36: 178-188.

Snijders, T.A.B. and R.J. Bosker. 1999. *Multilevel analysis: An introduction to basic and advanced multilevel modeling*. London: Sage.

SOEP Group. 2001. “The German Socio-Economic Panel (GSOEP) after more than 15 years – Overview.” Pp.7-14 in *Proceedings of the 2000 Fourth International Conference of German Socio-Economic Panel Study Users (GSOEP2000)* (Vierteljahrshefte zur Wirtschaftsforschung 70), edited by E. Holst et al.

South, S.J. 2001. “The Geographic Context of Divorce: Do Neighborhoods Matter?” *Journal of Marriage and the Family* 63: 755-766.

------ and K.D. Crowder. 2000. “The declining significance of neighborhoods? Marital transitions in community context.” *Social Forces* 78: 1067-1099.

------ and K.M. Lloyd. 1992a. “Marriage Opportunities and Family Formation: Further Implications of Imbalanced Sex Ratios.” *Journal of Marriage and the Family* 54: 440-451.

------ and K.M. Lloyd. 1992b. “Marriage Markets and Nonmarital Fertility in the United States.” *Demography* 29: 247-264.

Statistische Ämter des Bundes und der Länder (eds.). 1999. *Statistik regional – Daten und Informationen der statistischen Ämter des Bundes und der Länder*. CD-ROM.

Teachman, J. and K. Crowder. 2002. “Multilevel Models in Family Research: Some Conceptual and Methodological Issues.” *Journal of Marriage and the Family* 64: 280-294.

Yamaguchi, K. 1991. *Event History Analysis*. Newbury Park: Sage.

Tables:

Table 1: Variable description

Dependent variables	
First marriage / First birth	Binary variable that equals 1, if the woman experiences her first marriage (birth, respectively) within a one-year interval in the period 1984 to 1999.
Individual characteristics	
Age	Woman's age and age-squared. The age range is 20 to 35 years.
Education	Time-varying binary variables, indicating the woman's highest educational degree at the time of the interview: in education, no degree, vocational degree (reference category), university degree.
Child[a]	Time-varying binary variable that equals 1, if the woman is mother of (at least) one child.
Marital status[b]	Time-varying binary variable that equals 1, if the woman is married.
Foreigner	Time-constant binary variable that equals 1, if the woman belongs to the foreigner-sample of the GSOEP.
Regional characteristics	
Degree of urbanization	Time-constant binary variables, indicating whether the district is defined as agglomeration (reference category), as urban area, or as rural area.
Proportion of men[a]	Average proportion of men in the local population aged 25 to 30 in 1995-1997 (in %) (time-constant).
Day-care provision[b]	Local provision of day care slots in *Kindergarten* per 1000 children aged 3-6 (time-varying, 1986/1994).
Tertiary sector	Local share of employees in trade (in %) (time-varying, 1987/1995).
Unemployment rate	Local unemployment rate (in %) (time-varying, 1987/1996).
Female labor force participation rate (FLPR)	Local female labor force participation rate (in %) (time-varying, 1987/1995).
Crude marriage rate (CMR)[a]	Average of local crude marriage rates in 1986 and 1993 (time-constant).
Crude birth rate (CBR)[b]	Average of local crude birth rates in 1989 and 1995 (time-constant).
Ideational homogeneity index (IHI)	Time-constant binary variable that equals 1, if a single party received more than 50 per cent of the local votes in two recent elections (European parliament 1989, state parliament 1995/1999), and more than two thirds of the population share the same denominational affiliation (Protestant or Catholic).
Note: [a] Variable is used in the analysis of first marriages only. [b] Variable is used in the analysis of first births only.	

Table 2: Descriptive sample statistics

Variable	*First marriage* *Mean (Stdv.)*[a]	*First birth* *Mean (Stdv.)*[a]
Individual level		
Age	24.8 (3.9)	25.5 (4.1)
Age squared	629.9 (206.8)	665.0 (218.1)
In education	.22	.17
No degree	.17	.18
Vocational degree	.53	.57
University degree	.07	.08
Child	.09	-
Marital status	-	.27
Foreigner	.22	.23
Regional level		
Agglomeration	.59	.60
Urbanized area	.25	.25
Rural area	.15	.15
Proportion of men	51.3 (1.2)	-
Day-care provision	-	825.5 (175.0)
Tertiary sector	17.2 (3.9)	17.2 (3.9)
Unemployment rate	8.8 (3.2)	8.7 (3.2)
FLPR	41.4 (3.5)	41.2 (3.5)
CMR	7.5 (0.5)	-
CBR	-	10.2 (.9)
IHI	.10	.10
N (events)	746	1,025
N (districts)	288	300
N (women)	2,266	2,892
N (records)	10,077	13,537

Note:
[a] Standard deviations are not displayed for binary variables.

Source: GSOEP 1984-1999, DJI Regionaldatenbank, Statistik regional 1999, author's calculations

Table 3: 'First marriage' – Results of multilevel discrete-time logit models, 1984 to 1999

	Model 1			**Model 2**			**Model 3**			**Model 4**			**Model 5**			**Model 6**			**Model 7**		
	β	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*
Age	-			1.19	.16	***	.98	.16	***	1.00	.17	***	1.00	.17	***	1.03	.17	***	1.03	.17	***
Age squared	-			-.02	.00	***	-.02	.00	***	-.02	.00	***	-.02	.00	***	-.02	.00	***	-.02	.00	***
In education[a]	-			-			-1.18	.16	***	-1.18	.16	***	-1.15	.16	***	-1.14	.16	***	-1.14	.16	***
No degree[a]	-			-			-.11	.11		-.31	.11	***	-.31	.11	***	-.32	.11	***	-.32	.11	***
University degree[a]	-			-			-.06	.15		-.06	.15		.06	.15		.06	.16		.06	.16	
Child	-			-			-			1.00	.09	***	1.01	.10	***	1.02	.10	***	1.02	.10	***
Foreigner	-			-			-			.19	.10	*	.18	.10	*	.20	.11	*	.19	.11	*
Urbanized area[b]	-			-			-			-			-.05	.11		-.11	.12		-.08	.13	
Rural area[b]	-			-			-			-			-.02	.13		-.12	.14		.02	.19	
Proportion of men	-			-			-			-			-			.01	.04		.02	.04	
Tertiary sector	-			-			-			-			-			-.01	.02		-.01	.02	
Unemployment rate	-			-			-			-			-			-.02	.02		-.02	.02	
FLPR	-			-			-			-			-			-.01	.01		-.02	.02	
CMR	-			-			-			-			-			-			.01	.06	
IHI	-			-			-			-			-			-			-.34	.21	*
Constant	-2.52	.04	***	-18.37	2.05	***	-15.03	2.11	***	-15.28	2.19	***	-15.25	2.19	***	-14.44	2.24	***	-14.36	2.42	***
σ_u	.24	.09	***	.29	.09	***	.28	.09	***	.33	.09	***	.33	.09	***	.34	.09	***	.32	.09	***
-2 Log likelihood[c]	5316		-	5221		***	5136		***	5058		***	5058			5051			5047		

Note:

[a] Reference category: vocational degree.

[b] Reference category: agglomeration.

[c] Significance test for –2 Log likelihood compared to the previous model.

Significance: *<.10; **<.05; ***<.01

Source: GSOEP 1984-1999, DJI Regionaldatenbank, Statistik regional 1999, author's calculations

Table 4: 'First birth' – Results of multilevel discrete-time logit models, 1984 to 1999

	Model 1			**Model 2**			**Model 3**			**Model 4**			**Model 5**			**Model 6**			**Model 7**		
	β	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*	*β*	*s.e.*	*Sig.*
Age	-			.92	.11	***	.75	.12	***	.37	.12	***	.38	.13	***	.39	.13	***	.39	.13	***
Age squared	-			-.02	.00	***	-.01	.00	***	-.01	.00	***	-.01	.00	***	-.01	.00	***	-.01	.00	***
In education[a]	-			-			-1.53	.19	***	-.86	.20	***	-.84	.19	***	-.84	.20	***	-.84	.20	***
No degree[a]	-			-			.33	.09	***	.13	.09		.13	.09		.13	.09		.13	.09	
University degree[a]	-			-			-.15	.13		.14	.14		.17	.14		.18	.14		.18	.14	
Marital status	-			-			-			2.55	.08	***	2.55	.08	***	2.55	.08	***	2.55	.08	***
Foreigner	-			-			-			.06	.09		.09	.09		.11	.09		.11	.09	
Urbanized area[b]	-			-			-			-			.09	.09		.10	.09		.09	.10	
Rural area[b]	-			-			-			-			.21	.10	**	.20	.11	*	.17	.11	
Child care	-			-			-			-			-			-.00	.00		-.00	.00	
Tertiary sector	-			-			-			-			-			-.01	.01		-.01	.01	
Unemployment rate	-			-			-			-			-			-.00	.01		-.00	.01	
FLPR	-			-			-			-			-			-.01	.01		-.01	.01	
CBR	-			-			-			-			-			-			.01	.05	
IHI	-			-			-			-			-			-			.03	.17	
Constant	-2.50	.04	***	-15.34	1.52	***	-12.68	1.56	***	-8.10	1.62	***	-8.28	1.69	***	-7.58	1.70	***	-7.71	1.77	***
σ_u	.25	.06	***	.29	.06	***	.25	.06	***	.00	-		.00	-		.00	-		.00	-	
-2 Log likelihood[c]	7251		-	7135		***	6983		***	5822		***	5817		*	5813			5813		

Note:

[a] Reference category: vocational degree.

[b] Reference category: agglomeration.

[c] Significance test for –2 Log likelihood compared to the previous model.

Significance: *<.10; **<.05; ***<.01

Source: GSOEP 1984-1999, DJI Regionaldatenbank, Statistik regional 1999, author's calculations