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on the risk of divorce: Evidence from German data**

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Effect of labor division between wife and husband on the risk of divorce: Evidence from German data

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Abstract

Using German panel data from 1984 to 2007, we analyze the impact of labor division between husband and wife on the risk of divorce. Gary Becker's theory of marriage predicts that specialization in domestic and market work, respectively, reduces the risk of separation. Traditionally, the breadwinner role is assigned to the husband, however, female labor force participation and their wages have risen substantially. Our results suggest that there are gender-specific differences, e.g. female breadwinner-couples have a substantially higher risk of divorce than male breadwinner-couples. In contrast, the equal division does not significantly alter the probability of separation.

Keywords: Divorce, Labor Division, Germany

JEL-Classification: J12, J22

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1 Introduction

In most developed countries, divorce rates have increased dramatically during the last decades. At the same time, labor force participation of married women rose substantially. The question to what extent these two developments are related has widely been neglected by economists. However, Becker et al. (1977) already suggest a positive relationship between female labor force participation and risk of divorce in their work on marital stability. Their analysis is based on Becker's theory of marriage (Becker (1973, 1974)) that hypothesizes that specialization of the two spouses in housework on the one hand and market work on the other hand constitutes the most important factor to gains from marriage compared to staying single. Therefore, the one with the higher wage earnings capacity should specialize in market work, whereas the other one should specialize in doing housework. Due to their higher gains from marriage, these specialized couples should consequently have a lower risk of divorce than couples where both spouses are employed.

In principle, the theory is gender-neutral. It should not matter whether the husband or the wife participates in the labor force as long as he or she is able to derive a higher wage income. Nevertheless, the breadwinner role is usually assigned to the husband. One reason is probably that, on average, men still earn more than women. However, despite the high female labor force participation and that egalitarian gender attitudes have become more common today, husbands are also still expected to take on the provider role for his family by many people. Consequently, couples with a husband earning less than the wife are more likely to be frustrated or to be subject to social sanctions that in turn leads to a higher probability of separation. Moreover, while we observe a higher female labor force participation today than in the past, housework is still primarily the wife's domain (see e.g. Bittman et al. (2003); Hersch and Stratton (1994)). If one spouse is exposed to the double burden of domestic and market work, this additional stress and the lack of spouse's support are also very likely to reduce marital stability.

Since the Becker approach implies some strong assumptions, bargaining models have been proposed (e.g. Manser and Brown (1980); McElroy and Horney (1981)). Usually, the division of household goods is not symmetric

but depends on the two spouses' outside options and the relative bargaining power. Both are largely affected by the individual's income.

Our questions of interest are whether the labor division between wife and husband has any impact on marital stability and in what respect. Is specialization really stability-enhancing? If so, can we observe differences between the traditional specialization "housewife, working husband" and the non-traditional "househusband, working wife"? Does the modern equal division imply a higher risk of separation? Previous empirical analyses by economists and particularly sociologists are usually restricted to the impact of the wife's income relative to the total household income. The first group of studies find a positive relationship between this ratio and the probability of divorce, e.g. Kesselring and Bremmer (2006); Liu and Vikat (2004); Booth et al. (1984). That is, the higher the wife's income proportion, the higher the risk of separation. A second group of analyses does not find any statistically significant effect. Examples are Sayer and Bianchi (2000), Tzeng and Mare (1995), and Spitze and South (1985). Concerning the behavior of German couples only a few empirical studies exist that are usually limited to the effect of wife's employment status (e.g. Böttcher (2006), Ott (1992)). Hartmann and Beck (1999) provide a more elaborated evaluation of the relationship between wife's employment and marital stability. They conclude that it also matters whether the wife earns more than the husband, and whether there are conflicts about the division of housework or about time spent together. Stauder (2005) instead concentrates on the effect of the division of market and domestic work after childbirth. He finds that marital stability is only significantly diminished if the wife bears the double burden of market and domestic work.

Using a rich panel data set from the German Socio-Economic Panel (SOEP) from 1984 to 2007, we try to shed new light on these issues. For our analysis of divorce determinants, we use complementary log-log (cloglog) regression models with couple-specific random effects to control for unobserved heterogeneity. Our SOEP-sample consists of West German couples only that are observed from the beginning of their marriage onwards until separation or right-censoring. The analyses focus on the effects of labor division-patterns, nevertheless, various other factors are also controlled for like the presence of

children of different ages or education that may influence the risk of divorce as well as labor division patterns.

In order to test the effect of specialization, we do not just consider the wife's labor force status. We define the wife's labor income as proportion of total household income on the one hand and her proportion of total time used for housework on the other hand as variables of main interest. As indicator for market work, we use income instead of hours worked because we think that, for our purpose, the economic success is more important than time used. Moreover, it is consistent with Becker's household model.

Our results suggest that the labor division can have an effect on the risk of divorce but specialization per se is not stability-enhancing. We rather find gender-specific differences. Couples with a female main earner and a husband doing most of the housework have a substantially higher probability of separation than couples with the traditional male breadwinner/housewife-pattern. Marital stability is also considerably reduced if the wife has to bear the double burden of market and housework which we cannot find if the husband bears it. In contrast, the equal division does not significantly alter the risk of divorce.

The paper is structured as follows. Section 2 contains a discussion about the determinants of marital stability in the context of the two most important theoretical frameworks. Section 3 reviews the relevant empirical literature, whereas section 4 describes the empirical approach and the data we use. In section 5, empirical results are presented. Conclusions are given in section 6.

2 Theoretical discussion on the effects of spousal labor division on marital stability

There are two classes of theoretical frameworks modeling the decision-making of a family. So-called *unitary models* or *traditional household models* assume a joint utility function for all household members, whereas the second class is based upon bargaining theory.¹

¹For a more detailed review of theories of family decision-making, see e.g. Bergstrom (1997).

In the following, the two types are shortly presented in the context of marital stability. Focus is on the models' predictions concerning the relationship between the risk of divorce on the one hand, and labor division on the other hand. Nevertheless, other factors are also discussed since they likely have an influence on labor supply and wage earnings capacity, e.g. children or education.

2.1 Unitary models

With his "Theory of Marriage" and later extensions (Becker (1973, 1974); Becker et al. (1977)), Gary Becker provided a framework that is still the basis for many analyses concerning the behavior of families.

The main implication of his model is that the family acts as if it were maximizing a joint utility function that incorporates the preferences of all family members.² Utility only depends on household commodities like children, love, and affection. They are produced within the household with market goods and time of household members as input factors. Their productivity is influenced by environmental variables like household's human capital or individuals' health status. The model implies that two persons marry when the expected utility from being married exceeds the expected utility from remaining single. Analogously, married couples separate when the expected utility from remaining married falls below the expected utility from divorcing and possibly remarrying. One reason for this turnover in expected utilities can be an unpredictable change in personal traits of the spouse that may cause the partner to reconsider his or her marriage decision. Thus, in such a stochastic framework, the probability of divorce depends on the expected gains from marriage and the distribution of unanticipated gains/losses from marriage. One objective of the model is to find characteristics and spousal combinations that minimize this probability of divorce by influencing the gains from marriage and their uncertainty. For example, it is usually assumed that uncertainty is reduced by a longer search duration on the marriage market. A longer or more intensive search should enhance the match quality because an individual gathers more information

²In his work about social indifference curves, Samuelson (1956) assumed this behavior for families already.

about potential mates and own preferences concerning the optimal partner. In empirical estimations, this factor is usually captured by age at the time of marriage. A higher age at marriage should stabilize a relationship because it usually implies a longer search history.

However, in his model, Becker emphasizes the expected gains from marriage. They do not only rely on economies of scale by joining households. The main factor is the complementarity of a man and a woman in the home production of household commodities. Thus, these gains rise with increasing complementarity of inputs, namely market goods and time. This implies that the one with the higher wage earnings capacity should specialize in market work so that the household can afford more market goods. The other one should use his or her time for home production. This specialization gain is larger the higher the wage difference between the two spouses. Moreover, specialization implies a mutual dependence between the two mates. According to Becker, this aspect is the major incentive for partners to marry and, in the periods following, to stay together. Thus, every factor that makes the division of labor between husband and wife less advantageous decreases the mutual dependence and therefore raises the risk of marital disruption. Hence, negative assortative mating concerning wage earnings capacity (or other factors that are close substitutes) is optimal.

In principle, Becker's theory is gender-neutral. However, the economic provider role is traditionally assigned to husbands and the homemaker role to wives. Consequently, the increase in educational attainment and labor market activity of women can be partially responsible for the rise in divorce rates in the last decades. By growing equalization of men and women, the incentives to marry and if married to stay together are reduced.

The aspect of preferences concerning the labor division between oneself and the spouse is problematic. Some may still prefer the traditional labor division, others may search for an egalitarian relationship, so that a priori the impact of actually chosen labor division is not clear. Moreover, if the choice does not meet the expectations of at least one spouse, because their preferences do not harmonize or because of bad labor market and child care conditions, the gains from marriage are reduced.

The Becker model considers children as marital-specific investments that stabilize a relationship. These commodities increase the gains from mar-

riage since they make divorce more costly and thus, lower the probability that it occurs. Nevertheless, it is often very difficult for wives to re-enter the labor market after childbirth, in particular given the small supply of child care in Germany (see Stauder (2005)). This results in unhappiness about the imposed labor division between her husband and her and thus, increases the risk of separation. In this case, the observed specialization does not lead to a higher marital stability but the contrary.

Becker also provides an extensive analysis of optimal sorting with respect to other factors. He finds that positive assortative mating, i.e. mating of likes, is optimal for all other characteristics that are no good substitutes for the wage earnings capacity. Hence, homogamy with respect to interests, age, etc. should stabilize a partnership. He further shows that, given positive assortative mating is optimal, gains from marriage are higher for persons with higher values of characteristics. The impact of education is not straightforward. A good education improves the opportunities on the labor market which in turn makes specialization less advantageous. Hence, high education can destabilize a relationship. However, individuals with higher education are supposed to be more intelligent than others. This might imply that they are better able to form expectations about their spouse and his or her future characteristics.³ Therefore, they are less likely to become disappointed. An alternative interpretation is that they are better able to find a partner who is suited for lifetime. Both explanations imply an inverse relationship between education and risk of divorce. Hence, the effect of education on marital stability is ambiguous.

Some of the main assumptions of the unitary framework are subject of criticism. For example, it is not explicitly modeled in which way the individual preferences are incorporated in the joint utility function, and pooling of income is difficult to justify if each family member has different outside options. Furthermore, in times of increasing education and labor force participation rates of married women it is questionable that specialization still (if ever) constitutes the most important part of the gains from marriage. Nevertheless, despite their limitations, unitary models are still often used due to their simplicity and less stringent data requirements.

³Thanks to Erwin Amann for stressing this point.

2.2 Models with household bargaining

The second class of models based on bargaining theory allow explicitly for conflicts of interest and provide a mechanism by which family behavior is formed from individual preferences. It is distinguished between *cooperative* and *non-cooperative* bargaining solutions. Most popular is, however, the cooperative Nash-bargaining model which we present in the following. Some authors have questioned cooperative and have favored non-cooperative models. However, in our opinion, if marriage is not suited for a cooperative solution, then the Nash-bargaining solution may not be used for any situation. Members of a family should be able to make binding agreements. Nevertheless, Binmore et al. (1986) derive the Nash-bargaining solution as the approximation of a non-cooperative game and show that this solution has a quite general theoretical foundation.

As a solution to distributional problems between two players, 1 and 2, Nash (1950) presented the allocation of goods (x_1, x_2) that maximizes the product of the two persons' utility gains over the outcome in case of disagreement (s_1, s_2) :

$$\max_{x_1, x_2} (x_1 - s_1)^\beta (x_2 - s_2)^{1-\beta} \quad (1)$$

subject to

$$x_1 + x_2 = X. \quad (2)$$

The parameter β represents the relative bargaining power between the two spouses, whereas X stands for the output of a marital production process. The latter is defined as the output of home produced commodities (e.g. cooking, washing, child care) and consumption goods. In principle, both could be measured in monetary terms but often the home produced goods are not. The outcome in case of disagreement (s_i) is also called *threat point*. The definition of it is problematic and at the same time crucial for the outcome of these models. In their works about household decision-making in a bargaining framework, Manser and Brown (1980) and McElroy and Horney (1981) define the individual situation in case of divorce as the threat point. Even though the credibility of a divorce-threat is questionable in day-to-day

decisions its use in our analysis of divorce probabilities should be appropriate.⁴ Non-marketable goods like trust and mutual support are not included in X even though they are very important factors for a successful partnership.⁵ It can be assumed that they either do not require time as input but other resources or that the time invested in the production of these particular goods is not associated with disutility like working in the labor market. Nevertheless, if these goods are absent, living together with a partner could create a public bad instead of a public good. In these cases, a spouse makes forecasts about the permanence of this situation and evaluates the utility derived from monetary as well as non-monetary factors. Only if there does not exist a monetary compensation high enough for the unhappy situation marriage ends in divorce. Therefore, we restrict our analysis to monetary (observable) factors but keep in mind the existence of non-monetary causes of divorce.

Solving the above optimization problem with respect to x_1 and x_2 yield that, *ceteris paribus* within the Nash-bargaining framework, the advantages of being married compared to being single is:

$$x_1 - s_1 = \beta X - \beta(s_1 + s_2) \tag{3}$$

and

$$x_2 - s_2 = (1 - \beta)X - (1 - \beta)(s_1 + s_2). \tag{4}$$

It becomes obvious that the differences between the monetary values of the marriage and the outside options are determined by the relative bargaining power within marriage. Labor force participation and the associated wage income are usually regarded as important factor for the relative bargaining power. They should also raise the threat point so that divorce may be more likely if both spouses work than if one spouse depends economically on his or her partner. Moreover, the threat point is also determined by

⁴Other authors, e.g. Lundberg and Pollak (1993) as well as Konrad and Lommerud (1995), favor non-cooperative behavior within the household as the relevant threat point.

⁵Manser and Brown (1980) additionally include the partner's personal characteristics to the factors that determine the systematic utility of each individual. According to them, personal attributes of the partner like education may also affect the utility out of consumption.

the probability of finding a more suitable partner than the current one. It can be reasoned that a working spouse might not only have a higher risk of divorce due to his or her financial independence but also because of a higher probability to meet a more suitable partner. On the other hand, employment of both spouses leads to a higher family income and thus, to a higher systematic utility out of consumption for both. Thus, a priori, the effect of labor division is not clear. Similarly to the discussion in section 2.1, the aspect of preferences concerning the labor division (as modeled in Manser and Brown (1980)) is ambiguous.

3 Relevant previous literature

Our question of interest is related to the research on the relationship between female labor force participation and risk of divorce. This problem has been discussed more extensively among sociologists than economists. Since the associated hypotheses and estimation methods generally do not differ much between economists and sociologists we consider studies from both fields in the following literature review.

From the international perspective, it is quite common to use the wife's income as proportion of total household income as variable of main interest. With respect to the estimated effect of it the analyses can be divided into two groups. The first group consists of those studies that find a destabilizing impact of female's relative income. Early examples are Booth et al. (1984) and D'Amico (1983) (using wife's potential earnings). The second group does not find any statistically significant effect of this ratio. Examples are Tzeng and Mare (1995), Bumpass et al. (1991), and Spitze and South (1985). Tzeng and Mare (1995), however, find that a change in wife's earnings raises the probability of divorce which cannot be found for changes in husband's earnings. Similarly, Weiss and Willis (1997) suggest that an unexpected increase in wife's wage earning capacity destabilizes a marriage, whereas an unexpected increase in husband's wage earning capacity lowers the probability of divorce.

Oppenheimer (1997) reviews the relevance of the *independence hypothesis* which says that women's rising labor force participation has increased their

financial independence and has therefore reduced the value of marriage. Oppenheimer (1997) criticizes those studies that have found a positive relationship between the wife's income proportion and risk of divorce. She states that the independence hypothesis is based on the traditional gender-specific specialization and should not be relevant anymore for modern couples. However, some recent studies show the opposite. Kesselring and Bremmer (2006) (using a sample of the US Current Population Survey), Liu and Vikat (2004) (register-based data for Sweden), as well as Jalovaara (2003) (register-based data for Finland) find evidence for the independence effect despite the fact that Scandinavian countries usually stand for egalitarian gender attitudes. The authors show that if the female's earnings become a larger proportion of the total family income, the likelihood of divorce increases. This effect is not compensated by the stabilizing influence of a higher family income. Only Sayer and Bianchi (2000) confirm Oppenheimer's predictions after controlling for a huge set of indicators like demographic characteristics, children, marital duration, time spouses spent together, and a gender ideology index. Hence, empirical evidence concerning the effect of relative income is not clear.

Regarding the behavior of German couples, only a few empirical studies exist that can all be assigned to the German sociological literature. With the exception of Hartmann and Beck (1999) and Stauder (2005), all studies are limited to the effect of the employment status and refrain from analyzing the different aspects of being employed. Ott (1992) finds a significant destabilizing impact of female full-time employment for West German couples. Similarly, in her comparison of divorce probabilities in West Germany and the former GDR until 1990, Böttcher (2006) shows a positive relationship between female full-time employment and risk of marital dissolution for both countries. In contrast, Wagner (1997) finds this pattern only for the former GDR. For West Germany, there is no significant effect for couples that married before 1975 and even a stabilizing effect for marriage cohorts after 1975. Hartmann and Beck (1999) provide a more detailed evaluation of the relationship between female employment and risk of divorce using data from the Mannheim divorce study. They find that, controlling for her labor force status, if the wife earns more than her husband marital stability decreases significantly. However, by the inclusion of this dummy, the desta-

bilizing effect of her full-time employment is reduced. Conflicts about the division of housework and about time spent together also raise the divorce risk but do not alter much the effect of female employment. The higher propensity among full-time employed women to stay childless and to delay childbearing, respectively, is another destabilizing aspect related to full-time employment. Stauder (2005) concentrates on the influence of labor division between the two spouses after childbirth. Division is measured in time used for domestic and market work. According to his results, marital stability is significantly diminished if the wife has to bear the double burden.

In contrast to the majority of the existing literature, this paper considers not only the labor force status or the relative income but a combination of the relative income and the relative time used for housework. Thus, we include both aspects of specialization as modeled in Becker's theory of marriage. Unlike Stauder (2005), we do not restrict our sample to the time after childbirth and we use the financial aspect of employment, not the time.

4 Empirical approach

4.1 Complementary log-log model

Focus of our analysis is on the impact of certain explanatory variables on the conditional probability of getting divorced, i.e. the probability of getting divorced in time interval t given that the couple has not separated until then. In most cases a proportional hazard model like the Cox model is used for these kind of questions. However, for our analysis with grouped duration data discrete-time models are better suited since they do not rely on the assumption that at most one transition per period occurs. Several authors have considered the discrete-time variant of the continuous proportional hazard model (e.g. Kiefer (1988), Meyer (1990)). However, we follow an alternative approach and use a binary choice model since Sueyoshi (1995) has shown that the popular logit and probit models with period-specific dummy variables yield similar results to the discrete-time proportional hazard model. In fact, the cloglog model is perfectly equivalent to it (see Cameron and Trivedi (2005)) and therefore, we use this model with

marriage duration-specific dummy variables.⁶ The cloglog model is based on the type 1 extreme value distribution which is asymmetric in contrast to the logistic or standard normal distribution of the logit and probit model, respectively. This asymmetry makes cloglog models superior for the analysis of rare events like divorce.⁷ In order to consider the unobserved heterogeneity issue we estimate a random effects cloglog model.

Assuming a normal distribution, $N(0, \sigma_\nu^2)$, for the random effect ν_i of couple i , we estimate:

$$Pr(y_{i1}, \dots, y_{in_i} | \mathbf{x}_{i1}, \dots, \mathbf{x}_{in_i}) = \int_{-\infty}^{\infty} \frac{e^{-\nu_i^2/2\sigma_\nu^2}}{\sqrt{2\pi}\sigma_\nu} \left\{ \prod_{t=1}^{n_i} F(y_{it}, \mathbf{x}_{it}\boldsymbol{\beta} + \nu_i) \right\} d\nu_i$$

where

$$F(y, z) = \begin{cases} 1 - \exp\{-\exp(z)\} & \text{if } y \neq 0 \\ \exp\{-\exp(z)\} & \text{otherwise.} \end{cases}$$

The integral of the random effect component in our model is approximated by using adaptive Gauss-Hermite quadrature with 20 quadrature points. Refitting the model with different numbers of quadrature points did not yield substantial changes in the results.⁸

There is an intensive discussion on the effect of unobserved heterogeneity on the estimation of duration models (see e.g. Cameron and Trivedi (2005)). It is shown that the coefficients of the covariates are affected by it, however, handling this bias is difficult. Nicoletti and Rondinelli (2006) discuss the random effects complementary log-log model that we use. They find that this model is robust to a possible misspecification of the distribution of the unobserved heterogeneity.

⁶The addition of year dummies does not lead to any improvement.

⁷However, results do not differ qualitatively if we use a logit or probit model.

⁸For more details about the approximation method, see e.g. Liu and Pierce (1994) or in the context of random effects logit models, see Rabe-Hesketh and Skrondal (2008).

4.2 Sample

Our data is taken from the West German sample of the SOEP, waves 1984 to 2007.⁹ The advantage of this data is the availability of a rather long time series of 24 periods and numerous control variables.¹⁰ We only include couples that marry during the observation period so that we are able to follow a couple from the beginning of the marriage onwards until they separate/get divorced (whichever is stated first) or until observations are right-censored. In the following, we do not distinguish between separation and divorce and use them interchangeably.

Even though it would be very interesting to extend this analysis to both parts of Germany we restrict it to the West for two reasons. First, in the former GDR it was a social norm for women to work even after childbirth. Along with the ideological pressure, a low wage level, strong eligibility requirements for widow's pension, and restricted possibilities to claim alimony from the (former) husband in case of divorce forced women into full-time employment (see Berghahn and Fritzsche (1991)). Public provision of cheap and extensive child care for children of all ages made it possible to work full-time even after childbirth. In contrast, in West Germany, the lack of child care, incentives by the income tax system and stigmatization of working mothers have made it advantageous for wives to stay at home or to work at most part-time. Therefore, it is not reasonable to pool West and East German couples since the differences in female labor force participation and provision of public child care have continued to exist even after reunification.¹¹ Second, given our strategy to look only at couples that marry during the observation period, the sample of East German couples is too small to get reasonable estimates in separate regressions. Consequently, we only look at the effect of labor division on the probability of divorce of West German couples.

⁹The data used in this paper was extracted using the Add-On package PanelWhiz v2.0 Nov. 2007 for Stata. PanelWhiz (<http://www.PanelWhiz.eu>) was written by Dr. John P. Haisken-DeNew (john@PanelWhiz.eu). See Haisken-DeNew and Hahn (2006) for details. The PanelWhiz generated DO file to retrieve the data used here is available from us upon request. Any data or computational errors in this paper are our own.

¹⁰For more information on the SOEP see, e.g., Wagner et al. (2007).

¹¹For more information on family policies in West and East Germany, see e.g. Braun et al. (1994); Cromm (1998); Kreyenfeld (2004).

Another sampling problem is the treatment of the unemployed. In our opinion, a specific labor division induced by unemployment of one spouse is a special case. Losing the job is usually an unwanted, negative shock that affects the financial situation of the family as well as self-esteem and self-confidence of the individual concerned. In order to avoid mixing up different effects, we drop those observations in which at least one spouse is unemployed.¹²

We further restrict our data set to couples where both spouses are in the age range from 18 to 65 at the time of marriage. Ultimately, the sample consists of 1,128 couples with 8,758 couple-years and 204 divorces and separations (see table 1). Hence, the observed probability of divorce is 2.33 % per year, and 18.09 % of the couples finally separate. We do not only look at first marriages but remarriages as well: For 34.75 % of the couples, at least one spouse does not marry for the first time.

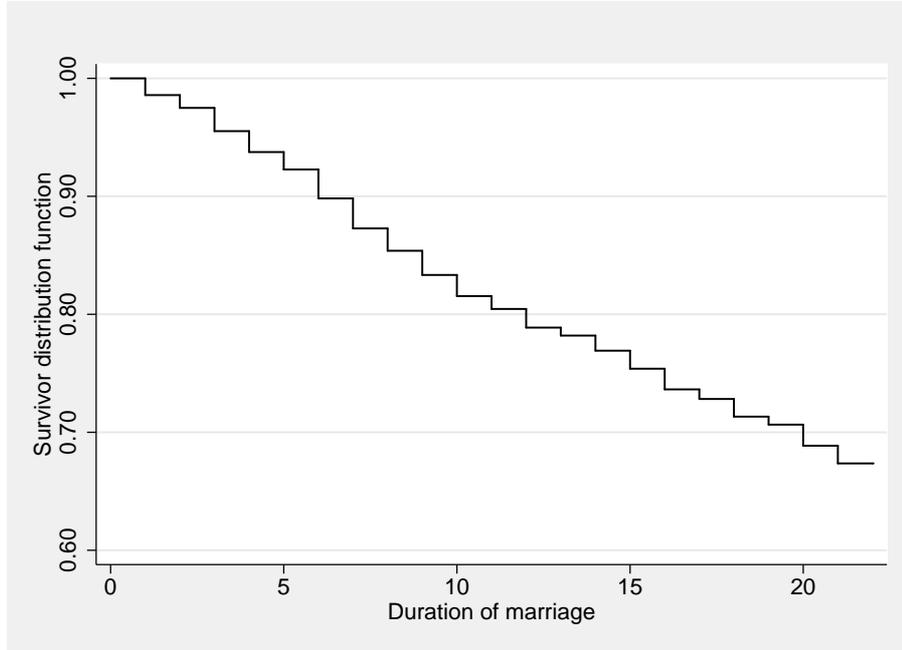
Table 1: Transitions

State of origin	Destination				Total
	Married	Separated	Divorced	Widowed	
Married	8,544	158	46	10	8,758

Figure 1 illustrates the Kaplan-Meier survivor function for the sample. It estimates the conditional probability of remaining married by period t given that the couple has not separated until t . We see that the probability of remaining married decreases by about five percentage points within the first three years of marriage. The largest drops occur between the years five and seven, and years eight and nine. After a marriage duration of ten years, the probability to stay together is 81.5 %. After the maximum observation time of 22 years, the likelihood to stay married is still 67 %.

¹²Nevertheless, our results are robust to the inclusion of the unemployed.

Figure 1: Kaplan-Meier survivor distribution function



4.3 Explanatory variables

4.3.1 Labor division

We estimate the probability of divorce in period t given explanatory variables in $t - 1$: $Pr(y_{it} \neq 0 | \mathbf{x}_{i,t-1})$. However, we deviate from this definition regarding our labor division variables. Labor market behavior can be largely influenced by the subjective probability of divorce (see Johnson and Skinner (1986)). Therefore, we expect a change in working behavior in the preceding years to divorce, in particular by women, if an individual already suspects separation. This would be then a case of reversed causality which would bias our estimates. For that reason, we use lagged variables of period $t - 3$ instead of $t - 1$ to circumvent this problem.

In order to find the effect of spousal labor division on the risk of divorce we define five labor division-patterns depending on the wife's proportions of total household income and total time used for housework.¹³ Therefore, we

¹³With this strategy we follow Stauder (2005) who uses time used for market and domestic work, respectively, to generate five different labor division patterns.

first generate the wife’s monthly gross labor income (wage plus income from self-employment) as proportion of the household’s monthly gross income to measure her economic success relative to the husband’s.¹⁴ We think that the financial aspect of labor force participation is in this case more important than hours worked. Moreover, it is consistent with Becker’s household production function that defines market goods, financed by wage income, and time use as input factors (see section 2.1).

Figure 2: Distribution of wife’s proportion of gross income

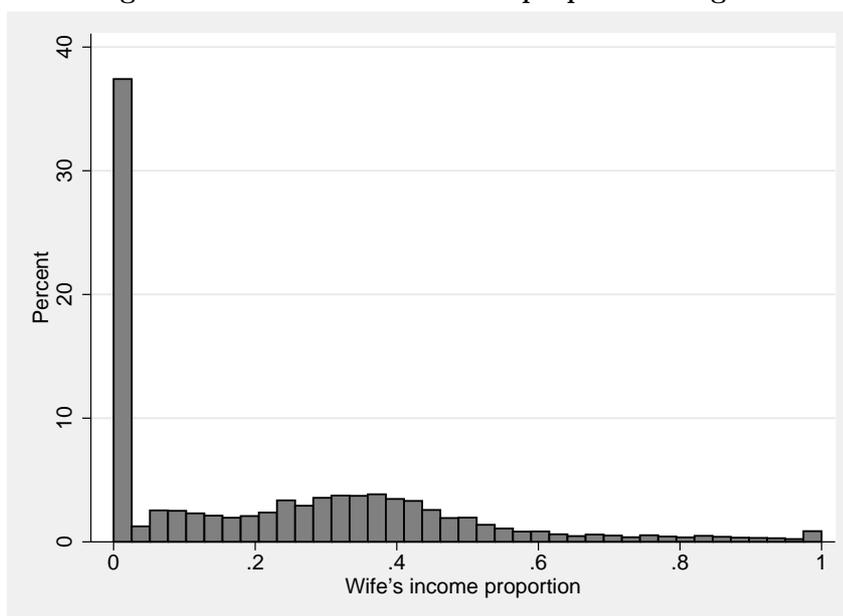
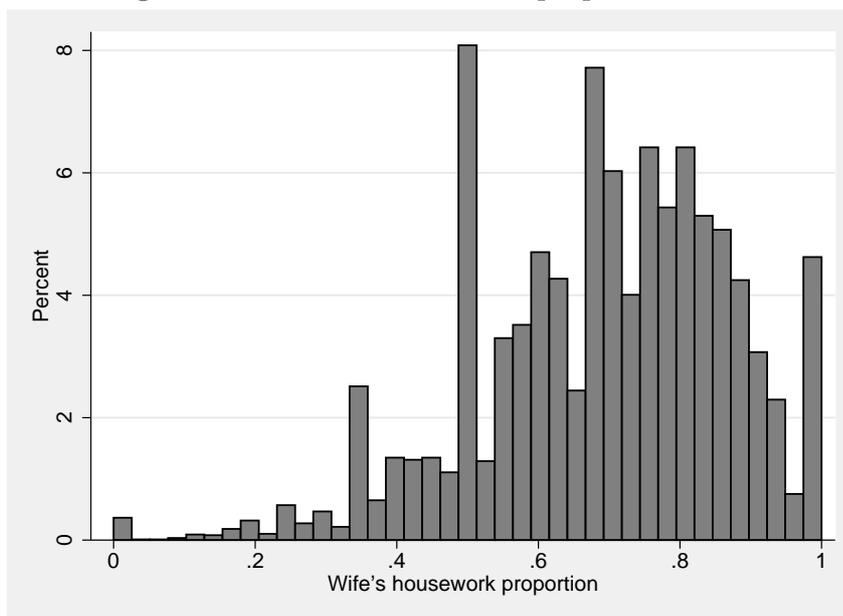


Figure 2 illustrates the distribution of the wife’s proportion of the household’s gross income. It shows that in the majority of observations the wife

¹⁴We decide to take the gross instead of the net income because of the special regulations for married couples in the German tax system. If the gross wage income of both spouses differ, the one with the lower income (usually the wife) pays a relatively high tax prepayment compared to his or her spouse since all tax allowances are assigned to the one with the higher income. This reduces the couple’s overall sum of tax prepayments. However, it makes a direct comparison of net incomes unfeasible since they suffer from a systematic distortion by the German taxation. For an example, see e.g. Bundesministerium der Finanzen (2008).

does not contribute any labor income to the household's income (36.94 %) or only a small fraction. In contrast, in only 0.67 % of all observations, the husband does not contribute. For 14.76 %, husband and wife earn roughly the same, i.e. the wife's proportion is between 40 % and 60 %.

Figure 3: Distribution of wife's proportion of housework



As second element of labor division, we generate the wife's proportion of total time used for housework. "Housework" is an aggregate that subsumes time used for housework (in a narrower sense) and shopping, for child care, and for crafts, repairs, and gardening.¹⁵ We prefer the aggregate to the narrow definition of housework since there may be an additional gender-specific specialization within housework chores which is, however, not part of our analysis.

Analogously to gross income, figure 3 shows the distribution of the wife's proportion of total time used for housework. In this case, the distribution has not such an extreme peak. The mode of the sample is the equal sharing of housework (8 %). However, as expected, the wife's proportion is usually

¹⁵The SOEP asks for these activities separately.

higher than the husband's. In 72.22 %, the percentage is higher than 60 %. In 4.56 % of all observations, the wife is solely responsible for the housework, whereas in only 0.37 % the husband is.

In a next step, we define three groups of wife's income and housework proportions, respectively: The wife's proportion makes up 0 to 40 %, 40 to 60 %, or more than 60 %.¹⁶ Then, we combine these income and housework-patterns with each other and generate five labor division combinations for our regressions:

1. Traditional labor division: wife's housework proportion is larger than her income proportion;
2. Non-traditional: wife's income proportion is larger than her housework proportion;
3. Equal: wife's and husband's shares are virtually the same;
4. Double burden husband: wife's housework and income proportions are both smaller than the husband's;
5. Double burden wife: wife's housework and income proportions are both larger than the husband's;

Table 2: Income and housework combinations

Wife's income prop.	Wife's housework prop.		
	0.00-0.40	0.40-0.60	0.60-1.00
0.00-0.40	double b. husb.	trad.	
0.40-0.60	non-trad.	equal	trad.
0.60-1.00	non-trad.		double b. wife

Table 2 illustrates how the nine possible combinations of wife's income and housework proportion are assigned to these five groups.

¹⁶Our results do not change substantially if we use intervals 35 % to 65 % or 30 % to 70 %.

Table 3: Descriptives of labor division variables

Variable	No. of obs.	in %
Traditional	7,187	82.06
<i>of which:</i>		
<i>Trad 1: wife's prop. = 0 %</i>	3,209	36.64
<i>Trad 2: wife's prop. < 40 %</i>	3,978	45.42
Non-traditional	540	6.17
Equal	500	5.71
Double burden husband	236	2.69
Double burden wife	295	3.37
Total no. of observations	8,758	

All variables refer to period t-3.

Table 3 shows the distribution of these combinations in our sample. For 82.06 % of all observations the traditional labor division can be found, whereas the non-traditional and the equal one can only be observed in 6.17 % and 5.71 % of all couple-years, respectively. As expected, there are only a few observations where one spouse is mainly responsible for both, earning income and doing housework. In 2.69 %, the husband bears the double burden, whereas in 3.37 % the wife does so. The traditional pattern is the reference group in regression (1).

Since the non-working wives constitute such a large group in our sample we subdivide the pattern of traditional labor division. There may be a difference between wives that earn nothing and wives that earn at least some money. Therefore, we differentiate between wives with zero income and a housework proportion larger than 40 % (*Trad 1*), and wives with some income lower than 40 % and a housework proportion at least 40 % (*Trad 2*). *Trad 1* is the reference group in regression (2).

4.3.2 Additional explanatory variables

In addition to the above mentioned labor division variables, we include a set of important variables that are very likely to have an effect on the risk of divorce. Some are also related to our labor supply variables. In the following, we briefly explain their definition, descriptive statistics are given in table 4.

First, in addition to the wife's income proportion, we also include the household's total gross income to control for level differences. Two other important aspects are education and the presence of children. Concerning education, we follow Blossfeld and Timm (2003) and define three hierarchical education levels:

1. "Low": No schooling degree or *Hauptschul-* or *Realschul-*degree, without vocational degree;
2. "Medium": No schooling degree or *Hauptschul-* or *Realschul-*degree, but with vocational degree or *Abitur/Fachhochschulreife*, with or without vocational degree;
3. "High": University degree or degree of university of applied sciences.

These three levels should reflect the main differences in labor market opportunities and earnings capacities as well as regarding their cultural resources (Blossfeld and Timm (2003)). Moreover, the educational level also captures (at least in parts) the preference concerning the labor division. Women with higher human capital investments should be less likely to prefer the traditional division of work. Reference group in our estimations are low-educated spouses, respectively.

The presence of children is a very important factor in the labor supply decision of men and particularly women. Therefore, we include the number of children of different ages in our regressions. We distinguish between age 0–1, 2–7, and 8–15, however, we do not differentiate between own, adoptive and children from previous relationships. Since there may be differences in the supply of child care that in turn would affect female labor supply, we also consider a dummy for living in a city center. Nevertheless, urban life

may also increase the risk of divorce because of the higher probability to meet a better match.

Additional controls are age at marriage, the absolute age difference, a dummy variable if it is not the first marriage for at least one spouse, and marriage duration dummies.

Table 4: Descriptive statistics of additional explanatory variables (all couple-years)

Variable	Mean	Std. Dev.
For at least one spouse not first marriage	0.34	0.47
H: Age at marriage	31.92	7.96
W: Age at marriage	29.24	7.19
Absolute age difference	3.91	3.79
Live in city center	0.08	0.28
H: High-educated	0.20	0.40
H: Medium-educated	0.72	0.45
H: Low-educated	0.08	0.27
W: High-educated	0.11	0.31
W: Medium-educated	0.76	0.43
W: Low-educated	0.13	0.34
No. of HH members age 0–1	0.12	0.34
No. of HH members age 2–7	0.64	0.78
No. of HH members age 8–15	0.45	0.76
HH's gross income in 1,000 Euro of 2000	3.87	2.42
Total no. of observations	8,758	

1) "H:" stands for husbands, "W:" for wives, "HH" for household.

2) All variables refer to period t-1 except household's gross income.

5 Results

Table 5 shows all coefficients of our random effects-cloglog estimations. In regression (2), we further distinguish between the two cases of the traditional pattern when the wife has no income (reference group) and the wife earns

some money (Trad 2). Standard errors are given in parentheses. Since we estimate a random effects-model, table 5 also includes ρ , the proportion of the total variance that is contributed by the panel-level variance. It ranges from 0.45 to 0.47. The hypothesis that $\rho = 0$, which would imply that the random effects estimator is not significantly different from the pooled estimator, can be rejected on a 5 % significance level. In the following, we will first briefly discuss the results for the other control variables, and then interpret the estimated effects of our labor division-patterns on the risk of divorce in more detail.

Our results suggest that remarriages have a lower risk of separation than first marriages. However, the effects are not statistically different from zero. The same holds for age at marriage. As theory predicts, the coefficients are negative, i.e. the older someone is at the time of marriage, the more stable the relationship is. However, as the dummy for remarriages, the effects are in either case not significant. Nevertheless, the age difference between two spouses is a relevant factor. Heterogamy with respect to age has a destabilizing effect. Similarly, as expected, city life lowers marital stability considerably. The effect of education was a priori not clear. On the one hand, high education improves outside options. On the other hand, high-educated individuals are likely better able to form expectations and have therefore a lower risk to become disappointed. In our sample, the latter dominates, in particular for husbands. Medium- and high-educated people have a lower risk of divorce than the reference group of low-educated ones. The predicted stabilizing effect of children as marital investments can be found for newborn and small children, however, the latter is not significantly different from zero. For older children we find a destabilizing effect which we cannot explain with a marriage duration effect since we include marriage duration dummies in our regressions (see section 4.1). Maybe spouses do not stay together just for the sake of the children if those have reached a certain age. Moreover, household's total gross income has a positive but insignificant effect on the risk of separation.

Of main interest is, however, the impact of labor division on the risk of divorce. We see that two patterns do positively affect the risk of divorce, whereas the others only have a relatively small and insignificant effect. The

Table 5: Coefficients of RE-cloglog-estimations

	(1)		(2)	
Equal division, t-3	0.1868	(0.3004)	0.3691	(0.3335)
Non-trad. division, t-3	0.5525**	(0.2735)	0.7277**	(0.3082)
Double b. husband, t-3	-0.4541	(0.5311)	-0.2607	(0.5530)
Double b. wife, t-3	0.7594**	(0.3235)	0.9315***	(0.3532)
Trad 2, t-3			0.2599	(0.2009)
Not first marriage	-0.0141	(0.2111)	-0.0341	(0.2150)
H: age at marriage	-0.0075	(0.0208)	-0.0069	(0.0212)
W: age at marriage	-0.0132	(0.0207)	-0.0112	(0.0212)
Absolute age difference	0.0499*	(0.0256)	0.0502*	(0.0261)
Live in City	0.7948***	(0.2302)	0.8084***	(0.2333)
H: high educ	-0.7021**	(0.3540)	-0.7113**	(0.3588)
H: med educ	-0.4656*	(0.2665)	-0.4826*	(0.2702)
W: high educ	-0.2981	(0.3895)	-0.3265	(0.3963)
W: med educ	-0.2569	(0.2353)	-0.2697	(0.2388)
No. of HH members age 0-1	-0.8766***	(0.3074)	-0.8652***	(0.3083)
No. of HH members age 2-7	-0.0762	(0.1200)	-0.0216	(0.1271)
No. of HH members age 8-15	0.2405*	(0.1266)	0.2558**	(0.1283)
HH gross income, t-3	0.0447	(0.0334)	0.0386	(0.0349)
Constant	-2.8445***	(0.6695)	-3.1310***	(0.7195)
No. of obs.	8,758		8,758	
No. of couples	1,128		1,128	
ρ	0.44872		0.47020	
p-value $H_0 : \rho = 0$	0.028		0.020	
Log-likelihood	-931.823		-930.969	

1) Standard errors in parentheses.

2) *: $p < 0.10$, **: $p < 0.05$, ***: $p < 0.01$.

3) "H": husband, "W": wife, "HH": household.

4) Results of marriage duration dummies not presented.

5) Reference groups: Low educated; Traditional/Trad 1.

most striking result is that couples with a wife bearing the double burden have a substantially higher risk of divorce than couples with a male breadwinner and a housewife. Similarly, if the wife is the main earner and the husband does most of the housework, marital stability is considerably diminished. If both spouses share equally the jobs of earning income and doing housework, the risk of divorce is not substantially affected compared to the traditional labor division. In contrast, if the husband bears the double burden, marital stability is even enhanced, however, the effect is not significant. If we further subdivide the group with a traditional labor division, we find similar results for the first four patterns. The effects are, however, usually stronger. If the wife works but earns less than 40 %, marital stability is not significantly altered compared to if she does not work.¹⁷

Thus, labor division does matter but specialization per se is not stability-enhancing. We rather find gender-specific differences. On the one hand, specialization has only a stabilizing effect if the traditional labor division between husband and wife is chosen. On the other hand, if the wife bears the double burden the risk of divorce is much higher unlike if the husband does it. Given that about 2/3 of divorces in Germany are initiated by women (see Bundesministerium für Familie, Senioren, Frauen und Jugend (2003)), one could think that financial independence is a necessary precondition for her to do so. Since the effect of "Trad 2" is not significant, her income must exceed a certain threshold for financial independence. However, the insignificant result for the equal division contradicts this interpretation. Frustration of one or both spouses that the wife is the main earner and not the husband as traditionally expected seems to be a better explanation for our findings. Moreover, the husband's self-esteem might be adversely affected by her economic success.

¹⁷If we assign those couples with wife's income proportion 40 to 60 % and housework 0 to 40 % or 60 to 100 % to the double burden groups, respectively, we still find the destabilizing effect of non-traditional and double burden wife couples. If we separate those of the non-traditional couples and those of the traditional couples who have an income proportion 40 to 60 %, the coefficients for the two non-traditional groups are still positive and weakly significant. The lower significance can probably be attributed to the small number of observations (366 and 174).

6 Conclusions

Using a rich panel data set of German couples, we test the hypothesis that specialization in market work and housework, respectively, increases marital stability. Gary Becker assumes that gains from marriage mainly result from the complementarity of man and woman in the production of home commodities. Therefore, one spouse should specialize in earning money (traditionally the husband), and the other one should specialize in doing housework (traditionally the wife) in order to reduce the risk of divorce. However, it is questionable whether this aspect still (if ever) matters. Nowadays, it is quite common for married women to work in the labor market. Moreover, some families rely on her income, at least temporarily, since job histories of men are increasingly characterized by breaks with spells of unemployment. In addition, only recently, German policy-makers reformed parental leave-regulations in such a way that fathers have an incentive to take a share of the legal parental leave. Thus, the traditional labor division with a working husband and a housewife should be less prevalent and consequently less relevant for marital stability.

Our data set provides rich information for both spouses about e.g. labor force status, income, children, and time used for housework. Hence, we are able to test for the effect of actual labor division on the risk of divorce. We show that it matters who does what. While the equal division does not significantly alter the risk of divorce, couples with a female breadwinner and a househusband have a higher risk of divorce than couples with a male main earner and a housewife. Hence, specialization per se does not enhance marital stability, only the traditional one. Marital stability is also substantially reduced if the wife bears the double burden which we cannot find for husbands. Our results suggest that frustration that the wife is the main earner and not the husband (so that the wife could stay at home) as traditionally expected substantially reduces the gains from marriage.

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