Unemployment and marital dissolution *

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Abstract. This paper analyses the effects of unemployment on the probability of marital dissolution. Based on panel data for a sample of Danish married couples, we estimate a dynamic model for the probability of marital dissolution where we take into account the possible effects of unemployment for both spouses. We also control for other factors such as education, age, presence of children, place of residence, health and economic factors. The empirical results show that unemployment seems to be an important factor behind marital instability. However, only unemployment of the husband has an effect, and this effect is immediate.

1. Introduction

Unemployment has a variety of social and individual costs and consequences, many of which are not normally recognized. The individuals hit by unemployment may be suffering more serious health problems, they may have a higher probability of marital dissolution, or they may even be more prone to commit crimes. Here we focus on the effects of unemployment on the probability of marital dissolution.

The literature on marital instability, whether theoretical or empirical, has been rather sparse when the main concern is on the effects of unemployment, whereas it has been abundant when other determinants of marital dissolution are considered. In this paper, we provide some empirical evidence with the hope of filling part of the gap.

In Denmark the annual divorce rate has been steadily growing for the last 25 years, reaching its highest level ever during the eighties. The divorce rate has increased from 0.5% in 1965 to 1.3% in 1987, although the marriage rate has decreased during the same period from 8.1% to 3.5% due to a widespread occur-

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rence of cohabitation[1]. Unemployment has also been high during the eighties, and even though we do not analyse trends in the divorce rate, this may indicate an effect of unemployment. There may be many explanations behind the development, and unemployment is only one of these possible explanations.

Based on panel data for a sample of Danish married couples, we estimate a model for the probability of marital dissolution[2] where we take into account the possible effects of unemployment for both spouses. We test whether the unemployment experience for the two spouses has a symmetric or an asymmetric effect on the probability of marital dissolution, and whether there is an interaction effect. Since our prime interest is the "pure" effects of unemployment on the probability of marital dissolution, we control for other factors that may influence this probability such as education, age, the presence of children, place of residence, health and economic factors. Some of the effects, as for instance the effects of health or unemployment, may not be immediate or they may accumulate, hence we estimate a dynamic model.

Some theoretical considerations behind the specification of the empirical model for the probability of marital dissolution are discussed in Sect. 2 of the paper together with the findings of previous empirical studies. Sect. 3 gives a brief description of the data. In Sect. 4 the empirical model is specified and the estimation results are presented and discussed. Finally, Sect. 5 contains some concluding remarks.

2. Theoretical considerations and previous results

There are numerous determinants and explanations of divorces, and some of them are related to economics, while others are more related to demography, sociology, or psychology. Many of the rigorous theoretical models put forward in the economic literature concentrate on specific aspects of these determinants, and hence they may not be able to explain more than a small part of the reasons behind divorces. In this section, we will briefly review some of the implications of the models presented in the literature, with the primary purpose of indicating some of the factors that should be included in the empirical analysis of marital dissolution.

The economic analysis of marriage and divorce is typically based on a neoclassical model with expected utility maximization as the main element. The foremost examples of this type of analysis of marital instability are given by Becker, Landes and Michael (1977) and by Becker (1981). The basic idea is that couples divorce when the expected utility from remaining married falls below the expected utility from divorcing. This analysis has a number of implications about the effects of income, education, age at marriage, number of children, etc. on the probability of marital dissolution. The gains from marriage depend on the degree of specialization between the spouses. If one of the spouses specializes in housework and the other specializes in market work, the gains from marriage are expected to be higher than without this division of labour. This is also closely

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[1]   The divorce rate is defined as the number of divorces during the year as a percentage of the number of existing marriages, while the marriage rate is the number of new marriages during the year as a percentage of the number of non-married men, aged 18 years or more.
[2]   In this study we use the terms dissolution and divorce interchangeably.

related to the concept of marriage specific capital, which may be defined as capital (in a broad sense) that is less valuable outside marriage than within marriage. In general, accumulation of marriage specific capital will have the effect of decreasing the probability of divorce, since such capital will lose some of its value at a divorce. Marriage specific capital includes children, home ownership, and also knowledge about the other spouse.

One of the most interesting contributions of the analysis is the role of uncertainty or imperfect information. Information about the characteristics of the spouse will usually be imperfect at the start of the marriage. The accumulation of information may thus alter the probability of divorce, especially if some characteristics are unobservable before and at the time of marriage, and are only experienced during the marriage. Since the framework is one of maximizing expected utility, unanticipated events will have a large influence on the probability of marital dissolution. This suggests that unexpected changes in income, as for instance caused by unemployment or health problems of a spouse, which dramatically alter the expected utility from remaining married may lead to a divorce[3].

Search theory can be applied to the economics of marriage by considering the process of finding a partner as a search process. If the search costs for some reasons are high, the search period is expected to be short, and the spouses may not match well together. An implication of this is that a young age at marriage is expected to be associated with a high probability of dissolution. A very short search period may also cause undesired differences between the spouses with respect to education, age, and other characteristics. Such differences may also arise under other circumstances, including ineffective search techniques, the presence of rare traits, or if the differences arise during the marriage due to temporal changes in the characteristics of the spouses.

Weiss and Willis (1985) also mention that labour market reversals for one or both spouses may result in divorce. Their analysis is performed by use of contract theory and they view children as collective goods of a marriage, thereby explaining why the existence of children reduces the probability of divorce. The model predicts that an uneven distribution of income between the spouses increases the probability of divorce. This last prediction contradicts the result above, where the gains from marriage increase with division of labour, and hence an uneven distribution of income would indicate a low probability of divorce.

Lommerud (1989) points out, also in a contractual setting, that the emotional and economic sides of a marriage cannot be studied separately, as emotions govern which contract can be entered into. Despite his use of a rigorous contract model he is very much in line with our belief, that most couples do not divorce as a result of "rational" utility maximizing behaviour. This view is also represented in other explanations of marital dissolutions from demography, sociology, and psychology.

Previous empirical studies of marital dissolution primarily fall into two groups. The first group analyses the determinants of the marital instability, whereas the other group is concerned with especially women's labour market responses to various types of marital "shocks".

The effects of various factors on the probability of marital dissolution have been estimated in a number of economic, sociological and demographic studies.

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[3]   A very similar explanation can be found in sociology, where it has been recognized that unpredictable and irregular events reduce marital stability.

The results generally seem to confirm that factors such as the existence and number of children, age, education, religion, living in big urban areas, etc. influence the likelihood of terminating a marriage. Hence, any specification of an empirical model for the divorce probability should include as many as possible of these factors, depending on data availability and specific circumstances of the study. Specific results obtained by previous studies are discussed in connection with the presentation of our own results in Sect. 4.

The effect of a divorce on women's labour supply seems to be well established in a number of empirical studies, see for instance Johnson and Skinner (1986, 1988) and Haurin (1989). Marital dissolution will be accompanied by an increased labour supply of the woman, whereas there will be virtually no response in the labour supply of the husband. Haurin also reports that if the husband suffers a certain amount of unemployment then the wife increases her labour supply in response to this change in household income. This is basically an added worker effect, and it shows that the experience of unemployment leads to responses in other variables. However, none of these studies investigates the effect of unemployment on the probability of marital dissolution, which is the main purpose of this study.

The discussion of the responses of labour supply does, however, highlight that there may be various sorts of simultaneity or endogeneity involved in the decisions that determine the actual divorce, labour supply changes, human capital investments, etc. The behaviour of the spouses who divorce may be influenced by the marital decision, and hence the question of which way causality runs must be given some attention. For example, using retrospective survey data Lehrer (1988) notes that when the wife's education at the time of the survey is included in an empirical analysis of dissolution probabilities, a positive effect of education emerges, but when instead the wife's education at the time of marriage is included, no effect is discerned. This is because reverse causality is being picked up in the former specification: after divorce women begin investing in human capital that is useful in the labour market. On the other hand, Johnson and Skinner (1986) investigate the direction of causality between the labour supply changes and the divorce probability by modelling divorce probabilities and married women's labour supply as simultaneously determined, and they find support for a unidirectional causality from the divorce probability to labour supply. These results indicate the need to specify the data and the empirical model very carefully with respect to the causality or simultaneity question. In the next section we describe how the data and the empirical model have been specified to avoid or alleviate these problems.

3. Description of data

This study is based on a sample of panel data covering the years 1979–1985[4]. In addition to information on marital status the sample includes data on demographic variables, economic variables and labour market behaviour for about 3000 married couples.

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[4]   Some information can also be obtained for the years 1976–1978. This is used later when lagged explanatory variables are included.

The sample is constructed as a subsample of a larger sample, which is drawn randomly from Danish administrative registers and includes 5% of the Danish adult population (240000 individuals). The master sample is described in more detail in Westergård-Nielsen (1984). The subsample contains all individuals from the master sample whose spouse was also included in the master sample in 1979, resulting in 3024 married couples in 1979. During the period the number of married couples decreases to 2448 in 1985 due to death, emigration, and marital dissolution. When a marriage is dissolved or one of the spouses dies the single individuals are excluded from the sample. No new couples enter the sample during the period 1979–1985, giving rise to a traditional panel selectivity problem as the sample in 1985 consists of married couples who on average are older and have longer marital tenure compared to the population.

Another selectivity problem is caused by the increasing number of people who are cohabitants without being legally married. It is estimated that about 14% of all couples in 1979 were cohabitants[5], and hence the divorce rate among legally married couples is expected to be an underestimate of all dissolutions. There is no way of identifying cohabitants in this study as the exact place of living of the individuals is not included in the registers on which the sample is based. Since the cohabitants are primarily young people, there may also be some systematic age variation that causes bias in the empirical results presented in Sect. 4.

Since all the variables in the sample refer to a period length of one year, it is impossible to date events exactly within the year. This creates some problems in the analysis since the behaviour of the spouses who divorce in a given year may be influenced by the marital decision during the year. These simultaneity or reverse causality problems were also discussed in the previous section, and in order to overcome the problems a marital dissolution is defined to happen if the spouses cease to be married and both are alive in the subsequent year. By using explanatory variables that only relate to the current or previous years, we have, at least, alleviated the problem of simultaneity.

By using this sample of panel data, we obtain a number of advantages compared to using cross-section data or retrospective data[6]. These advantages include the possibility of observing changes over time in the explanatory variables thereby allowing a dynamic specification of the model. We are, however, not able to perform a duration analysis of the marriages as the sample does not include the date at which the marriage started.

The unemployment of the wife and husband is measured by the variables U and HU, respectively, which are defined as 100 times the number of hours being unemployed during the year divided by the number of potential working hours. U and HU are equal to 0 if no unemployment is experienced. If a person is unemployed during the whole year, U or HU assumes the value 100. The registration of unemployment is only done for individuals who are insured against unemployment and a minor group of individuals on supplementary benefit payments. Individuals who are not registered are assumed to experience no

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[5] See Christoffersen (1987).
[6] Peters (1988) gives a very illuminating discussion of this point.

unemployment during the year[7]. Since the unemployment data are based on administrative registers with the main purpose of disbursing unemploment insurance benefits, these data can be considered to be very reliable. The unemployment variables U and HU enter the empirical models either directly, or as lagged variables, or as the sum variable U+HU.

The variable HSICK is an indicator variable taking the value of 1 if the husband receives sickness benefits during the year. As a general rule sickness benefits are received if a person has a spell of illness for more than 13 weeks. For women a corresponding variable is available (SICK), but we have chosen to leave it out since it mixes employment and health effects. This is due to the fact that women outside the labour force are not eligible for sickness payments. Furthermore, the variable to a large extent measures the effect of women being on maternal leave, which we do not want to confound with illness[8].

The sample contains information on the number of children in the household in different age categories. The variables CH0__2, CH3__6, CH7__14 and CH0__17 measures the number of children aged respectively 0−2 years, 3−6 years, 7−14 years, and 0−17 years. The variables AGE and HAGE measures the age of the spouses while the indicator variable REGION takes the value of 1 when the couple lives outside the Copenhagen metropolitan area. The number of years of formal education and vocational training for the wife and husband, respectively, is given by the variables S and HS. As an alternative to the variable S, an indicator variable S__LONG has been included in some models. S__LONG takes the value of 1 if the education and schooling of the wife exceeds 15 years.

Economic dependency among the spouses is measured by the variable DEP, which is defined as the proportion of the disposable household income earned by the husband. DEP assumes the value of 1 if the wife has a disposable income of 0, and if the husband's disposable income equals 0, DEP is equal to 0. The gross household income is measured by the variable GR__INC, and it includes both labour and non-labour income as well as received unemployment insurance benefits. The indicator variable OWNER takes the value of 1 if the couple owns its home, and the indicator variables FIRM and HFIRM take the value of 1 if the wife or husband, respectively, is a firm owner (totally or partly). These ownership variables are included in the analysis to represent various forms of marriage specific capital.

The sample contains a total number of 16 504 observations, where the explanatory variables are related to the years 1979−1984 (using no explanatory variables for 1985 due to the simultaneity problem previously discussed). Sample means and other descriptive statistics of the variables in the pooled sample are shown in Table 1. The sample mean of the indicator variable DIVORCE is 0.02, which indicates that 330 of the 16 504 observations represent divorces. Since couples who divorce drop out of the sample, this corresponds to a steady-state

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[7]   This may at first seem to be a rather strong assumption, But, firstly, there is a strong tendency for people with a high risk of experiencing unemployment to insure against unemployment, while 'low risk groups' have a low insurance tendency in Denmark. Secondly, unemployment enters the model as a measure of an unforeseen economic and social event. Thus it seems reasonable to set the value of the unemployment variable to 0 for housewifes and other individuals having a very loose attachment to the labour market (for instance students working during the summer or in weekends). A brief description of the Danish unemployment insurance system is given in an appendix.

[8]   We have, however, experimented with the variable SICK in the empirical analysis, but it turned out to have no significant effect on the probability of divorce.

Table 1. Descriptive statistics of variables in sample for 1979 – 1984

Variable	Mean	St.dev.	Min.	Max.
Wife's age (AGE)	46.24	13.78	18	77
Husband's age (HAGE)	49.43	14.27	20	77
Age difference (HAGE-AGE)	3.20	5.11	− 21	39
Wife's degree of unempl. (U)	4.70	16.26	0	100
Husband's degree of unempl. (HU)	3.76	13.85	0	100
Unemployment difference (HU-U)	− 0.94	19.92	− 100	100
Unemployment sum (HU + U)	8.46	22.71	0	200
Unemployment sum $t-1$ $(HU+U)_{t-1}$	7.98	22.06	0	200
Unemployment sum $t-2$ $(HU+U)_{t-2}$	7.33	21.08	0	196
Wife sick in the year (SICK)	0.06	0.24	0	1
Husband sick in the year (HSICK)	0.04	0.20	0	1
No. of children aged 0 – 2 years (CH0__2)	0.10	0.32	0	3
No. of children aged 3 – 6 years (CH3__6)	0.20	0.45	0	3
No. of children aged 7 – 14 years (CH7__14)	0.47	0.76	0	5
No. of children aged 0 – 17 years (CH0__17)	0.95	1.07	0	7
Region (1 = outside capital area) (REGION)	0.70	0.46	0	1
Wife's education (no. of years) (S)	9.09	2.98	7	18
Husband's education (no. of years) (HS)	9.77	3.32	7	18
Educational difference (HS − S)	0.68	3.04	− 11	11
Wife long education (= 1 if S > 15) (S__LONG)	0.05	0.21	0	1
Wife's economic dependency (DEP)	0.71	0.18	0	1
Gross household income (1000 DKK) (GR__INC)	200.28	108.98	0	1332
Couple home owner (OWNER)	0.70	0.46	0	1
Wife firm owner (FIRM)	0.02	0.14	0	1
Husband firm owner (HFIRM)	0.22	0.41	0	1
Divorce (1 = divorce) (DIVORCE)	0.02	0.14	0	1
Number of observations	16504			

divorce rate of 2% among the couples originally included in the sample (obviously higher than the aggregate divorce rate, since no new couples enter the sample). At the start of the sample period 3024 couples were included, hence a total of 10.9% of these marriages were dissolved during the six-year period.

4. The empirical model and estimation results

To investigate which factors influence the probability of marital dissolution, we specify a statistical model where the probability of divorce is a function of a vector of explanatory variables. Let Y be the indicator variable for the event of a divorce, i.e., $Y = 1$ corresponds to a subsequent marital dissolution and $Y = 0$ corresponds to a continued marriage. Then the general probability model is

$$\text{prob}(Y = 1 \mid X) = F(\beta X)$$

where X is the vector of explanatory variables, β is a vector of unknown coefficients and F is an arbitrary cumulative distribution function. We apply a logit specification for the probability function such that

$$\text{prob}(Y = 1 \mid X) = \frac{e^{\beta X}}{1 + e^{\beta X}}.$$

Table 2. Maximum likelihood estimates of coefficients and marginal effects from logit model of the probability of marital dissolution ("final" models)

	Model 1			Model 2		
	Est. coeff.	Asympt. std. dev.	Marginal eff.	Est. coeff.	Asympt. std. dev.	Marginal eff.
INTERCEPT	− 0.5806	0.6614		− 0.4653	0.6604	
HAGE	− 0.1061	0.0271	− 0.001847	− 0.1103	0.0271	− 0.001943
HAGE^2	0.0011	0.0003	0.000019	0.0011	0.0003	0.000020
DEP	− 0.9132	0.3090	− 0.015899	− 0.9244	0.3077	− 0.016282
HSICK$_{t-1}$	0.5518	0.2019	0.009607	0.5083	0.2035	0.008953
OWNER	− 0.4643	0.1188	− 0.008084	− 0.4575	0.1188	− 0.008058
HFIRM	− 0.5953	0.1773	− 0.010365	− 0.5913	0.1773	− 0.010415
HU + U	0.0053	0.0027	0.000092			
(HU + U)$_{t-1}$	0.0010	0.0028	0.000017			
U				0.0020	0.0030	0.000036
HU				0.0102	0.0029	0.000180
No. observations		15591			15591	
Deviance		3025.34			3022.06	
Aver. prob. of correct allocation		0.96			0.96	
Joint significance		95.17			98.45	
Pseudo R^2		0.030			0.032	

The marginal effects are evaluated at the sample mean of the explanatory variables

The deviance is equal to $-2l(\hat{\beta})$. The average probability of correct allocation is defined by

$$\frac{1}{n} \sum_{i=1}^{n} [y_i \hat{p}_i + (1 - y_i)(1 - \hat{p}_i)]$$

The joint significance test is a likelihood ratio test of the null hypothesis that all the β coefficients except the intercept are equal to 0. The pseudo R^2 is calculated as proposed by McFadden as $1 - l(\hat{\beta})/l(\hat{\beta}_0)$ and $l(\hat{\beta}_0)$ is the log-likelihood with a constant only

The unknown coefficients β are estimated by the maximum likelihood method. The explanatory variables can due to the panel structure of the data also include lagged values of the variables, thereby allowing for dynamic effects[9].

Since the logit function is non-linear, the coefficient estimates do not directly show the magnitude of the effects of the explanatory variables on the probability. The marginal effects can, however, easily be evaluated since

$$\frac{\partial}{\partial X_j} \text{prob}\,(Y = 1 \,|\, X) = \beta_j \frac{e^{\beta X}}{(1 + e^{\beta X})^2}\,.$$

These marginal effects involve the value of the X vector, and we have chosen to evaluate the marginal effects at the sample mean of the explanatory variables.

The estimation results for two "final" models are shown in Table 2 together with the marginal effects. These two "final" models represent the outcome of a

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[9]   Notice that this specification implicitly assumes independence of the observations of the same couple between time periods. This assumption may be too restrictive.

Table 3. Maximum likelihood estimates of coefficients from logit model of the probability of marital dissolution (different versions)

	(1)	(2)	(3)	(4)	(5)
INTERCEPT	−0.4757	−0.3258	−0.3957	−0.4347	−0.1004
	(0.6628)	(0.7127)	(0.6630)	(0.6603)	(0.7025)
HAGE	−0.1101	−0.1094	−0.1091	−0.1097	−0.1180
	(0.0271)	(0.0271)	(0.0271)	(0.0271)	(0.0282)
HAGE^2	0.0011	0.0011	0.0011	0.0011	0.0012
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0003)
DEP	−0.9224	−0.9298	−0.9315	−0.9525	−0.9622
	(0.3082)	(0.3099)	(0.3095)	(0.3090)	(0.3335)
HSICK$_{t-1}$	0.5028	0.4968	0.5094	0.4967	0.4439
	(0.2047)	(0.2046)	(0.2034)	(0.2037)	(0.2134)
OWNER	−0.4564	−0.4468	−0.4517	−0.4517	−0.4599
	(0.1188)	(0.1203)	(0.1188)	(0.1189)	(0.1263)
HFIRM	−0.5890	−0.5960	−0.5894	−0.5918	−0.6153
	(0.1775)	(0.1776)	(0.1775)	(0.1773)	(0.1923)
U	0.0012	0.0019	0.0021	0.0019	0.0019
	(0.0036)	(0.0030)	(0.0030)	(0.0030)	(0.0030)
HU	0.0095	0.0101	0.0101	0.0101	0.0107
	(0.0034)	(0.0029)	(0.0029)	(0.0029)	(0.0030)
(HU + U)$_{t-1}$	0.0015				
	(0.0033)				
(HU + U)$_{t-2}$	−0.0005				
	(0.0030)				
S		−0.0027			
		(0.0240)			
HS		−0.0108			
		(0.0234)			
HS-S(pos)^a			−0.0312		
			(0.0296)		
HS-S(neg)^b			0.0352		
			(0.0384)		
S__LONG				−0.3160	
				(0.3290)	
CH0__17					−0.0693
					(0.0745)

Asymptotic standard deviations in parentheses
[a] Difference between educational level of spouses, conditional on HS-S being positive
[b] Difference between educational level of spouses, conditional on HS-S being negative

number of experiments with various specifications of the explanatory variables included in the X vector. We have in general successively excluded variables with coefficients not significantly different from 0 to reach the "final" models[10], though both "final" models include an unemployment variable for which this is not the case. In Table 3, we report the estimation results for five different specifications of the model to give an idea of how other versions look.

We have found no effects of education in any of the different specifications, which we have tried with the length of education of the spouses as explanatory variables. When entered separately for the two spouses there are no significant ef-

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[10] We have throughout used a 5% significance level.

fects as seen from model (2) in Table 3. Alternatively, we have tried to specify an educational gap (difference in education between the two spouses), but again no significant effect is found. Model (3) in Table 3 represents a model version where the educational gap is entered in an asymmetric way to allow for the possibility of different effects depending on whether it is the wife or the husband who has the longest education. This shows a small tendency towards lowering the probability of divorce when the educational gap is large, but the effect is not significant at any conventional significance level. Similar results are obtained if the two gap variables are replaced by the squared educational gap. Entering an indicator variable for the wife having a higher education into the model gives no significant effect either. These results are similar to the results obtained by Becker, Landes and Michael (1977), who also find no significant effects of education on the probability of divorce. This result is consistent with their theoretical prediction of an ambiguous impact. In our case, it is also possible that the other economic variables that are included in the model may capture the effects of education.

With respect to children, neither the existence of children nor the number of children in different age-groups seem to have an effect on the divorce probability. This result is in contrast with the predictions of the standard theoretical model and with previous studies which find that children have a significantly negative effect on the divorce probability. One possible explanation of this puzzling result is that effects in opposite directions exist, which tend to cancel out such that our empirical result of no effect emerges. If both members of a married couple are labour force participants (which is the case for most Danish couples with children), the existence of children may strengthen the conflicts on the division of labour inside the household. This effect may counteract the negative divorce effect from children due to an increasing marriage specific capital. Another possible explanation of the result is that in our data no distinction is made between own children and children from previous marriages or cohabitations. The former will have a stabilizing influence while the latter will have the opposite effect, hence the net measured impact may be zero.

Age would be expected to have an effect on the probability of marital dissolution, either through the age of the two spouses separately or through an age gap. Our results show that the age of the husband influences the divorce probability. The age of the wife and the age gap of the spouses have coefficients not significantly different from 0 in all our experiments with these variables as explanatory variables. Also experiments with an asymmetric age gap effect, a squared age gap effect, and the total age of the two spouses to account for generational effects turn out to show no significant effects. The age of the husband has a non-linear influence, which we have modelled by a quadratic function of age. At low ages and at high ages the probability of marital dissolution is higher than at middle ages. In Table 4, we have calculated the probabilities for a number of situations to show the sensitivity of the probability for different values of the explanatory variables. These calculations show that young husbands have a higher divorce probability than old husbands (HAGE = 25 vs. HAGE = 65). This finding may be explained as a duration of marriage effect due to the more rapid information acquisition early in the marriage and the accumulation of marriage specific capital.

The economic dependency of the wife has a large, significantly negative effect on the divorce probability. One possible interpretation is that the economic dependency signals that a high degree of specialization has taken place in the mar-

Table 4. Sensitivity of average probability for marital dissolution

	Model 1	Model 2
Average probability	0.018	0.018
Standard couple[a]	0.017	0.017
Standard couple[a], but		
HSICK = 1	0.029	0.029
Standard couple[a], but		
OWNER = 0	0.027	0.027
Standard couple[a],but		
HFRIM = 1	0.010	0.010
Standard couple[a], but		
HAGE = 25	0.026	0.027
HAGE = 35	0.017	0.018
HAGE = 45	0.014	0.014
HAGE = 55	0.014	0.014
HAGE = 65	0.018	0.018
Standard couple[a], but		
DEP = 0	0.032	0.033
DEP = 0.25	0.026	0.026
DEP = 0.5	0.021	0.021
DEP = 0.75	0.017	0.017
DEP = 1	0.013	0.013
Standard couple[a], but		
HU + U = 0	0.016	
HU + U = 500	0.021	
HU + U = 1000	0.027	
HU + U = 1500	0.036	
Standard couple[a], but		
HU = 0		0.016
HU = 250		0.021
HU = 500		0.028
HU = 750		0.035
HU = 1000		0.045

[a] Evaluated at the sample mean of the quantitative variables and at HSICK = 0, OWNER = 1 and HFIRM = 0

riage, thereby increasing the gains from the marriage. It might, however, equally well just represent the case where the wife does not have the financial means for a divorce. The dynamic effects of the economic dependency have also been analysed by including lagged values of this variable (lagged one and two times), but the current value is the most important. Due to a strong correlation over time of the variable, it also creates multicollinearity problems to include the lagged values. As an alternative measure of the woman's labour force attachment we also included the labour market experience measured in years as explanatory variable, but it had no significant effect.

When analysing the other economic factors, we find that the gross household income has no significant effect on the probability of marital dissolution. If the married couple owns a home, they have a significantly lower divorce probability

than if they rent a home, which is in accordance with our a priori expectations. Ownership of a home will typically make it more costly for the couple to divorce, but the ownership may also be indicating a higher degree of stability in the marriage that is not directly observable. Ownership of a firm by the husband also significantly reduces the divorce probability, whereas ownership of a firm by the wife is very uncommon and has no significant effect. When the ownership variables (home and husband's firm) are included in the model, we find no significant effect of living in the metropolitan area. If the ownership variables are left out, living outside the metropolitan area significantly decreases the probability of marital dissolution, an effect similar to that of ownership. There is a positive correlation between living outside the metropolitan area and ownership, but the results show that the effect normally attributed to living in urbanized areas[11] disappears when we control for ownership.

Changes in health conditions of one or both of the spouses will normally represent unforeseen events, and hence increase the probability of divorce. In the general model, we have included both current and lagged values of the health indicator for the husband, but the only one having a coefficient significantly different from 0 is the lagged health indicator of the husband. Having suffered from health problems in the previous year significantly increases the probability of subsequent marital dissolution. From Table 4, it is even seen that the probability is almost doubled in this case. Only the lagged health indicator enters the "final" models, indicating that the effects of health problems on the divorce probability are delayed and take some time to reveal themselves. Despite the poor quality of the health indicator for women, we tried to enter it into the model, but it turned out that it did not have any significant effect. In any case, we do not take this result to indicate that men are more faithful than women.

Likewise, unemployment will normally represent an unexpected event, which changes the conditions of the marriage. The corresponding economic and psychological problems may lead to marital conflicts and hence increase the probability of marital dissolution. The results from the "final" models in Table 2 show that only the unemployment of the husband in the current year has an effect on the probability of subsequent divorce. The experience of unemployment significantly increases the probability, and the more unemployment the husband experiences, the higher is the probability. From Table 4, it is seen that the divorce probability is more than twice as high for a couple where the husband has been unemployed for a whole year than for a couple where he has experienced no unemployment. The unemployment of the wife has no significant effect, when it is entered separately into the model. A possible explanation of this result is that the economic loss from being unemployed to a certain degree is outweighed for the woman by the economic gains to marriage due to specialization. To test the theoretical prediction that the husband's and the wife's economic situations do not play symmetric roles for marital stability, the sum of the unemployment of the two spouses has been entered into the model. It has a significantly positive effect, but comparison of the two "final" models clearly shows that this is only due to the already discussed effect of the unemployment of the husband. The interaction effect of the two spouses' unemployment is totally insignificant. Unemployment in previous years (one and two years earlier) has no significant

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[11] For instance, Hartmann (1988) finds a strong positive relationship between the degree of urbanization and divorce rates in an analysis of regional variation in aggregate level divorce rates.

effects and neither has the change in unemployment from the previous year to the current year. Apparently, the effects of unemployment on marital instability are immediate and do not accumulate over time.

Our findings on the effects of unemployment seem to be consistent with the rather sparse previous evidence. Becker, Landes and Michael (1977) report that a study by Ross and Sawhill examines the effects of unemployment on the probability of divorce and finds "that men who experienced serious unemployment in the prior 3 years had a significantly higher probability of divorce over the subsequent 5 years" (p. 1161). Nothing is reported about the effects of unemployment for women. From an analysis of regional variation in aggregate level divorce rates Hartmann (1988) finds that unemployment (measured by the degree of long-term unemployment) has a positive effect on divorce rates. Since this result is based on aggregate data it says nothing about the structure of the effects of unemployment (the distribution between spouses, the dynamics, etc.), but it indicates that unemployment has an effect on the probability of divorce.

The results discussed above are obtained by using the full sample which include all individuals irrespectively of whether they are insured against unemployment or not. Relating to the discussion in Sect. 3 of the unemployment variable we have performed an experiment with a reduced sample only including the couples where both spouses are insured against unemployment. The results obtained by using this reduced sample are qualitatively similar to those obtained by using the full sample. If we further restrict the sample to couples where both spouses have been insured against unemployment in 3 consecutive years, we find that the only qualitative change is that the economic dependency of the wife has no effect in this restricted sample. We take this as support of the hypothesis that couples where the wife has a very stable labour force attachment have a higher probability of divorce.

5. Concluding remarks

This empirical study shows that unemployment seems to be an important factor behind marital instability. However, only unemployment of the husband has an effect on the probability of marital dissolution, whereas the event of the wife being unemployed has no significant effect on the probability. Furthermore, the effect of unemployment is immediate and does not appear to accumulate over time. A number of other economic and demographic variables also play a role in determining the probability of divorce.

A rough assessment of the importance of unemployment as a cause of marital dissolution can be calculated from the probabilities in Table 4. It is seen that a couple experiencing no unemployment has a probability of divorce of 1.6%, whereas a standard couple has a probability of 1.7%. Thus the difference of 0.1% may be attributed to the effect of unemployment, indicating that about 6% of all divorces are due to unemployment. The effects of unemployment may also be unequally distributed, since other sources have shown that a rise in unemployment often is distributed among those already hit by unemployment (cf. the insider-outsider theories).

The analysis performed here has taken into account the possible effects from unemployment and other factors on the probability of divorce. Simultaneity bias in the results has as far as possible been avoided through careful specification of

the model and the data. This does of course not rule out the possibility of en-dogeneity in the decisions that determine the actual divorce, labour supply changes, fertility decisions, etc. There may also be certain unobservables, which affect both the probability of becoming unemployed and the probability of divorce in the same direction and thereby partly account for the positive relation between the unemployment and the probability of divorce. Clarification of this issue requires better data and might be a topic for future research.

One of the arguments for the effects of unemployment on the probability of marital dissolution is that unemployment normally is an unexpected event. A future research topic may therefore be to investigate whether the type of unemployment (temporary layoffs, permanent layoffs, etc.) has an effect, such that for instance temporary layoffs have a smaller influence than permanent layoffs because they are more expected.

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Appendix. The Danish unemployment insurance system

Since the Danish unemployment insurance system has some distinctive features compared to the systems in most other countries, it seems appropriate briefly to explain how it works. In general, it appears as a rather generous system with little risk of running out of benefits, with rules that allow for benefits also for very short spells, with no employer experience rating at all, and with a substantial state subsidy to the UI-funds. Similar, but not identical, systems are found in Sweden and partly in Belgium and Finland.

Membership of a UI-fund is in principle voluntary. But since the UI-funds historically were organized by the trade unions, membership of the UI-funds is to a high degreee overlapping with membership of the trade unions. To qualify

for UI-benefits, the unemployed member should either enter the labour market directly from vocational training or have been a member for 1 year and have worked 26 weeks within the last 52 weeks.

Unemployment benefits can be obtained for about 3 years (there have been slight variations in the total eligibility period over the years). Some time before the expiration of benefits the unemployed is offered a job for a 9 months period (now 7 months), most often in the public sector. In this way eligibility can be secured for another 3 years period. The member can be insured either part time or full time. In the case that a full time insured person can only obtain a part time job, he or she is eligible to supplementary benefits.

Benefits to eligible members are calculated as 90% of the wage in the last job with an upper limit in nominal terms. The upper limit has been frozen in nominal terms for the period 1982–1987. About 70% of all members have a wage that would entitle them to receive maximum benefits and consequently have a replacement ratio which is below 90%. Benefits can be obtained for all unemployment spells exceeding 10 h.

The UI-funds are funded partly by the members and the employers and partly by the state. The members pay a contribution corresponding to maximum benefits for 6 days. Similarly employers' contribution corresponds to maximum benefits for 11 days for each insured employee with no experience rated contributions for the employers nor for the employees. These contributions are all tax-deductible. The rest of the expenses, which is about 2/3 of total benefits in the current state of unemployment, comes from the state. The state covers by statute all deficits out of general tax-revenue as well as it confiscates all surpluses in the UI-funds. The large state outlay means that there is a substantial subsidy to the unemployed and the firms (and virtually no insurance element).

In summary, the features of the unemployment insurance system mean that all persons with a stable labour force attachment and any noticeable risk of experiencing unemployment tend to be members. The persons who are not members are either persons with a very low risk of unemployment, persons who do not participate in the labour force, or persons who have a very loose attachment to the labour market and do not rely on their irregular participation. The latter group consists of housewifes working at Christmas time and students working during the summer or in weekends.