

Determinants of marital instability: a Cox-regression model

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I. INTRODUCTION

Following Becker's (1974) pioneering work, a substantial body of literature on the economics of marital dissolution has begun to accumulate (Sawhill *et al.*, 1975; Becker *et al.*, 1977; Michael, 1979; Becker, 1981). Economists' interest in marital dissolution stems from two sources. At one level is the idea that the economist's bag of tools, with its emphasis on choice subject to constraints, may be helpful in understanding phenomena (such as marriage, divorce and fertility) that until recently have been almost exclusively in the domains of demography, sociology and psychology. At another level, the acceleration in divorce rates that the Western world has witnessed in the post-World War II period has awakened interest on the causes of marital dissolution, and its implications for female labour force participation and the economic well being of the increasingly large number of members of dissolved households.

The objective of the present article is to quantify the influence of various factors on marital instability using the theoretical framework developed in the economic literature and data from a survey recently conducted in the USA, the 1982 *National Survey of Family Growth* (NSFG). This data set is rich in information on husbands' and wives' characteristics, allowing examination of several factors that previous studies have been unable to consider. The data are analysed using Cox's proportional hazards model (1972). This is a technique for the analysis of 'survival times', data that measure the interval until a certain event happens. While survival models have been employed extensively in the biomedical sciences to estimate the impact of exogenous variables on patient survival, and more recently by demographers interested in birth intervals and mortality, they have received little attention from economists.

The paper is organized as follows: Section II outlines the economic theory of family formation and dissolution on which this research rests; Section III presents the econometric technique; the data, variables and empirical results are described in Section IV; and Section V closes the paper with a summary of the main findings.

II. ANALYTICAL FRAMEWORK

Gains from marriage

In addition to love, companionship, and the production of children, other sources of gains from marriage include: (a) specialization and division of labour (e.g. if the husband's wage

exceeds the wife's wage, there may be advantages to husband and wife specializing in market and non-market production, respectively); (b) economies of scale (e.g. cooking a meal for two costs less than preparing two separate meals); (c) public goods (e.g. all members of a household consume all the heat produced by the furnace); and (d) positive externalities (e.g. a TV programme may yield more enjoyment if watched together with someone rather than alone, if utility is derived from the partner's consumption). For all of these reasons, marriage may lead to increased levels of production and consumption.

The search process

It is unusual for someone to marry the first potential partner encountered. By engaging in some search, the possibility of finding a more suitable spouse is opened. But there are also costs: the time and out-of-pocket expenses associated with the search process (e.g. dating, expenditures on personal appearance), and the forgone gains of marriage. For reasons similar to those discussed in the job search literature, as the process continues, the perceived benefits of further search tend to diminish and the expected costs of further search tend to increase. If at some point the costs are assessed to outweigh the benefits, a 'marriage offer' will result. The wedding bells will ring if the partner's calculations also dictate stopping the search process.

The fact that search is costly implies that many marriages will not be 'ideal' in the sense that better matches might have resulted had search continued, but they will be optimal in terms of the subjective costs and benefits of further search.

Marriage dissolution

Although union with a particular individual may seem optimal at a certain point in time, this assessment may subsequently change and the marriage be terminated if the costs are sufficiently small. The question of central interest to this research is: what characteristics of husband and wife make it likely that this situation will emerge? The economic model suggests the following considerations.

1. Factors that lower the gains from marriage are expected to increase the attractiveness of dissolution. For example, positive externalities of the type discussed above are less likely to be present if the spouses differ markedly in traits such as age or religion, characteristics that play an important role in non-market activities. Since the gains from marriage are smaller in these mixed unions, the probability of marital disruption is expected to be greater.
2. Factors that tend to precipitate an early end to the search process are likely to lead to a marriage far from the 'ideal', and therefore to a greater likelihood of a subsequent dissolution.
3. Factors that raise the costs of separation or divorce are predicted to be negatively associated with the likelihood of terminating a marriage. For instance, the probability of dissolution is expected to be lower among Catholics, since their religion prohibits divorce, thereby increasing the psychological costs of dissolution.

Unions are frequently made on the basis of imperfect information about the characteristics of the spouse. Information obtained subsequently may lead to a revision of the initial cost-benefit calculations and to marriage dissolution. Because information accumulates quickly following marriage, separations are most likely to occur at short marriage durations. Thus, it is important to allow the probability of dissolution to vary with time in the empirical analysis.

Previous studies have noted that unanticipated events and changes in the economic situation or health of a spouse may lead to marital conflict. Because of the nature of the data, these issues are not examined here. The present article focuses on the influences on marital dissolution of (a) husband–wife characteristics at the time of marriage (e.g. age at marriage) and (b) traits that for most individuals do not vary over time (e.g. religion).

III. THE STATISTICAL TECHNIQUE

A substantial part of empirical knowledge on the economics of marriage dissolution is based on static logit models where the probability of divorce in a certain interval of time (conditional on being married at the beginning of the interval) is specified as a function of a number of explanatory variables (Becker *et al.*, 1977; Michael, 1979). A shortcoming of this approach is that the selection of interval lengths is necessarily arbitrary. In addition, within the interval under consideration, information on the timing of the dissolution, if any, is not utilized. The Cox proportional hazards model is not subject to these problems. A recent study comparing these techniques for the analysis of entry into marriage and parenthood found that the Cox model provided a better fit to the data and more powerful ways of testing hypotheses about the effects of explanatory variables (Tuma and Michael, 1985).

In the Cox procedure, attention is focused on ‘survival time’, the interval until a certain event happens; in the present context, the time between marriage and dissolution. A ‘failure’ is said to occur when the event takes place. The distribution of survival times may be characterized in several ways, among them the hazard function and the survival function. If T is a non-negative random variable indicating time until failure, the hazard function, $h(t)$, represents the instantaneous rate of failure conditional on survival to time t :

$$h(t) = \lim_{\Delta t \rightarrow 0^+} \frac{\Pr(t \leq T \leq t + \Delta t | T \geq t)}{\Delta t} \quad (1)$$

and the survival function, $F(t)$, shows the probability that T is at least as great as a value t :

$$F(t) = \exp \left\{ - \int_0^t h(u) du \right\} \quad (2)$$

In the Cox-regression model, h is expressed as follows:

$$h(t, \mathbf{z}) = h_0(t) \exp(\boldsymbol{\beta}' \mathbf{z}) \quad (3)$$

where $h_0(t)$ is an unspecified time-dependent function, \mathbf{z} is a vector of covariates, and $\boldsymbol{\beta}$ is a vector of unknown coefficients. The risk of dissolution is thus allowed to vary with time and with the exogenous variables. When all the elements in \mathbf{z} are 0, the hazard function equals $h_0(t)$.

The corresponding survival function is:

$$F(t, \mathbf{z}) = (F_0(t))^{\exp(\boldsymbol{\beta}' \mathbf{z})} \quad (4)$$

where

$$F_0(t) = \exp \left\{ - \int_0^t h_0(u) du \right\} \quad (5)$$

According to this model, the ratio of the hazard for an individual with covariates z^1 to that for an individual with covariates z^2 does not depend on time, since

$$h(t, z^1) = h_0(t) \exp(\beta' z^1) \quad (6)$$

$$h(t, z^2) = h_0(t) \exp(\beta' z^2) \quad (7)$$

and hence

$$h(t, z^1)/h(t, z^2) = \exp\{\beta'(z^1 - z^2)\} \quad (8)$$

With regard to the interpretation of the coefficients, note that if β_m (the coefficient associated with explanatory variable z_m) is positive, an increase in z_m raises the value of the hazard function and therefore decreases survival time. A positive β_m thus implies that as z_m rises, the probability that dissolution has taken place at each marital duration becomes higher.¹ Significance tests for individual coefficients may be conducted with standard t -tests as in OLS; the overall significance of groups of coefficients may be assessed with likelihood-ratio statistics.

Those individuals who have not experienced marital dissolution by the time of the survey are treated as censored at the interview date, or at the date of husband's death if this occurred earlier. The fact that marital instability has *not* been observed by this time is an important piece of information, utilized in the estimation procedure. The technique, called the 'partial likelihood' method, involves ordering the observations according to the time of event occurrence (marital dissolution) or censoring. Suppose that the set R_i represents the indices of individuals at risk just prior to t_i , i.e. individuals who have not experienced the event nor have been censored by this time, and assume that an individual with characteristics z_i experiences the event at time t_i . The probability of observing this given R_i is:

$$\exp(\beta' z_i) / \sum_{j \in R_i} \exp(\beta' z_j) \quad (9)$$

The partial likelihood, \mathcal{L}_p , is the product of these probabilities for the k events that are observed to occur:²

$$\mathcal{L}_p(\beta) = \prod_{i=1}^k \left\{ \exp(\beta' z_i) / \sum_{j \in R_i} \exp(\beta' z_j) \right\} \quad (10)$$

The parameter estimates have been shown to be efficient and consistent under certain assumptions (Efron, 1977; Tsiatis, 1981). Breslow (1974) has suggested a procedure to estimate the baseline hazard function, $h_0(t)$, given estimates of the coefficients. For more details on this and alternative hazards models, the interested reader is referred to Cox (1972), Kalbfleisch and Prentice (1980), and Namboodiri and Suchindran (1987).

¹ In the empirical model of Section IV, most of the explanatory factors are specified as 0-1 variables. A positive β_m in this case implies that when z_m takes the higher value, 1, the likelihood of dissolution is greater.

² The partial likelihood takes a different form when there are ties among failure times; see Breslow (1974).

IV. DATA, VARIABLES AND EMPIRICAL RESULTS

Conducted by the National Center for Health Statistics, the 1982 NSFG was addressed to 7969 women 15–44 years of age of all marital statuses living in the USA. The survey documents marital histories and contains abundant information on husbands' and wives' characteristics, including their educational and religious background, ages at marriage, place of residence, and a number of other socio-economic and demographic variables. Black women were oversampled in order to obtain an adequate number of observations for each racial group.

Brief definitions and descriptive statistics for the variables employed in the analysis are reported in Table 1. Cases corresponding to never married women and observations with invalid codes for important variables are excluded. White and black women are considered separately to explore possible differentials in marital stability patterns by race.³ Seventy-three per cent of the first marriages of white respondents were intact at the time of the survey, compared to 61% for black women.

The study focuses only on the respondent's first marriage. Dissolution, if any, is measured as of the date husband and wife started to live separately, regardless of whether the legal formality of a divorce decree took place subsequently. Measuring marital disruption in this way is particularly important for black women, because many rely on separation as a way of functionally terminating their marriages. Among those who do get a divorce, duration in the separated status is, on average, longer than for white women (Cherlin, 1981; Norton and Moorman, 1986). Confirming these tendencies, the present data show that by the time of the survey, 87% of separations of white women had been followed by a divorce; the figure is only 59% for black women. A shortcoming of this approach is that instability may be overstated if some separations are followed by eventual reconciliation; however, this problem seems small compared to those that would arise if divorce were used as the measure of marital disruption.

The empirical results are reported in Tables 2 and 3.⁴ Table 2 presents the estimated coefficients and their *t*-ratios. Rough measures of the quantitative importance of these effects are provided in Table 3, which shows the estimated values of $1 - F(t)$, the complement of the survival function, for selected values of *t*. The first row indicates that for a white individual in the reference group (all variables set at zero; see Table 1, footnote a), the probabilities of marital dissolution by the fifth and tenth years are 0.19 and 0.34, respectively. The fact that the corresponding probabilities for black women are similar, 0.21 and 0.40, suggests that racial differences in the values of the covariates play a major role in explaining white–black differences in marital instability. The remainder of Table 3 displays probabilities of separation for couples that differ from the benchmark group by only one characteristic, as indicated.⁵

The first set of variables corresponds to factors thought to operate primarily by influencing the gains from marriage. As a proxy for his permanent income, a husband's education is expected to have a negative impact on marital instability. One reason why high income men are likely to gain more from marriage is that, as noted by Becker (1981), they can compete

³The few respondents of race other than white or black are excluded.

⁴The estimations were performed with the 1985 version of the P2L computer program in the BMDP package.

⁵Note that comparison of column 1 with 2, and 3 with 4, shows that dissolutions occur at a more rapid pace in the five years immediately following marriage.

Table 1. *Variable definitions and descriptive statistics*

Definition ^a	Means	
	White women	Black women
Husband's education		
Less than 12 years	0.20	0.27
More than 12, less than 16	0.18	0.15
16 years or more	0.23	0.10
Wife's education		
Less than 12 years	0.24	0.31
More than 12, less than 16	0.20	0.16
16 years or more	0.11	0.07
Relative economic status		
Better	0.39	0.40
Worse	0.09	0.05
Different religion	0.26	0.20
Difference between husband's and wife's age		
Less than 0	0.15	0.15
More than 6	0.13	0.15
Husband previously married	0.10	0.10
Wife's age at marriage		
Less than 18	0.18	0.17
24 or more; less than 30	0.11	0.16
30 or more	0.02	0.03

Premarital birth	1 if first live birth (if any) occurred before date of marriage; 0 otherwise	0.06	0.36
Premarital conception	1 if first live birth (if any) occurred less than 7 months after marriage; 0 otherwise	0.10	0.16
Catholic	1 if husband and/or wife are Catholic; 0 otherwise	0.39	0.11
Attendance to religious services	Index ranging from -3 for those who never attend religious services to +3 for those who attend once a week or more often	-0.34	0.59
Family of origin not intact	1 if at age 14 respondent was not living with her own father and own mother	0.22	0.39
Outside of SMSA	1 if respondent does not live in a Standard Metropolitan Statistical Area	0.24	0.21
Region	1 if respondent's region of residence is in region indicated; 0 otherwise		
West		0.20	0.10
North Central		0.27	0.15
North East		0.17	0.15
Date of marriage: before 1970	1 if marriage took place before 1970; 0 otherwise	0.43	0.42
Number of cases		2757	1603
At time of survey, respondent's first marriage:			Percentages
was intact		73.45	61.26
had ended with husband's death		1.56	3.62
had ended in separation		3.23	14.41
had ended in divorce		21.76	20.71

^aNote that the modal category has been chosen as the benchmark for all discrete variables, and the religiosity variable has been scaled so that 0 is the median value. A member of the reference group is, in this sense, a 'typical' individual.

^bFor those cases where information on father's education was missing, the median value for the appropriate racial group was imputed.

^cReligious groups are broadly defined: Protestant, Catholic, Jewish, other, no religion.

Table 2. *Estimated coefficients and t-ratios*

	White women	Black women
Husband's education^{ab}		
Less than 12 years	0.0137 (0.1)	-0.1579 (-1.5)
More than 12, less than 16	-0.4606 (-3.8)	-0.3279 (-2.3)
16 years or more	-0.5942 (-4.2)	-0.5927 (-2.9)
Wife's education at date of marriage		
Less than 12 years	0.0304 (0.3)	0.0347 (0.3)
More than 12, less than 16	0.0865 (0.7)	0.0747 (0.5)
16 years or more	-0.1889 (-1.0)	0.3032 (1.4)
Relative economic status^d		
Better	-0.0503 (-0.6)	0.0555 (0.6)
Worse	-0.1279 (-0.9)	0.3530 (2.0)
Different religion	0.6749 (7.5)	0.7721 (7.1)
Difference between husband's and wife's age^{ad}		
Less than 0	-0.3319 (3.1)	0.0153 (0.1)
More than 6	-0.0048 (-0.04)	0.2294 (1.8)
Husband previously married	-0.2850 (-1.7)	-1.106 (-4.7)
Wife's age at marriage^{ac}		
Less than 18	0.3720 (3.4)	0.2253 (1.9)
24 or more; less than 30	-0.3653 (-2.1)	-0.2584 (-1.6)
30 or more	-1.1669 (-1.6)	-0.0621 (-0.2)
Premarital birth	0.5135 (3.4)	0.1481 (1.5)
Premarital conception	0.1520 (1.3)	0.0821 (0.7)
Catholic	-0.3448 (-3.8)	-0.5769 (-3.7)
Attendance to religious services	-0.1162 (-5.8)	-0.0973 (-4.1)
Family of origin not intact	0.3223 (3.7)	0.2813 (3.2)
Outside of SMSA	-0.4708 (-4.7)	-0.5180 (-3.9)

Table 2. (Cont.)

	White women	Black women
Region ^{a,b}		
West	0.0393 (0.4)	0.5274 (3.9)
North Central	-0.3047 (-3.0)	-0.0128 (-0.1)
North East	-0.3102 (-2.4)	0.0634 (0.5)
Date of marriage: before 1970	-0.4281 (-4.9)	-0.2778 (-2.8)

Likelihood ratio test for joint significance of dummy variables yields a *p*-value of:

^a0.05 or less for whites;

^b0.05 or less for blacks;

^c0.10 or less for blacks;

^d0.20 or less for blacks.

The dummy variables for wife's education are insignificant at all conventional levels for whites and blacks; the relative economic status variables are insignificant at all conventional levels for whites.

more effectively in the marriage market and more easily attract wives with the desired characteristics. Another reason, emphasized by Sawhill *et al.* (1975), is that a higher level of income results in a better standard of living and can eliminate certain sources of marital disharmony (e.g. crowding, unpleasant living conditions). The results support these hypotheses and previous findings reported in the literature (Becker *et al.*, 1977; Michael, 1979). Non-linearities emerge: the dummy variables indicating 16 or more, or between 12 and 16 years of schooling are significantly negative (*t*-ratios are -4.2 and -3.8 for whites, -2.9 and -2.3 for blacks); the effects associated with having a high school diploma or less, however, are not significantly different. Quantitatively, the influence of education appears to be important. For white women, the probability of separation by the fifth year almost doubles—from 0.11 to 0.19—when years of schooling declines from 16 or more to 12; there is a comparable increase for black women from 0.12 to 0.21. The significant effects associated with husband's schooling, coupled with the pronounced racial differential in educational attainment (only 10% of the black husbands in the sample have 16 years of schooling or more, compared to 23% for whites) point to differences in men's schooling levels and earnings as an important source of the greater instability of black marriages.

An increase in wife's wage would be expected to generate income effects similar to those discussed above in connection with husband's earnings. However, because women typically earn less than men, an increase in wife's wage (holding husband's income constant) may reduce the benefits from the traditional division of labour within marriage and increase the likelihood of separation. Results from previous research generally suggest that either these effects cancel each other out (e.g. Becker *et al.*, 1977) or the latter tends to dominate (e.g. Michael, 1979). As Michael (1979) notes, however, results from some studies are difficult to interpret, because in certain cases more than one proxy for the value of female time is used while in others endogenous fertility variables are included in the right-hand side. In addition, there are problems with the proxies for the value of female time typically used: wages,

Table 3. Estimated values of $1-F(t)$, the complement of the survival function, for $t=5$ and $t=10$

	White women		Black women	
	$t = 5$ years	$t = 10$ years	$t = 5$ years	$t = 10$ years
Reference group	0.19	0.34	0.21	0.40
Selected groups ^a				
Husband's education				
Less than 12 years	0.20	0.35	0.19	0.36
More than 12, less than 16	0.13	0.23	0.16	0.31
16 years or more	0.11	0.21	0.12	0.25
Relative economic status				
Better	0.19	0.33	0.22	0.42
Worse	0.17	0.31	0.29	0.52
Different religion	0.34	0.56	0.41	0.67
Difference between husband's and wife's age				
Less than 0	0.26	0.44	0.22	0.41
More than 6	0.19	0.34	0.26	0.48
Husband previously married	0.15	0.27	0.08	0.16
Wife's age at marriage				
Less than 18	0.27	0.46	0.26	0.48
24 or more; less than 30	0.14	0.25	0.17	0.33
30 or more	0.06	0.12	0.20	0.38
Premarital birth	0.30	0.51	0.24	0.45
Catholic	0.14	0.26	0.13	0.25
Attendance to religious services				
= -2	0.24	0.41	0.25	0.47
= 2	0.16	0.28	0.18	0.35
Family of origin not intact	0.26	0.44	0.27	0.50
Outside of SMSA	0.13	0.23	0.13	0.26
Region				
West	0.20	0.36	0.33	0.58
North Central	0.15	0.27	0.21	0.40
North East	0.15	0.27	0.23	0.42
Date of marriage: before 1970	0.13	0.24	0.17	0.32

^aAll other variables are set at 0, i.e. each group differs from the reference group in only one characteristic.

earnings or educational attainment *at the survey date*. On the one hand, unions involving women who, subsequent to marriage, allocate substantial amounts of time to investments in education and other skills useful in the labour market, may be at increased risk of dissolution because of smaller gains from division of labour. On the other hand, women who eventually dissolve their marriages, or who perceive a high probability of separation at some time in the future, have greater incentives to make investments in schooling after marriage than their counterparts in stable unions.⁶ It is clear, therefore, that the interpretation of the coefficients

⁶Empirically, there appears to be a substantial amount of post-marital human capital investment activity. Twenty percent of white women and 23% of black women in the sample continued their education after marriage.

on variables indicating the *current* value of female time is plagued by direction-of-causality problems.

Results based on the present data set are indeed very sensitive to how the value of female time is measured. When educational attainment at the time of marriage is employed, as in Table 2, the effects are insignificant for both white and black women. In contrast, Table 4 shows that strongly significant effects for both racial groups emerge when schooling at the interview date is employed.

Table 4. *Estimated coefficients and t-ratios*^a

	White women	Black women
Wife's education at date of survey ^b		
Less than 12 years	-0.1190 (-1.0)	0.0879 (0.8)
More than 12, less than 16	0.4802 (4.6)	0.4531 (4.1)
16 years or more	0.2698 (1.7)	0.4233 (2.4)

^aAll variables in Table 2 (except wife's education at date of marriage) are held constant.

^bLikelihood ratio test for joint significance of dummy variables yields a *p*-value of less than 0.05 for whites and blacks.

Sanderson (1980) has argued that one reason for the greater incidence of marital instability in the black population may be traced to the fact that the male–female wage gap in white marriages is usually wider, and hence the potential gains from specialization are greater. The present results show that, husband's income held constant, an increase in the value of female time (measured by schooling at marriage date) has no impact on the risk of dissolution, suggesting that the income and division of labour effects associated with this increase cancel each other out. Whether this result holds when better proxies for the value of female time are used (e.g. the wife's wage at the time of marriage, or, if not employed, her imputed wage based on instrumental regressions appropriately corrected for selectivity bias) is an important topic for future research.

In the spirit of Easterlin's relative economic status theories (1968, 1973), it may be hypothesized that women who have gone down the socio-economic ladder through marriage experience smaller gains from marriage and are thus more likely to dissolve their unions. Supporting this view, the results for blacks show that if husband's education falls short of father's education by three years or more, the marriage is at greater risk of termination ($t = 2.0$). No significant differences emerge, however, between the stability of marriages that represent improvement or maintenance of status ($t = 0.6$). At least as measured here, relative economic status appears to play no role in the likelihood that a white couple will dissolve their marriage.

The results strongly support the hypothesis that differences in religion between the spouses reduce the gains from marriage and increase the attractiveness of separation (t -ratios are 7.5 and 7.1 for whites and blacks, respectively). Among the variables considered in this study, the impact of intermarriage is one of the most pronounced: the probability that a mixed marriage will fail by the fifth year is 0.34 for whites and 0.41 for blacks. Similarly large effects are reported by Becker *et al.* (1977).

The pattern of coefficients on the husband–wife age gap varies by race in an interesting way. If the respondent is older than her husband, the likelihood of separation rises significantly for whites ($t = 3.1$) but not for blacks ($t = 0.1$). On the other hand, marriages in which the husband is substantially older than the wife are at greater risk of disruption among blacks ($t = 1.8$); but no significant effect is discerned for whites ($t = -0.04$). To the best of the present author's knowledge, this racial differential has not been noted in previous research.

A prior marriage for the husband may increase the likelihood of dissolution for several reasons. First, he may have children from his previous wife and, as Becker *et al.* (1977) note, the presence of such children may decrease the gains from the current marriage. In addition, Becker (1981) notes that remarried individuals are more likely than the average person in the first marriage to have characteristics that reduce the gains from marriage (e.g. a quarrelsome temperament, inefficient search techniques). They are also more likely to be individuals who are willing to put an end to a relationship that does not work. But on the other hand, a failed marriage may provide a learning experience that tends to increase the chances of success for a subsequent union. The sign of the net effect is thus unclear *a priori*. Empirically, the conclusions from previous studies are mixed, some suggesting that a prior marriage may have a small stabilizing effect (Glick and Norton, 1971); others indicating a destabilizing influence (Bumpass and Sweet, 1972; Becker *et al.*, 1977). McCarthy (1978) reports differentials by race: for blacks, second marriages have a higher probability of remaining intact than first marriages, but for whites, second marriages are either as likely or more likely to be dissolved. Confirming McCarthy's results for blacks, Table 2, column 2, shows that the coefficient on the variable indicating a previous marriage is negative and strongly significant ($t = -4.7$). The probability of separation by the fifth year is only 0.08 if the husband is not in his first marriage.⁷ Although the sign of the remarriage variable is also negative for white women, it is only marginally significant ($t = -1.7$).

The discussion now turns to the second set of variables, those related to the length of the search process. Women who marry at a very early age (an indicator of short search) have a significantly higher likelihood of eventual separation. For white women, the fifth-year dissolution probability ranges from a low of 0.06 when the wife's age at marriage is 30 or greater, to a high of 0.27 when it is less than 18. For black women, the probability of dissolution is lowest (0.17) when the wife's age at marriage is between 24 and 30, and highest (0.26) when it is under 18.⁸

A premarital conception or birth are also likely to be indicators of short search because they provide incentives to marry precipitately, even at the cost of accepting a 'mismatch', a marriage far from the 'ideal'. The woman who has accidentally become pregnant during search probably desires to give legitimate status to her child, and also faces the prospect of the child reducing the gains from marriage with any other partner. For the woman who already is

⁷Some of the men in second or higher order marriages may be widowers rather than divorcees. Given the ages of the respondents in the sample, however, the proportion of widowers is likely to be small. Another remark in connection with the remarriage variable is that its significantly negative effect for blacks persisted when probit regressions similar to those conducted by Becker *et al.* (1977) were run; the probabilities of separation by the fifth and tenth years were significantly lower when the husband was not in his first marriage, other factors including husband's age at marriage (to the NSFG respondent) held constant.

⁸Dummy variables indicating husband's age at current marriage were omitted from the final regressions because they had no significant effects in preliminary runs. The coefficients of other variables were not sensitive to their inclusion or exclusion.

a mother, the child's presence decreases the benefits of waiting for a better offer. In sum, a prenuptial conception or birth are likely to be associated with a high risk of dissolution because they encourage stopping the search process quickly. An additional consideration in the case of illegitimacy is that the child represents capital specific to a previous union and may be a source of disruption in the present marriage.

Empirically, the effects associated with giving birth to a child before marriage have the expected signs; however, the coefficient is substantially larger and more significant for white women (t -ratio is 3.4 for whites but only 1.5 for blacks). Although the authors do not comment on this, results reported by Menken *et al.* (1981, Table 1) also suggest that illegitimacy has a more pronounced impact on whites. A child born out of wedlock may reduce gains to marriage more for white women, because illegitimacy is relatively uncommon in this group and viewed with less acceptance. The coefficients associated with premarital conception are positive but insignificant for both races.⁹

The final set of variables represents various measures of the cost of dissolving a marriage. In accordance with expectations, if husband and/or wife are affiliated with the Catholic church, the risk of separation is lower (t -ratios are -3.8 and -3.7 for white and black women, respectively). Those who attend religious services more frequently also have lower probabilities of marital break-up (t -ratios are -5.8 and -4.1); this is to be expected if religiosity is associated with placing a higher value on family ties.

Women with a family history of marriage dissolution are likely to view separation or divorce with more acceptance than their counterparts who have grown up in stable homes. The results (t -ratios are 3.7 and 3.2) support this hypothesis and previous findings by Bumpass and Sweet (1972) and Pope and Mueller (1976).¹⁰ In view of the fact that black women are almost twice as likely as their white counterparts to have grown up in non-intact families (the proportions, shown in Table 1, are 0.39 for black women and 0.22 for white women), these results suggest that racial differences in the incidence of a broken-home family background may contribute substantially to the observed black-white differential in dissolution rates.¹¹

Respondents living in SMSAs have higher probabilities of dissolution. This may be due to the greater ease of securing a divorce and also possibly to the brighter prospects for remarriage in big urban areas. The rate of marital break-up varies significantly across the three geographical regions. For white women, the dissolution rate is higher in the West than in the North Central and North Eastern regions;¹² for black women, the rate in the West exceeds by

⁹As argued in the text, part of the effect of illegitimacy and the bulk of the impact of premarital conception are expected to operate through the length of the search process. Because wife's age at marriage is one indicator, albeit imperfect, of length of search, the model was re-estimated omitting the age variable to obtain approximate measures of the total effects associated with premarital birth and conception. The coefficient on premarital conception became marginally significant for whites ($t = 1.7$) but remained insignificant for blacks ($t = 1.1$). The coefficients on illegitimacy did not change substantially.

¹⁰Other reasons why a broken-family background may influence the likelihood of dissolution are offered by Pope and Mueller (1976). In contrast to the findings reported here, Duncan and Duncan (1969) and Heiss (1972) find very small or no significant effects associated with parental family instability.

¹¹This, of course, leaves open the initial cause of the greater instability of marriages in the black population. In contrast, emphasis on the lower levels of male earning capacities among blacks leads to a prediction of lower gains from marriage and higher dissolution rates.

¹²Statistical tests using information on the variance-covariance matrix of the coefficients show that these differences are statistically significant (t -ratios are 3.0 and 2.6).

far that in any other region. This higher level of marital instability in the West has emerged in numerous previous studies and probably reflects a socio-economic and legal environment that makes marriage dissolution less costly there (see Pang and Hanson, 1968; Fenelon, 1971).¹³

The marked rise in dissolution rates that these data indicate for the more recent cohorts of women are consistent with the well known secular increase in the incidence of divorce. The liberalization of divorce laws and the reduced stigma attached to marriage breakdown have decreased the cost of divorce over time. And as growing numbers of individuals have joined the ranks of the divorced, the remarriage market has improved, further increasing the attractiveness of separation and divorce.

V. CONCLUSIONS

The main substantive findings of this study may be summarized as follows. (a) An increase in husband's education lowers the probability of marital instability; the impact is non-linear, however. (b) No effects associated with the wife's education at the time of marriage are discerned. (c) In accordance with theoretical expectations, black women whose socio-economic status has declined through marriage are more likely to dissolve their unions; no significant effect emerges for whites. (d) Marrying outside one's religion substantially increases the likelihood of marital conflict. (e) White couples in which the wife's age exceeds the husband's are at increased risk of marital disruption. In contrast, for blacks the increased risk is observed when the wife is substantially younger than her husband. (f) A previous marriage for the husband decreases the chances of dissolution, a result that is strongly significant for blacks and marginally significant for whites. (g) Marriages contracted at young ages are more likely to fail. (h) A premarital birth increases the chances of dissolution for white women, but has no significant impact among black women. (i) Holding wife's age at marriage constant, a premarital conception has no significant effects. (j) Affiliation with the Catholic church discourages separation. Frequency of attendance to religious services operates in the same direction. (k) A broken-family background increases the likelihood of marital instability. (l) Place of residence and date of marriage have important influences on the probability of dissolution.

A number of factors other than those discussed above may influence the stability of unions over time. One of them is the nature – formal or informal – of the union. In preliminary runs conducted with the black sample, a variable indicating informal union emerged with a significantly negative coefficient, suggesting that unions not cemented by a legal contract have greater stability than formal marriages, a highly implausible finding. Upon reflection, however, there is an explanation: the present data set is a cross-section survey, and it is likely that the successful informal unions were reported, with most of the unsuccessful ones 'forgotten'. Panel data would be helpful for studying these types of issues, as well as the impact on marital stability of changes over time in the ages and number of children and in the wife's labour force participation. Disentangling cause and effect with these time-changing variables will be a difficult task, but efforts in this direction have already begun (Johnson and Skinner, 1986) and will continue in the years ahead.

¹³Weed (1974) argues that the main explanation is the relatively high frequency of teenage marriages in the West; however, age at marriage is held constant in the present analysis (see footnote 8), suggesting that there must be other sources for the geographical differentials.

At the methodological level, this study illustrates the potential usefulness of survival models. In the same way that marriage histories were analysed here by examining how estimated probabilities of dissolution vary with exogenous factors, these models may be used to study other event history data, such as promotions, quits, layoffs, and retirement. In each case, the researcher may be interested in quantifying the impact of various explanatory factors on the occurrence and timing of the event, on the basis of data where censoring is present (i.e. some individuals may not have experienced the event by the date of the interview, although they may do so at some unspecified future time). Survival models, which utilize the considerable information to be had in the fact that individuals with certain traits have *not* experienced the event in a given period of time, may provide an appropriate framework for the statistical analysis of these and a wide range of other economic issues.

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