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TWO PAPERS ON THE RECENT RISE IN U.S. DIVORCE RATES

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ABSTRACTS

Why Has the U.S. Divorce Rate Doubled Within the Decade?

This paper seeks to explain the recent rise in U.S. divorce rates using an economic framework. Annual time series data from 1920 to 1974 are used in the empirical analysis. The estimated equation tracks the actual series quite well. It attributes the recent increase in divorce to improved contraceptive technology, reduced average duration of marriage (resulting from the age distribution of the population) and income growth. Projections suggest a flattening of the divorce rate series in the near future.

Anatomy of the Divorce Rate: 1960-1974

This paper uses Vital Statistics data from the Divorce Registration Area to decompose into age-specific components the rise in the aggregate divorce rate between 1960 and 1974. While women in their 20's comprise only about 20 percent of the married population, they appear to have contributed over 60 percent of the decade growth in the divorce rate.

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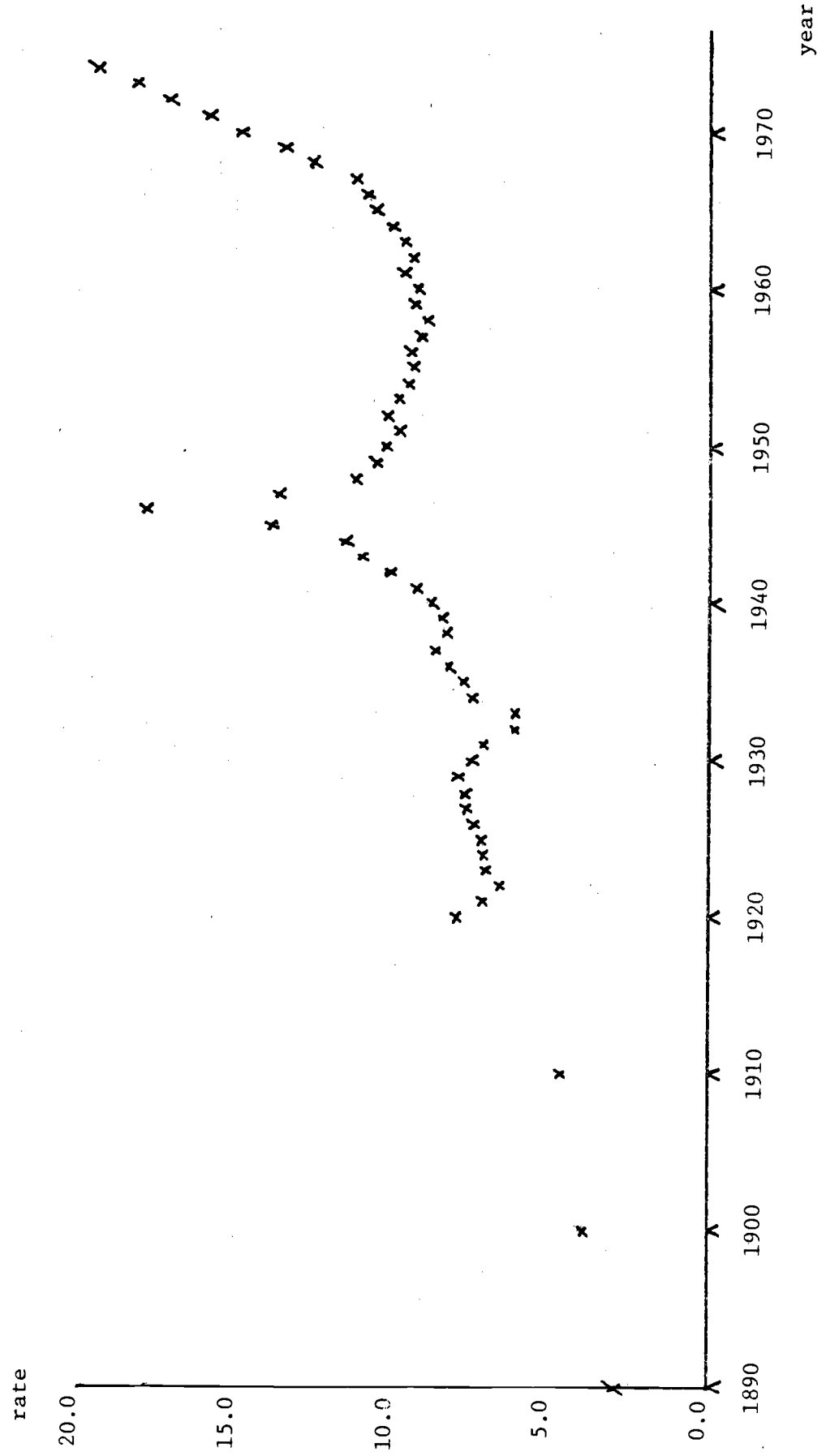
Introduction

The motivation for this paper is to understand the causes of the recent rise in the U.S. divorce rate. Figure 1 shows the time series of annual divorce rates (number of divorces per 1000 married women age 15 and over) since 1920 with decennial estimates back to 1890. The series exhibits an upward trend with three substantial disruptions: a short episode during the Great Depression, a sharp rise during and immediately following World War II, and an extended upswing in the most recent seven years. One can readily offer single ad hoc explanations for the first two of these disruptions from the long-term trend, but the cause of the current rise is less apparent. This recent upswing is exceptional by historical standards but is not unique to the U.S. The recent doubling of the U.S. divorce rate represents a major demographic phenomenon for which no explanation and little analysis has yet appeared. As a divorce is in some respects analogous to a job separation or to a dissolution of any long-term contract, an economic perspective is employed in a demographic context in seeking an explanation for the rise in divorce.

I. Analytical Issues

Recent economic analyses of marriage and cross-sectional divorce provide the context for this multivariate analysis of the U.S. aggregate divorce rate.[1] Marriages may be made in heaven but are assumed to be negotiated in competitive markets in which each partner settles for the best he or she can do, given the available choices which are limited by the competition of others and the costs involved in searching more thoroughly. Divorces result when those negotiated marriage contracts appear no longer to represent the expected best alternative marital circumstance even in light of the costs of dissolution and perhaps recontracting.

Figure 1. U.S. Divorce Rate 1890 to 1974 (Divorces per thousand married women age ≥ 15)



The economic literature on marriage suggests at least three forces which affect the gains from a marriage; the smaller those gains the greater the likelihood of divorce. (1) The level of the family's income (in particular the income of the primary worker) is expected to be negatively related to divorce, as the marriage gains are positively related to the level of resources. (2) The relative wage rate of the secondary worker, or the labor force attachment of the secondary worker, is expected to be positively related to divorce, as the gains from specialization within the marriage decline with increases in the secondary worker's labor market attachment. (3) The similarity between spouses in traits or characteristics used jointly in marital activities is expected to be negatively related to divorce, as these traits are technical complements in non-market production and are thus positively related to the gains from marriage.

Cross-sectional divorce studies tend to confirm all three of these forces,[2] and introduce two other forces which influence divorce. (4) Unexpected events are maritally destabilizing (e.g., unexpectedly high or low income, severe episodes of unemployment, fertility impairment, and health changes appear to increase the likelihood of divorce). (5) If we conceive of family-produced capital jointly owned by the spouses and having greater value in the marriage in which it is produced than elsewhere -- marital-specific capital -- then the stock of such capital at any duration of marriage will be negatively related to the probability of divorce, with causation running in both directions. Own-children are the most prevalent example of such capital.

The analogue to job separation is very clear here. The first three forces are related to the general adequacy of the match; the better that

matching the less likely any random perturbation will render that marriage (or that job) no longer desirable. The fourth implies that for any given quality of the match, the bigger a random shock to the system the more likely the match will no longer be desirable. The fifth factor is comparable to job-specific human capital that represents an additional capital loss from dissolving the match.

The application of many of these cross-sectional results to aggregate time series is quite straightforward. Increases in women's labor force participation rates, unanticipated increases in unemployment rates, decreases in number of children in the family, and any phenomenon which might result in less well-matched couples should increase the aggregate divorce rate.[3] In the case of other variables, notably those which operate through the marriage market, analytical modifications are required in dealing with aggregate time series data.

Consider the effect of males' income on the gain from marriage. In the cross section an increase in one man's income has two effects on his expected gains from marriage: it raises the gain from marriage to any partner via complementarity of his income with other resources and it increases his relative attractiveness in the marriage market, which improves his chances of securing a relatively better mate. In the aggregate, however, only the first of these two forces operates; if all men's incomes rise there is no improvement in the relative attractiveness of any one man, hence no resorting. Since the differential sorting effect by income is not present in the aggregate time series, the gains from marriage should not rise with income as much in aggregate time series as in the disaggregate cross section data. Hence the negative effect of husbands' income on divorce in the cross section should be weaker in the time series.

There are two other reasons the effect of husbands' income may not be strongly negatively related to the likelihood of divorce in aggregate time series data. First, cross sectional findings suggest the relationship between income and the likelihood of divorce is nonlinear -- steeply negative at low income levels, rather flat at middle income levels and even positive at very high income levels [see Becker, Landes, Michael (1977)]. As changes in aggregate time series income reflect changes in average income a relatively weak relationship with divorce may be expected. Second, to the extent time series income fluctuations reflect transitory income, they may represent little or no impact on the expected gains from marriage.

Another aggregation issue involves the fact that the likelihood of divorce typically declines with duration of marriage. There is considerable evidence from cross-sectional studies that various factors such as age at marriage affect divorce rates differently at different durations of marriage. In the cross section one can remove the complicating influence of duration by decomposition. In time series data one has only the mean or median marriage duration for standardization and it may be that critical interactions involve other moments of the distribution of marriage duration.

In addition to differences between the cross section and the time series due to aggregation there are, of course, factors which change over time that are fixed in the cross section. One such factor is business cycle fluctuations encompassed in such variables as income and unemployment as discussed above. A second additional time series factor is war. In a time series study of divorce it seems inappropriate to omit war years, as is frequently done in other time series analyses. This variable, say

measured as the percent of adults in military service, surely merits attention in the past fifty-year perspective and perhaps in the past twenty years as well. Admittedly, the emphasis on this phenomenon is prompted by the obvious empirical relationship between the divorce rate and the war years, so the purity of hypothesis testing in this regard is questionable. However, it seems clear on a priori grounds that a military manpower variable should be negatively related to the gains from the current marriage for at least four reasons. (1) Many marriages during wartime are initiated relatively quickly prior to entering service (perhaps prompted by military pay supplements for spouses) or relatively quickly in order to avoid service as in the 1960's. These marriages which resulted from less marital search presumably result in less well-matched pairs and hence in relatively low gains from marriage; thus they should exhibit higher rates of divorce. (2) Among existing marriages, wartime military service is typically an unexpected event, and such events are generally maritally destabilizing. (3) The separation of spouses itself is maritally destabilizing as associations weaken and other ties are more likely to form -- greater depreciation of and less new investment in spouse-specific capital lowers the capital loss involved in divorce. (4) The imposed mobility and the increase in the size and the sex imbalance in the pool of unmarried persons resulting from war tend to raise the probability that a relatively attractive mate might be encountered, which further raises the probability of divorce.

An additional time series influence is technological change, of which the most important aspect in the present context is technological change in fertility control. The oral contraceptive, first patented in 1955 and first marketed in the U.S. in 1960, followed by the medical acceptance of

the IUD after 1962[4] represented an abrupt and sizable change in the efficacy of available contraception. Two quite different observations provide convincing evidence that couples faced a very different circumstance related to fertility control in the post-pill era than they faced prior to 1960. First, estimates of the actual use-effectiveness of contraceptive techniques imply huge differences between the pill-IUD technology and the pre-pill methods. Briefly, the probability of a pregnancy in ten years when using rhythm, foam or jelly, condom or diaphragm, IUD, or pill is .98, .88, .77, .22, and .09 respectively.[5]

Second, evidence on actual fertility outcomes, when measured by, say, the conditional probability of a birth for women with six children at a given age showed essentially no change from 1930 to 1960 despite the large fluctuation in actual fertility over this period. But this measure of fertility plummeted in the years following 1960 (see Table 1). Likewise, Sanderson's extensive study of birth probabilities isolated year-specific effects (removing cohort and age effects). For higher-order births, the year effect was essentially nonexistent until 1960 after which the year effect was very pronounced (again, see Table 1). The use-effectiveness data and these year-specific fertility indicators for high-order births imply that a major change in fertility control occurred in the 1960's.

These changes in contraceptive technology in the early 1960's were followed by further medical improvements in fertility control through changes in male and female sterilization procedures and by legal changes governing elective abortions. Students of contraceptive behavior argue convincingly that the past fifteen years deserve to be considered a period of "contraceptive revolution" [see Westoff and Ryder (1977)]. Given that such a revolution has taken place, why should it be expected to affect the

Table 1. Indexes of birth probabilities for women with six children, by age and year; and Sanderson's index of the current-year component for the birth probability for women with six children. (1960=1.00)

Year	Birth Probability Index for Women Aged: 30-34 (1)	35-39 (2)	Sanderson's Index of Current Year Component (3)
1930	1.06	1.16	0.99
1935	1.00	1.05	0.98
1940	1.00	0.94	0.98
1945	1.12	1.06	na
1950	1.01	0.99	0.93
1955	1.05	1.06	1.01
1960	1.00	1.00	1.00
1965	0.71	0.70	0.64
1970	0.46	0.42	(1966 = 0.46)
1973	0.34	0.29	na

Source: Cols. (1), (2) from Table 9B, Heuser (1976); Col.(3) from Figure 41, page 183, Sanderson (1974); Sanderson's series stops in 1966 and excludes the war years.

Table 2. Probability of Divorce in five-year marriage duration intervals by number of young children present at the beginning of each interval; white women

	5-10 Years of Marriage	10-15 Year of Marriage*
Overall Probability of Divorce in the five-year period:	3.92%	3.55%
If Zero Children under 6 at the beginning of the interval:	6.01	4.69
If One Child under 6 at the beginning of the interval:	4.01	2.96
If Two Children under 6 at the beginning of the interval:	2.82	1.97

*Estimated assuming 1.0 older child in the family. The regression holds constant wife's age, age at marriage, education, and premarital pregnancy status.

Source: Becker-Landes-Michael (1977) based on 1967 SEO data.

divorce rate? Three reasons are suggested here, and because of the importance of this factor in the empirical estimation below, these three reasons are discussed at length. First, improved fertility control lowers actual fertility which tends to raise the rate of divorce.[6] In cross-sectional studies of divorce there is statistical evidence of the commonly held belief that the presence of children, in particular young children, inhibits divorce.[7] Table 2 shows the implied partial effects of the first and second young child on the divorce probability over two successive five years of marriage in one recent study. The presence of a young child in the household is estimated to lower the likelihood of divorce in these intervals by roughly 30 percent; a reduction from two to one child is associated with a roughly 50 percent rise in the likelihood of divorce.

While the decline in fertility since 1960 cannot be attributed exclusively to improved contraception, surely some part of the decline is related to the introduction of the pill and the medical acceptance of the IUD. Despite reservations expressed at earlier dates [e.g., Ryder (1972) pp. 237-239], Westoff and Ryder (1977) conclude on the basis of their extensive analysis of contraception and fertility behavior through the 1960's that: "the entire decline in births within marriage across the decade of the 1960's can be attributed to the improvement in the control of fertility" (p. 340) which "is no doubt attributable in large measure to the advent

and wide diffusion of a new, highly effective birth control technology, particularly the pill and the intrauterine device" (p. 308). The total marital fertility rate in the U.S. fell from 1961 to 1974 from 3.42 children per married woman to 1.63, a decline of 1.79 children [see Gibson (1976)]. If, say, sixty percent of that reduction is attributable to the changed contraceptive technology, that one fewer child may have resulted in a substantially higher likelihood of divorce, if the findings characterized in Table 2 are indicative of that effect.

A second reason contraceptive technology may affect divorce behavior involves a more indirect but not necessarily less powerful channel of influence: it reduces uncertainty about subsequent fertility, which in turn alters household investment behavior in a manner which raises the likelihood of divorce. With imperfect fertility control, young couples face considerable uncertainty about their subsequent fertility. The amount of this uncertainty is not trivial and its relation to contraceptive behavior can be illustrated with findings from a study using the 1965 National Fertility Survey. Partitioning the sample of women into groups deemed to have had similar fertility intentions, women who used relatively effective contraception had a much smaller likelihood of experiencing excessive fertility than women who used relatively poor, or no, contraception (Table 3 provides some details on the samples and fertility outcomes). Viewing the observed actual fertility by the 24th year of marriage as an indication of the ex ante risk of excess fertility faced by these women, those who used "good" contraception (primarily condom and diaphragm in the time intervals in question) had less than half as high a likelihood of having five or more children than did those who used "poor" contraception, and less than one-third as high a likelihood than did those women who used no contraception

Table 3. Fertility outcomes by contraceptive strategies for white non-Catholic women

A. Estimated probabilities of selected fertility outcomes for women married 20-24 years and estimated to have "wanted" three children, by contraceptive strategy

Contraception used in first birth interval	Estimated probability of having five or more children	Index of uncertainty
good contraception	4.4%	1.00
poor contraception	10,1	2.30
no contraception	14.1	3.20

B. Actual percentage of women in each cell who had five or more children, for women 35-44, for cells defined by women's education level and contraceptive strategy

Contraception used in first birth interval	Women's Education		
	9-11 years	12 years	13 years
good contraception	13.9%	10.3	6.5
poor contraception	27.5	14.9	11.7
no contraception	26.7	14.3	11.1

Source: Derived from Michael and Willis (1976), based on 1965 NFS data. Probabilities obtained as follows: the mean μ and standard deviation σ of actual number of live births was computed for each of three groups of women distinguished by the contraceptive technique used in their first birth interval (good = condom or diaphragm; poor = all other techniques; none = no technique). The probabilities were calculated for each group for a standard normal distribution, using $(x-\mu)/\sigma$ with $x = 5$.

Index of Uncertainty is simply the probability in row (2) or (3) relative to that for "good contraception" users.

(some of whom were and most of whom thought themselves subfecund). There is both considerable variation by contraceptive technique in the uncertainty couples face, and there is substantial uncertainty faced by couples using even the best available pre-pill technology. Of course, one cannot yet have a 24-year history of fertility outcomes for pill-IUD users, but judging from the differential use-effectiveness of these techniques, the comparable chance of having more than five children when using the pill should fall practically to zero.

This reduction in uncertainty about subsequent fertility faced by a young couple in their 20's or 30's can be expected to influence decisions about their consumption and savings behavior, the wife's labor market attachment, and for some the attractiveness of being married per se. Consider two 30-year-old women with no additional children desired. If faced with a probability of .75 or higher of another pregnancy within the next ten years (a reasonable expectation using a pre-pill technology), the attractiveness of making a labor market career investment might appear considerably less than if the accurate expectation was no pregnancy. There is considerable evidence that the presence of young children lowers the likelihood of married women being in the labor market [e.g., Heckman, Willis (1977) estimate the effect per child to be about -.09 on a mean of 0.43 for a 1967 sample], and discussions of on-the-job investments in skills by women frequently emphasize that these investments are often postponed until childbearing is completed as skills depreciate relatively rapidly when the woman is outside the labor force [see Mincer, Polachek (1974)]. Faced with uncertainty about future fertility, a woman may delay her anticipated labor market investment. That delay might well be accompanied by other activities which would increase her skill in non-

labor-market activities, subsequently decreasing the attractiveness of marital dissolution and also of a market career altogether. Perhaps more broadly than the change in labor market orientation of women, couples may respond to uncertain future fertility by orienting their plans and present activities in ways that tend to strengthen their marriage by increasing the capital losses from dissolution. Although no evidence is adduced linking the reduced uncertainty about future fertility to investment behavior, the logic that underlies those investments surely implies that the effect is to be expected.[8]

An additional impact of this uncertainty about subsequent fertility relates to the decision to be married or unmarried. It has been argued [Becker (1974)] that one of the important production efficiencies which generates a demand for marriage is the more basic demand for bearing and rearing own-children. In a world of quite imperfect fertility control, the force of this argument might be changed: given a desire to be sexually active, an inevitable consequence is some substantial risk of a birth which implies a likelihood of marriage if the birth is to be legitimized. If, with improved contraception, sexual activity no longer need involve a substantial risk of birth, then the derived demand for marriage would be based on the smaller demand for "desired" or "wanted" children rather than on the demand for "actual" (wanted and unwanted) fertility. Thus, the gains from marriage per se may have been reduced appreciably with the recent fertility control technology changes, especially for persons who "wanted" no children.[9]

The third reason improved contraceptive technology may encourage divorce is that it weakens an important restriction on extramarital sexual activity. By lowering the risk of conception, the cost of non-marital sex

is reduced which presumably raises the quantity demanded, thus increasing extra-marital search that in turn raises the probability of encountering a preferred mate. Evidence here too is difficult to obtain, but Ryder and Westoff show that within marriage "coital frequency is positively associated with the effectiveness of contraception" [Westoff and Ryder (1977), p. 67], for presumably the same reasons.

The change in fertility control technology in the 1960's has another feature which makes it an attractive variable to use in studying time series divorce. The technological change can be considered exogenous; it was introduced before the rise in divorce began and had its roots in medical innovations for which patents were first applied as early as 1952. It is often the case that a set of variables moves together over time in a consistent manner, as in the past fifteen years the decline in fertility, growth in women's labor force participation and growth in divorce rates have done. But it is not an easy matter to identify the causally prior force which has influenced such series. Surely there is much simultaneous causation among fertility, women's labor force rates and divorce rates in recent years but we would like to know which of these or what other influences prompted the changes which have taken place. While technological innovations may themselves be induced by demand considerations and perhaps the contraceptive technological changes in the late 1960's were responding to social forces, it seems reasonable to argue that the pill-IUD technology was in no meaningful sense caused by the divorce rate.

Another factor often discussed as an important influence on the divorce rate in recent years is the change in the legal costs (broadly defined) of divorce. Surely the costs affect the demand and as discussed

below these costs have fallen in many states in the U.S. within the past decade. What is far less clear is whether it is appropriate in trying to explain the rise in divorce to use the easing of divorce laws as an exogenous influence. In other areas of law, such as minimum schooling legislation, studies have indicated that changes in laws do not alter behavior but are, rather, responses to and codification of behavioral changes [see, e.g., Landes, Solmon (1972)]. So, without a simultaneous system in which these law changes were themselves predicted, it seems inappropriate to place much weight on these changes in divorce laws in explaining the recent rise in divorce.

One final potentially important influence on time series divorce results from a dynamic relation with the series itself. A general rise in the divorce rate influences subsequent years' divorce rates in several ways: (1) by creating a greater pool of more readily available potential mates which probably lowers the expected (net) gain from the current marriage, thus inducing increased divorce; (2) by increasing the expectation of divorce which reduces incentives to invest in marital-specific capital, which lowers the losses incurred by divorce (i.e., the expectation is self-fulfilling); (3) by ultimately raising the proportion of all marriages which are second and third marriages, in which the divorce rate is, typically, higher [see McCarthy (1977)].

II. 1920-1974 Time Series Analysis

The preceding section discusses numerous factors expected to influence the divorce rate over time. The regression analysis reported in this section and in the appendix focuses on the aggregate annual time series of divorce rates since 1920, with a few appendix regressions restricted to the post-war period. The estimation involves a single reduced form

equation and thus several factors which are considered simultaneously determined with the divorce rate are not included directly in the equations (some are reported in the appendix for comparison). Five principal variables are used in the regressions: income (Y), for which cross section results show strong negative coefficients but as discussed above, this negative effect should be much weaker in the time series; unemployment (U) for which the positive cross section effect might also be somewhat weaker; a measure of marriage duration (MD) used to standardize for this important demographic dimension of divorce rates -- as measured MD is inversely related to the median duration of marriage and thus should be positively correlated with the divorce rate; a measure of military manpower (GI) which should be positively related to the divorce rate; and one of two measures of contraceptive technology, CT, a diffusion measure based on estimated adoption of the pill and IUD in the U.S., or DF, a diffusion measure based on a logistic diffusion curve. Another variable with which experimentation was performed with little success is a crude measure of an Easterlin relative income concept [see Easterlin (1973)], REL(Y), defined here as the ratio of real per capital income in year t to real per capita income in year t-15. The idea here is to capture the economic circumstances of an individual in year t (think of, say, a 28-year-old) relative to the economic circumstances that individual experienced in his or her formative years, taken to be about fifteen years before (say, at age 13). The hypothesis is that the better the person's current circumstance relative to his or her childhood circumstance, the higher his relative income and the lower his likelihood of divorce.[10]

The variables used in the regression analysis for the period 1920-1974 were annual observations. Their sources and measurement details are listed in appendix Table A-1. Briefly, they are:

DR: divorce rate: the number of divorces per 1000 married women age $\geq$ 15 (μ = 10.1; σ = 3.1; range 6.1 - 19.3)

Y: income: personable disposable income per capita in 1967 dollars (μ = \$1783; σ = \$603; range \$934 - 3045)

REL(Y): relative income: for year t the ratio of real personal disposable income per capita in year t to the real PDI per capita in year t - 15 (μ = 1.27; σ = 0.28; range 0.54 - 1.92)

U: unemployment: percent of civilian labor force unemployed (year averages) (μ = 7.1; σ = 6.1; range 1.2 - 24.9)

MD: marriage duration: for year t, the ratio of the total number of marriages in years t, t-1, t-2, to the total number of marriages in years t, t-1, ..., t-14. This ratio should be inversely related to the median duration of marriage. (μ = 21.5; σ = 2.2; range 18.0 - 25.4)

GI: military manpower: percent of the population age $\geq$ 18 which is in the military (μ = 2.1; σ = 2.5; range 0.3 - 12.3)

CT: contraceptive technology: estimate of the percent of married spouse-present women who are using an oral contraceptive or IUD (μ = 3.4; σ = 9.2; range 0 - 35)

DF: technology diffusion: an index intended to reflect the diffusion of changed contraceptive technology in the 1960's. The index reaches 98.5% saturation in 15 years (μ = 4.3; σ = 13.4; range 0 - 68.6)

As the decision to divorce precedes the final issuing of a divorce decree by many months,[11] it is assumed that a two-year lag on most exogenous variables would be appropriate. The contraceptive technology variable CT or DF is the only one for which a longer lag seemed appropriate. Whether the channel of influence of this factor is through a reduction in actual fertility, a reduction in uncertainty about subsequent fertility, or a repercussion of a reduced cost of extra-marital sex, a lag between initial adoption and the decision to divorce of, say, three years seemed reasonable, a priori, so a total lag of five years for this variable is used. Clearly, the proper lag structure may differ from variable to variable, and the entire impact may not be transmitted to the divorce rate in any single

year. Experimenting with distributed lags and alternative single-period lags has not been done, however.

Table 4 reports results from five regressions estimated by a two-stage process employing the "Durbin-procedure" for removing the autoregressive structure from the residuals.[12] Regarding the directions of effects, marriage duration, military manpower and contraceptive technology have the expected, and reasonably strong, positive effects on the divorce rate. Unemployment has a substantial positive effect, as in the cross section (although this effect does not accord with one's casual impression from the drop in divorce in the early 1930's). The most puzzling result in these regressions is the persistently positive effect of income. While the strong negative effect from the cross section was not expected, the significant positive effect of income on divorce has not been explained. My explanation is this: measured income (Y) is capturing in part the positive effect on divorce of the growth in women's labor force participation. To investigate this possibility, time series regressions using women's labor force participation rates (LF) and men's income (MEN(Y)), both available only in the post-war period, were run (see appendix Table A-4). The labor force variable did appear to weaken the significance of the positive income (Y) effect although LF itself never approached significance, while MEN(Y) had a much weaker (insignificant) effect when used in place of Y and its effect was further weakened by including LF, which supports the view that Y's significant positive effect is reflecting, in part at least, the rise in LFPR of women. The REL(Y) variable is not useful in these regressions (see Table 4). Preston and McDonald (1976) did find relative income important in explaining cohort divorce differen-

Table 4: Time series regressions on divorce rate, 1920-1974. (Two stage estimation; all variables lagged two years except CT and DF which are lagged five years.)

Regression No.	Y	LN(Y)	REL(Y)	U	MD	GI	CT	DF	Intercept	$\bar{R}^{2*}$	F	DW
1.	.002			.090	.345	.543	.140		-3.105	.94	126.	1.64
	(5.09)			(3.41)	(5.34)	(9.62)	(6.01)		(-1.74)			
2.		3.381		.100	.333	.544	.158		-24.520	.94	143.	1.64
		(5.56)		(3.93)	(5.54)	(10.03)	(8.27)		(-4.78)			
3.	.002			.092	.366	.539		.091	-3.874	.95	185.	1.89
	(7.83)			(4.26)	(7.16)	(11.52)		(8.14)	(-2.86)			
4.	.002		- .016	.089	.347	.533	.140		-3.139	.93	90.	1.76
	(4.06)		(-0.02)	(3.05)	(4.34)	(8.98)	(5.05)		(-1.62)			
5.	.002		- .192	.089	.375	.535		.089	-3.895	.95	134.	1.99
	(6.64)		(-0.32)	(3.69)	(6.18)	(10.72)		(7.13)	(-2.69)			

t-values in parentheses

Estimates of $\hat{\rho}$ for these five equations are: .14, .09, .08, .21, and .15 respectively.

* Reported $\bar{R}^2$ are computed for dependent variable D; the $\bar{R}^2$ for $(D_t - \hat{\rho}D_{t-1})$ are: .92, .93, .95, .91, and .94 respectively.

tials but both the measure of relative income used here and the analysis of period instead of cohort divorces helps explain its poor showing in these regressions.

Figure 2 plots the predicted series (from equation (3), Table 4) together with the actual divorce rate series; the predicted series mirrors the actual series quite well.[13] In order to track through time the impact on the divorce rate of the various explanatory variables, Table 5 indicates the decade-by-decade changes attributable to each variable, based again on eq. (3) in Table 4. Considering income and unemployment together as the influence of the economy, this influence contributed on the order of magnitude of two-thirds of a percentage point per decade to the growth in divorce in three of the five decades. In the most recent decade the effect of the economy was to raise the divorce rate by about three times its ordinary decade effect.

The military manpower variable contributes to the growth in divorce rates in these decade changes through the 1940's and 1950's only. The exceptional role played by this variable in the mid-1940's is indicated by the four-year period effects shown parenthetically in Table 5. (In the post-war regressions, the military manpower variable was invariably statistically insignificant.) The marriage duration variable appears to have an important influence on the decade changes throughout this half century. Marriage duration lengthened over time from about 1920 through 1933, shortened during the remainder of the 1930's, was low throughout and immediately after World War II, lengthened thereafter until about 1960, then shortened again. Thus the changes in the duration of marriages tended to depress the divorce rate in the 1920's, late 1940's and throughout the

Figure 2. Actual and Predicted Divorce Rates

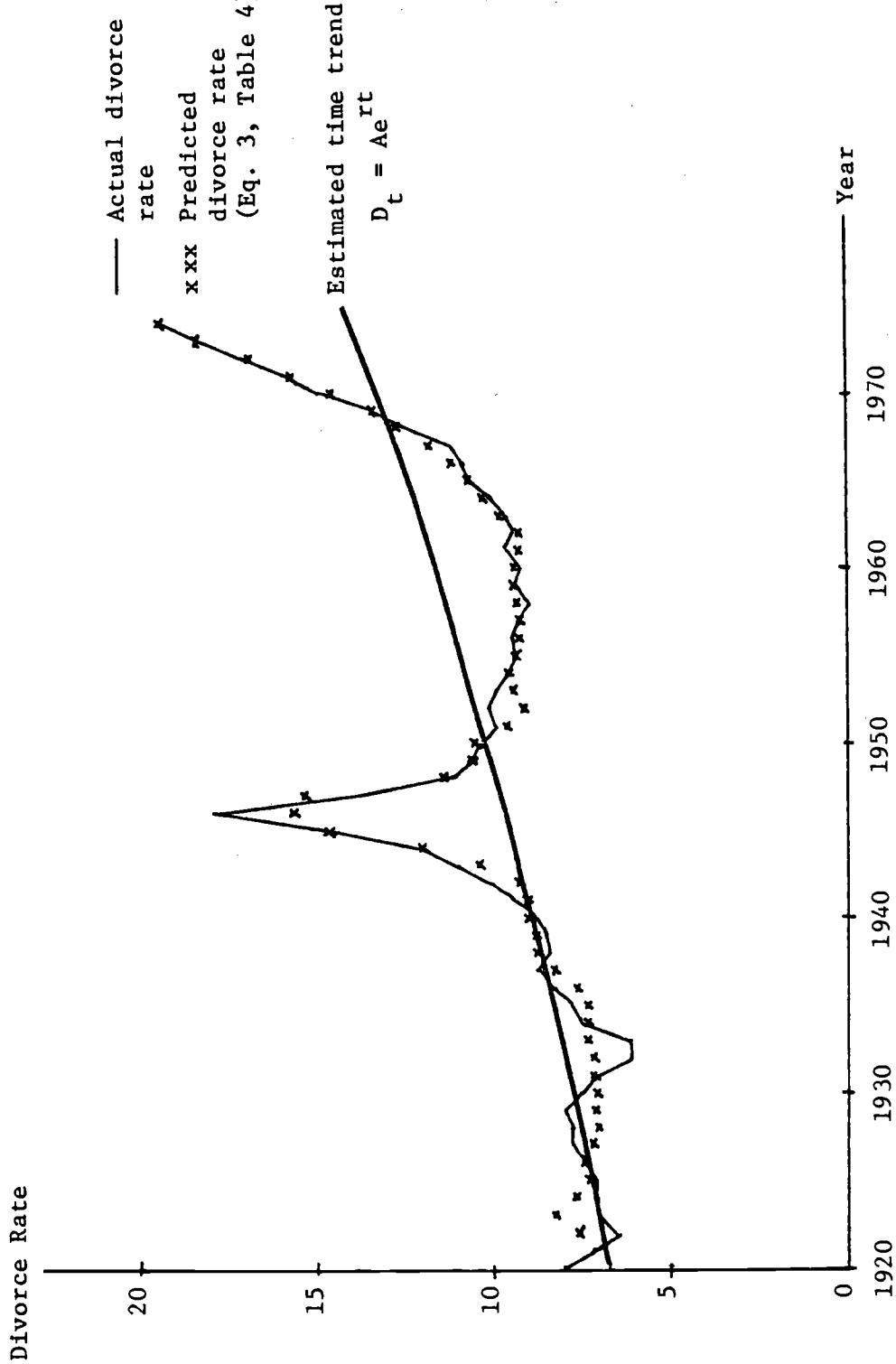


Table 5. Decade-by-decade effects of explanatory variables on the divorce rate, as estimated by equation (3), Table 4

	Decade						Total
	1922-32	1932-42	1942-52	(1942-46)	1952-62	1962-72	1922-72
Income (Y):	.203	.343	1.177	(1.432)	.651	1.920	4.294
Unemployment (U):	.321	.541	-.852	(-1.228)	.018	-.055	-.027
Military manpower (GI):	-.105	.097	.483	(6.088)	.397	.073	.945
Marriage duration (MD):	-.838	.991	-.885	(.143)	-.878	2.312	.702
Contraception diffusion index (DF):	-	-	-	(-)	-	3.728	3.728
Total predicted change:	-0.419	1.972	-0.077	(6.435)	0.188	7.978	9.642
Actual change:	-0.5	4.0	0.0	(7.8)	-0.7	7.6	10.4

1950's, and tended to raise the period-specific divorce rates during the 1930's and from 1960 to the present.

The effect of the contraceptive technology proxy in the most recent decade is very strong when measured by either DF or CT. [The comparable 1962-1972 effects of CT from regressions (1), (2), and (4) of Table 4 are: 4.477, 5.063, and 4.469 respectively.] The lengthy discussion in the preceding section offers an explanation for this strong effect.

The final column of Table 5 shows each variable's half century effect. While marriage duration had a relatively strong effect on the divorce rate in each of the decades considered, it, like unemployment, is cyclical so its influence on the fifty-year trend in the divorce rate is substantially smaller relative to other variables. Over the fifty-year period, the growth in income appears to be a principal factor in the growth in divorce, contributing 4.3 percentage points or about 45 percent of the "explained" increase. Although both military manpower and marriage duration also contribute 0.9 and 0.7 percentage points, these figures are quite sensitive to the particular fifty-year period chosen for the comparison.[14] Unemployment has no significant influence over the fifty years. The contraceptive technology variable, measured as either DF or CT, does have a pronounced effect through its impact in the recent decade.

III. Further Explorations

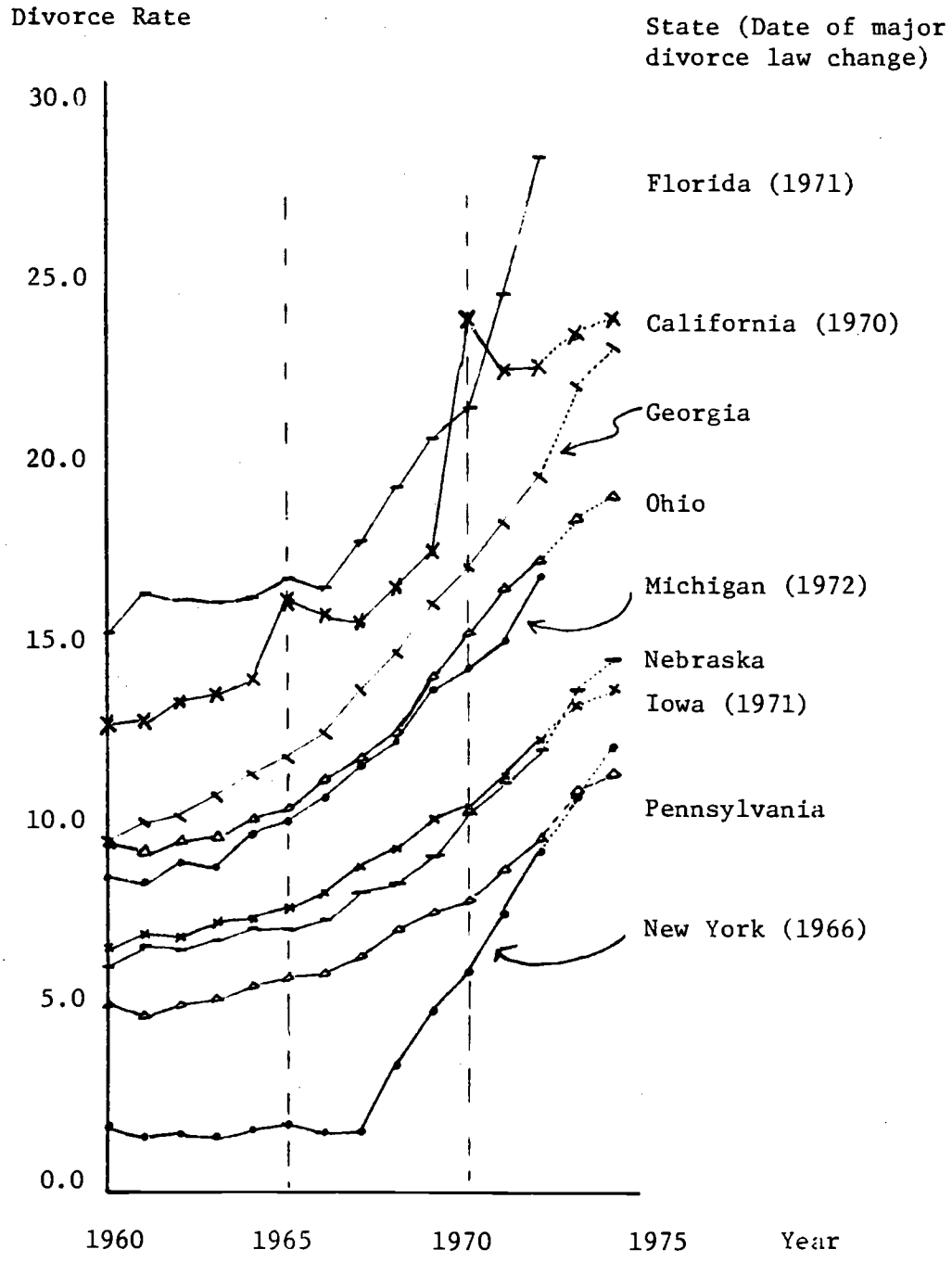
Divorce Laws. Regarding the easing of legal barriers to divorce, there is no disputing the magnitude of changes in laws governing divorce in certain states such as California, Iowa, Florida, and Michigan with the advent of no-fault dissolutions in 1970-71. It is, however, difficult to quantify in general the easing of divorce laws over time.[15] Moreover, as

discussed above, there is a more fundamental question of whether changes in laws can legitimately be viewed as an exogenous social force.

While legal ease of divorce was not incorporated in the time series regressions above for both of these reasons, Figure 3 provides some crude indication of the relation between the rise in divorce and the statutory changes in divorce laws in several states. The figure simply shows the annual time series since 1960 of divorce rates for specific states.[16] There was only one notable change in the divorce laws during the 1960's: New York eased its law moderately in 1966. The new no-fault dissolution law which went into effect January 1970 in California marked the beginning of a two-year period in which several states -- including Iowa, Florida, Michigan, Oregon, Colorado, and Vermont -- adopted no-fault [see Wheeler (1974)]. In most of these states in which law changes have occurred, appreciable increases in divorce rates are observed subsequently -- certainly in New York and California and perhaps Iowa and Florida as well. Whether the higher rates of divorce persist several years after the easing of the law is not clear -- compare New York (where it appears to do so) with California (where the effect appears to be temporary).[17]

Yet, while we observe increases after the enactment of new, easier divorce laws, we also observe considerable increases in divorce rates prior to the passage of those laws, and contemporaneous increases in states in which no law change took place. The figure does not lend support to the argument that the divorce law changes caused the rise in divorce rates which began in the 1960's. In almost every state investigated the rise in divorce began several years before the law was changed. Whether the change in laws subsequently altered divorce behavior or altered only its timing, or in some states had no effect, is far less clear. Whatever forces caused

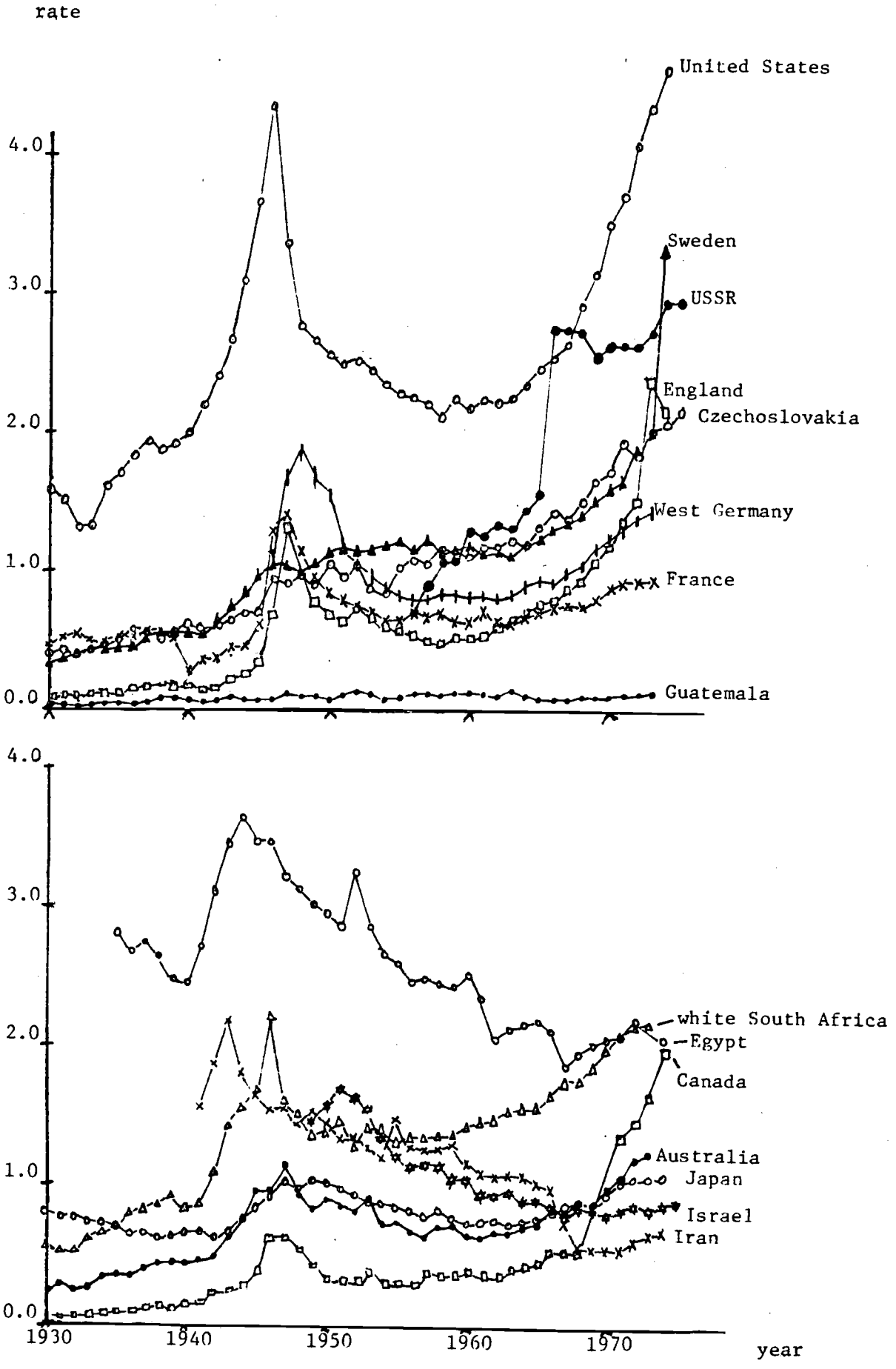
Figure 3. Annual Divorce Rates for Selected States, 1960 to 1974



the rise in divorce rates probably also contributed pressure, at least indirectly, on legislators to codify in the form of easier divorce laws a more tolerant social attitude toward divorce.

International Comparison. Additional perspective on the rise in U.S. divorce rates in the past decade can be obtained by a comparison of international crude divorce rates (divorces per 1000 population). For an arbitrarily selected set of countries, Figure 4 reveals the following pattern: North American and European countries appear to have experienced a marked and sustained rise in divorce rates beginning in the mid-1960's; the rest of the world, generally speaking, did not. This paper does not provide an analysis of these data but several relevant points can be observed from the figure itself: (1) The marked rise in the U.S. divorce rate in the mid-1960's is not an isolated, national phenomenon. Thus the cause of that rise probably is not a purely domestic force such as a change in laws. (2) The impact of World War II is evident in practically every country and even the more modest change in Sweden during the 1940's confirms this interpretation of the war-related increase in divorce. (3) There appears from this casual evidence to be a relationship between the recent rise in divorce and the adoption of the oral contraceptive: the rise in divorce has been far less dramatic in predominately Catholic countries such as Guatemala and France, in middle-Eastern countries, and in highly developed countries such as Japan in which more traditional forms of contraception are still the prevalent mode (in Japan the IUD and pill had not been officially approved for use by 1971). A multitude of additional factors may need be accounted for in a more thorough international study, but Figure 4 appears to lend support to this contention that in countries where the new modes of contraception have not been adopted the rise in divorce rates in recent years has been much less pronounced.

Figure 4. Time Series of Crude Divorce Rates for Arbitrarily Selected Countries (Source: United Nations Demographic Yearbooks)



Demographic Standardization. To determine if the recent growth in the U.S. divorce rate might have been the result of demographic shifts toward population groups which traditionally have high divorce rates, several demographic standardizations were performed. Between 1960 and 1970 estimates of age-specific divorce rates suggest that no more than 20 percent of the decade change in divorce is attributable to changes in the age composition of the population and much of the increase (about 40 percent) is due to increase in the divorce rates of women aged 20-29 [see Michael (1977)]. The attribution of the growth in divorce to younger couples is consistent with the contention that the contraceptive revolution of the 1960's is a primary cause of that growth, for the impact of the improved fertility control should be strongest on women with more remaining years of fertility risk.

Divorce rates are generally observed to be higher in second than in first marriages.[18] A shift in the proportion of all U.S. marriages which are second (or higher order) marriages would tend to raise the observed overall divorce rate, but no such shift is evident for the period from 1950 to 1970.[19] So there is no ground for supposing the observed rise in divorce between 1960 and 1970 is attributable to a shift toward second marriages.

Likewise, it has long been known that divorce rates differ geographically in the U.S. in a curious manner: they rise rather continually from the Atlantic coast to the Pacific coast. Without discussing the reasons for this pattern here, it would be important to know if the recent rise in divorce is a geographically local phenomenon or if much of the rise could be attributed to population shifts among regions. The answer here too appears to be no. Vital Statistics data show a substantial rise in the divorce rate between 1960 and 1970 in every division of the country.

IV. Summary and Prognosis

The recent increase in divorce rates in the U.S. appears to be attributable disproportionately to couples in their twenties; their high and rapidly growing divorce rate has been reinforced by their rising proportion in the married population. The largest age cohorts today (1977) are those aged 16-20 and as these cohorts marry there should be continued upward pressure on the aggregate divorce rate. The rising age at first marriage has offset this tendency somewhat, but the basic arithmetic of the aging of baby-boom cohorts has had and will continue to have a significant impact on the aggregate divorce rate -- in 1960 there were one-third as many women in their 20's as there were women in their 30's, 40's, and 50's; by 1975 there were one-half as many women in their 20's!

Regarding the forces that have contributed to the change in divorce behavior over the past fifteen years, the growth in the economy, measured in terms of real per capita income, appears from Table 5 to have had a substantial influence explaining perhaps 25 percent of the growth in divorce rates between 1962 and 1972. Real growth in the economy over the next decade should continue upward pressure on the divorce rate. The reconciliation of considerable cross-sectional evidence of a negative relationship between income and divorce and the observed positive relationship in the aggregate time series deserves further study. The discussion in Section II explains why a negative relationship is not expected in the time series, but does not predict a positive relationship. Perhaps the explanation is that variety is a luxury in the context of interpersonal relations as it is observed to be in diets, work routines, etc. But perhaps the explanation is that aggregate income is in part reflecting the positive effect on divorce of the rising labor force participation of women, as discussed in Section III.

The other major factor suggested by the regression analysis as an important cause of the recent decade's rise in divorce is the improvement in contraceptive technology which began in the early 1960's. In terms of a prognosis, the regression analysis can be interpreted in at least two ways. If this phenomenon is strictly the diffusion of the oral-IUD contraception technology, working through the channels discussed in Section II, one would expect at least a leveling off of the divorce rate soon, as that technology is now surely effectively diffused in the U.S. (In the longer run, this effect may lower divorce rates as many potential married couples may choose not to marry and the remainder exhibit a lower rate of dissolution.) However, a second interpretation is also possible. If the underlying phenomenon which the CT or DF variable reflects is an exogenous, technologically induced shift toward costless, perfectly effective fertility control, then the whole impact of this phenomenon may not lie behind us. Significant post-pill innovations in sterilization, fetal monitoring and perhaps abortion represent further advances toward perfect fertility control, and may be expected to continue to exert upward pressure on the observed divorce rate. Of course, the regression equation estimated here more adequately reflects the first of these two interpretations, but the logic of the argument need not.

As all the variables in the divorce regression in Section III are lagged at least two years and the regression ends in 1974, the equation can be used to predict the divorce rate for an additional four years on the basis of actual values for the explanatory variables. The actual divorce rate and the predictions from eq. (3) in Table 4 for the last four years over which the regression was run and for the subsequent four years are shown below:

Year	Divorce Rate Actual	Predicted
1971	15.8	15.6
1972	17.0	16.9
1973	18.2	18.3
1974	19.3	19.4
1975	20.3	20.5
1976		20.9
1977		21.3
1978		21.3

The equation implies a substantial reduction in the rate of increase in the divorce rate over the "next" few years. The prediction for 1975 tracks well the official 1975 divorce rate (which recently became available in May 1977), and the flattening of the divorce series thereafter appears to be consistent with the preliminary vital statistics figures on divorces subsequently.

FOOTNOTES

1. See Becker (1974), Becker, Landes, Michael (1977), Preston, McDonald (1976), and Ross, Sawhill (1975).

2. For example, in Becker, Landes, Michael (1977) a ten percent increase in husband's earnings is associated with a reduction in the probability of divorce in the first five years of marriage by about 0.2 percent from a mean of 6.8 percent (the effect is nonlinear and appears to persist through the first 25 years of marriage); Ross, Sawhill (1975) find an additional $1000 of wives' annual earnings raises by one percent ($t = 3.4$) the probability of divorce in a four-year period, holding husbands' earnings fixed; and for a positive assortative trait such as religion, Michael (1976) finds that similarity between spouses reduces the probability of divorce substantially.

3. One exception, perhaps, is the impact of an increase in the unemployment rate. An increase in unemployment experienced by one man may convey new information to him and his spouse about his labor market prospects compared to others, and this information may be maritally destabilizing. [Ross, Sawhill (1975, p. 56) find that an extended period of unemployment is destabilizing.] An increase in unemployment in the aggregate, however, may be viewed as a cyclical phenomenon conveying no such information. Thus while unemployment is positively related to the probability of divorce in cross-section studies, that effect may be weaker in the aggregate data. In principle, high unemployment could induce a postponement in divorce, as it does the purchase of many durable goods and, apparently, births and marriages [see Silver (1965)].

4. The IUD became a medically accepted and thus a generally available contraceptive option in the U.S. only after Guttmacher's 1962 international conference on IUDs. See Huber, et. al. (1975).

5. See Michael, Willis (1976, pp. 36-39) for details and qualifications. These probabilities are calculated as $1-(1-p_i)^{120}$ where p_i is the estimated monthly probability of conception using technique i.

6. Of course, the direction of causation is not altogether clear here if fertility is affected by the anticipation of divorce. Becker, Landes, Michael (1977) discuss this issue in detail and present evidence suggesting that the causation between fertility and divorce flows in both directions.

7. See Becker, Landes, Michael (1977) who use SEO data for white women. Cherlin (1977) using NLS data for white women aged 30-44 also finds that the presence of young (but not older) children tends to lower the probability of marital separation.

8. It may be well to note and clear up an apparent inconsistency here. Above it was suggested that unexpected events are maritally destabilizing per se while here the argument is made that the reduction in uncertainty about subsequent fertility is destabilizing due to its impact on intervening investment behavior. The former point pertains to an unanticipated event -- a change in one's health, or labor marketability for example. The latter pertains to a recognized or anticipated uncertainty which affects behavior whether or not the event actually occurs. The same distinction could be made regarding any other stochastic event. Couples may marry with some anticipated risk of the husband being unemployed sometime. No statement has been made about the impact on divorce of a change in that anticipated risk. What has been argued is that an unanticipated period of unemployment is maritally destabilizing. In the case of the risk of conception, the case is argued that a reduction in that risk is maritally destabilizing. Moreover, to the extent the change in available contraceptive technology itself was an unanticipated event, it should be expected to be maritally destabilizing per se.

9. A major remaining puzzle related to this point is the precipitous rise in recent years in the rate of illegitimate births [see Hartley (1975)]. Perhaps a substitution of abortion for contraception as a means of fertility control may be a factor. That is, perhaps some couples find a contraceptive strategy involving a hypothetical abortion not as easy to implement once a pregnancy is detected (for financial, emotional, religious or other reasons). Perhaps the rise in divorce itself, which has resulted in an increase in the proportion of children not raised by both their natural parents, has resulted in a reduction in the social sanctions against illegitimacy.

10. Preston, McDonald (1976) use five separate income terms in their analysis of cohort divorce and find a strong deterrent effect of recent income and a strong destabilizing effect of income about 12 years prior to marriage.

11. Some information on the length of time between separation and divorce is available for DRA states. In 1969 in California about 7% of divorces took place in less than one year after separation while about 14% took place after three or more years of separation; for Michigan the comparable figures were 46% and 15% and for Virginia 3% and 24% respectively [see Table 22, Plateris (1973)]. Of course the final decision to divorce may also be made some months after separation has taken place.

12. If the relationship

$$D_t = a + b\ Y_{t-1} + \varepsilon_t$$

exhibits autocorrelation, the Durbin procedure involves first estimating

$$D_t = a' + \rho\ D_{t-1} + b'\ Y_{t-1} + b''\ Y_{t-2} + e_t$$

and using ρ as an estimate of the first-order autoregressive parameter in the second stage equation:

$$(D_t - \rho D_{t-1}) = a(1-\rho) + b(Y_{t-1} - \rho Y_{t-2}) + u_t.$$

13. For reference the figure also includes a time trend estimate obtained by the regression $\ln D_t = a + bT$ (or $D_t = Ae^{rT}$) in which $\hat{b} = .01296 (t = 8.3)$; $\hat{a} = 1.666 (t = 21.5)$ and $\bar{R}^2 = .56$. Divorce rates for census years prior to 1920 are available and are substantially lower than predicted by this constant growth rate of 1.3. When the 1890, 1900 and 1910 observations are included in the regression, the growth rate is 1.5.

14. That is, if the fifty years were shifted back in time by as little as two years, 1920-1970, military manpower's effect would have been estimated as -1.0 percent due to the first World War, and marriage duration's effect would have been 0.5 percent.

15. Statutory changes are a matter of record but changes in practice, procedures or interpretation are far more difficult to identify or evaluate. Plateris [see Rheinstein (1972)] indexed the ease of divorce by state for 1959, but to my knowledge no one has updated Plateris' work, much less provided a time series.

16. The married populations are estimates extrapolated from 1960 and 1970 censuses; the number of divorces are from Vital Statistics through 1972. The divorce numbers for 1973 and 1974 were kindly provided by Alexander Plateris' office at D.H.E.W.

17. In a study of the impact of the no-fault law in California, Schoen, Greenblatt and Mielke reach the surprising conclusion that there is "no basis for concluding that non-adversary divorce led to any increase in marital dissolutions among Californians" (1975, p. 231). They contend that nearly all the additional 1970-71 divorces resulted from the timing feature of the law (six-month instead of twelve-month minimum residency and required time between filing and decree), with some additional Californians divorcing in their own state instead of Nevada after the new law went into effect.

18. For example, in 1970 the divorce rate in California for first marriages is estimated to be 22.1 while for second marriages it is 40.5. The reason for much of this difference is a vast difference in the average duration of marriages, but even holding duration constant one observes a sizable differential [see McCarthy (1977)].

19. The proportion of marriages which were second or higher order in 1950, 1960 and 1970 were 13.8, 13.0, 13.7 percent respectively, according to the decennial censuses.

APPENDIX

Appendix Table A-1 indicates the sources of variables used in Table 4 and in this appendix. Table A-2 is a simple correlation matrix for 1920-1974 (below the diagonal in this table) and for 1950-1974 (above the diagonal).

Table A-3 indicates several additional regressions which may be compared to those in Table 4. The only additional variable is:

F: Fertility: live births per thousand women aged 15 to 44 (μ = 101.6; σ = 15.7; range 75. to 125.)

The ordinary first difference equations (eqs. 1-4) exhibited serious serial correlation as did the level equations (not shown). Including time in the first difference regression (eq. 2) affected nothing. Including fertility (eqs. 3 and 4), which suffers from simultaneity problems, weakens CT substantially.

In the first of the three modified first difference equations, REL(Y) replaces Y (eq. 5) and performs no better than in eq. (5) of Table 4. Eq. (5) adds an income-squared term to eq. (1) of Table 4, but the coefficient is not significant. Eq. (8) is a slightly altered form of the two-stage estimation procedure used in eq. (3) of Table 4, adding the initial year observation as $X_t\sqrt{1-\rho^2}$, as discussed in Johnston (1972, p. 261). As is consistent with the discussion in Johnston or Griliches, Rao (1969), this modification had no substantive effect on the estimator.

1950-1974. Because of higher quality post-war data on several exogenous variables and the nature of the divorce series during the 1940's, a separate regression analysis of the post-war period was done. The analysis includes four additional variables:

MEN(Y): Men's income: median real income of males age 14 and over;

I: Income: per capita personal income excluding transfer payments, in 1967 dollars;

LF: Labor force participation rates: the LFPR of women with spouse present and with children under six;

PA: Public assistance: average monthly AFDC payment per recipient in 1967 dollars.

The means, standard deviations and ranges of the variables for this shorter time period are:

Variable	μ	σ	Range
DR	11.5	3.1	8.9-19.3
Y	2316.0	398.0	1771.-3045.
MEN(Y)	4.7	0.8	3.3-5.9
U	4.8	1.1	2.9-6.8
GI	2.4	0.5	1.4-3.4
MD	20.9	2.5	18.1-25.4
CT	7.5	12.5	0-35.
F	108.0	12.0	86.-123.
LF	20.1	6.2	10.8-30.3
PA	33.7	5.1	28.3-43.1
I	2.4	0.4	1.8-3.2

Table A-4 indicates the most useful results from this analysis, all in modified first difference form. GI and MD were never significant in this short time period. Neither PA, F, nor LF showed statistical significance but there is considerable multicollinearity among these variables and income. The use of men's income MEN(Y) in place of Y destroyed the significance of the positive income effect.

Table A-1. Data Sources

VARIABLE	DEFINITION (see text)	DATE	SOURCE
DR	Divorce Rate (p. 14)*	1920-1974	Vital Statistics of the United States, Volume III, annual issues (U.S. Public Health Service)
Y	Income (p. 14)*	1903-1928	A Study of Saving in the U.S., Volume III (NBER)
		1929-1963	The National Income and Product Accounts of the U.S., 1929-1965 (U.S. Bureau of Economic Analysis)
		1964-1974	Survey of Current Business, July Issues (U.S. Bureau of Economic Analysis)
I	Income (p. A-1)	1946-1974	NBER Troll Data Bank (Survey of Current Business)
MEN(Y)	Men's Income (p. A-1)	1944-1974	Current Population Reports, Series P-60, Nos. 35, 90, and 103 (U.S. Bureau of Census)
REL(Y)	Relative Income (p. 14)*	1920-1974	(Same as Y)
U	Unemployment (p. 14)*	1918-1928	Manpower in Economic Growth: The American Record Since 1800 by Stanley Lebergott (McGraw-Hill)
		1929-1970	Employment and Earnings, May 1972 (U.S. Bureau of Labor Statistics)
		1971-1974	Handbook of Labor Statistics and Employment and Earnings (U.S. Bureau of Labor Statistics)
MD	Marriage Duration (p. 14)	1918-1967	100 Years of Marriage and Divorce Statistics, United States, 1867-1967, Table 1 (U.S. Public Health Service)
		1968-1974	Vital Statistics of the U.S., Volume III for various years (U.S. Public Health Service)

Table A-1 (continued)

GI	Military (p. 14)*	1918-1970 1971-1974	Various Reports and unpublished data U.S. Department of Defense The Budget of the U.S. Government, annual reports (U.S. Office of Management and Budget)
F	Fertility (p. A-1)*	1915-1974	Vital Statistics of the U.S., Volume I, 1968 and annual issues (U.S. Public Health Service)
CT	Contraceptive Technology (p. 14)	1915-1973	CT for the period 1960-1970 is defined to be the annual estimate of married women spouse present using the pill or IUD, obtained from Ryder (1972 Tables 2 and 8) based on NSF data. For the period prior to 1960 the series is assumed to be zero; for the period since 1970 the figures are estimates derived by linking Ryder's series to an oral contraceptive series ("minimum percentage of U.S. women 15-44 supplied with oral contraceptives through commercial channels") based on annual sales figures and reported in Piotrow et al (1974), and to an IUD series on the number of IUD's distributed in the U.S. reported in Huber et al (1975).
DF	Diffusion of Contraceptive Technology (p. 14)	1915-1975	So far as I am aware, there is no estimated diffusion curve for contraceptive technology; a modification of a diffusion curve estimated by Bonus (1973) for TV's has been used. Assimilating the diverse and complex information about contraceptive technology (especially the awareness of its repercussions on the variance of fertility outcomes) seems a more complicated process than purchasing a TV, so the TV diffusion curve has been flattened somewhat. The index employed here reaches 50% saturation in about 9 years and 99% saturation in 16 years. The curve is a logistic: $DF = 1/(1+\exp(4.35 - 0.57T))$ where T = year - 1960.

Table A-1 (continued)

LF	Women's labor force participation rate (p. A-1)*	1948-1974	Handbook of Labor Statistics, 1972 and Special Labor Force Reports (U.S. Bureau of Labor Statistics)
PA	Public Assistance (p. A-1)*	1936-1970	Social Security Bulletin, Annual Statistical Supplement, 1971 (U.S. Social Security Administration)
		1971-1974	Public Assistance Statistics (U.S. Social and Rehabilitation Service)

*General source: U.S. Statistical Abstracts

Table A-2. Simple correlation matrix (1950-1974 above diagonal; 1920-1974 below diagonal)

	DR	Y	REL(Y)	U	GI	MD	CT	DF	F	LF	PA	MEN(Y)	I
DR	1.000	.880	.045	-.001	-.220	.797	.985	.958	-.786	.843	.943	.785	.865
Y	.795	1.000	-.282	.022	-.090	.625	.888	.795	-.472	.985	.968	.980	.997
REL(Y)	.505	.560	1.000	-.453	-.101	.417	.010	-.000	-.546	-.364	-.159	-.416	-.295
U	-.301	-.482	-.611	1.000	-.573	-.149	-.054	.106	.277	.077	.032	.023	-.024
GI	.545	.361	.504	-.437	1.000	-.424	-.131	-.240	.183	-.040	-.169	.005	-.033
MD	.494	.141	.376	-.196	.157	1.000	.758	.667	-.856	.564	.740	.501	.601
CT	.764	.692	.193	-.155	.018	.404	1.000	.936	-.776	.853	.951	.804	.878
DF	.739	.616	.162	-.116	-.002	.370	.943	1.000	-.752	.759	.856	.695	.778
F	-.377	.079	-.038	-.494	-.105	-.500	-.217	-.235	1.000	-.408	-.622	-.325	-.458
LF										1.000	.947	.986	.985
PA											1.000	.916	.958
MEN(Y)												1.000	.987
I													1.000

Table A-3: Additional time series regressions on divorce rate, 1920-1974 (First difference form (equations 1-4) and modified first difference (equations 5-7); all variables lagged two years except CT, DF and F which are lagged five years.)

Regression No.	Y	Y^2	REL(Y)	U	MD	GI	CT	F	DF	Intercept	$\bar{R}^2$	F	DW
1.	0.004			0.090	0.161	0.329	0.129				.35	8.1	2.45
	(5.09)			(1.46)	(1.07)	(3.89)	(1.80)						
2.	0.004			0.088	0.163	0.331	0.127			0.017	.34	6.4	2.46
	(1.53)			(1.32)	(1.07)	(3.80)	(1.73)			(0.12)			
3.	0.006			0.118	0.022	0.277		-0.054			.35	8.1	2.31
	(3.05)			(2.00)	(0.12)	(3.11)		(-1.76)					
4.	0.005			0.095	0.041	0.294	0.094	-0.039			.35	6.8	2.43
	(2.11)			(1.53)	(0.23)	(3.28)	(1.22)	(-1.16)					
5.*			.153	.009	.243	.486	.231			2.993	.73	28.9	2.25
			(0.15)	(0.20)	(2.03)	(6.16)	(8.26)			(1.17)			
6.*	.007	-.000		.105	.322	.527	.199			-6.361	.92	103.3	1.81
	(2.06)	(-1.44)		(3.66)	(4.81)	(9.21)	(4.21)			(-2.21)			
7.*	.002			.098	.367	.539			.089	-4.10	.95	185.8	1.84
	(8.42)			(4.73)	(7.16)	(11.49)			(8.05)	(-3.06)			

t-values in parentheses

* modified first difference regressions' estimated ρ: .60, .16, and .08 respectively.

Table A-4: Time series regressions on divorce rate, 1950-1974 (Modified first difference; all variables lagged two years except CT and F which are lagged five years.)

Regression No.	I	Y	MEN(Y)	U	PA	F	LF	CT	Intercept	$\bar{R}^2$	F	DW
1.	3.697			.242	-.150	-.006	.003	.202	5.291	.91	41.	1.76
	(2.03)			(2.00)	(-1.24)	(-0.20)	(0.03)	(4.01)	(1.08)			
2.	5.237			.256				.138	-4.447	.83	39.	1.99
	(3.00)			(2.53)				(3.54)	(-0.93)			
3.			1.135	.128				.202	3.644	.76	26.	1.90
			(1.08)	(1.10)				(5.20)	(0.64)			
4.		.004		.176	-.160	-.017	-.017	.199	7.264	.92	46.	1.68
		(2.12)		(1.75)	(-1.33)	(-0.50)	(-0.15)	(3.91)	(1.57)			
5.			.600	.122	-.074	.006	.111	.219	5.840	.87	27.	1.83
			(0.63)	(0.98)	(-0.58)	(0.17)	(0.88)	(4.05)	(0.99)			

t-values in parentheses

The estimated ρ's are: .67, .85, .86, .65, and .72 respectively.

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Anatomy of the Divorce Rate: 1960-1974

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Over the past ten years the United States has witnessed a dramatic rise in its aggregate divorce rate. After remaining relatively stable for over forty years (except for two years in the Great Depression and three years during World War II), in the latter half of the 1960's the divorce rate began to rise precipitously and has continued that rise to today. Table 1 indicates the pattern of the U.S. divorce rate since 1920.

This general pattern of increase in divorce in the past decade is not unique to the United States. It is also evident in Canada, in many European countries including United Kingdom, Norway, Sweden, Czechoslovakia, USSR and to a lesser degree East and West Germany, as well as in Australia and New Zealand. The rise is not, in general, found in middle-Eastern, African, Latin or South American, or Asian countries.

The demographic literature has informally suggested numerous possible causes of this increase in divorce in the U.S., but empirical evidence on the importance of contributing factors has not appeared. Often cited causes such as the liberalization of divorce laws, the impact of the War in Vietnam and the rise in women's labor force participation rates cannot help explain the quite similarly timed burst in the divorce rates in many other countries. The rise in divorce may, in fact, prove to be a difficult phenomenon to explain, so more extensive and systematic research on its nature and its causes appears warranted.

To begin to understand the causes of the recent upswing in divorce, several research approaches seem feasible. First, some historical perspective should prove useful and Glick and Norton (1973) provide perspective with retrospective information from the 1971 CPS, focusing on cohort divorce behavior. Likewise, a recent multivariate analysis of

cohort divorce over the past century by Preston and McDonald (1976) provides perspective, although the Preston-McDonald study itself ends with 1969. A second approach is a multivariate analysis of the recent time series divorce rate itself, and studies of this nature are currently underway (e.g. Michael, 1977). A third approach, which this short paper employs, is a decomposition of the recent increase in order to see its anatomy more clearly. By knowing more about which groups, social or demographic, have contributed most to the increase, we should be in a better position to understand the reasons for the recent change. The difficulty with this approach is the sparcity of information about characteristics of those divorcing. This paper uses available information from Vital Statistics on women's age at the time of divorce together with information from the U.S. decennial censuses. With this information the change in divorce over the past fifteen years is decomposed into age-specific divorce rates and age-specific marriage weights that are affected by changes in age structure and in age at first marriage.

These age-specific divorce rates permit us to address two types of questions: (1) What is the anatomy of the rise in the aggregate divorce rate since 1960? Is the rise due to a shift in the age structure of the married population toward ages which traditionally have higher divorce rates? Is the rise due to a roughly equal proportionate rise in the age-specific divorce rates or is it attributable to a disproportionate rise in the divorce rate for a few age groups? (2) Is the time pattern of the rise in the aggregate divorce rate (i.e. a low growth rate from 1960 to 1965 and a high growth rate from 1965 to 1970 and from 1970 to 1975) mirrored in all of the age-specific divorce rates?

To address the first set of questions a decomposition of the divorce rate into age-specific population weights, marriage proportions and divorce rates can be performed. Let

D_{it} = the number of divorces in the i^{th} age group in year t;

M_{it} = the number of married women in the i^{th} age group in year t;

P_{it} = the number of women in the i^{th} age group in year t.

The divorce rate at time t is defined as:

$$(1) \quad DR_t \equiv \frac{D_t}{M_t} \times 1000 = \sum_i \frac{D_{it}}{M_{it}} \frac{M_{it}}{M_t} \times 1000 = \sum_i \left(\frac{D_{it}}{M_{it}} \frac{M_{it}}{P_{it}} \frac{P_{it}}{P_t} \div \frac{M_t}{P_t} \right) \times 1000$$

$$= \sum_i (d_{it} \, m_{it} \, p_{it} \div m_t)$$

where d, m and p are the group's divorce rate, marriage proportion and population weight respectively. These quantities are calculated for eight age groups defined as $\leq$ 19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49, and $\geq$ 50, for several years.

The Vital Statistics data used are from the Divorce Registration Area (DRA), which reports divorces by age, but the DRA was only begun in 1958 with 16 states reporting. By 1971 there were 29 states in the DRA, but not all recorded age at decree. I selected for study all states (15) which were in the DRA by 1960 with a preponderance of reported divorces distributed by age at decree. (Divorces not distributed were apportioned by age in the same proportions as those reported for each state separately.) The set of states included Alaska, Georgia, Hawaii, Idaho, Iowa, Kansas, Maryland, Montana, Nebraska, Oregon, Pennsylvania, Tennessee, Utah, Virginia, and Wisconsin. Published data are available for these states through 1973, and data for 1974 were kindly provided me by Alexander Plateris' office.

The 1960 and 1970 censuses provide information on the number of married women by age in each state, so age and state specific divorce rates for 1960 and 1970 were obtained using the annual divorce flows from Vital Statistics (the DRA) and the annual stocks of women at risk from the censuses. As the flow of divorces is an annual series, divorce rates for 1965 and 1974 are also estimated but these are based on straight line extrapolations of the stocks of married women based on the 1960 and 1970 census figures. Thus, the rates estimated for the mid-decade years are subject to greater error and will be treated accordingly.

This set of fifteen states exhibited a somewhat lower level of divorce than the U.S. as a whole, but the growth in divorce rates is very similar to the growth for the U.S., as seen from Table 2. So from the point of view of the changes over time, this fifteen-state sample appears to be representative of the U.S. as a whole.

Equation (1) can be used to construct synthetic divorce rates reflecting what the divorce rate would have been under various assumptions about changes in the d's, m's and p's. Table 3 shows several of these synthetic divorce rates.[1] If the population's age structure shifted between 1960 and 1970 as in fact it did, but no change had taken place in the age-specific proportions married or in the age-specific divorce rates, the aggregate divorce rate in 1970 would have fallen by 1.2 percent from 1960 to the level 7.54. If the population's age structure and marriage proportions shifted between 1960 and 1970 as in fact they did, but the age-specific divorce rates had remained unchanged, the aggregate divorce rate in 1970 would have been 8.24, some 8 percent higher than in 1960. However, if the age-specific divorce rates shifted, as in fact they did, while the

marriage proportions and population weights had been unchanged, the 1970 divorce rate would have been 12.21, practically identical with the actual 1970 divorce rate. So, had the age composition of the married population been unchanged between 1960 and 1970, the aggregate divorce rate would still have risen by about sixty percent over the decade.[2]

Table 4 addresses the same issue somewhat differently, showing each age category's contribution to the decade growth in the divorce rate from 7.6 to 12.2. Col. (7) again indicates that a very large portion of the growth in divorce over the decade is attributable to changes in age-specific divorce rates. The final column indicates that over sixty percent of the decade growth is attributable to women in the 20's (i.e. 33.9, + 26.9), despite the fact that these women represent only about twenty percent of the married population. [See Cols. (3) and (4).] The substantially greater contribution of women in their 20's than of women in their 30's results from the relative growth in the marriage weight of the former (a combined contribution of 21.2 percent) compared to the relative reduction in the marriage weight of the latter (a combined contribution of -7.0 percent).

So, Tables 3 and 4 indicate that the decade's rise in divorce is surely <u>not</u> due to a shift in the age structure of the married population, nor is it the result of a proportionate rise in the divorce rates at all ages. In fact, the divorce rate rose far more rapidly for women in their 20's and early 30's. The shift in age structure of the married population further increased the impact of the growth in young women's divorce rates.

Turning to the question of the time pattern of the growth in divorce rates, Table 5 provides an answer. The more rapid rate of increase in the second half of the 1960's is mirrored in the age-specific rates for women in

their 20's and 30's, but not so for women over age 40. In fact, for women over age 40 the per annum growth rate in divorce was higher in the first half of the 1960's than in the second half. So in this regard, as well as in the decomposition shown in Table 4, the burst in divorce in the late 1960's is attributable to women in their 20's and 30's. The sustained rise in the early 1970's also appears to be caused by younger women.[3] The decade changes shown in column (4) again reflect this differential growth in divorces among younger women. The fourteen year change shown in column (5) confirms this tendency.

These tables provide a valuable clue to the explanation of the rise in divorce rates in recent years. Both the higher decade growth rate for younger women and the within-decade pattern of that growth imply that the explanation lies with forces which have influenced younger couples, not with forces which influence all ages similarly. So in order to argue convincingly that forces such as the easing of divorce laws or improved labor market opportunities for women have caused the rise in divorce in the U.S., one must explain why that force should have a greater impact on younger couples.

One final note. The sustained disproportionate growth in the divorce rate for younger couples implies a substantial change since 1960 in the divorce probability density function by age. In 1960 the age-specific divorce rate for women aged 45-49, for example, was about 40 percent as high as for women aged 25-29; by 1974 it was only 25 percent as high. So not only has the risk of divorce increased dramatically over the past decade and a half, the relative risk at young ages has also risen considerably. It may be that we will find that much of the postponement in fertility among young couples over the past decade is in fact related to this shift in the relative likelihood of divorce at younger ages.

Table 1: U.S. divorce rate for selected years. (Annual number of divorces per thousand married women age 15+)

Year	Divorce Rate
1920	8.0
1930	7.5
1940	8.8
1950	10.3
1960	9.2
1965	10.6
1970	14.9
1975	20.3

Source: U.S. Vital Statistics

Table 2: Comparison of levels and growth rates of divorce rates for the fifteen state sample and the U.S. total

Year	Fifteen state sample	U.S. total
Divorce Rate		
1960	7.6	9.2
1965	8.9	10.6
1970	12.2	14.9
1974	16.7	19.3
Per Annum Growth Rate		
1960-1970	4.7	4.8
1965-1974	7.0	6.7
1960-1974	5.6	5.3

Table 3: Synthetic divorce rates - 1960 and 1970 (fifteen state sample)

	Synthetic Rate	Percentage Change from DR_{1960}
Actual DR_{1960}	7.63	-
DR'_{1970} if p's changed but d's and m's did not change:	7.54	-1.2%
DR''_{1970} if p's and m's changed but d's did not change:	8.24	8.0
DR'''_{1970} if d's changed but p's and m's did not change:	12.21	60.0
Actual DR_{1970}	12.22	60.2

Table 4: Anatomy of the growth in the divorce rate 1960-1970, by age, for women in the fifteen-state sample.

Age	Divorce Rate		Marriage Weight		Percent of Divorces		Percent of Decade Growth in Divorces Due to:			
	1960	1970	1960	1970	1960	1970	Change in Divorce Rate	Change in Marriage Weight	Interaction	Total
	(per 1000)		(percent)		(percent)			(percent)		
≤19	24.9	28.3	2.5	2.3	8.0	5.4	1.4	0.4	0.0	1.8
20-24	18.8	31.1	9.0	10.7	22.1	27.2	19.3	8.9	5.8	33.9
25-29	11.7	22.3	11.1	11.7	17.1	21.3	20.4	3.4	3.1	26.9
30-34	9.2	16.0	12.6	10.5	15.1	13.8	15.0	-1.7	-1.3	12.1
35-39	7.8	12.3	13.2	10.4	13.5	10.5	10.6	-2.5	-1.5	6.6
40-44	6.5	9.7	12.0	11.0	10.2	8.7	6.7	0.1	0.0	6.8
45-49	4.5	6.8	10.7	11.1	6.2	6.2	4.3	1.1	0.6	6.1
≥50	2.0	2.6	28.9	32.3	7.8	6.9	2.9	2.3	0.6	5.8
Total	7.6	12.2	100.0	100.0	100.0	100.0	80.6	12.0	7.3	100.0

$$\Delta D = D_{t_7} - D_{t_6}$$

$$\text{Col}(7) = \left((d_{it_7} - d_{it_6})M_{it_6}\right) \div \Delta D$$

$$\text{Col}(8) = \left((M_{it_7} - M_{it_6})d_{it_6}\right) \div \Delta D$$

$$\text{Col}(9) = \left((d_{it_7} - d_{it_6})(M_{it_7} - M_{it_6})\right) \div \Delta D$$

$$\text{Col}(10) = \text{Col}(7) + \text{Col}(8) + \text{Col}(9)$$

Table 5: Per annum growth rates of age-specific divorce rates, for specified time intervals (fifteen-state sample).

Age Group	Time Interval				
	1960-1965	1965-1970	1970-1974	1960-1970	1960-1974
≤ 19	0.4	2.2	11.0	1.3	4.1
20-24	4.4	7.6	4.2	6.0	4.8
25-29	6.1	6.8	10.1	6.5	7.5
30-34	2.1	9.0	12.6	5.5	7.6
35-39	2.9	6.2	9.2	4.6	5.9
40-44	4.2	3.9	4.7	4.0	4.2
45-49	5.4	2.8	5.2	4.1	4.5
≥ 50	2.8	2.5	6.3	2.6	3.6
Total	3.2	6.3	7.8	4.7	5.6
U.S. Total	2.8	6.8	6.5	4.8	5.3

FOOTNOTES

1. The synthetic divorce rates in Table 3 are computed as a weighted average across each of the fifteen states separately. When computed as a single fifteen-state total the synthetic rates are $DR'_{1970} = 7.59$; $DR''_{1970} = 7.59$; $DR'''_{1970} = 12.26$.

2. One might wonder how the 60 percent actual rise is reconciled with an 8 percent rise due to a change in weights and a 60 percent rise due to a change in age-specific rates. The two imply a negative covariance. If $x = \Sigma ab$ and $dx = \Sigma[a(db) + (da)b + (da)(db)]$, then in this case the $dx = 60.2$, $\Sigma a(db) = 8.0$, $\Sigma(da)b = 60.0$, so $\Sigma(da)(db)$ must equal -7.8 $(=60.2 - 8.0 - 60.0)$.

3. These per annum growth rates may be misleading in this regard. For women aged 20-24, for example, the divorce rate rose 5.7 points in these four years from 31.1 to 36.8 (a per annum growth rate of 4.2) while for women over age 50, the divorce rate rose 0.8 points from 2.6 to 3.4 (a per annum growth rate of 6.3). Of the total growth in the divorce rate from 1970 to 1974 the percentage attributable to the change in the eight age-specific divorce rates were as follows: 7.2, 12.0, 25.7, 21.9, 11.2, 4.3, 3.4 and 4.8 for a total of 90.4 percent of the total four-year growth.

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