



# Sex, Property Rights, and Divorce

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## **Abstract**

This paper examines how differences in sex drives between husbands and wives affect bargaining strengths during marriage and particularly at times when divorce might occur. The basic argument follows from the fact that sex drives vary over an individual's life cycle, and are systematically different for men and women. The spouse having the lowest sex drive at any time in the marriage has a property right over whether or not sexual intercourse will occur, with a consequent increase in bargaining power at the margin. The paper derives a number of testable implications from its model, and, using several data sources, shows empirically how this difference affects marriage, adultery and divorce.

**Keywords:** marriage, adultery, bargaining, sex, divorce

Wood Allen To Psychiatrist: "Almost never. Only three times a week."

Diane Keaton to psychiatrist: "Constantly. At least three times a week."

*Scene from Annie Hall*

## **1. Introduction**

This paper examines the implications for divorce of an unexplored, but important, biological and cultural difference between men and women.<sup>1</sup> Specifically, we examine how differences in the physical sex drives between men and women over the human life-cycle may lead to difficulties in bargaining during marriage or at the time of divorce.<sup>2</sup> Most sex research over the last forty years has concluded that the sex drive for men peaks on average in the late teens and early twenties. Thereafter, the sex drive slowly tails off. For women, the sex drive rises, peaks in the mid thirties, and then falls off. Hence it is unlikely that the demands for sexual intercourse throughout the marriage are ever matched exactly. Like Woody Allen's character in *Annie Hall*, many husbands may feel there is too little sex early on in the marriage, yet ironically, they may feel that the wife is too demanding during the marriage's middle years.

Although in many marriages the husband may always be the one with the highest sex drive,<sup>3</sup> it is possible for a reversal in the excess demand for sex to occur during the

marriage; that is, the wife's demand for sex might exceed the husband's during the middle years of the marriage.<sup>4</sup> One way to think about this change in sexual desire is to conceive of it as a switch in property rights over sex within marriage. Assuming that intercourse within marriage is always mutual,<sup>5</sup> then the property right over the decision as to the occurrence or frequency of love-making belongs to the spouse that *least* wants it—initially the wife. If a reversal in sex-drive occurs; that is, if during the marriage the wife's demand for sex exceeds the husband's, then it results in a switch in this property right to the husband. If, later on in the marriage, the wife's sexual desire declines faster and becomes lower than that of her husband, then another switch in property rights occurs, with the wife again holding the property right during the later part of the marriage.<sup>6</sup>

One's sex drive is not completely dependent on hormones and varies depending on occupation, drug abuse, physical health, number of children, age, and income. In this paper we explore the effect of a switch in property rights over sex (or alternatively, a change in the value of sexual currency) on a series of observable margins. To do this we organize the paper as follows. Section two briefly surveys biological and social science research on sexual demands over the life cycle, and provides evidence for our fundamental assumption of demands for sex over the life cycle. Section three provides arguments for divorce that are relevant in light of the evidence discussed in section two. Finally, section four combines sections two and three to develop testable hypotheses regarding the variance in ages of divorced people, gender differences in the age at divorce, the duration of marriage, the frequency of sex over the life cycle, and gender differences in the timing of adultery. All of the hypotheses, along with some alternative hypotheses, are confronted with data from various sources, with our model performing strongly in all tests. Since our theory is based upon a universal biological model, the fact that we use American data is not important. Our model should also apply in other contexts, like Canada or Europe, where the divorce laws and punishments for extra-marital sexual conduct are similar.<sup>7</sup>

## 2. The relative demands for sex

Generally speaking, realistic assumptions are not of paramount concern to economists. However, given the controversial nature of our model, we feel compelled to provide some evidence for the underlying assumption in it. Male and female differences in sexual desire are relatively well documented, and the distinction is often recognized in popular culture. The *Atlantic* reports that "One of the most prominent differences between the sexes as regards love is that their capacity for it ... may well peak at different periods in the life-cycle."<sup>8</sup>

There are a number of reasons for why sexual demands change over the life-cycle. One obvious and important reason is hormonal.<sup>9</sup> The hormone testosterone, often called the "male sex hormone", varies over the life of both men and women. Like male desire and other male sex hormones, it is at its highest level during the late teens and early twenties. It then gradually falls over a male's lifetime. In a chapter on hormonal factors and sexual response, the famous Kinsey sex research report states:

“reported levels of the 17-ketosteroids [a sex hormone] in the human male differ from the reported levels ... in the human female.... They reach a peak in the late teens or early twenties in the male, but from that point they drop steadily into old age.” [pp. 755–756, 1968]

Though exogenous changes in male hormones explain the fall in male sex drive, it is compounded by external pressures as well. Male incomes increase during the first twenty to thirty years in the workforce, and this raises the opportunity costs of all leisure activities, including sexual pursuits. Increased workloads and overtime are physically taxing, and reduce the desire for sex. As well, increases in family size put pressure on husbands to produce more income, and this also raises the cost of sex.

For women, the hormonal balance is more complicated, and sex drives in women are not thought by sexologists to depend so heavily on hormonal levels. However, sex hormones do play some role,<sup>10</sup> and according to Kinsey:

“The levels of the 17-ketosteroids which are reported for the human female are quite different from those reported for the male. During adolescence and the later teens, there is a sharp rise in the ketosteroid levels of the female. The curve reaches its peak somewhere in the middle twenties, shows a rather sharp drop in the next ten years, and then lies on a plateau for some years. It continues on this level through menopause and into the middle fifties, and does not show a further drop until the late fifties or sixties.” [Kinsey et al. pp. 756–757, 1968]

The effect of hormones on female sex drives can be ambiguous. For example, the onset of menopause, where the ovaries reduce the output of the female hormone estrogen, can make intercourse less pleasurable for women, while at the same time the fall in the risk of pregnancy can make sex more enjoyable. Many researchers conclude that the increased sexual desire by women throughout their late 20s and 30s results not only from hormonal changes, but also from a gradual acquisition of sexual knowledge.<sup>11</sup> To the extent that women are raised in a more sexually protected environment that discourages sexual experimentation before marriage, and to the extent sexual enjoyment increases with experience, then young women simply will not enjoy sex as much at young ages as they will later.<sup>12</sup> Presumably sexual desire corresponds with greater enjoyment. On the other hand, it also appears that the demand for sex on the part of women falls quite rapidly after their mid 40s to 50s. In the first major study of sexual behavior since Kinsey, Lauman *et al.* report this fall in several places. For example, in reporting on individuals with low sex drives, they state:

“They are predominantly women, some 78 percent of the total in the category. Over 60 percent of these women are over the age of forty ...” [p. 141, 1994].

In reporting on the appeal of vaginal intercourse, they state:

“Age, for instance, was curvilinearly related to the appeal of vaginal intercourse: younger and older respondents were somewhat less likely to report it as highly preferable. *The decline is more significant for older women.* From a peak of 81 percent of women in their twenties, the percentage remains stable through the middle-aged cohort and declines abruptly (to 67 percent) for women in their late fifties.” [p. 151, 1994 (emphasis added)].

Hence, although the demand for sex rises for women over the first half of their adult lives, it also appears to fall faster than men’s in the second half.<sup>13</sup>

In addition to hormonal factors, documented studies report systematic differences between men and women in terms of their physical ability to enjoy sexual fulfillment through orgasm. According to the Kinsey Institute:<sup>14</sup>

We have pointed out that the frequencies of sexual response in the male begin to decline after the late teens or early twenties, and drop steadily into old age. [Kinsey et al., p. 715, 1968]

Female curves showing orgasm, rise more slowly [than for men] and do not reach their peak until the mid twenties or still later. [Kinsey et al., p. 717, 1968]

According to Mahoney:

The discrepancy between sexual drive and sexual gratification differs for men and women in our society throughout the life cycle. Men are most potent and virile in their late teens and early twenties.... Women seldom achieve maximum sexual response capacity until their mid-thirties,... [pp. 45–46, 1983.]

Throughout the sex research literature, an average male in late adolescence is described as being in a state of almost constant sexual arousal, while by the mid-thirties his attention is more likely to be family- or career-oriented.<sup>15</sup>

Whatever the reasons, there is little doubt that the demand for sex by men peaks early and then gradually falls over their lifetime, while for women, their demand for sex peaks during their mid-thirties, and falls. Indeed, a Kinsey report concludes its chapter on hormones and sexual behavior with the following sentence that nicely summarizes the relative demands for sex:

The early development of sexual responsiveness in the human male and its later development in the female, the location of the period of maximum responsiveness for the male in the late teens and early twenties and for the female in the late twenties, the subsequent decline of the male’s sexual capacities from that peak into old age,... [p. 759, 1968]

The rates of decline may vary for different people, but on average we take as a stylized fact that the demands for sex look something like Figure 1, where it is assumed the

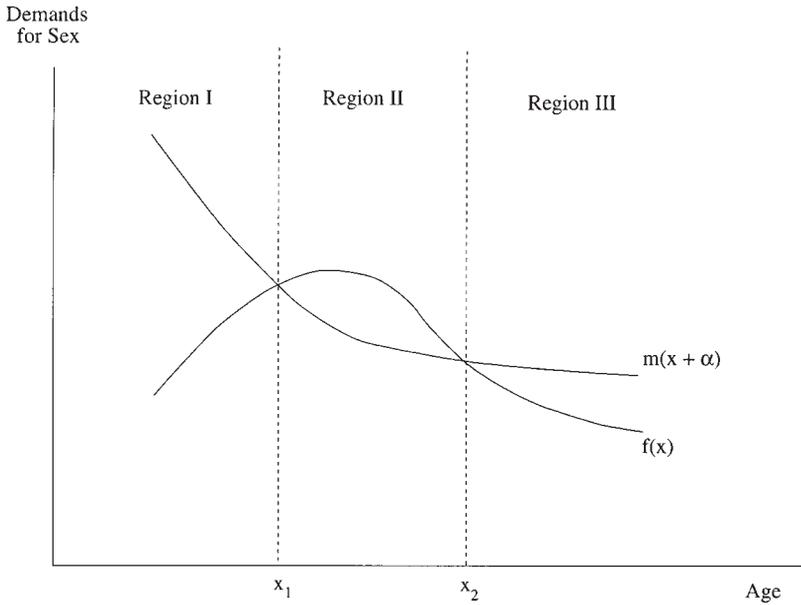


Figure 1. Life-cycle Demands for Sex

husband and wife are the same age. The curves are also drawn so that they cross.<sup>16</sup> All of the arguments that follow assume this as well, however, it must be repeated that our argument only requires that there exist some marriages where the relative demands cross. If this never occurs, then the qualitative predictions still carry through as long as the shapes remain the same and the husband has the higher demand for sex.<sup>17</sup> Given the demands for sex in Figure 1, the property right over sex is held by the wife in regions I and III, and is transferred to the husband in region II.

### 3. The incentive to divorce

Peters (1986), building on earlier work by Becker, Landes and Michael (1977), developed a pure “Coasian” model of divorce where couples remain together as long as the gains to marriage are greater than the gains apart. If we define the value of marriage as  $M$ , and the value single as  $S^i$ , then a marriage remains together as long as

$$M > S^h + S^w. \quad (1)$$

In such a model, bargaining issues are irrelevant. If the total gains from marriage are higher than the joint gains from divorce, the marriage remains together, period. However, the value of a marriage is obviously a function of many things, including joint income, number of children, compatibility, and the quantity and quality of sex. The value of being single is obviously a function of many of these things as well.<sup>18</sup> The ability to bargain will

depend on the distribution and nature of property rights of both the husband and the wife throughout the marriage because in real life, negotiating within marriage is never costless.<sup>19</sup>

Since marriage contracts are not complete, even anticipated changes over the life-cycle may influence either party's bargaining positions over time. Promises made at the time of marriage are never fully binding so, at the margin, any transfer in property rights to one party hurts the bargaining position of the other. It follows then, that if one party to a marriage wishes to leave, and at the same time experiences an increase in property rights over marital goods (i.e., an increase in bargaining power), then the party least wanting the divorce will be less able to prevent the divorce from happening. For example, a spouse without independent sources of income is less able to prevent divorce because that person has less to bargain with. In the context of property rights over sex, if the husband wishes to leave the marriage, any transfer of property right over sex to him, or corresponding decline in the wife's sexual currency, at that time will diminish the wife's ability to convince her husband to stay.<sup>20</sup>

Our argument that transfers in property rights reduce bargaining power becomes critically important only if the marriage is in jeopardy and divorce is a real possibility. For couples obtaining huge surpluses from their marriage, a transfer of property rights over sex is probably irrelevant for the decision to divorce. Furthermore, our argument loses force if the *wife* instigates the divorce during middle age, since the transfer to the husband increases the chances of the marriage remaining intact when the wife wishes to leave. We now turn briefly to both of these issues. We ask why might divorce take place, and why might husbands be more likely to instigate them in the middle years of the marriage?

There are a number of arguments for why divorces occur, and why many of them come after relatively long marriages. Becker, Landes and Michael (1977) note that divorce is frequently a function of imperfect information prior to marriage, and that divorce is often the result from a mistake in selecting a spouse. This hypothesis explains why many divorces occur within the first two years of marriage, but does not do as well in predicting later divorces. An alternative explanation is based upon opportunism. For example, a medical doctor or other professional has an incentive to leave after a spouse has financed a medical or professional degree if the local courts do not recognize the degree as marital property.<sup>21</sup> Although it is difficult to quantify how often this has occurred, there are now reported "degree cases" in nearly every state, and many states treat the acquisition of a degree as a factor in awarding alimony precisely because this type of opportunism occurs.<sup>22</sup> Martin Zelder (1993) argues that the existence of children, the marriage's public goods, may lead to "inefficient divorces" because the couple cannot bargain with these assets to ease other marital problems. Finally, Lloyd Cohen (1987) argued that the timing of contributions of husbands and wives varies over the life-cycle of a marriage as well. Specifically, the capital value of women tends to fall over their lifetime, while for men it rises and then falls. According to Cohen:

Since the capital asset of a wife is different from that of a husband, there is no reason a priori why they should be characterized by the same time profile of growth and

depreciation. I will argue that women in general are of relatively higher value as wives at younger ages and depreciate much more rapidly than do men. [p. 278, 1987]

Cohen pointed out that in many “traditional” marriages husbands have an incentive to leave after the majority of their wives, capital was expended.

A common thread throughout these examples, and one that is supported by research on divorce, is that generally the husband, not the wife, is the one wanting to leave a marriage during the middle age years.<sup>23</sup> The husband may not actually bring suit, so the statistics on who files for divorce are often misleading. He may just leave, or may begin another relationship or become physically abusive, or may simply stop contributing to household production, provoking the wife’s eventual filing.<sup>24</sup> The reasons why husbands *generally* initiate divorce are many, and no doubt have little to do with sex.<sup>25</sup> However, these incentives for husbands to initiate divorce, when coupled with the transfer of property rights over sex, motivate the comparative statics discussed later.

In Figure 1, Region I, the wife has the property right over sex, and therefore can use her willingness for sex as currency in marital bargaining. If the husband did wish to leave during this period the wife, *among other things*, could offer more intercourse within the marriage in order to pay the husband to stay. This may or may not be sufficient, but the wife at least has this option. However, if the husband wishes to leave while the marriage is in Region II of Figure 1, then bargaining using sexual willingness as currency will be unsuccessful. Now the wife no longer possess the property right to sex and cannot compensate the husband with more of it. Just when the wife needs the bargaining power the most, it is reduced.<sup>26</sup> Our point is not that wives never leave their husbands, nor that wives can *only* bargain with sex. The point is that on average men are more likely to leave, and that during the middle years sex will be of little use in bargaining, *ceteris paribus*.

It may appear that the husband’s sexual desires are being met during the time when he has the property right over sex, and that therefore, he should be satisfied. However, keep in mind that our argument assumes the basis for the divorce is likely elsewhere in the marriage. Our point is that the husband is no longer as interested in sex as he used to be and as his wife currently is. Other things constant, a loss of ability to pay on the part of the wife, reduces her ability to bargain with her husband if he wishes to leave. Our argument is analogous to stating that wives with incomes are better able to transfer wealth to their husbands if the husband threatens to leave than wives without incomes. As a result, more frequent or enthusiastic intercourse cannot compensate, as it might have before, for trouble elsewhere in the marriage.<sup>27</sup>

#### 4. Hypotheses and tests

Below we develop several comparative static tests based on the general nature of Figure 1, and on the argument that it is common for middle aged men to initiate divorce. Data used to test the hypotheses mostly come from the divorce records for divorced couples in Fairfax County, Virginia, for 1987.<sup>28</sup> In addition, the adultery test (section 4.5) uses Fairfax divorce records from 1992, while that on the frequency of intercourse (section 4.4)

uses data collected by Blumstein and Schwartz from their study of American couples. Given that the transfer of property rights to sex occurs sometime between the late twenties and early forties, depending on the age differences of the couple, *ceteris paribus*, the bulk of divorces should occur in these age groups as well. This is consistent with the Fairfax data, where approximately 65% of the divorces occur between the ages 25 and 40. This is only indirect evidence for our model, and certainly other theories of divorce would suggest the same thing. However, our model yields a number of surprising predictions that do not occur in most models of divorce. In particular, our model generates the following predictions.

1. As husbands increase in age relative to their wives:
  - a. the spread in ages of any age difference category increases at a decreasing rate,
  - b. the age of the husband at divorce increases, but the average age of the wife does not decrease or increase,
  - c. the duration of the marriage falls,
  - d. the probability of the wife committing adultery increases, but decreases for the husband.
2. The frequency of sex falls throughout the marriage.
3. The probability of adultery falls and then rises for husbands.
4. The probability of adultery rises and then falls for wives.

Most of these predictions are not obvious, and the asymmetry in some of the predictions for husbands versus wives is surprising. We now go through them one by one.

#### 4.1. Spread in potential divorce ages

Given the argument above, the probability of divorce increases when the property right over sex transfers to the husband.<sup>29</sup> Figure 1 was drawn under the assumption that the husband and wife were the same age, and of course, this is usually not the case.

In the past it was more common for the husband to be several years older than his wife. When the spouses are of different ages, the likelihood of a property right transfer changes as well. As the age of the wife increases relative to the husband, there is a closer match in the demands for sex early on in the marriage, and a lower chance of a transfer of property rights. When the husband increases in age relative to the wife, the opposite is true. This implies that the traditional marriage, where the husband is older, is subject to more risk of divorce, other things equal, because the property right to sex is transferred longer to the husband.<sup>30</sup>

However, the effect of differences in age leads to further predictions from our model. From Figure 1, let  $x$  be the age of the wife and  $\alpha$  be the age difference between the spouses—hence  $x + \alpha$  is the age of the husband. Let  $m(x + \alpha)$  and  $f(x)$  be the demands for sex for a husband and wife—as shown in Figure 1. The effect of increases in  $\alpha$  (increases in the husband's age relative to his wife) are to shift  $m(x + \alpha)$  to the left, and

therefore, shift the intersections of the demands left as well. This implies that the age at the intersections is a function of  $\alpha$ . These functional relationships solve the following equations:

$$f(x_1(\alpha)) - m(x_1(\alpha) + \alpha) \equiv 0 \quad (2)$$

$$f(x_2(\alpha)) - m(x_2(\alpha) + \alpha) \equiv 0 \quad (3)$$

Where  $x_1$  and  $x_2$  correspond to the age of the wife at the intersections in Figure 1. The intersections  $x_1$  and  $x_2$  vary as follows with respect to  $\alpha$ :<sup>31</sup>

Hence when there is a relative increase in the husband's age the property right to sex transfers earlier to the husband and remains with him longer. Assuming that divorce occurs only while the husband has the property right to sex<sup>32</sup> and defining the "spread" in the potential ages at divorce as simply  $x_2 - x_1$ , it is straight forward to show how the spread in ages at divorce increases as the husband increases in age relative to his wife.

$$\frac{d(x_2 - x_1)}{d\alpha} = \frac{f'(x_1)m'(x_2) - m'(x_1)f'(x_2)}{[f'(x_1) - m'(x_1)][f'(x_2) - m'(x_2)]} > 0 \quad (4)$$

What this means is that the set of potential ages for which a divorce occurs is larger as the husbands increase in relative age. If we looked at a group of divorced individuals, then as the divorced husbands increase in relative age, the actual spread or variance in their divorce ages should also increase. For example, if we look at divorced couples where the wife is fifteen years older than her husband, then the spread in the ages of those couples at the time of divorce will be smaller than the spread in the ages at divorce of couples where the husband is fifteen years older. Further, since the demand for sex on the part of the male tends to flatten out, the increase in spread should increase at a decreasing rate.

Figure 2 graphically shows the effect of changes in the age difference of the spouses. As one spouse increases in age relative to the other, the demand for sex shifts left.<sup>33</sup> From Figure 2 (panel (a)) it is clear that as the age of the wife increases relative to her husband's, the length of time during which the property right to sex belongs to the husband decreases. Hence there are fewer years during which the wife is in the poor bargaining position. When the age of the husband increases (panel (b)), the opposite is true, the property right to sex is held longer by the husband, and so there are more years during which the probability of divorce is higher. The implication is clear and surprising: as the age of the husband increases relative to the wife the spread of potential divorce ages increases—which leads to an increase in the actual spread of divorce ages for groups of divorced individuals.

To test this prediction, we use the 1987 divorce records from Fairfax County, Virginia. From this data we can calculate the age differences at the time of divorce, where age difference is the age of the husband minus the age of the wife, and three different measures of spread: the variance in ages, the coefficient of variation, and the range in ages divided by the average age of husbands with an age-difference group. Running an OLS

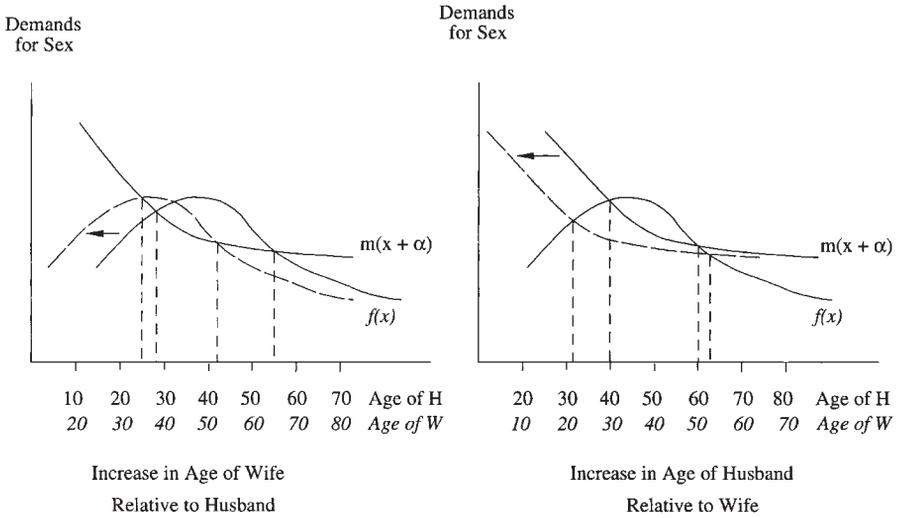


Figure 2. Changes in the Variance of Age at Divorce

regression of the different measures of spread in age at divorce on the age difference and age difference squared provides a straight-forward test of our hypothesis.

Table 1 presents the definitions, and summary statistics of the variables used in all of the regressions, while Table 2 reports the results of this test. The first three columns in Table 2 use the variance as a measure of spread. That is, for any given age difference category (e.g., the husband ten years older than the wife would be one category), we calculate the variance in the ages of those divorcing.<sup>34</sup> The results clearly confirm our prediction. Our model predicts a positive sign for AGE-DIFF, and a negative one for AGE-DIFF-SQ. This is confirmed, and both are significant at the 5% level, implying that the variance does increase at a decreasing rate with respect to age difference. These results are strengthened when corrections are made for potential heteroskedasticity problems.

An objection might be raised that this result stems from a built-in correlation between the variance of divorce ages and the independent variable. Since the variance is not a scale free measure, increases in age differences may lead to older husbands in general, and these groups may have a higher age variance. To test for this we look at two other measures of spread. The first is the coefficient of variation, and the other is the range in divorce ages adjusted by the average age of husbands within the group. Both regressions using these new dependent variables are also reported in Table 2. As can be seen, the result still holds when this adjustment is made: when husbands of a *given* age marry younger wives, there is an increase in the spread of ages at divorce.

A second objection may be raised regarding the absence of any demographic control variables used in our regressions. Other things equal, we would prefer to have measures of education, number of children, religion, etc., but Virginia divorce records do not contain this information. However, it is unclear why any of these types of variables would influence the *spread* in divorce ages, and even more unclear how they would relate to the

Table 1. Summary Statistics

Variable	Definition	Mean	Std.Deviation
Dependent:			
VARIANCE	= Variance in Age at divorce.	68.84	26.96
DIVORCE AGE			
Husband	= Age at which Husband divorced	38.4	9.67
Wife	= Age at which Wife divorced	35.7	9.00
FREQUENCY			
	= 1 A few times	4.81	1.37
	2 Once ever few months		
	:		
	7 Daily or almost every day		
Independent:			
AGE-DIFF	= Age of husband – Age of wife	3.50	9.96
AGE-DIFF-SQ	= AGE-DIFF $\times$ AGE-DIFF	108.5	111.69
MARRYING AGE			
Husband	= Age at which Husband married	23.75	3.16
Wife	= Age at which Wife married	22.41	3.35
AGE	= Age of person	37.35	12.02
EDUCATION	= Years of education	15.22	2.18
INFIDELITY	= 1 if ever committed	.24	.43
REL-FREQ			
	= 0 if never attend church	2.59	2.29
	:		
	8 attend church almost daily		
MARR-NUM	= number of marriages	1.22	.50
MULTIPLE-H	= 1 if husband married more than once	1.30	.58
MULTIPLE-W	= 1 if wife married more than once	1.26	.54
INCOME			
	= 1 No income	6.55	3.34
	2 less than \$2500		
	:		
	11 \$30,000 to \$49,000		
	12 Over \$50,000		
TOGETHER	= years together as couple	11.77	11.5
TOGETHER-SQ	= TOGETHER $\times$ TOGETHER	270.9	444.
TIME TO 1ST ADULTERY	= Length of time until first adultery committed	13.01	8.71
TIME2	= TIME $\times$ TIME	243.22	292.0

asymmetric prediction of our model. For example, suppose all religious people had marriages where the wife was older, while all non-religious couples had marriages where the husband was older. It is plausible that the non-religious couples might have a higher divorce rate, but why would the spread of divorce ages for given categories of age differences be influenced by religion? Religion and other demographic variables *may* be correlated with AGE-DIFF, but omitting these variables from a regression causes no bias if they are not explanatory variables—that is, correlated with the dependent variable as well.<sup>35</sup>

Table 2. Dependent Variables = Variance, CV, and Range/Age of Divorce Ages

Dependent Variable	Variance				Range/Age
	OLS	GLS I	GLS II	CV	
Constant	71.77 (13.06)*		2.91 (5.03)*	1.97 (15.57)*	1.06 (22.15)*
Adjusted Constant		75.39 (21.05)*	32.71 (3.67)*		
AGE-DIFF	2.06 (4.15)*	2.04 (5.83)*	2.03 (7.77)*	.04 (3.31)*	.02 (4.64)*
AGE-DIFF-SQ	-.093 (-2.11)*	-.188 (-5.65)*	-.249 (-9.00)*	-.004 (-3.81)*	-.003 (-7.51)*
Adj. R <sup>2</sup>	.32	.95	.79	.29	.62
F	8.82	209.06	43.24	7.97	28.2
N†	34	34	34	34	34

\* *t*-statistics in parentheses. The ‘\*’ indicates significance at the 5% level.

† The sample size reflects the 34 different age difference categories, not the number of individuals in the original data set.

4.2. Gender differences in the age at divorce

As the age of husbands increases relative to their wives, the average age of husbands at divorce is expected to increase. This can be shown by differentiating equations (2) and (3).

$$\frac{d((x_2 + \alpha + x_1 + \alpha)/2)}{d\alpha} = \frac{1}{2} \frac{d(x_2 + x_1)}{d\alpha} + 1$$

$$= \frac{f'(x_1)f'(x_2) - m'(x_1)m'(x_2)}{2[f'(x_1) - m'(x_1)][f'(x_2) - m'(x_2)]} > 0 \tag{5}$$

Testing this prediction, however, is contaminated by a sample selection bias caused by the fact that extreme values in age differences are unlikely for various ages at marriage. For example, when men are fifteen years older than their wives, they tend to be older on average at the time of marriage, and hence at the time of divorce. No marriages where the husband is twenty years older start at young male ages, which of course, means that none of these marriages end at young ages either. In order to control for this bias we truncate the sample in order to test the prediction that the rise in divorce age is due to the property right over sex being transferred to men over more years of the marriage, and over more years later in their life when their relative age increases.

Interestingly, there is a non-obvious asymmetric prediction for the average age of the wives at divorce as the relative age of their husbands increase. As the husband’s age increases, the property right transfers to the husband for more years of the marriage, both *earlier* and *later on*. Hence the divorce could occur at an earlier or later age for the wife, so there is no unambiguous prediction regarding the age of the wife at divorce. In terms of our model given in equations (2) and (3) we have:

$$\frac{1}{2} \frac{d(x_2 + x_1)}{d\alpha} = \frac{f'(x_1)m'(x_2)[2m'(x_2) - f'(x_2)]}{2[f'(x_1) - m'(x_1)][f'(x_2) - m'(x_2)]} \begin{matrix} > \\ < \\ = \end{matrix} \quad (6)$$

Although the transfer of property rights takes place over higher and lower ages for wives, for the stylized model presented in Figures (1) and (2), these extra years are mostly distributed over the younger years. Consider the second panel in Figure 2. As the relative age of the husband increases, the transfer of property rights takes place much earlier in the wife's life, and lasts just a little longer. Hence, there may empirically be a negative effect of age difference on the age at divorce for women, although this should not be as strong as the prediction on the husband's age.

These predictions are tested using the same data used for the spread in divorce ages, except this time the data was not categorized by age difference, and as a result the sample sizes are considerably larger. In order to control for problems in sample bias caused by truncated marriage ages, divorced couples were only chosen if their marrying age was less than thirty. In addition to this, two additional regressions were run where the sample only contained marriages where the age difference was 10 or 5 years. This eliminates the sample selection bias which could occur with large values in age difference, these marriages could only take place when one spouse is already older.

Table 3 presents the results of the OLS regressions. For men, the age at divorce clearly increases with increases in the relative age difference for all samples. Namely the variable AGE-DIFF is positive and significant for men. Taken by itself, even with the adjustments for bias, the regression for husbands may still only prove the obvious that as husbands get older relative to their wives their divorce ages are older as well. However, the obvious corollary to this alternative hypothesis is that the age of wives should fall as the age difference increases. Our model, though, makes an *asymmetric* prediction regarding the age for wives, and this prediction is borne out in the regressions. The variable AGE-DIFF

Table 3. Dependent Variable = Age at Divorce

Variable	Husband	Wife	Truncated +/- 10		Truncated +/- 5	
			Husband	Wife	Husband	Wife
Constant	26.59 (18.47)*	25.55 (21.83)*	25.99 (17.59)*	26.10 (20.37)*	26.78 (16.42)*	27.48 (18.20)*
AGE-DIFF	.341 (6.42)*	-.15 (-2.48)*	.428 (6.50)*	-.08 (-.92)	.55 (4.75)*	-.08 (-.69)
AGE-DIFF-SQ	-.01 (-1.77)	-.001 (-.457)	-.03 (-3.05)	-.03 (-2.48)*	.01 (.18)	-.01\$ (-.17)
MARRYING AGE	.38 (6.17)*	.41 (8.27)*	.42 (6.48)*	.40 (7.23)*	.37 (5.18)*	.34 (5.16)*
Adj. R <sup>2</sup>	.04	.04	.04	.03	.03	.015
F	39.31	34.79	36.57	29.07	23.44	11.21
N	2338	2656	2291	2433	1854	1892

t-statistics in parentheses. The \*\* indicates significant at the 5% level.

is negative and generally *insignificant* for women. Although there is some evidence that average age declines for wives at divorce as the age difference increases, when the outliers are removed, this relationship disappears.

#### 4.3. *The duration of marriage*

When the property right over sex transfers to the husband, the marriage is in greater jeopardy because if something in the marriage triggers the husband to initiate a separation, the wife is less able to convince him to stay. In this story of divorce it is crucial for a problem to arise elsewhere in the marriage. There is no threat to the marriage caused by the transfer, or decline in the value of sexual currency, *per se*.

As the positive age difference between husband and wife increases, the length of time during which the husband has the right to sex increases. This also raises the probability that something goes wrong in the marriage while the husband has the property right, which implies that the marriage is in jeopardy earlier and longer. Hence our model predicts that the duration of the marriage should fall as the husband increases in age relative to the wife.<sup>36</sup>

To test this we again use the population of divorces from Fairfax County for 1987. A duration model is appropriate for such a test since it takes account the probability of divorce for a given duration. The class of model used here is a proportional hazard specification of the form:

$$\lambda(t, X, \beta, \lambda_0) = e^{X'\beta} \lambda_0(t)$$

Where  $t$  is duration time,  $X$  is a set of explanatory variables with unknown coefficients  $\beta$ , and  $\lambda_0$  is a baseline hazard. This model has the feature that

$$\frac{\partial \ln \lambda}{\partial X} = \beta$$

and so  $\beta$  measures the impact of  $X$  on the conditional probability of becoming divorced. Although the duration model can handle censored observations, in our data set everyone gets divorced and so no observations are censored. Table 4 presents the partial likelihood estimates. Consistent with the model, the coefficient for AGE-DIFF is negative and significant—as husbands increase in age relative to the wife, the duration of the marriage falls.

Once again our lack of information on demographic characteristics may cause a problem for this particular test. For example, men entering a second or third marriage may marry younger women, increasing the age difference. Individual with previous divorces though, also have higher probabilities of divorce. Hence our result may be the result of a large number of previously divorced males in the sample. To control for this, we add a dummy variable MULTIPLE-H to the regression which equals one if the husband has

Table 4. Partial Likelihood Estimates Dependent Variable = Length of marriage

Variable			
AGE-DIFF	-.046 (-10.19)*	-.046 (-10.09)*	-.042 (-8.45)*
AGE-DIFF-SQ	.0003 (0.99)	.0003 (.89)	.0002 (.77)
MARRYING AGE (husband)	.062 (19.99)*	.055 (15.56)*	.053 (13.72)*
MULTIPLE-H		.185 (3.46)*	.151 (2.68)*
MULTIPLE-W			.116 (2.05)*
Log Likelihood	-21,217	-21,711	-21,709
Global Chi-Square	480.37	492.93	497.40
N	3102	3102	3102

*t*-statistics in parentheses. The “\*” indicates significance at the 5% level.

been married before. As can be seen from Table 4, this does not alter our result. Even adding a similar dummy variable for the wife fails to change the result that as the age-difference increases, the duration of the marriage falls.

#### 4.4. Frequency of Sex

Our model has certain implications for the frequency of sex within a marriage. If there were no “margins” to marriage other than intercourse, and romance was always mutual, then this model would make an exceptional prediction regarding frequencies of sex. In stages I and III of figure 1, sex would only occur when the wife wanted it, while in stage II sex would only occur when the husband consented. Hence the frequency of sex over the life cycle would follow the lower envelope of Figure 1. However, couples constantly negotiate throughout a marriage and often trade intercourse in exchange for some other marital or private consumption good.<sup>37</sup> When trades take place, it is possible for sex to occur even when one partner is “not in the mood”. As a result the actual frequency of sex should lie between the male and female demands of Figure 1. This would generally imply a downward sloping frequency of sex over the life-cycle of a couple.<sup>38</sup>

To test this prediction we obtained a copy of the data used by Blumstein and Schwartz in their study of American couples, which contained information on frequency of sex for couples.<sup>39</sup> The variables used in the regression along with their summary statistics are listed in Table 1. The results of our OLS regression with FREQUENCY of sex as the dependent variable are reported in Table 5. Most relevant to this paper is the observation that frequency of sex falls with the length of the relationship (measured by the variable TOGETHER), holding constant an individual’s age, education, frequency of religious attendance, number of marriages, total income, and whether or not the individual com-

Table 5. OLS estimates—dependent variable = FREQUENCY

	Variable	Coefficient
AGE	.010	(-4.92)*
EDUCATION	-.03	(-4.37)*
INFIDELITY	-.065	(-1.94)
REL-FREQ	.010	(1.47)
MAR-NUM	-.012	(-2.38)*
INCOME	.014	(3.19)*
TOGETHER	-.023	(-5.29)*
TOGETHER-SQ	-.000	(-1.61)
Adjusted $R^2$	.104	
$F$ Statistic	121.58	
$N$	8237	

$t$ -statistics in parentheses. The \*\* indicates significance at the 5% level. Note this table uses data from Blumstein and Schwartz.

mitted an act of infidelity. This is consistent with the model here. Unfortunately, the data does not contain the relative ages of the couple, and so further testing exploiting the effects of relative age differences as done with the earlier tests is not possible.

#### 4.5. Adultery

Given the different demands for sex in Figure 1, it seems reasonable to predict that, *ceteris paribus*, the individual with excess demand is more likely to commit adultery than the other partner.<sup>40</sup> This would imply several things. First, husbands should be more likely than their wives to commit adultery in Regions I and III, while wives are more likely in Region II. Assuming that a couple marries early in their adult lives, this implies that the probability of adultery on the part of the wife should rise with the duration of the marriage and then fall, while the probability of the husband committing adultery should fall and then rise. Secondly, as the husband's age increases relative to his wife, Region II becomes larger, and the probability of the wife committing adultery should increase, while the probability of the husband committing adultery should decrease.

Data on adultery is very difficult to find, of course. We use the population of adultery cases from the divorce records of Fairfax County for 1992.<sup>41</sup> Not all acts of adultery end in divorce, but our model should hold for those that get divorced and those who do not.<sup>42</sup> From this sample the mean length of time until the first adultery for wives is 16 years, while for husbands it is 8 years, which is generally consistent with our model. Table 6

Table 6. Dependent Variable = 1 if Husband (Wife) committed Adultery

	Variable	Husband	Wife
Constant	4.68 (2.44)	-2.89 (-2.06)	
TIME TO 1ST ADULTERY	-.76 (-2.46)*	.52 (2.31)*	
TIME2	.017 (2.13)*	-.01 (-1.92)	
AGE-DIFF	-.56 (-2.04)*	.36 (1.75)	
AGE-DIFF-SQ	-.025 (-1.13)	.01 (.71)	
Log Likelihood	-53.8	-52.8	
Chi-Square	23.95	17.03	
N	39	39	

*t*-statistics in parentheses. The "\*" indicates significance at the 5% level.

presents two logit regressions, one for husbands, the other for wives, where the dependent variable is one if the husband (wife) committed the adultery. The results show that, conditional on a divorce and adultery occurring, the probability of the wife committing adultery increases as the relative age increases, while the probability of the husband committing adultery decreases with the age difference. The table also shows that the probability of adultery by a given spouse also behaves as expected. For wives, the probability increases and then decreases with the length of time until the adultery is committed, for husbands the opposite holds, as predicted. This latter result is quite interesting. It is unsurprising that husbands commit adultery sooner than their wives, but our model has the secondary prediction that husbands basically abstain from adultery in middle age, while wives behave in the opposite manner.<sup>43</sup>

## 5. Conclusion

This paper has examined the implications of a non-compensated transfer of property rights over sex from the wife to the husband during marriage. This transfer is significant because during this period the wife is more vulnerable to divorce if the marriage is in trouble. If the husband decides to leave the marriage while he has the property right over sex; that is, the wife's sexual currency is not as valuable, she has one less asset to bargain with. More interest and enthusiasm about sexual activity and intimacy has little or no value at the margin to the husband when he has the property right.

Several writers in the past decade have produced arguments for why bargains may not be reached in marriage recontracting. The most common argument is perhaps the medical school syndrome, where the husband is able to abandon the wife and take her human capital investment with him. The question, however, is why are these instigated divorces not resolved by recontracting between the husband and wife? Although there are many

reasons, economists, in focusing on education, number of children, and so on, have ignored the potential role of the demand for sexual intercourse in preventing bargaining solutions.

Our model has focused on the implications of different demands for sex over the life-cycle for married couples when the relative ages of the couple varies. This is certainly the easiest implication to test, but it is not the only one. If more extensive data were available, there would be a number of additional implications based on incomes, work patterns for wives, and other demographic variables which might be tested. Unfortunately, these variables are not available in divorce records, and traditional sources of data do not contain information on the necessary variables to test our model. Our lack of control variables open us to the critique that other factors may explain any given result. However, it must be pointed out that our model was consistent with *all* of the predictions. Counter hypotheses can be raised for any given result, but it is much more difficult to come up with an alternative theory to explain all of them. Furthermore, when we were able to control for the obvious counter hypotheses (e.g., the variance is the wrong measure, too many men in the sample with multiple marriages), our results remained unaffected. Using the data that was available for testing the model was not only consistent, but the predictions of the model are clean, original, and a little surprising.

Our model and results are generally inconsistent with the pure Coasian approach of Peters. When bargaining costs are low enough and life-cycle changes anticipated, then changes in the demand for sex will be bargained over in a marriage contract. Our model is generally consistent with positive transaction cost models of divorce, where information is not cheap, and bargaining not costless. Ours has also been a partial equilibrium model. We recognize and have argued elsewhere that other factors such as education, no-fault laws, number of children, and the like influence the probability of divorce. Our point here is that relative sex drives may matter as well, and our empirical results suggest they do.

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### Notes

1. The purpose of the paper is to complement the substantial literature on divorce which examines the effects of children, education, work force participation, no-fault divorce laws, and transaction costs. This paper is not intended to provide a general equilibrium theory of divorce, but rather to provide a partial equilibrium model, couched within a Becker-type framework. See, for example, Becker, *et al.*, 1977.

2. We argue that these differences are primarily hormonal and cultural, and therefore, we treat them as exogenous throughout the paper. Most research on sexuality has been done by psychologists and biologists, and has built on the initial research of Alfred Kinsey. This literature tends to emphasize the biological aspects of an individual's sex drive. More recently, social scientists have begun analyzing sexual behavior (e.g., Posner 1992, Laumann *et al.* 1994). This literature places more emphasis on cultural, market, and other non-market factors. For our purposes, the debate over the cause of different sex drives between men and women is mostly moot. For us what matters is that a difference in sex demands exists, and fortunately, on this point, there is large agreement.
3. Perhaps due to conditioning early in life which leads women to avoid sexual intercourse. However, it is possible for the reverse. For example, in *Favrot v. Burns*, 332 So. 2d 873 (La. App. 1976) the husband attempted to divorce his wife because she insisted on more frequent intercourse than they had agreed upon in a premarital contract.
4. Although our model assumes that such a switch occurs for *some* couples, we explain later in the paper that this is not necessary for our predictions as long as the demands for sex over the life cycle are as described in the next section; in other words, that the relative demands are as we describe. Furthermore, our predictions all relate to the incidence of divorce, and our general thesis is that mis-matched demands for sex can contribute to divorce. We *are not* arguing that there is a switch in excess demands for sex *for all* couples. One referee has pointed out that there may be "marriages of convenience" where sexual activity is not expected and does not occur. In these cases, there will be not sexual bargaining, and our model will not apply. Where abstinence is not consensual, the aggrieved spouse may seek an annulment early in the marriage, or a divorce on grounds of fraud or impotence later in the marriage.
5. This, of course, is not always true. Since rape is by definition nonconsensual, it is outside the bargaining model we describe here, and so we abstract from rape within marriage. Posner (1992: pp. 388–391) discusses marital rape, concluding that most of the historical reasons it was not a crime have lost their force. Forcible intercourse in marriage constitutes a social problem, and may occur more often in the era of no-fault divorce. See *Planned Parenthood v. Casey*, 112 S. Ct. 2791 (1992).
6. To use more common economic language we could state that the "short end of the market" determines the volume of trade. Alternatively, we can think of a price for sex, with the value of sexual currency for the wife falling and then rising over the life of the marriage.
7. See Brinig, (1997) for an international comparison of divorce laws.
8. Person, p. 76, 1988.
9. Given that hormonal factors play a large role in the demand for sex, we treat "desire" and "ability" as virtually synonymous.
10. Recent studies that gave testosterone to surgically postmenopausal patients reported that the sex drives increased to levels that exceeded the pre-operative and demonstrated that female sex drives do respond to hormone levels. (Gallagher, p. 77, 1988).
11. For example, see Kinsey's (1968) chapters on non-hormonal influences on sexual desire. The comprehensive study by Laumann *et al.* stresses the fact that sexual behavior is not simply a biological outcome, but rather involves social parameters as well. Although we cite the Laumann study, its cross sectional structure prevents any conclusions regarding life-cycle demands for sex. In fact, the authors of the study explicitly point this out (p. 145, 1994).
12. Pregnancy may also ultimately help female sex drives. According to Mahoney:  
 "if [pregnancy] does not result in obstetrical damage, [it] improves sexual responsiveness. The supply of blood vessels in the pelvic area is permanently increased during and after pregnancy, thus intensifying the engorgement and release experience during orgasm." [p.46, 1983]
13. Regarding oral sex, the Laumann study found that "Older women, in particular, were highly unlikely to report giving oral sex or receiving it as very appealing." In an older study, Newman and Nichols (p. 309, 1970) report that older men have higher sex drives than older women.
14. Another Kinsey report states:  
 If you are counting orgasms, there is scientific evidence to support the idea that women's sexual peak is later than men's. Most young men during adolescence and their early twenties report more frequent

orgasms than men in older age-groups. ... These younger men also have very short refractory periods, in some cases requiring only a few minutes between one orgasm and the next...

Women in general, on the other hand, experience their highest number of orgasms from their mid-20s to mid-40s. [Reinisch and Beasley, p. 79–80, 1991]

15. Hence the change in sexual desire is reflected in sexual capacity. According to one doctor, "An 18-year-old man can climax up to eight times in 24 hours; when they're 35, once every 24 hours is more the norm." (Perlmutter, p. 3, 1989). In a recent New York Times article, Altman (1993), in discussing a study done by the New England Research Institute, states: "men representing the general population confirmed that the ability to have an erection declines with age." The Institute study found that at age 40, 5 of men report impotence, by age 70 this increases to 15. Overall, 52 of men between 40 and 70 experienced some degree of impotence.
16. Kinsey draws a graph of multiple orgasms for males and females over their life-cycle that is virtually identical to Figure 1 (See Figure 151, p. 718). Under the graph they state:
 

For the male the curves show an aging effect, and for the female a plateau extending from the mid-teens into the late fifties. [p. 718, 1968]
17. When the demands do not cross, the wife always maintains the property right to sex. As her demand for sex rises relative to the husband's, the value of the property right or sexual currency (that is, the husband's willingness to sacrifice for sex) starts to fall. Hence, during middle age, in such marriages, sex may still be used by the wife to bargain with, but it will be less effective than at other times in the marriage. The qualitative effect will be the same as if the property right had actually transferred. It should finally be pointed out that our model assumes that sex is a private good, jointly produced by the couple.
18. It is quite possible, that at the time of marriage, the quantity of any marital input is not at a first best optimum. It is also possible that a couple gets and remains married when some marital inputs are never optimal. For example, some couples may discover they must remain childless for medical reasons, yet remain together. In terms of sex, both partners may fully recognize that their demands may never exactly match. A couple marries when the value of the *collection* of marital inputs is greater than the value of being apart or with someone else. In an all-or nothing decision like marriage, where a bundle of attributes are being traded, there is nothing irrational with some of the attribute levels not being first best at some point in time.
19. There is an ever growing literature on the effect of no-fault divorce laws on the divorce rate, which provides evidence to this point. When transaction costs are positive, the model expressed in equation (1) does not always hold. See Allen (1992) or Brinig and Buckley (1997), for example.
20. The idea of "sex as currency" dates back at least to Aristophanes' *Lysistrata*, where the women of Athens and Sparta suspend marital privileges in an effort to end the Peloponnesian War. As *Lysistrata* states:
 

Here's how it works: we'll paint, powder, and pluck ourselves to the last detail, and stay inside, wearing those flimsy tunics that set off everything we have—and then slink up to the men. They'll snap to attention, go absolutely mad to love us—but we won't let them. We'll abstain—I imagine they'll conclude a treaty rather quickly. [p. 27, 1970]

In more academic fashion Richard Posner (1992) discusses the role of sexual intercourse in marriage, and traces the form of exchange found in the mutual obligations to be open to intercourse in companionate marriage (pp. 111–113). He also writes that extramarital sex is a poor substitute for marital sex in companionate marriage (p. 118). This last point would appear to be confirmed by Laumann *et al.*, who find that adultery is much less common than generally perceived. For a general discussion of nonsexual bargaining in marriage, see Lundberg and Pollak (1993).
21. In the United States, the only jurisdiction to treat the degree as marital property is New York. *O'Brien vs. O'Brien*, 66 N.Y. 2d 576, 489 N.E. 2d 712 (1985).
22. See Brinig and Crafton (1994) for a discussion. For one of the many reported cases, see *Mahoney v. Mahoney*, 91 N.J. 488, 453 A.2d 527 (1982). Allen (1990) provides evidence that "title" property division laws, which were common in Canada and many states until recently, provided an opportunity for husbands to divorce and leave with a disproportional share of marital property.
23. See Allen (1990) or Parkman (1992) for some evidence of this.

24. Friedman and Percival (1976, p. 75) show a greater than 50% filing rate by women since 1800, despite the historically disastrous economic consequences for women. By 1960, the percentage of both plaintiffs and successful divorce litigants who were wives had increased to more than 70%. Because divorces required proof of fault during this period, only the "innocent" party—not the one causing the demise of the marriage—could file. Thus the wife would file when forced to by the husband, or would cooperate by filing when the husband purchased her acquiescence. Immediately after the introduction of no-fault divorce, the percentage of women who filed declined (Gunter and Johnson (1978)), though this difference has not persisted (Brinig, 1993). In short, who files for divorce is an inappropriate measurement for who instigates a divorce.
25. For example, wealth after divorce falls so much for ex-wives relative to that enjoyed during marriage that they tend to stay in unhappy relationships while their husbands have incentives to leave. See Finnie (1995) for a careful estimation on the fall in female living standards post-divorce.
26. Sex is still a "good" for the husband in Region II, so it is not the case that the wife can increase the value of the marriage by offering to have less sex. It is simply the case that the husband is now the short end of the marital sex market. Further, this figure also assumes that alternatives to intercourse within the marriage (e.g. prostitution, masturbation, golf) are not perfect substitutes (Posner, 1992: p. 118). We consider extramarital sexual intercourse in section 4.5.
27. It may be countered that many men leave their middle-aged wives for younger women. We offer two responses: first, the younger wife will have a lower demand for sex that closer matches the man's (this would imply that the marriage will probably be short lived as the young wife's demand is increasing, which corresponds to casual observation); second, the analysis here is holding spouse constant, changing partners could increase the value of sex at the margin.
28. Fairfax County is a Washington suburb with a population of about 1.5 million. It is one of the most ethnically diverse and wealthiest counties in the US. There are approximately 5000 divorces per year in the county. The results of the paper could be expected to hold true for Western Europe, which has essentially the same divorce rules.
29. As the end of Region I is reached, the total value of any additional sex transferred becomes quite small. This low value may be insufficient to save the marriage if trouble arises elsewhere, and so of course, divorce is possible outside of Region II. The thrust of the argument here is unaffected by this complication, and throughout the empirical section we consider the rise in the probability of divorce as occurring when the transfer of property rights takes place.
30. In the past, fault divorce law protected women from abandonment, and a reversal in the property right over sex was not as serious (Posner, 1992: pp. 247–248). Hence, all of the predictions here are conditioned on the possibility of a no-fault law existing. The data used for this paper comes from a state with both fault and no-fault grounds for divorce.
31. Given the shapes of the curves in Figure 1, we can say the following about the partial derivatives:  $f'(x_1) > 0$ ;  $f'(x_2) < 0$ ;  $m'(x_1), m'(x_2) < 0$ ;  $m'(x_1) < m'(x_2)$ ; and  $f'(x_2) < m'(x_2)$ .
32. This, of course, is over stated to simplify the argument. More accurately, the probability of divorce is higher.
33. More accurately, one of the scales of the  $x$ -axis shifts.
34. This is not quite true since some extreme age difference categories have only one observation. These extreme age groups were combined in order to calculate a variance. This resulted in four age difference groups at either end being combined. Since the number of observations used to calculate the dependent variable is not constant, and in some instances is quite small, measurement error may lead to a heteroskedastic error term. Assuming that each variance within a age difference category is distributed normally, the variance in the estimated variance is given by  $4\sigma/T$  where  $T$  is the number of divorces in a given age category [Kennedy p. 108]. Running a regression of the squared residuals of the OLS regression on this term, allows for a predicted residual, which can then be used to adjust the original variables in the regression. The results of this adjusted regression are reported in Table 2 under the GLS columns. Two GLS regressions were run: one with only an adjusted constant; another with both an adjusted and ordinary constant. Since the results are virtually the same as the OLS regression, there would not appear to be any heteroskedasticity problem.

35. We leave it to others to show the theoretical link between demographics and variance in divorce ages.
36. Note again the asymmetry. We are not saying that the duration should fall for any absolute difference in age. For our model it is crucial that the husband increase in relative age. If the wife increases in relative age then the duration of the marriage should increase.
37. The fact that we've only considered the use of sex as currency at the time of divorce does not mean it is not used as such at other times in the marriage.
38. This prediction is not as pedestrian as it might sound. For example, a generally downward sloping frequency of sex implies that bargaining does take place. The more parabolic the frequency of sex over time, the less bargaining that takes place. In addition, it is important to test even the obvious predictions of a model.
39. This data, unlike the Fairfax county sample, did not contain adequate information on infidelity and so we could not use it to test our predictions regarding adultery. The sample was collected by Blumstein and Schwartz using all types of methods. It is not a random sample, but it does sample more than just divorced couples. For a full discussion of procedures and the data, see Blumstein and Schwartz (1983).
40. Of course, adultery need not take place with another married person. Baker and Bellis' (1993) suggest that up to 10% of the population of Liverpool, England, may be illegitimate.
41. Virginia, of which Fairfax County is a part, is a state with a mixed fault and no-fault system. Although most couples divorce using the no-fault separation ground, fault, and particularly adultery, will be raised in the divorce pleadings since it affects not only the ground for divorce but also the award of property and alimony. Alimony is not normally available to a spouse who is shown to have committed adultery. On the other hand, adultery by the payer spouse may increase the amount of alimony awarded. Va. Code Ann. §§20-107.2 and 20-107.3. For an example of a case where the payment to the wife was increased due to sex outside of the marriage, see *L.C.S. vs. S.A.S.* 453 S.E.2d 580 (Va. App. 1995). Here, although the attorney husband made nearly all the financial contributions to the marriage, the wife received 50% of the property plus alimony when he was divorced based upon his conviction for child sexual abuse.
42. Admittedly, this data is wrought with potential measurement problems. For example, we only selected those divorces where adultery was explicitly raised in the divorce file, indicating the other party discovered the infidelity and was unhappy enough to make it public. Blumstein and Schwartz (Figure 49 p. 274, 1983) present some evidence in favor of this hypothesis that uses a non-divorce sample. They found that for husbands the incidence of infidelity increased over the life of the marriage, while for women it increased and then fell. Their table does not, however, group categories as we would like. There are three categories for "years together"; 0-2, 2-10, and 10+. It is unlikely that the switch in property right occurs just two years after the marriage begins, and so the fact that they found the rate of infidelity increases for men is not inconsistent with our theory. The model should hold for couples who cohabit in long-term relationships. Thus in countries like Sweden, where cohabitation is very common, there should be sexual bargaining since the biological features of the couple do not change.
43. We thank one referee for pointing out that adulterous wives should be involved with younger men since their demands for sex are closer matched. In fact, Baker and Bellis (1993) supply some evidence for this. They show that a number of British women apparently marry stable, high earning men, and then have affairs with younger men who may be more attractive, passing the resulting children off as the husband's.

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