
**A Theory of Divorce
and Labor Supply****(with Michael C. Keeley)****Abstract**

The theory of allocation of time in markets for labor and marriage presented in Part Two of this book also leads to a theoretical analysis of labor supply and divorce. The theory presented here focusses on income effects on labor supply and divorce. It gives some reasons why it is important to estimate income effects on labor supply and divorce simultaneously. Results are then reported for such joint estimation. This chapter also offers new interpretations of results from simultaneous empirical analyses of divorce and labor supply other than the ones presented here, and contributes to the methodological debate regarding the usefulness of experimental data.

Introduction

The existing literature analyzes income effects on divorce with one set of tools and its effect on labor supply with a different set of tools. The basic

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framework used by economists for analyzing income effects on *labor supply* is the income-leisure trade-off. This framework takes household structure as given, and has no room for incorporating marriage or divorce. Typically, this framework is of a static nature, and income changes are conceived of as unexpected changes in current income, which does not originate from work.

It has been postulated on theoretical grounds and shown empirically that income and labor supply are negatively related. Economic literature offers ample evidence that wives' labor supply is more income elastic than that of husbands. Following Mincer (1962) this has been explained in terms of women's larger involvement with household work and the existence of relatively good substitutes for women's time in the home.

The economic analysis of *divorce* is based on Becker's (1973, 1981) theory of marriage (see also Becker, Landes and Michael 1977). Income effects are assumed to be unexpected at the time of marriage. Given a higher income, individuals can obtain a better match than with the spouse they are currently married to. The sociological literature has also considered the choices between marriage, singlehood, and remarriage in a cost-benefit framework, and has focussed on the possible independence from marriage that can be obtained with added income from outside the marriage (e.g., Hannan, Tuma and Groeneveld 1977, Oppenheimer 1988).

These two separate bodies of theories lead to separate hypotheses of negative effects of income on labor supply, and positive effects of income on divorce. In other words, the existing literature does not provide a single explanation accounting simultaneously for income effects on divorce and on the labor supply of husbands and wives.

In contrast to the separate theories regarding the determinants of labor supply and divorce found in the literature, the analytical framework presented in Part Two allows us to integrate the analysis of labor supply and divorce. Specifically, in the case of income effects, the same analysis leads to the hypothesis of larger income effects on wives' labor supply than on husbands' (Hypothesis 5 in Chapter 3), and to the hypothesis that unexpected changes in income will be positively related to divorce (Hypothesis 9' in Chapter 4). This theory of labor supply and divorce can also be useful in

offering new interpretations of results from more recent simultaneous empirical analyses of labor supply and divorce.¹

In this chapter, it is shown how income effects on labor supply and divorce depend on the same intervening factors, including divorce costs and substitutability in the supply of spousal labor. It is also shown how the magnitude of income effects on a particular couple depends on the number of other people in the environment experiencing similar income effects. If large numbers of people participating in the same marriage market obtain additional income, for instance, the conditions in the marriage market will vary in directions similar to the changes occurring to each individual eligible couple. As a result, divorce will be less likely and labor supply will change less than if few other people experience an income change.

The possible implications from such analysis are important for policy purposes. Through programs such as Aid for Families With Dependent Children (AFDC) the government is presently transferring income, thereby causing effects on labor supply, divorce and remarriage. In the past, the government has run Negative Income Tax (NIT) experiments, which have created unique opportunities for researchers to study unexpected income effects on labor supply and divorce. It is important to assess correctly the extent to which any income transfers have an impact on labor supply and family structure.

Many studies have shown that income transfers such as AFDC and NIT discourage labor supply and marriage, while they tend to encourage female headship and divorce. With respect to the welfare system, Moffitt (1992) reports a number of econometric studies showing that labor supply is reduced by welfare programs such as AFDC and Food Stamps. Hoffman and Duncan (1988) have shown that women who were divorced or separated were less likely to remarry when they could benefit more from AFDC. As to Negative Income Tax, which at one point was seriously considered as an alternative to traditional welfare programs, two major reasons for its demise were the findings that NIT leads to (1) reductions in work time (Rees 1974; Robins and West 1980; and Robins, Tuma and Yaeger 1980) and (2) increases in divorce or separation among families receiving support (Hannan, Tuma, and Groeneveld 1977; and Groeneveld, Tuma, and Hannan 1980, Keeley 1987).²

A major drawback of most studies on the effect of income

transfers in general--and of NIT programs in particular--is that they have not accounted simultaneously for the effect of income transfers on labor supply and divorce. Estimating these effects separately leads to biased estimations.

The advantages of a simultaneous estimation are (1) unbiased estimation of any effects (including income effects) on labor supply or divorce, and (2) given a simultaneous theoretical analysis of divorce and labor supply, a better understanding of how income and other factors influence behavior. In particular, this theory enables us to assess the direction of a possible bias due to the experimental nature of the data.

This chapter first summarizes the theory regarding labor supply and divorce presented in Chapters 3 and 4, and then expands that theory. This is then followed by an empirical analysis based on Two-Stage Least Squares. The chapter's conclusion includes policy implications.

Theory

The general theory of labor and marriage presented in Part Two allows us to integrate the analysis of labor supply and divorce. The decisions to marry, stay married or divorce are viewed as closely interrelated with labor supply decisions in the following ways.

An individual's decision to supply labor is conceived of as a choice between leisure and two occupations, labor in the conventional sense and spousal labor, defined as any task performed for the benefit of one's spouse. Marriage is viewed as the institutional framework within which the exchange of spousal labor takes place. Given possible substitution between many potential spouses, markets for spousal labor establish equilibrium quasi-wages for spousal labor for men and women, the quasi-wage being one material component of the value of spousal labor.

In a monogamous society marriage tends to occur when at the equilibrium \bar{w}_j^* and \bar{w}_m^* a man demands the amount of spousal labor a woman wants to supply and that woman demands the amount of labor supplied by the man. A married couple in equilibrium

experiences no excess demand for, or supply of, spousal labor at the relevant w^* s. For instance, in Figure 3.4, reproduced in Figure 10.1, a couple is in equilibrium when its demands for spousal labor are D , its supplies of spousal labor are S , and the equilibrium quasi-wages are \bar{w}_{fl}^* and \bar{w}_{ml}^* .

Based on this analysis, we get predictions regarding both labor supply and divorce. With respect to labor supply, it was shown in Chapter 3 that given the existence of marriage markets (markets for spousal labor), the conventional comparison between w and w^* --the basis for individual decisions to work--involves more than what is usually analyzed in the literature on labor supply. One component of the value of time w^* is the quasi-wage established in the marriage market. In addition, w^* also has a material component dependent on marriage-specific and individual factors, and a non-material (or psychic) component. The material compensation an individual receives for providing spousal labor thus depends on general conditions in the market--affecting all individuals somewhat related to the same market--and on conditions specific to the couple. For instance, a wife is more likely to gain access to her husband's credit cards if the quasi-wage established in her marriage market is high, and/or if her husband is attached specifically to her, and therefore possibly willing to treat her better materially than the prevailing market-established compensation level.

The same theory can help us analyze divorce decisions as well. Any excess demand and supply of spousal labor at the equilibrium w^* levels can be a ground for divorce. The benefits of divorce and recontracting into new marriages are a better match between what a man and a woman want in terms of demand and supply of spousal labor. However, there are costs of divorce as well, including costs of search for a new partner, losses from investments in match-specific capital, and losses due to indivisibilities in marital assets.³ In addition, divorce may involve direct monetary outlays. Given such divorce costs, markets for spousal labor are not spot markets. A couple may decide to stay married even if there are excess demands or supplies of spousal labor at the market w^* s.⁴

Divorce costs faced by each partner in a marriage and total divorce costs affect both partners' hours of work and the couple's probability of divorce. Assume a couple initially in equilibrium at the

market level \bar{w}_{f1}^* and \bar{w}_{m1}^* , as depicted in Figure 10.1. Given excess demands or supplies of spousal labor caused by any exogenous change, husband and wife can either (1) let the material component of w^* they give each other differ from the market level \bar{w}_f^* and \bar{w}_m^* , or (2) find other ways to reduce excess demands or supplies for spousal labor.

When a couple lets a marriage-specific quasi-wage w^* differ from the market equilibrium level \bar{w}_f^* and \bar{w}_m^* , the mechanism is as follows. A wife or husband who demands spousal labor and is faced with positive costs of divorce experiences utility from spousal labor beyond the utility that would be provided by potential substitutes.⁵ In other words, this person's demand for this particular spouse exceeds his or her demand for spousal labor provided by others. With higher demand, the marriage-specific w^* rises. In turn, this will also raise the costs of divorce to the partner, who will prefer the higher w^* received from this spouse over the w^* available in the market. For instance, if a husband is in love with his wife, but this love is not reciprocated, he translates his emotional costs of divorce into a w^* exceeding market-level. This shifts part of the costs of divorce to the wife, who will now find it difficult to obtain as much income from spousal labor if she marries somebody else. Individuals who supply spousal labor and who find divorce costly get a higher utility from working for their present spouse than from working for a potential substitute. The larger supply that this person is willing to supply to this particular spouse will cause the marriage-specific w^* to be lower than the market equilibrium \bar{w}_f^* or \bar{w}_m^* . (It may be helpful to think of these divorce costs as the value of match-specific capital either to the worker or to the spouse enjoying the work.⁶ Divorce costs thus cause the marriage-specific demands and supplies of spousal labor to shift in a way that (a) reduces any excess demand or supply for spousal labor, and (b) creates a gap between market equilibrium \bar{w}_f^* or \bar{w}_m^* and marriage-specific w^* .⁷

If there are limits to fluctuations in marriage-specific w^* s, there is a need to reduce the excess demands or supplies of spousal labor by other means such as friendly negotiations between the spouses or use of violence and threat of violence.

Divorce is linked to labor supply, in the sense that the

principal way to reduce any excess demand or supply of spousal labor is by adjustments in the amount of labor supplied outside the home.

Higher divorce costs are likely to discourage divorce. They are also likely to cause more divergences between the labor supply of a married person and that of a comparable single person. In the case of women, who tend to supply more spousal labor than men, one expects the difference between the labor supply of a married woman and that of a single woman to be larger, the higher the costs of divorce.

The Effect of Predicted Divorce on Labor Supply

Predicted divorce is expected to affect labor supply. A lower likelihood of divorce is likely to be associated with more differences between the labor supply of married people and that of single people. More specifically,

Hypothesis 33

The labor supply of married women with a high likelihood of divorce will be larger than the labor supply of women with a low likelihood of divorce.

The likelihood of divorce may vary across individuals, for instance as a result of differences in divorce costs. Furthermore, the likelihood of divorce may change over time if divorce becomes more (or less) common. As to men's labor supply, married men with a high likelihood of divorce are likely to be more similar to unmarried men than married men with a low likelihood of divorce. Married men typically work more than unmarried men, but this is less likely to be the case with married men with high likelihood of divorce.

The effect of costs of divorce and predicted divorce on labor supply decisions may vary with other factors related to the decisions to work and to marry. One of these factors is spouse's income.

Effect of Spouse's Income. Labor supply during marriage and after divorce is a function of the value of time at each of these two points in time. Women married to higher income husbands are more likely to receive some income from their spouse after a divorce (in the form of alimony, child support or a property settlement, for instance). They may also have personal characteristics that are

attractive in marriage markets and it may be relatively easy for these women to replace their spousal income lost through divorce by remarrying. Consequently, a predicted divorce does not lower their future value of time as much as that of similar women married to men earning a lower income. Given that labor supply responds to changes in predicted value of time in the future, there is less need for such women to go to work prior to the divorce. Availability of spousal income after divorce thus lowers the costs of divorce and therefore reduces the need for a married woman to supply labor as if she were single.

In other words,

Hypothesis 33.1

The effect of predicted divorce on the labor supply of married women will be stronger the lower the likelihood of post-divorce spousal income such as alimony or child support.

However, being married to a high-income husband is no guarantee of post-divorce spousal income. It could be that the wife is not attractive and expects to do poorly in the marriage market, or that she is being abused by her husband. In fact, Dechter (1992) has found that relative income losses due to divorce for wives with high-income husbands tend to exceed such losses for wives with low-income husbands. This would imply that wives of high-income husbands experience higher divorce costs than wives of low-income husbands. Combining these two correlates of high-income husbands (more post-divorce income and larger income losses), it is not clear whether wives of high-income husbands are more or less likely to enter the labor force as a result of a predicted divorce. The effect of predicted divorce on the labor supply of married women will be stronger for women married to low-income husbands to the extent that they do not expect post-divorce settlements. However, that effect will be weaker for women married to low-income husbands to the extent that they are likely to experience less of an income loss as a result of divorce.

Expected post-divorce spousal income varies positively with husband's income and with husband's education, a good proxy for his permanent income. Education may also be related to husband's willingness to agree to a fair divorce settlement.

An alternative interpretation of weaker effects of predicted divorce on the labor supply of women married to husbands with higher incomes, is that these women have more desirable characteristics which are valued in the marriage market relatively to women married to low-income husbands, the idea behind Hypothesis 33.2.

Women's Characteristics. Another factor which is likely to affect the difference in the value of time of a married woman prior to and after divorce is the level of market-determined w^* relevant to women with certain characteristics. Any factor such as race or age which affects market w^* is likely to also affect actual w^* in a marriage, and therefore the potential drop in income a woman could experience. Black women tend to have a worse marriage market than white women (see Chapter 5), so Hypothesis 33.2 applies to them. The hypothesis also applies to women who have passed what most people consider as the age of peak productivity in spousal labor. In most cultures, that age is associated with youth and fecundity.

Hypothesis 33.2

The effect of predicted divorce on the labor supply of married women will be larger for women in a better marriage market position, such as white women in comparison to black women, and women at peak ages in comparison to older women.

Predicted divorce affects labor supply *via* its effect on present and future compensation for spousal labor. The larger the drop in income a woman expects to experience after divorce, the more she is likely to enter the labor force prior to divorce. Even though white women's average interval between divorce and remarriage is shorter than that for black women, it is still the case that divorced white women do not remarry right away and generally are worse off after divorce than prior to divorce. Black married women may expect less of a drop in income from spousal labor as a result of divorce than white women, given the lower w^* they seem to receive while married (judging from indicators such as black-white differences in female labor supply level and alimony). Consequently, black married women do not expect divorce to affect them as much as what white married women expect to experience. Black-white differences in the effect of

predicted divorce on women's labor supply would be particularly pronounced among women with low chances of remarriage, e.g., a function of number of children.

More generally, Hypothesis 33.2 applies to any factor which affects market w^* , which includes sex ratio variations.

Men's Spousal Productivity. There may also be trade-offs between various characteristics of the husband and the material support he gives his wife both during and after a divorce, as discussed earlier in Parts Two and Four. For instance, a husband who is much older than his wife--let us say Johnny Carson and his third wife--may be compensating her generously for this drawback, both before and after a divorce. Consequently, such a wife would not rush into the labor force if she predicts a divorce. This leads to the following hypothesis:

Hypothesis 33.3

The effect of predicted divorce on the labor supply of married women will be weaker in the case of women married to men with relatively undesirable characteristics, as valued in the marriage market.

Children. It is well known that the presence of young children deters divorce. Children are likely to be associated with higher marriage-specific benefits and therefore higher loss from divorce to both husband and wife. It was found by Dechter (1992) that expected economic losses following divorce are important deterrents to divorce for couples with dependent children. One may therefore want to estimate whether the effect of predicted divorce on labor supply of married women varies with husband's income conditional on number of young children.

There are more factors influencing labor supply and divorce. One factor influencing labor supply and divorce which is of particular interest in this study is income.

Income Effects

If both husband and wife experience unanticipated increases in

their non-wage income (V_f and V_m in terms of the notation used in Chapter 3) their individual demands for normal goods and services, including leisure s_i , is expected to increase. To the extent that we are in the range of h_f where spousal labor generates disutility, the wife's higher income, V_f , makes her less interested in working, including working as a spouse. Similarly, the husband will be less interested in working outside and inside the household. At the same time, husband's demand for wife's h_f increases as a result of his higher income, V_m , and wife's demand for husband's spousal labor increases as well. In terms of Figure 10.1 the supplies S shift leftwards to S' and the demands D shift rightwards to D' .

If it is assumed that the marriage market component of w^* is unaffected, such income changes affecting an individual couple will cause a disequilibrium for that couple in terms of the amount of spousal labor they supply to each other and demand from each other. The right-ward shifts in demand for spousal labor and left-ward shifts in supply of spousal labor cause excess demands for spousal labor at the unchanged market determined w^* 's.

These excess demands for spousal labor at the market-established quasi-wages are grounds for divorce. If costs of divorce are nonexistent, the couple will separate. The wife will try to find a new husband who at the market quasi-wage wants to consume the reduced quantity of spousal labor she supplies, whereas the husband will look for a new wife wanting to supply him with higher spousal labor, and similarly with respect to husband's spousal labor. In other words, if costs of divorce are zero for everybody, markets for spousal labor are like spot markets.

Assuming husband and wife have the same preference for work compared to leisure, and assuming there are no divorce costs, there is no reason to expect a change in own non-wage income V to cause more of a proportional reduction in the wife's labor supply outside the home than in the husband's labor supply.

Given that divorce is costly, the excess demands for spousal labor caused by increases in unexpected income can be bridged by either (1) increases in the material component of w^* to bring it above the market level \bar{w}_{f1}^* or \bar{w}_{m1}^* , for instance, to the levels \bar{w}_{f2}^* or \bar{w}_{m2}^* in Figure 10.1, or (2) negotiations or violent ways to cause reductions in excess demand for spousal labor.

Income and Labor Supply. If excess demand for spousal labor is obtained through increases in w^* we expect an increase in the amount of spousal labor supplied, and therefore a parallel decrease in the amount of labor supplied (outside of marriage). If there are limits to fluctuations in marriage-specific w^* 's, and excess demands for spousal labor are reduced through negotiations or threats, it is also likely that increases in spousal labor supplied will occur. In either case, an increase in income is expected to cause decreases in labor supplied outside of marriage.

As was hypothesized in Chapter 3 under Hypothesis 5, to the extent that there existed an initial division of labor whereby the wife was supplying more spousal labor than the husband, *if a husband and wife who are married to each other experience independent and equal increases in income, the wife's labor supply is likely to decrease more than the husband's.*

It is now shown that the effect of income on husband's and wife's labor supply is likely to be more asymmetric the higher the divorce costs, the higher the divorce costs of the wife relative to those of the husband, the more the wife's income is affected relative to the husband's income, the fewer the substitutes for spousal labor, and the more women are willing to substitute between labor and spousal labor.

Divorce Costs. Hypothesis 5 is based on the assumption that costs of divorce are such that the couple experiencing income increases chooses not to divorce. If husband and wife opt for divorce, this reflects a situation of zero or low divorce costs, which implies that the income effects on their labor supply are likely to be the same. Hypothesis 5 is more likely to hold the higher the costs of divorce and the less the couple is likely to divorce. It can also be shown that asymmetry in husband's and wife's divorce costs is related to asymmetry in income effects on labor supply. To demonstrate that, let us consider two extreme cases: that where only the wife finds divorce costly, and that where only the husband finds divorce costly.

If the wife experiences costs of divorce but the husband does not (for instance, because she expects to be taking care of their children after divorce, which makes her search for a new partner more difficult than his), the wife will be willing to let the husband's w_m^* go up above its market equilibrium level, but the husband may not be

willing to let the wife's w_f^* increase above its market equilibrium level. Let us assume flexible w^* , and excess demand for husband's spousal labor disappears. Consequently, even if the original excess demand for spousal labor was the same for husband and wife (at the market level quasi-wages), after internal adjustments in quasi-wage an excess demand will be left in the case of the wife's spousal labor but not in the case of the husband's spousal labor. Given her costs of divorce, friendly negotiations or threat of violence will then bring the wife to increase her spousal labor supply and thereby decrease her labor supply more than the husband will. This effect may be reinforced by an income effect, as the wife's quasi-wage for spousal labor does not rise, while that of the husband does. The wife's real income consequently drops in comparison to the husband's real income.

Also, it is possible that the wife would reduce her demand for husband's spousal labor, which would also increase the asymmetry between an income effect on husband's labor supply and wife's labor supply.

If the husband finds divorce costly but the wife does not, the wife will not be willing to let the husband's w_m^* go up above its market equilibrium level whereas the husband will be willing to let the wife's w_f^* increase above its market equilibrium level. Consequently, even if the original excess demand for spousal labor was the same for husband and wife (at the market level quasi-wages), after internal adjustments in quasi-wage an excess demand will be left in the case of the husband's spousal labor but not in the case of the wife's spousal labor, thereby generating a smaller decrease in the wife's labor supply than in the husband's. This will be reinforced by real income effects, as the wife's real income increases relative to that of the husband.

It follows that Hypothesis 5 is more likely to hold when women's divorce costs are high compared to men's divorce costs. Divorce costs are expected to be higher for women than for men due to (1) women's tendency to retain custody over the children, which reduces the likelihood and speed of remarriage (Chiswick and Lehrer 1990), and (2) women's tendency to specialize in home production, which implies their skills are less valuable after divorce than those of men specializing in the labor market. More generally, the larger women's relative costs of divorce, the larger the effect of unanticipated income changes on women's labor supply.

Hypothesis 5.1

The lower the likelihood that women will divorce (e.g. due to women's high divorce costs), the more an increase in income is likely to reduce the participation of married women in the labor force.

It is noteworthy to compare Hypotheses 33 and 5.1. Hypothesis 33 deals with the impact of divorce costs on the *level* of women's labor supply, whereas Hypothesis 5.1 deals with the way changes in income cause *changes* in that labor supply.

Threat or Violence. If the threat of violence or actual violence is used to eliminate any excess demand in spousal labor, and it is more likely to be used by men, and given positive costs of divorce, an unexpected change in income is more likely to cause an increase in spousal labor supplied by women (or decrease in spousal labor demanded by women) than a change in men's demand or supply of spousal labor. Consequently, an unexpected change in income is more likely to affect women's labor supply than men's.

Source of Income Change. In deriving Hypothesis 5 we assumed that husband and wife experience equal income changes. It follows from the theory of marriage presented above that income effects on husband's labor supply will be larger (compared to income effects on wife's labor supply), the larger the increases experienced by the husband in comparison to the increases experienced by the wife. Looking at it the other way, Hypothesis 5 is more likely to hold when women's income increases more than men's.

Substitutes for Spousal Labor. This is a factor that Mincer used in order to explain what is being predicted in Hypothesis 5. In terms of this theory, the poorer the substitutes for spousal labor, the more additional income will be translated into increased demand for spousal labor, the larger the excess demands for spousal labor, and the more labor supply is likely to decrease as a result of an income transfer.⁹ In other words,

Hypothesis 5.2

The poorer the substitutes for spousal labor, the more an income effect on labor supply is likely to be negative.

If wives' spousal labor is harder to replace than husband's, it follows that income increases may generate larger excess demands for women's spousal labor than for men's, and therefore Hypothesis 5 holds. It follows that Hypothesis 5 is less likely to hold in situations where good substitutes for spousal labor are easily available or cheap. Note that even if husbands can very easily find substitutes for their wives' time, no gender asymmetry is expected if divorce is costless. It is only if divorce is costly that the husband's ability to find substitutes for his wife's time is likely to affect the wife's labor supply, and similarly for husband's labor supply.

Substitutability Between Labor and Spousal Labor. A person's ability to substitute one job for another--spousal labor for labor--determines the extent to which an unexpected income increase is likely to reduce labor supply. The elasticity of supply of spousal labor reflects *inter alia* substitutability between the two kinds of labor. The larger the resemblance between tasks involved in spousal labor and outside labor, the more elastic the supply of each kind of labor. Furthermore, income changes are more likely to cause shifts in the supply of spousal labor that has low substitution with other forms of labor than of spousal labor that is easily substitutable.¹⁰ For example, a nurse is likely to find her spousal labor relatively more similar to her work outside the home than a computer analyst, and her supply of labor will be more elastic. The more elastic S , the more marriages are likely to survive unexpected changes in income.

Even though occupational segregation by gender has decreased in recent years, it remains true that women work in jobs which resemble household work more often than men do. Therefore, wife's labor supply is likely to drop more than husband's when each experiences an increase in income. This can be seen, for instance, by considering the extreme case of a wife with a perfectly elastic supply of h_f , replacing the supply in panel b of Figure 10.1. When the husband's income rises and he demands more of her spousal labor, she can accommodate this change costlessly. A trade-off between reduction in labor supplied and divorce will not even be at issue. Furthermore, an increase in income is not likely to cause as large a left-ward shift in spousal labor supply if the two forms of labor are highly substitutable than if the two forms of labor are very different, especially if the psychic benefits of spousal labor are less income

elastic than the psychic benefits of a career outside the home.

The higher women's elasticity of substitution between labor and spousal labor in comparison to men's, and the less women's spousal labor supply is inelastic in comparison to that of men, the more Hypothesis 5 is likely to hold.

Income and Divorce. There is an incentive for divorce when an individual couple experiences excess demand or supply of male or female spousal labor at the relevant w^* levels. When husband's and wife's income increase independently, a gap is created between spousal labor supplied and spousal labor demanded, which in turn generates an incentive for divorce and remarriage. Divorce is expected to occur when the benefits of individual recontracting into marriages with no excess demand or supply of spousal labor exceed the costs of divorce (including direct and opportunity costs of search for a new partner). The analysis presented above also leads to predictions regarding income effects on divorce.

As stated in Hypothesis 9' in Chapter 4, *unexpected changes in income lead to divorce*. If divorce were costless, any such excess demand for spousal labor would cause divorce. Given that divorce is costly, the likelihood of divorce is a function of both the costs and the benefits of divorce.

Costs and Benefits of Divorce. Hypothesis 9' is more likely to hold if divorce costs are lower. To the extent that friendly negotiations are happening, it does not matter who owns the divorce costs, as has been explained in Becker (1981). If threat of violence is used, then the distribution of divorce costs matters. The threat of violence is only capable of discouraging divorce if the abused partner has costs of divorce. Hypothesis 9' is also more likely to hold when the benefits from divorce are higher. In turn, these benefits depend on (1) the amount by which both husband's and wife's demand for spousal labor exceeds the quantity supplied at the market quasi-wages (i.e. the size of the initial excess demands for spousal labor), (2) the degree to which such excess demands are eliminated through adjustments in match-specific quasi-wage, and (3) the degree to which such excess demands are eliminated through negotiations or threats of violence.

Income Elasticity of Demand for Spousal Labor. Unexpected changes in income are more likely to cause divorce if the demands for

spousal labor are more income-elastic. This follows from the fact that the more income-elastic such demands, the more one expects a gap between quantity demanded and supplied at the equilibrium quasi-wages. The larger such a gap, the larger the possible benefits from divorce and recontracting with a new spouse.

Income Elasticity of Supply of Spousal Labor. Hypothesis 9' is more likely to hold if the supply of spousal labor responds more to income changes. In such case, there will be more of a decrease in spousal labor supplied, and therefore more of an excess demand and more likelihood that this excess demand cannot be bridged.

Rigidity in Quasi-Wage. Hypothesis 9' is more likely to hold if increases in marriage-specific quasi-wage are limited by institutional, technical, or legal constraints. If quasi-wages cannot be changed much, divorce is more likely to result from excess demands for spousal labor. This rigidity is more of a problem if supply of spousal labor is inelastic and use of threats is unavailable, and increases in demand for spousal labor thereby cause large increases in w^* .

Implications for Recent Trends in Divorce. This analysis suggests a number of new explanations for recent trends in divorce. It is possible that changes in the occupational characteristics of working women, following the dramatic increase in women's labor force participation in the U.S. since 1965, combined with decreased use of violence by husbands against wives, have caused increases in divorce. To the extent that married women have entered an increasing number of careers involving tasks that are very different from the tasks typically performed in spousal labor, their supply of spousal labor has become more inelastic. In contrast, in the past a vast majority of married women were employed in occupations such as nursing or teaching, which resemble aspects of spousal labor, and are therefore likely to be associated with an elastic supply of spousal labor. For many women today, possible switches between spousal labor and labor have therefore become more costly in terms of career opportunities and satisfaction, than was the case for women in the past. What probably has not changed, are the pressures for women to make such adjustments following income fluctuations or other fluctuations over the course of married life.

It follows from this analysis, that as women's supply of

spousal labor has become less elastic, a given increase in demand for wife's spousal labor due to increased male income is therefore likely to cause a large increase in w^* for a marriage to continue. If there are rigidities in w^* and the use of violence is limited, larger changes in quasi-wage resulting from given fluctuations in income are more likely to cause a divorce than was the case when women's supply of spousal labor was more elastic. In the past, high elasticity of substitution between the two forms of labor may have implied less of a need for adjustment in quasi-wage for the marriage to continue to function, and divorce may have been less likely to follow a given exogenous change experienced by a given married couple. Another point following from this analysis, which is of a more trivial nature, is that the use of violence within marriage and divorce are alternative ways to coping with the effects of fluctuations in income or other changes faced by a married couple.

Wage is another factor which is likely to affect labor supply and divorce simultaneously.

Wage Effects

As mentioned in Chapter 3, an individual uncompensated wage (w) increase includes (1) an income effect leading people to work less in general, and generally also less outside the home, and (2) a positive compensated wage effect leading to substitution of outside labor for spousal labor and time for self. These two effects can therefore cancel each other.

Furthermore, if both partners in a marriage get higher wages, the income effects are as discussed above. Substitution effects exacerbate the problem of a decrease in the supply of spousal labor, causing a further gap between spousal labor demanded and supplied at the equilibrium w^* . It follows from the theory that both these effects will have a stronger discouraging influence on the labor supply of wives than of husbands, if couples stay married.

A wage effect on divorce also includes a positive income effect encouraging divorce, and a positive compensated wage effect leading to a decrease in the supply of spousal labor. In turn, this may lead to divorce.

Next we examine a determinant of labor supply and divorce

that has not previously been considered in the literature, and carries potentially important policy implications.

Number of People Affected by a Change

An additional determinant of the effect of unanticipated income changes on labor supply and divorce is the proportion of people in a given society who experience such income change. In the discussion above w^* , the compensation established in the market for spousal labor, was assumed to remain unchanged. This is likely to be the case if most individuals participating in a given market for spousal labor have demands and supplies that are unaffected by an income change.

However, the market equilibrium quasi-wage may increase if a considerable proportion of the men and women interacting in the same markets for spousal labor receive extra income. This is likely to reduce the need for readjustment through divorce or changes in labor supply. It follows that

Hypothesis 5.3

A change in income will have a stronger effect on the supply of labor when fewer people in a marriage market are experiencing a similar change, and

Hypothesis 9'.1

A change in income will have a stronger effect on divorce when fewer people in a marriage market are experiencing a similar change.

This can be illustrated with the help of Figure 10.1. The two markets for spousal labor originally have aggregate supplies S and aggregate demands D . The equilibrium compensations are then \bar{w}_{f1}^* and \bar{w}_{m1}^* . If a substantial amount of participants in these markets get unanticipated increases in income, and the market demands increase to D' and the market supplies decrease to S' , the market compensation will increase, possibly to \bar{w}_{f2}^* and \bar{w}_{m2}^* . If the same graph also represents an individual couple experiencing unanticipated

income effects and therefore shifts in D and S similar to the shifts occurring in the markets, at the new equilibrium \bar{w}_{f2}^* and \bar{w}_{m2}^* this couple will have no reason to divorce. In other words, Hypothesis 9' is not likely to hold if all participants in the same marriage markets are experiencing the same income changes, and reacting similarly to such changes.

If the new equilibrium corresponds to the same level of h_f , there will be no reason for men and women to adjust their labor supply differently, and therefore Hypothesis 5 is not likely to hold. Had this couple been the only one to experience unanticipated changes, they would have experienced an excess demand for spousal labor, and divorce and adjustment in labor supply may have occurred. When many people experience unanticipated increases in income, fewer changes will occur in both labor supply and divorce, even in the case where divorce costs exist (although aggregation becomes more complicated).

Likewise, the effect of any change in individual characteristics affecting marriage and labor supply will depend on the extent to which this change is limited in scope. The more widespread the change, and the more others surrounding the individual react similarly to that individual, the more marriage market conditions are likely to move in unison with individual changes, and the less one expects changes in individual marriage and labor supply.

We are now ready to analyze the effects of a NIT program on labor supply and divorce.

The Effect of a NIT Program

The entire discussion so far is relevant to the analysis of the effects of a Negative Income Tax program on labor supply and divorce. A Negative Income Tax program that transfers income as a function of earnings includes both a positive income effect and a negative compensated wage effect. (See Keeley et al. 1978, and Keeley 1981.)

Participation in NIT was generally unanticipated at the time of marriage, and the income effect involved with NIT is therefore expected to have a positive impact on divorce. This impact depends on the excess demands for spousal labor, rigidity in w^* , costs of

divorce, etc., as discussed above. For the same reason, we also expect a decrease in labor supply, especially in the case of wives.

The increase in spousal labor resulting from the negative wage effect will help the couple in bridging the gap between demanded and supplied spousal labor that originated from the income transfer to both wife and husband. Following the discussion above, to the extent that the positive income effect dominates the negative compensated wage effect, it is predicted that both married women and married men will work less after they become eligible for NIT, but that married women's labor supply will respond more to eligibility to treatment than married men's labor supply.

Furthermore, it follows from this analysis that the larger the percentage of NIT beneficiaries in a marriage market, the fewer the expected divorces and the less gender asymmetry will be found in NIT's effect on labor supply. This follows from the fact that market determined w^* s will rise if a NIT program affects a large fraction of the people who would possibly marry each other.

As this book goes to press, new research has appeared regarding the effective of NIT experiments on divorce (e.g., Cain and Wissoker 1990). The debate regarding the use of experimental approaches vs. non-experimental econometric techniques is still unresolved. The analysis presented here does not invalidate the use of experimental data. It points out to a "small scale bias" which needs to be corrected if one wants to generalize conclusions based on a small sample of experimental participants.

To the extent that marriage markets (markets for spousal labor) are segregated by ethnicity or race,¹¹ it follows that when a larger proportion of an ethnic group in a particular city participates in a NIT experiment, the smaller the expected effect on divorce and the less the expected gender asymmetry in labor effects.

This could explain why NIT experiments have caused more divorce (e.g., Groeneveld, Tuma, and Hannan 1980, Keeley 1987) and discouraged female labor supply more (e.g., Rees 1974, Stephenson and McDonald 1979) among white participants in an experiment (who typically constitute a minute fraction of the white population in a city) than among blacks or Chicanos. The NIT experiments in Denver and Seattle were specifically designed to cover primarily black areas of Seattle and primarily Chicano areas of Denver. Black and

Chicano experimental subjects constituted a larger fraction of their respective marriage markets than did white experimental subjects in the same cities. Even though only a fraction of Denver's Chicanos and of Seattle's blacks participated in the experiments, the proportion of blacks and Chicanos participating in the experiments could have been sufficiently higher to cause increases in equilibrium quasi-wages for spousal labor of a magnitude that would discourage both divorce and dramatic changes in labor supply, especially in women's labor supply.

Interestingly, Keeley (1987) found that for Chicanos NIT treatment only had a positive effect on divorce if they were above the breakeven level. It is possible that higher income Chicanos intermarry with the non-Chicano population (mostly of Denver) to a greater extent than lower income Chicanos, and therefore only Chicanos with lower income experienced an increase in market w^* as a result of the NIT experiment. This would decrease the benefits of divorce and recontracting for lower income Chicanos but not for higher income Chicanos.

It also follows from the analysis that the divorce response is closely related to the labor supply response to income changes such as the advent of NIT. It is therefore necessary to estimate labor supply and divorce simultaneously, as is done in the empirical work reported below.

Empirical Analysis

The joint estimation of income effects on labor supply and divorce was performed with data from the Negative Income Tax (NIT) experiment performed in Denver and Seattle during the period 1970-1978.

Sample

Eleven different experimental programs were tested in the Seattle and Denver Income Maintenance Experiments. The programs differed in support levels, tax systems, and duration (3, 5, or 20 years). Support levels ranged from \$3,800 to \$5,600 in 1971 prices and tax rates ranged from .50 to .80. In all programs, the support level varied positively with family size. About 60 percent of the

sample families were enrolled in one of the 11 NIT programs and the remainder served as controls. When a divorce occurs, both of the former spouses are eligible for the NIT plan to which they were originally assigned, but the new support level depends on who gets custody of the children.

A complex criterion for sample selection was imposed. First, husbands and wives with pre-enrollment normalized income greater than \$11,000 were excluded. The reason for this exclusion is that the Seattle and Denver experiments assigned all families with normal income greater than these bounds into the control group and, therefore, these families cannot be suitably compared with families on financial treatment. Second, we excluded families that had pre-enrollment incomes below the breakeven level but greater than 1.3 times the grant breakeven level.¹² Third, families who were assigned to the 20-year program were also excluded because of the extremely nonrandom procedure used to assign these families to treatment (see Robins and Stieger 1980). Finally, we deleted individuals for whom data are missing for more than 90 days in any half-year in their employment history or in the pre-experimental years.¹³ More on these experiments and procedures can be found e.g., in Keeley 1981.

Methodology

Two models of the effect of NIT on labor supply are estimated. The first looks simultaneously at labor supply and divorce, whereas the second only looks at labor supply.

The simultaneous model consists of equations 10.1 and 10.2.

$$p_d = Z_p b_x \quad (10.1)$$

and

$$l = X_p b_l + p_d a_1 + p_d I a_2 + (1-p_d) I a_3 \quad (10.2)$$

where

p_d = a dummy variable that equals 1 if the person divorces.

X_p = a vector of pre-experimentally determined

control variables. (See Appendix 10.B)

Z_p = a vector of pre-experimental variables including all variables in X_p and in addition variables measuring eligibility to NIT. Eligibility variables are parameterizations of the changes in the pre-NIT budget constraints caused by the particular NIT program to which the family was assigned. Eligibility variables are described in Appendix 10.C.

l = hours of work (outside the household) in the second experimental year.

T = an eligibility dummy

Both sets of explanatory variables include all possible indirect measures of divorce costs available. Equation 10.1 enables us to predict the probability that a person divorces as a result of NIT eligibility. Equation 10.2 predicts hours of work as a function of background variables X_p , exposure to NIT (T), and estimated probability of divorce.

The probability of divorce is in part a negative function of divorce costs. As was seen above, the higher the costs of divorce, the larger the expected difference between the wife's reduction in labor supply as a result of T and the reduction in husband's labor supply. It is therefore predicted that expected probability of divorce will have a stronger positive effect on wife's labor supply than on husband's.

The effect of eligibility to NIT on labor supply is given by the difference in hours with eligibility, denoted as $l(T=1)$ and hours in the absence of eligibility, denoted as $l(T=0)$. This difference is given by:

$$l(T=1) - l(T=0) = a_1 [p_d(T=1) - p_d(T=0)] + a_2 p_d(T=1) + a_3 [1 - p_d(T=1)] \quad (10.3)$$

Thus, a_1 provides an estimate of the indirect effect of eligibility through its effect on marital status, a_2 represents the average response of persons who are expected to divorce after becoming eligible and a_3 is an estimate of average response of persons who are expected to remain married after becoming eligible.

Parameters a_2 and a_3 are predicted to differ in magnitude and perhaps even in direction in the case of women, but not necessarily in the case of men. If divorce is predicted to occur, women will probably

not shift their supply of spousal labor to the right at the expense of l , labor outside the household, and a_2 could even be positive. In contrast, if divorce is not predicted to occur, married women are likely to reduce their labor supply substantially, i.e., a_3 is predicted to be strongly negative. The higher the costs of divorce and the lower the probability of divorce, the larger the discouraging effect of NIT on married women's labor supply.

The structural model consisting of equations 10.1 and 10.2 is estimated using two-stage-least squares (2SLS). This model will be compared to a simple non-structural model which has been discussed extensively in Keeley and Wai (1980), and Robins, West, and Stieger (1980)¹⁴. The simple model can be described as

$$l = X_1 c_1 + T c_2 \quad (10.4)$$

where c_1 is likely to lie between a_2 and a_3 . This results from the fact that married women are predicted to differ in their labor supply response to NIT experiments not only depending on whether they actually got divorced during the experiment, but also depending on divorce costs and likelihood of getting divorced. The negative income effect of a NIT experiment on female labor supply will be stronger if women are predicted to stay married (e.g., because of high costs of divorce) than if they are observed to be married without knowledge about their chances of divorce ($a_3 > c_1$), and weaker for women predicted to get divorced than for women observed as married ($a_2 < c_1$). If information on divorce costs were available, predicted divorce probabilities would not be as necessary to obtain good predictions of NIT's effect on labor supply.

Estimates from that non-structural model applied to the complete sample are reduced-form estimates of labor supply response, conditional on initial marital status. The non-structural model was also applied to separate samples of husbands and wives who do not change marital status during the first two years, and husbands and wives who change marital status, i.e., they divorce. Because of possible selectivity bias, the average response of those with unchanged marital status cannot be interpreted as the response conditional on unchanged marital status and there is a similar problem with the results for those who change marital status.

Variables

The dependent variable measuring labor supply is annual hours of work during the second year of the experiment with zeros for nonworkers. The dependent variable measuring marital status is a dichotomous variable that takes on the value of one if the person divorced at any time during the first two years of the experiment. Labor supply is measured during the second year because it is believed that (at least for persons on the 3-year program) adjustment to either the start-out or end of the experiment will be at a minimum. In addition, most previous estimates of labor supply response have used the second year (see Keeley et al. 1978, Robins and West 1980, and Robins, West and Stieger 1979). Since labor supply is measured during the second year, marital status change is measured as a change occurring any time during the first two years. (Persons with changed marital status have been in their new marital status for varying periods of time.)

The independent variables that were used are described in Appendix Tables 10.B and 10.C. Mean hours of work for various samples of husbands and wives are found in Table 10.1.

Results

Table 10.1 presents results from the simple model which does not take simultaneity into account. These results confirm our prediction (Hypothesis 5) that among couples who remain married, eligibility for treatment results in a larger (negative) labor supply response on the part of wives than on the part of husbands (a reduction of 172 hours versus a reduction of 144 hours). Similarly, using different sample and variable specifications Robins and West (1980) found that participation in the experiment reduced hours worked by husbands by 129 hours, and by wives by 166 hours. Also consistent with these results is the finding reported by Robins, Tuma and Yaeger (1980) that wives eligible for treatment in this NIT experiment showed a decrease in the rate of entering employment of 30 percent, while such decrease was only 10 percent among husbands.

These results are consistent with results from other NIT experiments. Labor market hours decreased by 30.6 percent for white wives enrolled in the New Jersey-Pennsylvania Income Maintenance

experiments, whereas the corresponding decrease for white husbands was 5.6 percent (Rees, 1974).

Another result is that NIT treatment reduces the hours of work of women who stay married substantially more than the hours of work of women who divorce. Table 10.1 also indicates a substantially larger response for husbands who divorce after the start of the experiment (a significant difference according to an F-test). However, all these results should be regarded with skepticism because of possible selectivity bias. In order to obtain unbiased estimates of response as a function of marital status change, we now turn to the simultaneous model specified above.

In Table 10.2 presents estimates of the simultaneous model, which includes predicted divorce as one of the explanatory variables. Here the difference between the labor supply response of men and women who remained married is much larger than was apparent from the reduced-form estimates (170 hours for husbands versus 279 hours for wives). The contrast between women predicted to stay married and predicted to divorce during the first 2 years of the experiment is also much larger than that between women actually staying married and divorcing according to Table 10.1. Married women eligible for treatment who divorced during the experiment appear to have increased their labor supply rather than having reduced it, and the difference in response between women who stay married and women who divorced ($a_3 - a_2$) is significant at the 1 percent level. Women predicted to stay married worked 766 hours less as a result of the experiment than women predicted to divorce. This confirms Hypothesis 5.1. In contrast, the simultaneous model indicates no significant differences in labor supply response between men who are predicted to divorce and those who are predicted to remain married. ($a_3 - a_2 = -180$ hours). The difference between a reduction of 180 hours for men and a reduction of 766 hours for women is large, and to the extent that it is statistically significant, this possibly supports Hypothesis 5.2.

The results in Table 10.2 also suggest that the effect of divorce *per se* (coefficient a_1 in equation 10.3) is to increase hours of work for both husbands and wives. The effects, however, are relatively small and statistically insignificant.

It was thus found that the labor supply response of women

depends on whether they are predicted to stay married or not, but that predicted divorce does not affect the labor supply response of men. That finding confirms the theoretical analysis presented here. To the extent that predicted divorce is related to divorce costs, it was hypothesized that with higher divorce costs (i.e. lower predicted divorce) there would be more of a difference in husbands' and wives' labor supply response to a change in income. It was found that if divorce is predicted (e.g., because divorce costs are low) men and women respond in similar ways to NIT. If it is predicted that divorce does not occur (e.g., because of high divorce costs) men and women are found to respond very differently to NIT, namely women expected to remain married reduce their labor supply much more than men expected to remain married.

From the differences in results between the reduced-form and simultaneous models it appears that selectivity bias may be an important factor affecting the estimates reported in Table 10.1. This selectivity bias may very well originate from the absence of adequate information on divorce costs, which affects both divorce probability and labor supply. Two of the factors one would expect to be positively related to divorce costs, the number of children aged 4 or less and the number of family members, were included as independent variables in both the labor supply and the divorce equation. There are, however, many more correlates of divorce costs which were not controlled for.

Other Evidence

The theory presented here can also be applied to other joint estimations of labor supply and divorce. Since the empirical work discussed above was performed, other studies have also analyzed labor supply and predicted divorce. Greene and Quester (1982) and Johnson and Skinner (1986), also found that generally married women's labor supply increases when a divorce is anticipated, evidence for Hypothesis 33.

Greene and Quester (1982) and Johnson and Skinner (1986) also found that predicted divorce had more of an impact on the labor supply of white women than on that of black women. They offer no satisfactory explanations for such finding, which can be interpreted as evidence for Hypothesis 33.2. Black married women may expect less

of a drop in income from spousal labor as a result of divorce than white women, and are therefore less likely to change their labor supply when expecting a divorce.

Johnson and Skinner (1986) also found that the interaction of husband's income and predicted divorce and of husband's education and predicted divorce had a negative sign in regression of wives' labor supply. This offers support for Hypothesis 33.1, according to which women married to higher income husbands are more likely to receive some income from their spouse after a divorce, and are therefore less likely to go to work prior to a divorce. The same explanation holds for the interaction of husband's education and predicted divorce.

Conclusions and Policy Implications

This theory of divorce and labor supply is an attempt at joint modelling of these two important aspects of behavior. The theoretical part of the paper explains some of the reasons why a joint theoretical analysis is important, and why estimates from a simultaneous model of labor supply and divorce would differ from reduced form estimates of either labor supply or divorce. Some hypotheses were derived, mostly regarding income and wage effects, the topic of the empirical analysis.

This chapter adds to Mincer's theory of why women's labor supply responds more to income changes than men's. It was shown that the difference in the way married men and women's labor supply respond to income changes depends on the chances that a divorce will occur, possibly a function of divorce costs. Furthermore the theory presented here can help explain results from other simultaneous estimations of labor supply and divorce that have been published after most of this chapter was written. The theory presented here thus provides a framework that can potentially be more useful than what was shown in this paper.

Our simultaneous estimation of the effect of eligibility to a Negative Income Tax experiment on wives' and husbands' labor supply and on divorce has shown that single equation models of labor supply taking marital status as given generate a selectivity bias. The existence of such bias is consistent with our theory of individual allocation of time from which both labor supply and divorce decisions are derived simultaneously. Some of the hypotheses derived in the

theoretical section were confirmed.

We found that income transfers reduced wives' labor supply more than husbands', which is consistent with our theory. Although other theories have led to the same insight, the advantage of this theory is that the same theory also explains why some families divorced and others did not, and that it points out to variables such as divorce costs which intervene in the effect of income transfers (or other factors) on labor supply.

This chapter also carries policy implications. The results reported here confirm those of previous studies of Negative Income Tax experiments. As in other studies, NIT was found to have a significantly negative effect on labor supply of both husbands and wives, much more so for wives than for husbands. It was also confirmed that NIT has a positive impact on divorce probability.

To a large extent, talks of replacing the welfare system with NIT have stopped as a result of these strong effects on labor supply and divorce. The theory presented here suggests that maybe NIT has been shelved away too soon. According to this, one reason why NIT levels and tax rates were found to have such strong impact at an experimental level is that relatively few people participated in these experiments. The theory suggests that under most assumptions, the more people are experiencing unexpected changes, the less an individual is likely to be affected by such change. This implies that had NIT moved out of its experimental stage and become policy, many of the undesirable effects on labor supply and divorce would not have occurred.

This insight holds for any unexpected change, and not for only NITs. This chapter is also relevant to the huge literature on the effects of welfare benefits such as AFDC.

There is clearly much room for further work in this area. The theory could be derived in a more systematic way and made to include more relevant variables. It would also be desirable to generalize the theoretical framework by developing dynamic models. Likewise, there is plenty of room to improve on the empirical work by using better and more recent data sets and better methods.

Labor supply, divorce and income transfer programs are all areas of great policy relevance, and therefore a theory which improves on the state of the arts in the analysis of these issues can be

very valuable.

Notes

1. Most of this chapter was written before models such as Johnson and Skinner (1986). The empirical estimations by Michael Keeley presented here were performed prior to 1980.

2. In the Gary experiment no such rise in divorce was observed, but then people opting for divorce and not receiving custody of their children disqualified from the experiment, whereas this was not the case in Denver or Seattle (Wolf 1979).

3. Both the costs of search and the benefits from searching for an appropriate mate are likely to be high in comparison to search for other services or forms of employment. The costs of search are also a function of the complexity of the vector of personal characteristics relevant to the choice of a mate. Marriage-specific capital and costs of search are also found in Becker's theory of divorce (see Becker 1973, and Becker, Landes and Michael 1977). The latter article emphasizes children as particularly specific to a marriage, which is consistent with viewing children as a couple's collective good (see Weiss and Willis 1985). The term "match-specific" capital has been used with respect to worker-employer relations, e.g., by Rosen (1985). The terms "match-specific" and "marriage-specific" have all been inspired by the concept of job skills specific to a firm developed by Becker (1964). These terms have been used independently in an analysis of divorce by Lehrer (1992).

4. The existence of divorce costs also causes aggregation problems. Part of spousal labor now becomes non-homogeneous, and not fully substitutable. This implies that market equilibria in h_f are most influenced by the demands and supplies obtained assuming no divorce costs, which applies first of all to the population of marriage eligibles who are not currently married. Aggregate demand and supply will also include that part of the demand and supply of married people which is not match-specific. It still remains true that numbers of men and women (the sex ratio) will affect labor supply.

5. If a husband finding divorce costly is married to a wife with no divorce costs, and we focus on women's spousal

labor, the situation can be compared to that of a firm who has invested in a worker's firm-specific human capital, without similar investments on the worker's part. She may have been paid a higher w^* than that available in the market for women's spousal labor. The husband gets more utility from his present wife's spousal labor than he would from potential substitutes. The husband is consequently willing to subsidize his current wife's spousal labor. He will be willing to pay her according to the compensation for her spousal labor established by the market plus the costs of divorce he saves by staying married.

6. If the wife finds divorce costly, but the husband does not, she may have been supplying her spousal labor at a w^* lower than the market quasi-wage (prior to the unexpected income change). This is like a situation where the worker has acquired firm-specific capital valued by the worker but not by the firm. This implies that the wife is willing to subsidize her own work to her husband. She may have agreed to have her compensation for spousal labor lowered, possibly by the entire amount of her divorce costs.

7. When both spouses find divorce costly, the difference between market equilibrium quasi-wages and actual quasi-wages for spousal labor can be either positive or negative. The maximum value of the difference between the two quasi-wages is the amount of divorce costs faced by the husband. Its minimum value is *minus* the amount of divorce costs faced by the wife. In comparison to Becker's (1974a, 1981) theory of marriage and divorce, the gain from marriage is separated into a producer surplus enjoyed by the spouse working in the household and a consumer surplus enjoyed by the employer of such spousal labor. Some of those surpluses are general in the sense that they could be enjoyed with another spouse, and some are specific in the sense that they can only be enjoyed with the current spouse. One of the major insights contributed by Becker's theory of marriage and divorce is that if marriage partners can bargain it is the total gain from marriage which matters, and not its initial distribution among the spouses. The present analysis leads to the same conclusion as that version of Becker's theory which takes account of opportunities for remarriage. It is the sum of the marriage-specific consumer and producer surpluses that the decision to divorce, since the spouse experiencing fewer or no divorce costs can be "bribed" into staying married.

8. The distinction between husband's income and wife's income also plays an important role in the bargaining theory of marriage developed by Manser and Brown (1980).

9. Substitutes for spousal labor are generally imperfect, as is indicated in the assumption of a downward sloping demand for such labor.

10. This may help explain why it is customary at many workplaces to have women do tasks such as serving coffee, which are similar to tasks most women perform as spousal labor. It may be easier for women to perform such tasks on the job than for men, given past experience in the home. It may also be in the best interest of men as a group to encourage such customs in order to make women's supply of spousal labor more elastic.

11. Intermarriage among the various racial-ethnic groups is generally low in the United States. In 1975, for example, only about 2.4 percent of black women had a partner of a different race, almost always white (Spanier and Glick 1980).

12. Grant breakeven level is the level of income at which NIT grant becomes zero. Families in this earning region were erroneously given an experimental tax rate that may have exceeded 100 percent.

13. Attrition is by far the most important factor causing a reduction in sample size. However, during the first two years, the period during which response is measured, sample size was reduced by only 15 percent for husbands and 12 percent for wives, due to attrition.

14. Using OLS to estimate the probability equation does result in heteroscedastic errors and a loss in efficiency. Practically the use of probit or logit instead of OLS made very little difference in other divorce equations we ran. For reasons of costs and convenience we used OLS and included the squares of many of the variables in Z_p in order to minimize possible specification bias. See also Olsen (1980) for a comparison of linear and nonlinear estimation procedures.