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An Economic Analysis of Domestic Violence

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Abstract   While economists have been studying the family as an economic unit for almost thirty years, most models have focused on cooperative family units. Domestic violence, one of the most widespread violent crimes against women, is one example of a family unit that is better explained as a noncooperative relationship. In this paper, a noncooperative model of domestic violence is presented. The comparative statics from this model predict that women's incomes and other financial support received from outside the marriage (family, welfare, shelters, divorce settlements, etc.) will decrease the level of violence in intact families because they increase the woman's threat point. Implications of the theoretical model are discussed and empirical evidence is summarized. The results from existing and new analysis provide support for the hypothesis that improved economic opportunities for women will decrease the level of violence in abusive relationships.

Keywords: domestic violence, household bargaining, noncooperative

1 INTRODUCTION

Led by the pioneering work of Gary Becker (1965, 1973, 1981), economists have been studying the family for thirty years. However, the work by economists has focused on families that exhibit cooperation and altruism. Initial studies of the family treated marriage as a cooperative institution in which both spouses behave as if they are altruistic, allocating goods and time to satisfy a common set of family preferences. In contrast, the bargaining models developed by Manser and Brown (1979, 1980) and McElroy and Horney (1981) treat each spouse as an independent party with distinct preferences. In doing so, they arrive at a cooperative family utility function which incorporates the preferences of both individuals. Although the optimization is over a cooperative utility function, the

solution must provide each spouse with a level of utility at least as great as that which could be achieved outside of the marriage. This constitutes the individual's threat point in the bargaining relationship. This cooperative bargaining model provides the initial framework for a model of marriage that is not entirely altruistic in nature. In considering marriage in these terms, it becomes possible to consider the threat points available to both spouses and the impact of differing incomes within and outside of marriage.

Studies of families which don't fit into the cooperative framework have been relatively ignored in the literature even though they are not uncommon. Households characterized by domestic violence are examples of families which don't fit the cooperative mold. Studies on the incidence of domestic violence indicate that between three and four million women in the US are beaten by their partners each year (Heise 1992: 2). These beatings take place at extreme cost to both the victims and society. Noncooperative models of the family are necessary to adequately characterize the behavior of households where violence occurs. Although there has been little study by economists on the incidence of violence, Tauchen, Witte, and Long (1991) model the determinants of violence within the family. In their model, the man punishes the woman with violence for behavior of which he does not approve and the woman adjusts her behavior in an attempt to minimize this violence. Both spouses have the ability to make transfers to the other, and each has a threat point level of utility that must be maintained. The empirical work analyzes the impact of income on the level of violence. In all but the highest income households in which the woman is the primary source of earnings, a rise in her income diminishes the violence while a rise in the husband's income increases the level of violence.

This paper presents a model of the strategic interaction between a man and a woman in a relationship with domestic violence. Using a game theoretic model, we analyze the equilibrium solution to a game in which each spouse, with independent preferences and threat points, maximizes utility given the behavior and the threat point of the other. Although the setup is noncooperative, altruistic behavior is not precluded. If a man or woman derives utility from the spouse's happiness, this is accounted for in each spouse's own optimization problem. The man maximizes his utility by choosing the optimal transfer and level of violence. The woman's threat point determines the level of violence she will tolerate for a given transfer from the man. As her income (and consumption) increases, the marginal utility she receives from an additional unit of consumption declines; therefore, the man's ability to "buy" violence from her decreases and the violence falls. In addition to formalizing the strategic interaction in the relationship, this paper explicitly models the effects of outside alternatives (welfare, services such

as shelters, extended family resources, and divorce settlements) on the woman's utility and the level of violence.

From the solution to this strategic model, the comparative statics yield clear predictions on the impact of the woman's income and external services on the violence in the household. The predictions are intuitive. A rise in the woman's income increases the likelihood that she leaves the relationship; this increase in her threat point lowers the level of violence if she stays. Anything that raises the woman's utility outside of the marriage, such as the availability of services or a generous divorce settlement, will increase the probability that she leaves and, therefore, lower the level of violence if she stays.

Section 2 contains a simple model of a violent relationship. Following the presentation of the simple case, the more complex Nash and conjectural variations models are discussed. The Nash equilibrium reinforces the comparative statics from the simple model and also provides new predictions on the effects of wages and leisure time on violence. Comparative statics from the conjectural variations model suggest that the predictions of the Nash model are strengthened as the woman's degree of foresight rises. In Section 3, the implications of the theoretical model are discussed and empirical support for the model is presented. The comparative static result that an increase in a woman's income decreases the level of violence is supported by existing studies as well as new evidence from data from Omaha, Nebraska, and Charlotte, North Carolina. While the data are not available to test the prediction that the availability of services decreases violence, the importance of this finding and the necessity of new data collection are also discussed. Conclusions and ideas for further research are contained in Section 4.

2 THE NONCOOPERATIVE MARRIAGE GAME

Marriage is modeled as a strategic relationship in which each partner maximizes utility subject to the constraint that the other remains in the marriage. If no equilibrium exists within these constraints, divorce will ensue. We emphasize that despite the strategic nature of the following models, love and altruism are not ruled out; one's utility can be increasing in that of the other, and this impact alters the decision to act in a manner that may harm one's spouse. However, although altruism affects the magnitude of the choice variables, it will leave the qualitative results unchanged provided that each person values his or her own consumption more highly than the spouse's consumption.

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2.1 The Simple Model

Consider first a simple model and begin by examining the optimization choice facing the man. Suppose that the level of violence as well as net transfers to his wife are the choices available to him.[1] Also assume that his utility is increasing in self-esteem, power, behavior modification, or any number of other psychological factors that may be present in a violent relationship. We assume that in abusive relationships, violence raises the man's utility through its impact on any number of these factors (for example, violence increases his control which increases his utility).[2] Thus, the man's utility function is $U^M = U^M(S(V), C^M, \eta)$ where $S(V)$ is a variable incorporating all factors such as self-esteem that are strictly increasing in violence, C^M is his consumption, (note that all superscripts denote the man (M) and woman (W)), and η denotes marital capital that offers the man utility within the relationship but will not remain if he is single. Similarly, the woman's utility is specified as $U^W = U^W(V, C^W, \eta, U^M)$. Since the woman's commitment is such a large factor in domestic violence relationships (59.7 percent of the women in the Omaha Domestic Violence sample said that one of the reasons they stay in their relationships is their love for their abusers), we model his utility within her utility.[3]

If his utility is increasing in violence and his personal consumption, then he will maximize utility subject to his budget constraint and the constraint that his spouse will remain in the relationship.[4] The corresponding constrained optimization is:

(1) $\quad \max_{V, C^M} U^M(S(V), C^M, \eta)$ subject to $\overline{U}^W = U^W$ and his budget constraint

where $\overline{U}^W$ denotes the woman's threat point or external utility level which is exogenous. Recognizing that consumption is constrained by income as well as the

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1 Both the man and woman are capable of making transfers to one another. However, it is redundant to model this decision from both perspectives since it is only the *net* transfer that matters. Thus, the man is able to choose the net level of transfers to the woman simply by returning any transfer she may choose to make to him. In addition, she has no incentive to offer him transfers as long as the utility she receives from her own consumption exceeds that which she receives from his increased utility. However, given that he may choose to lower her utility level with violence, he may offer transfers in order to keep her marital utility above her threat point.

2 Tauchen *et al.* (1991) assume that his utility is eventually decreasing in violence while we assume that it is everywhere increasing.

3 Omitting her utility from his utility function is not meant to imply that men do not receive satisfaction from women's happiness. This omission is for simplicity and does not impact the qualitative results. Including the man's utility in the woman's utility reveals that only the quantitative solution is affected by accounting for altruism.

4 Ultimately the solution must satisfy the constraint that he remain in the marriage as well. If no such solution can be obtained, the marriage dissolves.

transfer choice, equation (1) can be rewritten as:

$$(2) \quad \max_{V, t} U^M(S(V), \frac{I^M - t^W}{P_c}, \eta) \text{ subject to } \overline{U}^W = U^W$$

where I^M is the man's income, t^W represents transfers to the woman, and P_c is the overall price of consumption. Aggregate consumption is a normal good. We take the labor/leisure decision (and therefore, income) of both the man and the woman to be exogenous; the effects of relaxing this assumption are discussed in Section 2.2. The woman's consumption within the relationship (C^W) is equal to her own income (I^W) plus any transfer he makes to her (t^W) divided by the price of consumption (P_C). Once the woman's income is determined, she has no additional means to affect the level of violence and net transfer payments. Thus, the woman's actions are taken to be exogenous along with the man's income level. The man then chooses violence and transfers to optimize his utility subject to her minimum utility constraint.

The woman's constraint implies that her utility must be at least $\overline{U}^W(C_s^W)$, her utility outside of the marriage, or her threat point. This external utility is a function of $C^W{}_s$, or the woman's consumption when she is single where $C^W{}_s = (I^W + X)/P_c$. Utility outside of the relationship, therefore, indirectly depends upon her income (I^W) and the price of consumption goods as well as the level of various support services available to a woman if she leaves her marriage. These services, denoted X, may be welfare payments, family support or shelters.[5] It also may be true that her external income depends upon the man's income if there is an expected divorce settlement. If she expects to receive a fraction α of his income then $C^W{}_s = (\alpha I^M + I^W + X)/P_c$. The man will continue to increase V and decrease t^W until this constraint becomes binding provided that he derives more utility from his personal happiness than from hers. Consequently, for the sake of simplicity, we do not explicitly model her utility within his. Her utility, which ultimately determines his constraint, is as follows:

$$(3) \quad U^W = U^W(V, C^W, \eta, U^M) = U^W(V, \frac{I^W + t^W}{P_c}, \eta, U^M(S(V), C^M, \eta))$$

where η represents marital capital that offers the woman utility (either positive or negative) within the relationship but does not remain if she leaves; this may

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5 X is represented in dollar terms in the woman's external budget constraint. The results do not differ if it is viewed as a separate good aside from C_s^W.

be, for example, utility derived from remaining together for the children or disutility derived from exposing the children to a violent situation. The woman's marital utility is increasing in C^W and U^M but decreasing in V. Note that if $\eta \leq 0$ and U^M does not positively enter the woman's utility function, or she derives no marriage-specific utility, then she will definitely choose to leave if $X + \alpha I^M > t^W$; if services and the divorce settlement adequately compensate her for the loss of his transfers, she will not remain in the marriage. The man's first order conditions resulting from the optimization of (2) collapse to:[6]

$$
(4) \quad \frac{U_V^M}{U_{C^M}^M} = -\frac{U_V^W}{U_{C^W}^W}
$$

$$
(5) \quad U^W = \overline{U}^W(C_s^W)
$$

A third nonbinding condition that the man's utility must exceed his external utility, $\overline{U}^M$, must hold.

Intuitively, the man's MRS between violence and income must equal her MRS. In other words, he purchases violence from her until her trade-off between consumption and violence is equated with his trade-off. The following illustration represents the optimal level of violence and the man's consumption, which identically determines the transfer payment.

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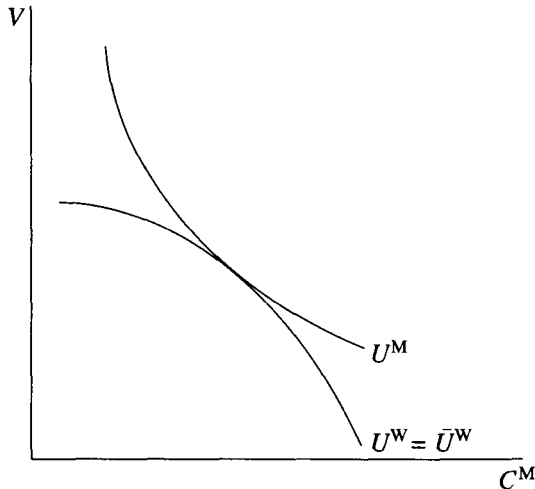
6 Note that the marginal utility for violence is $(\partial U/\partial S)(\partial S/\partial V)$. Since V is the choice variable we simply refer to the marginal utility of V with no further mention of S.

The man gets positive utility from both violence and own consumption. In contrast, the woman receives negative utility from both violence and her husband's consumption (an increase in his consumption implies a decrease in the net transfer to the women and, therefore, a fall in her consumption, C^W). Therefore, the woman's utility is increasing toward the origin; thus the man maximizes his utility subject to her constraint of $\overline{U}^W$ at the point of tangency. As her MRS falls, or as violence requires greater transfers for compensation, he optimizes at a lower level of violence. Also, assuming that violence is a normal good for the man, as the woman's external utility rises, or shifts in, violence falls.

The comparative statics reveal the effect that the exogenous level of the woman's income has on the overall level of violence.[7] We find that $\partial V/\partial I^W < 0$; as the woman's income rises, her consumption also increases. This decreases her marginal utility for consumption, thus making it harder for the man to commit the same levels of violence for a given transfer. Conversely, $\partial V/\partial I^M > 0$ if α is small; however, when α is sufficiently large relative to the ratio of her marginal utility for consumption outside and inside marriage, $\partial V/\partial I^M$ may be negative.[8] We also find that $\partial V/\partial X < 0$ and that $\partial V/\partial \alpha < 0$, while $\partial V/\partial \eta > 0$ if and only if $\partial U^W/\partial \eta > 0$; or as her constraint becomes more binding violence falls. The inclusion of the man's utility in the woman's utility function does not affect any of the predicted signs as long as she derives

1   net positive utility from additional transfers despite the negative impact on his consumption, and
2   net negative utility from violence despite the utility it provides the man.

Her altruism does, however, impact the magnitude of the violence. The greater utility she receives from his happiness, the greater the level of violence in the relationship.

Note that this model implies that in equilibrium the woman's utility within the relationship is identical to that if she should leave. This does not imply that women in violent relationships gain nothing from remaining. In fact, it is precisely because the relationship offers something that cannot be obtained outside of the relationship that she chooses to stay. For example, women stay for economic security or because they love their partners. These benefits are

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7 The comparative statics are provided in Appendix A.
8 Recall from Appendix A that we assume that her marginal utility for consumption outside of marriage (W) is larger than within (T). Thus if the settlement that she receives is large enough, $\alpha > (T/W)(C/(C-D))$, additional income for the man may increase her external utility more than her internal utility.

precisely the reason that the man is able to commit violence without her leaving. However, there is a limit to the violence she will accept. If the man is a completely selfish optimizer, he will increase the violence up to this point without exceeding it, leaving the woman just indifferent between leaving and not. Consequently, all of the marital benefits for the woman, while they do exist, are offset by the violence. Of course, if the man's behavior is not completely selfish (if he receives any utility from his wife's utility), he may only extract some of the surplus she receives from the relationship in which case she may still derive some additional utility from remaining in the relationship.

2.2 The Nash Game

In the simple model, the woman has no ability to impact the violence. Suppose that instead of only having the choice of whether to stay in the relationship or to leave, the woman has the power to influence her situation through decisions that affect her income. The first model shows that as the woman's income outside of the relationship rises, she will be more likely to leave. Similarly, as her income rises within the relationship, her marginal utility of additional dollars he might transfer to her falls, thus lowering the level of violence she will accept. Instead of taking these income levels to be exogenous, it is straightforward to amend the model to include the women's labor/leisure choice, thus endogenizing her income. The solution to this extended model is a simple Nash equilibrium in which he chooses violence and transfers given her labor market choices while she simultaneously makes her labor/leisure choice as a function of his optimizing behavior. The results of this model simply imply that not only does a woman's exogenous income have a negative impact on the level of violence, but her wage rate also decreases the violence. A similar extension could endogenize the man's income from which we can show that a rise in his wage rate will have an ambiguous impact of violence; this result is similar to the ambiguous impact of his income in the original mouel. While an extension of this nature is straightforward, the empirical predictions it provides are not testable with the data available. Testing this prediction requires having information on both labor supply and wage rates. The data used for the empirical analysis in Section 3 only includes total employment income.

In the Nash game, the woman affects violence only indirectly: her choices impact his reaction in the simultaneous solution. If she is foresighted enough to take his reaction into account in her original optimization, she will be more capable of affecting the violence. This conjectural variations game reinforces the

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comparative statics in the Nash game;[9] the signs are unchanged, but the magnitudes of the effects are larger. Any variable that strengthens her external utility will have a larger negative impact on the level of violence if she undertakes this increased degree of strategic planning over a simple Nash strategy.

3 IMPLICATIONS AND EMPIRICAL EVIDENCE

The predictions from the noncooperative bargaining models include several variables that are expected to unambiguously affect the level of violence in relationships characterized by abuse. The data set required to test the predictions presented above must include individual data on the level of violence in the household, disaggregated household income, available extended family resources, and proxies for the amount of marital capital such as the number or presence of children and the duration of the relationship. In addition, community level data must be merged with the individual data to create variables on the availability of public and private services for battered women, state level variables on the generosity of divorce settlements for women, and prices. The data set must be national in order to provide variation in service availability, divorce law, and prices.

While many of the available data sets which focus on domestic violence include the required individual data, all are collected within one metropolitan area and, therefore, provide no variation on the availability of services or prices. Consequently, no one data set includes all the information necessary to undertake a comprehensive empirical study of the predictions of the model outlined above. As a result, each of the following subsections focuses on the empirical evidence available regarding the impact of each particular variable on the level of abuse in violent households. This evidence is drawn from several different sources including other economic studies, new regression analysis, and the inter-disciplinary literature on domestic violence. Section 3.1 examines evidence on the effects of a woman's income level on the incidence of violence as well as the effects of the abuser's income on the violence in the household. Section 3.2 discusses the effects of environmental variables that increase a woman's threat point, such as the availability of services and extended family resources, on violence in intact marriages and Section 3.3 focuses on the evidence on the effects of marital capital on violence.

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9 The details for both the Nash and conjectural variations models are available from the authors upon request.

3.1 Income

The model predicts that as a woman's income increases (either through an increase in the wage, hours worked or nonwage income), the level of violence in the household decreases. The rationale is that as a woman's income increases her consumption also increases; this is turn decreases the marginal utility of consumption and, as a result, the husband is able to inflict less violence for a given transfer because the value of the transfer to the woman has declined. The effect of the husband's income on the level of violence is ambiguous in our model. Whether the effect is positive, negative or zero depends on the size of α. Feminist resource theory within the sociological literature also predicts that as women's incomes increase and their alternatives to violent marriages improve there will be less wife abuse (see Okun 1986).

Does any empirical evidence exist to support the prediction of a negative relationship between women's incomes and wife abuse? Tauchen *et al.* (1991) focus on the effects of the incomes of the woman and her abuser on the level of violence in the household. As previously discussed, their predictions on the effect of an increase in female income on violence are the same as those of our model when they assume that the reservation utility is binding. Tauchen *et al.* test their theoretical predictions using data on 125 women who had been physically abused by their intimate male partners from Santa Barbara County, California. The negative effect is supported by their empirical results for low- and middle-income couples and for high-income couples in which most of the household income is the man's. Only for high-income couples where most of the income is the woman's is this negative effect contradicted.

In order to provide additional evidence on the effects of a woman's income on the level of violence, regression analyses using two different data sets are undertaken. The first data set is the Domestic Violence Experience in Omaha, Nebraska, 1986–1987 (see Dunford *et al.* 1990 for further discussion of the data set). This data set, like most data sets on domestic violence, is not random as tne sample is generated from police call responses. Interviews with the victim were conducted within one week of the original incident in the base period and follow-up interviews were conducted at six months and 12 months after the initial incident. The final sample used for the empirical analysis includes 211 observations at the baseline, 184 observations at the second wave, and 165 observations at the third wave; the total panel data set includes 560 observations for the empirical analysis. The second data set is the Charlotte (North Carolina) Spouse Assault Replication Project, 1987–1989 (see Hirschel *et al.* 1993 for further discussion of the data set). While this data set includes two interviews, only the first is usable as the follow-up contains no income data. However, this data set

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has an advantage over the Omaha data because the income variables are continuous rather than categorized. The final sample used for the Charlotte empirical analysis is 340 observations. The descriptive statistics for the data sets are included in Tables 1 and 2 in Appendix B.

Using the Omaha data, the dependent variable is the number of fights in the past six months (not including the baseline incident) in which the woman was physically injured. Because many women do not report a violent incident in the past six months, there are a significant number of observations with zero as the dependent variable.[10] Consequently, the estimation is undertaken using Tobit techniques. Three independent variables are included for the woman's income (as well as other variables)—a dummy variable for whether the woman worked for pay,[11] the level of monthly nonwage income (from all other sources including welfare, public assistance, child support, unemployment, social security disability, relatives, illegal activity, and food stamps), and nonwage income squared. The results from the Tobit estimation of this equation are presented in Table 3 in Appendix B. As expected, both the woman's employment dummy and her nonwage income have a negative and significant effect on the level of violence. Nonwage income squared has a positive and significant effect. A woman who works for pay experiences approximately six fewer incidences of physical abuse in the six month period. A woman who receives an additional $100 in nonwage income per month experiences approximately one less incidence of physical violence over a six month period.

The regression using the Charlotte data uses the number of times the woman was physically abused in the previous six months as the dependent variable. Note that the mean of the dependent variable is significantly greater in the Charlotte equation than in the Omaha equation because the question asked in the Charlotte data set requires only physical abuse not a physical injury as in the Omaha data set (see means in Tables 1 and 2 in Appendix B). Again, a significant number of observations have zero values for the dependent variable and, therefore, Tobit is

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10 In the Omaha data set, 44.9 percent of the observations have a zero value for the dependent variable, the number of fights in the past six months in which the woman was physically injured. Some 96 percent of the observations have violence levels of 10 incidents or less. One percent of the observations have dependent variables of over 50 incidents of violence. The maximum level of violence is 180 incidents. Omitting this observation (the only observation in the sample with violence over 100 incidents) results in no significant changes in the results presented in Table 3 of Appendix B.

11 The monthly take-home pay information is categorized rather than continuous. Initially, all of the income information was utilized by first including income dummies for each income category and then by converting the categories to a continuous variable by assigning midpoints. However, the explanatory power increased by only including a dummy variable for employment.

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the appropriate estimation technique.[12] The woman's monthly take-home pay in levels is included as an independent variable to investigate the effects of income on violence. The woman's monthly take-home pay squared was initially included as an independent variable but was insignificant in all specifications and was, therefore, dropped from the model. The results are presented in Table 4 of Appendix B. The woman's income has a negative and significant effect on the level of violence. A woman with an additional $1,000 in monthly take-home income experiences six fewer incidences of violence.[13]

The effect of the husband's income on the level of violence is also of interest. In the model presented here, the predicted effect is ambiguous and depends on the size of α. The prediction of Tauchen *et al.* (1991) of the effect of the man's income on the level of violence, once again, depends on the assumption of whether the threat point utility is binding. Their empirical results indicate the effect of the man's income on violence is positive for low- and middle-income couples, negative for high income groups in which most of the income is the man's and insignificant for high-income groups in which most of the income is the woman's. The Omaha regression indicates that if a man works for pay the violence is significantly decreased. However, increases in nonwage income significantly increase the level of violence. These differing results may reflect that the stresses of male unemployment increase violence while, given a man's employment status, additional increases in income increase violence. The results indicate that increases in male nonwage income increase violence at a decreasing rate. This result is consistent with the Tauchen *et al.* (1991) results that the effect of income on violence is positive for low income couples and negative for high income couples. The man's monthly earnings is positive but insignificant in the Charlotte violence equation.

The evidence presented here, both from Tauchen *et al.* (1991) and our new empirical work, provides support for the hypothesis that women with higher incomes experience less violence. The sociology literature on domestic violence

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12 In the Charlotte data, 11.1 percent of the final sample have zero values for the dependent variable, the number of times the woman was physically abused in the previous six months. Some 72 percent of the observations have violence levels of 10 incidents or less. Approximately 7 percent of the observations have dependent variables of over 50 incidents of violence. The maximum level of violence is 99 incidents.

13 It is important to note that leisure (and, therefore, labor hours) is endogenous in the more complex model presented in Section 2.2. Consequently, it is desirable to include the wage rate rather than earnings as a regressor in the violence equations. However, neither the wage rate nor hours of labor supply are available in the Omaha and Charlotte data sets. If labor supply is endogenous to the level of violence, the income results may be biased. The Omaha regression was undertaken without the employment dummy and the woman's nonwage income continues to have a negative and significant effect on the level of violence.

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provides additional support for this hypothesis. Several studies empirically evaluate the effects of a woman's income on the likelihood that she leaves a violent relationship. For example, Gelles (1976) finds that the fewer resources a woman has the less power she has and, therefore, she is less likely to leave an abusive relationship. Pagelow (1981) also finds that a woman's access to resources has an effect on whether she leaves a violent husband. These studies support the model presented here—as a woman's economic opportunities improve, her threat point increases which increases the probability that she will leave the relationship.

Sociological studies have also examined the relationship between the level of wife abuse and the economic, political, and legal status of women. Coleman and Straus (1986), Allen and Straus (1980), Straus *et al.* (1980), and Straus (1973) all find a higher rate of domestic violence in male-dominant marriages than in egalitarian marriages. Kalmuss and Straus (1990) look specifically at the relationship between a woman's economic dependency and the level of abuse in intact families. Using The National Family Violence Survey of 1975, they find that "women whose dependency on marriage is high tend to experience more physical abuse from their husbands than women whose dependency is low" (1990: 379). While no formal model is presented, the authors discuss a scenario similar to our model; they argue that dependent wives have fewer alternatives to the relationship than more economically independent wives. As a result, dependent wives have less leverage to negotiate changes in their husband's behavior and, therefore, must tolerate more physical abuse.

Two aggregate studies, Straus (1994) and Yllo and Straus (1990), examine why rates of wife abuse differ from state to state using the 1985 and 1975 National Family Violence surveys, respectively. Using an index of gender equality for each state which combines indicators of economic status, political status, and the legal status of women, both studies' results show a negative relationship between gender equality and the state rate of wife abuse. Straus (1994) concludes that the evidence from these two multivariate studies support the work of feminist scholars (see, for example, Levinson 1989, Dobash and Dobash 1979, and Martin 1976) who have used anthropological, historical, and case study data to show the link between wife abuse and gender inequality. Further work which uses individual-level data to examine the effects of state variables such as women's wages and the legal status of women on the level of violence in intact families would provide interesting insight into whether only an individual woman's alternatives affect the level of violence she endures or whether the status of women, in general, in her community affects the level of violence.

3.2 Environmental Variables

The theoretical model presented in Section 2 explicitly models the effects of exogenous alternatives which increase the woman's threat point on the level of violence. The comparative statics show that any variable that increases a woman's threat point—extended family resources, public and privates services for battered women, and laws which result in generous divorce settlements for abused wives—decrease the level of abuse if the woman stays. This result is important for policy-makers and charities interested in helping victims of abuse. The result indicates that even if a woman never uses a service, simply its availability improves her well-being because it increases her threat point (or reservation utility) which, as a result, increases her marital utility. Consequently, organizations which evaluate their effectiveness by the number of clients who use their services may be underestimating their effects on the lives of battered women in the community.

Is there any empirical evidence to support the hypothesis that women in relationships characterized by domestic violence who live in areas with more services experience less abuse? The data sets previously discussed are all collected within one metropolitan area and, as a result, there is no variation in the availability of services across women. There is data on service use in several of the data sets. However, service use is endogenous to the level of violence (service use may decrease the level of violence but the level of violence may also increase the probability of service use). The only national data sets which focus on intra-family violence are The National Family Violence Surveys of 1975 and 1985 (see Straus 1990 for further discussion). While these surveys are national random samples, the intent of the studies is providing insight on the percentage of families in which violence occurs and, therefore, the subsample of families in which wife abuse occurs is relatively small. In addition, while state of residence is given, service availability varies substantially across communities within states and no community-level data are available in the National Family Violence Surveys. As a result, a rigorous study of the effects of service availability on violence cannot yet be undertaken.

The existing literature on domestic violence includes relatively little discussion of the effects of services on family violence. There is some literature on what determines the utilization of these services (see, for example, Gelles 1976 and Pagelow 1981) and there is much discussion on the inadequacy of existing services (focusing mostly on police intervention and the legal system). In addition, there is a small body of literature evaluating the effectiveness of services which focuses mostly on battered women's shelters. While most shelter studies use the woman's planned or actual living arrangement upon leaving the shelter

as the outcome or effectiveness measure (see, for example, Gondolf and Fisher 1988, Aguirre 1985, and Snyder and Scheer 1981), Berk *et al.* (1986) is the only study to use the amount of abuse reported in a follow-up interview as the outcome measure. They find that a shelter stay and other interventions decrease the number of violent incidences. However, no studies examine the effects of the availability of services on the level of violence in intact families. The theoretical model in Section 2 of this paper implies that services increase a woman's alternatives or threat point and, as a result, decrease the level of violence in intact households even if she doesn't use the services; this result is an important theoretical addition to this literature. To test this prediction, a national data set with state-, community-, and individual-level variables must be collected. Only then will the government and private organizations get a complete picture of their effectiveness in decreasing violence against women.

3.3 Marital Capital

In the model presented in Section 2, the woman stays in the relationship as long as her marital utility does not fall below her threat point or her reservation utility. There may be benefits (or losses) to staying in a relationship (besides the husband's transfers) that are not available outside the relationship. These benefits (or losses), called marital capital and represented by η in the model, offer the woman utility (positive or negative) within the relationship but will not remain if she leaves. The comparative statics reveal that η has a positive effect on the level of violence if marital capital increases marital utility (marital capital provides benefits) but decreases the level of violence if marital capital decreases marital utility (marital capital provides losses).

Children are one example of marital capital as staying in or leaving the relationship has effects on their well-being. However, the effect of children on the level of violence may be either positive or negative. If a woman believes her children are better off in an intact family, they will increase her marital utility relative to her reservation utility which will lead to an increase in violence. However, if a woman believes that the violence has a negative effect on the children her marital utility falls below her reservation utility and the violence will decrease. Tauchen *et al.* (1991) include both the total number of children and the number of children under six as independent variables in their regression of the determinants of violence. Their bounded influence regression results indicate that the total number of children has a positive effect of the level of violence while the number of young children has a significantly negative effect. The results from the Omaha and Charlotte regressions are presented in Appendix B. Using the Omaha data, the presence of children has a negative and marginally

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significant effect on the level of violence. Children can be separated into age groups in the Charlotte data. The presence of young children (under six) has a negative but insignificant effect while the presence of older children has a positive and significant effect on the level of violence.

These results taken together suggest that women perceive there to be negative effects of violence on young children. Women may believe that witnessing violence in the home may have serious consequences for young children or they may fear for their children's safety. However, having older children appears to increase marital utility relative to the threat point. That is, women see more benefits to remaining in the marriage for their children if they are older than six. This may be because of their increased financial needs, their greater attachment to their fathers, or because the mother believes it is less likely that they will be harmed.

Two other variables are included in the regressions to proxy for marital capital—the length of the relationship and a dummy variable indicating if the man and woman are married. The longer a couple has been together, the more physical and emotional marital capital there is likely to be. In addition, if the couple is married there is likely to be more marital capital. As expected, the duration of the relationship has a positive and significant effect on the level of violence in both the Omaha and Charlotte regressions. These results support the hypothesis that any variable which increases a woman's ties to her relationship will increase the level of violence. Being married significantly increases the level of violence in the Charlotte regression but has no significant effect on violence in the Omaha regression.

4 CONCLUSIONS AND IDEAS FOR FUTURE RESEARCH

While research on economics of the family has progressed rapidly in the past few decades, most economists have focused on cooperative households. However, clearly some households involve noncooperative relationships. A household characterized by violence is one example of a noncooperative family setting. Section 2 presents a formal model of such a setting. Men are assumed to indirectly receive positive utility from inflicting violence while women get negative utility from having violence inflicted upon them. A woman stays in the relationship as long as her relationship utility exceeds that of her utility outside the relationship, her threat point. A man may choose to make transfers to the woman to increase her marital utility and, therefore, keep her in the violent relationship.

The comparative statics derived from the noncooperative model provide some clear predictions on the determinants of violence in an abusive relationship. An increase in the woman's income is predicted to decrease the amount of violence.

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A woman making her own money gets less marginal utility from her husband's transfers and, therefore, he cannot inflict as much violence for a given transfer payment without violating her threat point. Increased opportunities outside the marriage made available through services provided by the government, charities, and family members and large divorce settlements for women are also expected to decrease the level of violence in the household thereby improving the woman's marital utility.

The empirical evidence presented in Section 3 provides support for the prediction of a negative relationship between a woman's income and the level of violence in the household. Evidence from several sociological studies suggests that women are more likely to leave battering relationships if they have better economic opportunities outside the household. In addition, Tauchen *et al.* and two new empirical studies presented in Section 3 find that women who choose to stay will experience less violence if they have higher incomes. This result supports the sociological model of domestic violence over the psychological model. The sociological model views domestic violence as a result of the inequality of women. Wife abuse happens because it can happen. If women have more alternatives then it can no longer happen. Alternatively, psychoanalytic approaches focus on problems with the individuals in the relationship (both the man and the woman). Stopping the problem requires curing the individuals rather than society. More evidence on whether a given husband inflicts less violence as his wife earns more income (within household effects rather than cross-sectional) could have a dramatic effect on the literature on why men batter.

While there is evidence to support the negative relationship between a woman's income and violence, there is little empirical evidence to support the prediction that other alternatives provided for women, such as government transfers, generous divorce settlements, and shelters, have a negative effect on the violence in intact relationships. The data required to test this prediction are not yet available. A national data set (or at least a data set which includes individuals from several metropolitan areas) that includes individual-level data as well as some state-level (divorce laws and AFDC payments) and community-level (available services such as shelters as well as police procedure) variables would allow for interesting research on the effects of laws, government transfers, and service availability on the probability that women leave abusive relationships as well as on the level of violence in intact families. These results would be important to policy-makers and private organizations which provide services for battered women in evaluating the effectiveness of their services. If the theoretical prediction in Section 2 is valid then groups which evaluate the effectiveness of their services by how many women they serve may be undervaluing the benefits of their work.

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Future theoretical work should focus on incorporating the use of services into the game theoretic framework. The model presented in Section 2 assumes that services affect the level of violence only as an exogenous variable which increases a woman's threat point. However, if the threat point of the woman is unknown to the man, she may use services to signal to him that the violence must decrease or she will leave the relationship. Use of services such as shelters, helplines, police intervention or the court system may be a way for women to send the appropriate signal. This analysis could explain why so many women use services only to return home or drop charges in a few days. The effects of various services on domestic violence are likely to differ in terms of their effectiveness. Models and empirical evidence to evaluate the effectiveness of various services would provide information which could be used for cost-benefit analysis. Such work could result in using public and private dollars allocated toward decreasing domestic violence more efficiently.

APPENDIX A

Recall equations (4) and (5).

$$(4) \quad \frac{U_V^M}{U_{C^M}^M} = - \frac{U_V^W}{U_{C^W}^W}$$

$$(5) \quad U^W = \overline{U}^W(C_s^W)$$

Total differentiation yields the following matrix:

$$\begin{pmatrix} A-B & C-D \\ S & T \end{pmatrix} \begin{pmatrix} dV \\ dt^W \end{pmatrix} =$$
$$\begin{pmatrix} \alpha CdI^M + DdI^W + DdN^W \\ \alpha WdI^M + (W-T)dI^W + (W-T)dN^W + (W)dX - Ud\eta \end{pmatrix}$$

where

A = change in man's MRS between V and C^M w.r.t. V: $A < 0$.

B = change in woman's MRS between V and C^W w.r.t. V: $B > 0$.

C = change in man's MRS between V and C^M w.r.t. t^W: $C < 0$.

D = change in woman's MRS between V and C^W w.r.t. t^W, I^W, and N^W: $D > 0$.

Note that if cross partials are assumed to be zero, then the only variables from equation (4) that have non-zero derivatives are those that affect violence and consumption.

S = woman's marital marginal utility for V: $S < 0$.

W = woman's external marginal utility for I^W, N^W, and X: $W > 0$.

T = woman's marital marginal utility for t^W, I^W, and N^W: $T > 0$.

U = woman's marital marginal utility for η: $U > 0$ iff $\partial U/\partial \eta > 0$; otherwise $U < 0$.

We assume that $W > T$. If the woman's total income is greater within the marriage, then her marginal utility for consumption will be larger outside of marriage. Performing the relevant comparative statics on each exogenous variable, unambiguous signs are found. More detail on the comparative statics for the simple, Nash, and conjectural variations games are available from the authors upon request.

APPENDIX B: DATA AND REGRESSION ANALYSIS

TABLE 1: Descriptive statistics, Omaha data

Variable	Mean	Standard Deviation
Number of violence incidents in past six months	2.38	10.65
Man works for pay (1 = yes)	0.82	0.38
Man's other monthly income (dollars)	263.8	382.06
Woman works for pay (1 = yes)	0.56	0.5
Woman's other monthly income (dollars)	216.09	366.85
Presence of children (1 = yes)	0.76	0.43
Married (1 = yes)	0.64	0.48
Duration of relationship (months)	75.15	85.28
Woman's age (years)	30.51	8.13
Woman's education (years)	12.08	2.24
Sample Size		560

TABLE 2: Descriptive statistics, Charlotte data

Variable	Mean	Standard Deviation
Number of violence incidents in past six months	14.38	24.34
Duration of relationship (years)	6.08	7.36
Married (1 = yes)	0.58	0.05
Presence of young children (1 = yes)	0.46	0.5
Presence of older children (1 = yes)	0.35	0.48
Woman's age (years)	30.88	9.17
Woman completed high school (1 = yes)	0.66	0.47
Man uses alcohol or drugs (1 = yes)	0.68	0.47
Woman's monthly take-home earnings (dollars)	490.85	464.92
Man's monthly take-home earnings (dollars)	757.46	755.08
Sample Size	340	

The following tables contain the results from Tobit estimations of the violence equations for the Omaha data and Charlotte data, respectively. Several demographic variables including racial dummy variables for both the woman and the man, the man's age, and the man's education were initially included in the estimation but were dropped because they were consistently insignificant in all specifications of the empirical model.

TABLE 3: Results from Tobit estimation, Omaha data (N=560).

Variable	Coefficient	T-statistic
Constant	12.69	2.21
Man works for pay	–4.32	–2.15
Man's other income	0.33	3.46
Man's other income squared	0	–3.4
Woman works for pay	–5.78	–3.51
Woman's other income	–0.01	–3.13
Woman's other income squared	0	2.43
Children	–3.09	–1.67
Married	–0.64	–0.37
Duration of relationship	0.03	2.45
Woman's age	–0.01	–0.05
Woman's education	–0.38	–1.01
Log-likelihood	–1,280.97	

TABLE 4: Results from Tobit estimation, Charlotte data (N=340)

Variable	Coefficient	T-ratio
Constant	20.52	2.76
Man's monthly earnings	0	0.55
Woman's monthly earnings	−0.01	−1.78
Duration of relationship	0.86	3.57
Married	6.58	2.2
Young children	−3.39	−1.07
Older children	6.05	1.99
Woman's age	−0.57	−2.63
Woman completed high school	−4.43	−1.44
Man uses alcohol or drugs	7.38	2.45
Log-likelihood	−1,433.99	

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REFERENCES

Aguirre, B. E. (1985) "Why Do They Return? Abused Wives in Shelters," *Social Work* 30: 350–354.

Allen, C. and Straus M. A. (1980) "Resources, Power, and Husband–Wife Violence," in M. A. Straus and G. T. Hotaling (eds.) *The Social Causes of Husband–Wife Violence*, Minneapolis: University of Minnesota Press.

Becker, G. S. (1965) "A Theory of The Allocation of Time," *Economic Journal*, 75: 493–519.

——— (1973) "A Theory of Marriage: Part I," *Journal of Political Economy*, 81, 4: 813–846.

——— (1981) *A Treatise on the Family.* Cambridge, MA: Harvard University Press.

Berk, R. A., Newton, P. J., and Berk, S. F. (1986) "What a Difference a Day Makes: An Empirical Study of the Impact of Shelters for Battered Women," *Journal of Marriage and the Family* 48: 481–490.

Coleman, D. H. and Straus, M. A. (1986) "Marital Power, Conflict, and Violence in a Nationally Representative Sample of American Couples," *Violence and Victims* 1: 141–157.

Dobash, R. E. and Dobash, R. P. (1979) *Violence Against Wives: A Case Against Patriarchy*, New York: Free Press.

Dunford, F. W., Huizinga, D., and Elliott, D. S. (1990) *Domestic Violence Experience in Omaha, Nebraska, 1986–1987*, Boulder, CO: University of Colorado at Boulder, Institute of Behavioral Science.

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Gelles, R. J. (1976) "Abused Wives: Why Do They Stay?" *Journal of Marriage and the Family* 38: 659–668.

Gondolf, E. W. and Fisher, E. R. (1988) *Battered Women as Survivors: An Alternative to Treating Learned Helplessness*, Lexington, MA: Lexington Books.

Heise, L. (1992) *Fact Sheet On Gender Violence*, New York: IWTC/UNIFEM Resource Center.

Hirschel, J. D. *et al.* (1993) *Charlotte [North Carolina] Spouse Assault Replication Project, 1987–1989*, Ann Arbor, MI: Interuniversity Consortium for Political and Social Research.

Kalmuss D. S. and Straus, M. A. (1990) "Wife's Marital Dependency and Wife Abuse," in M. A. Straus and R. J. Gelles, (eds.) *Physical Violence in American Families*, New Brunswick, NJ: Transaction Publishers.

Levinson, D. (1989) *Family Violence in Cross-Cultural Perspective*, Newbury Park, CA: Sage Publications.

McElroy, M. and Horney, J. (1981) "Nash-Bargained Household Decisions: Toward a Generalization of the Theory of Demand," *International Economic Review*, 22, 2: 333–349.

Manser M. and Brown, M. (1979) "Bargaining Analysis of Household Decisions," in C. B. Lloyd, E. S. Andrews, and C. L. Gilroy, (eds.) *Women in the Labor Force*, New York: Columbia University Press.

———— (1980) "Marriage and Household Decision-Making: A Bargaining Analysis," *International Economic Review*, 21: 31–44.

Martin, D. (1976) *Battered Wives*, New York, NY: Pocket Books.

Okun, L. (1986) *Woman Abuse: Facts Replacing Myths*, Albany, NY: State University of New York Press.

Pagelow, M. D. (1981) *Woman-Battering: Victims and Their Experiences*, Newbury Park, CA: Sage Publications.

Snyder, D. K. and Scheer, N. S. (1981) "Predicting Disposition Following Brief Residence at a Shelter for Battered Women," *American Journal of Community Psychology* 9, 5: 559–566.

Straus, M. A. (1994) "State-to-State Differences in Social Inequality and Social Bonds in Relation to Assaults on Wives in the United States," *Journal of Comparative Family Studies* 25, 1: 7–24.

———— (1990) "The National Family Violence Surveys," in M. A. Straus and R. J. Gelles (eds.) *Physical Violence in American Families*, New Brunswick, NJ: Transaction Publishers.

———— (1973) "A General Systems Theory Approach to a Theory of Violence between Family Members," *Social Science Information* 12: 105–125.

Straus, M. A., Gelles, R. J. and Steinmetz, S. K. (1980) *Behind Closed Doors: Violence in the American Family*, New York: Doubleday/Anchor.

Tauchen, H. V., Witte, A. D. and Long, S. K. (1991) "Domestic Violence: A Nonrandom Affair," *International Economic Review* 32, 2: 491–511.

Yllo, K. A. and Straus, M. A. (1990) "Patriarchy and Violence against Wives: The Impact of Structural and Normative Factors," in M. A. Straus and R. J. Gelles (eds.) *Physical Violence in American Families: Risk Factors and Adaptations to Violence in 8,145 Families*, New Brunswick, NJ: Transaction Publishers.