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DOMESTIC VIOLENCE, EMPLOYMENT, AND DIVORCE*

BY AUDRA J. BOWLUS AND SHANNON SEITZ[1]

The University of Western Ontario, Canada; Queen's University, Canada

Conventional wisdom suggests abused women get caught in a cycle of violence and are unable or unwilling to leave their spouses. We estimate a model of domestic violence to determine who abuses, who is abused, and how women respond to abuse via employment and divorce. In contrast to conventional wisdom, abused women are 1.7–5.7 times more likely to divorce. Employment before abuse occurs is found to be a significant deterrent. For men, witnessing violence as a child is a strong predictor of abusive behavior: re-socializing men from violent homes lowers abuse rates by 26%–48%.

1. INTRODUCTION

Domestic abuse[2] is a social issue of concern to individuals and policymakers alike. The magnitude of the problem may be surprising: Estimates from the Canadian Violence Against Women Survey (VAWS) indicate that 29% of ever-married women (Statistics Canada, 1993a, p. 4) and 50% of divorced women have been victims of abuse.[3] Two of the most troubling aspects of domestic violence are the following patterns of behavior documented in the psychology literature (Walker, 1979). First, abusive relationships are characterized by a "cycle of violence," where tension builds up until violence occurs, the abusive husband repents so his wife stays in the marriage, and the process repeats itself with ever-increasing violence. Second, battered women are characterized by "learned helplessness," where abused wives begin to learn what is going to happen to them through the cycle of violence, but become unable or unwilling to leave an abusive marriage.[4]

In this article, we study the behavior of men and women in abusive relationships to determine what drives some men to abuse their wives and what keeps some

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[2] The expressions domestic abuse and domestic violence shall be used interchangeably in this article.

[3] Following the Canadian Criminal Code, the VAWS defines domestic violence as including any of the following activities: threatening to hit, pushing, grabbing, shoving, slapping, kicking, hitting, biting, beating, choking, threatening to use or using a gun or knife, or sexual assault.

[4] See, for example, Dutton (1995).

women in abusive marriages. We also study the relationship between employment and domestic violence, as policymakers point to increased financial independence of women as one way to reduce or prevent abuse. We use unique data, the 1993 VAWS, to document several stylized facts about domestic abuse. The VAWS, which contains a large, random sample of women, is one of the most representative data sets currently available on domestic violence.[5] This is in direct contrast to most data sources on domestic violence that contain small, select samples of abused women. Having access to a representative sample enables us to make comparisons between women who have never been abused, those who were abused in the past, and those who are currently abused. The data highlight several noteworthy aspects of abuse: in contrast to conventional wisdom, the VAWS shows that (i) the vast majority of violent marriages end in divorce and (ii) many husbands stop abusing their wives before divorce occurs. We also find that (iii) the average characteristics of abused wives and abusive husbands are markedly different from their counterparts in nonviolent marriages. In particular, abused women and abusive men, on average, have less education and are more likely to come from violent homes. Finally, there is evidence of a relationship between abuse and female employment as (iv) abused women have slightly lower employment rates and (v) men are slightly more likely to abuse nonworking wives.

We develop a model of domestic violence, divorce, and employment that captures the aforementioned features of the data. Men and women make decisions sequentially in the model. Women make marital status decisions taking into account expectations of abuse given their spouse's characteristics and past behavior, and men decide whether to abuse taking into account the likelihood their wives will divorce them. Domestic violence serves two roles for men within the model: Men may have preferences over abuse directly and may also use abuse as a mechanism through which to influence their wives' behavior, in particular their employment decisions. Women then make employment decisions taking into account how their behavior influences the likelihood of experiencing abuse in the future. In order to estimate the model, we use retrospective data from the VAWS on marriage, domestic violence experienced by women in current and past relationships, violence in the family backgrounds of women and their spouses, and the female's current employment behavior. By controlling for observed and unobserved characteristics and by taking advantage of the, albeit limited, information on the timing of marriage, abuse, and employment, we can determine the extent to which the correlations observed in the raw data are due to causal relationships.

The results of our analysis reveal the following findings. First, domestic violence is the most important factor in divorce decisions: Women who are abused are significantly more likely to divorce than women in nonviolent marriages. Second, for men observing domestic violence as a child, the likelihood of abusing one's own wife is 1.9–5.3 times greater, depending on the age of the wife. This finding

[5] Several studies outside the economics literature have studied these data extensively. For example, Thompson et al. (2001) and Ratner (1998) document the determinants of injuries resulting from physical abuse in the VAWS and the health effects of abuse, respectively. Wilson et al. (1995) consider the demographic correlates of domestic violence.

highlights the importance of intergenerational effects of domestic violence.[6] Third, we find that employment reduces the likelihood a husband abuses his wife for marriages in which the wife is under the age of 30. Finally, we find no evidence of a causal effect of abuse on employment.

We consider several policy experiments designed to prevent or reduce the occurrence of domestic violence. Three lessons can be drawn from the experiments:

(i) The policy experiments highlight an interesting relationship between the timing of abuse and the deterrent effect of employment: Young women are able to reduce the likelihood of abuse through working, but only *before* abuse arises in marriage.

(ii) For women in abusive marriages, working no longer has a large effect on the likelihood she will be abused in the future, as state-dependence in abuse for husbands overwhelms any effect of the wife's employment. Abused women therefore are less likely to use employment as a means of preventing further abuse. In these cases, policies that make it easier for women to leave abusive spouses are more effective in ending domestic violence than policies designed to prevent further abuse within the marriage.

(iii) The most effective policies for reducing abuse within marriage are those that directly target the behavior of men. Re-socializing men from violent homes, in particular, is a promising strategy for preventing domestic violence.

Our work is related to a small but growing literature that studies the economic implications of abuse. Tauchen et al. (1991) were the first to model domestic violence within an economic framework. In their model, husbands maximize utility by choosing the amount of abuse and income to transfer to their wives, subject to the wives' reservation utility levels. This framework has been applied to several data sets to estimate the number of incidents of violence in abusive marriages (Tauchen et al., 1991; Farmer and Tiefenthaler, 1997; Kingston-Riechers, 1997). The papers in this literature, although providing an important first step in our understanding of domestic violence, tend to rely on small, select samples of currently married and abused women or samples of women who contacted the police or visited a shelter. These data likely exclude women who left abusive relationships after observing their spouse's behavior and may provide an inaccurate portrayal of the prevalence of abuse. Others in the literature have studied the effects of abuse on employment (Lloyd, 1997a, 1997b) and the relationship between abuse and divorce (Kingston-Riechers, 2001). Although these studies point out important potential effects of abuse, they ignore the selection into marriage and the relationship between employment and marital status decisions. Furthermore, domestic violence is also often treated as an exogenous determinant of the female's behavior. These issues all have important consequences for any inference regarding domestic violence and are addressed in our article.

[6] Pollak (2004) provides a theoretical framework for the study of intergenerational violence.

The remainder of the article is organized as follows. Section 2 describes the VAWS and presents a set of stylized facts on domestic violence. The model used to describe the relationship between abuse, employment, and divorce is described in Section 3, as is the estimation procedure. The estimation results and policy experiments are presented in Section 4. Section 5 concludes.

2. THE VIOLENCE AGAINST WOMEN SURVEY

The VAWS was conducted between February and June of 1993 and involved telephone interviews of 12,300 women aged 18 and above in all provinces of Canada. The survey collected information on violence experienced since the age of 16 as well as the respondent's perception of personal safety. The VAWS is particularly useful for our purposes in three respects. First, it contains a random sample of women. This is in contrast to most surveys involving abuse-related subject matter, where samples tend to be limited to abused women seeking services (Tauchen et al., 1991; Farmer and Tiefenthaler, 1997) or to low-income families in a restricted geographical area (Lloyd, 1997a, 1997b).

Second, all activities considered an offense under the Canadian Criminal Code, reported or not, were recorded. As a result, the problem of underestimating the prevalence of violence by restricting responses to reported incidents is reduced. Considering the highly sensitive nature of the survey questions, the data may still be subject to some degree of underreporting. It is likely that all women do not fully disclose abuse to the interviewer out of fear, shame, or denial (Okun, 1986; Weis, 1989; Straus and Gelles, 1992; Dutton, 1995). Furthermore, women may be more likely to report abuse in a past marriage than abuse in a current marriage. It is also possible that nonresponse to the survey as a whole may be correlated with abuse. We are not able to directly address this issue. However, Statistics Canada, recognizing the sensitive nature of the survey, consulted a wide range of experts while constructing the questionnaire to mitigate the degree of nonresponse in the survey. Interviewers were trained to recognize and respond to signals that the respondent was concerned about being overheard and telephone numbers of local support services were offered to women reporting current cases of abuse and to women in distress (Statistics Canada, 1994b). In addition, sensitive questions on the survey were prefaced with statements designed to make the respondent more comfortable answering the question. As a result of these efforts, it is likely that underreporting of domestic violence is diminished to a large extent.[7] It is still important to note that if abuse is underreported in the VAWS, especially for those women currently in abusive marriages, it may be the case that the effect of abuse on divorce will have an upward bias. However, it is also important to note that studies of divorce that do not include information on domestic violence will

[7] A total of 19,309 eligible respondents were contacted, resulting in a response rate of 63.7% (Statistics Canada, 1994a). In light of the relatively low response rate, we compared the VAWS with the Canadian Survey of Consumer Finances (SCF). The average characteristics of women are the same with the exception of the proportion of women living in urban areas and educational attainments. See Section A of the Appendix for further details.

overstate the effects of variables, such as education, that are highly correlated with both divorce and domestic violence.

Third, the data set contains information about the frequency, severity, and timing of abuse in current and past marriages, as well as information on violence in the family of origin for women and their spouses.[8] In this context, violence in the family of origin refers to whether the respondent or the spouse observed their father abusing their mother. As noted in the Introduction, domestic abuse is often treated as an exogenous determinant of outcomes, even though in the same literature it also is recognized as the outcome of a household decision problem. Information on family background aids us in studying the simultaneity of these outcomes as it provides a source of exogenous variation in determining abuse. In addition to information on domestic violence, the VAWS contains standard information on the personal characteristics of women, including current employment status, education, and the presence of children.

In order to conduct our analysis, we impose the following restrictions on the sample. First, the age range of the sample is restricted to women aged 25 to 55 who are not enrolled in school, eliminating 5,620 women. Any married women with more than two relationships (432) and any currently single women with more than one relationship (259) are removed, for the data only contain information on the current spouse and one past spouse. Any women reporting that they are currently married, are not separated, but are not living with their spouse (112)[9] and widows (87) are eliminated from the sample. Women who are remarried more than 1 year (131) are also eliminated from the sample, as we do not have sufficient information on the timing of abuse in the second marriage to estimate the duration of abuse. Finally, all respondents with missing covariate information are eliminated (393). The sample size is thus reduced to 5,266 women, of which 8% is never-married (single), 74% remains in their first marriage, 8% is divorced and currently single, and 10% is remarried.

For the purpose of our analysis, abuse is defined as an indicator equal to 1 if the highest level of reported abuse involves kicking, biting, beating, choking, threatening to use or using a gun or knife, or sexual assault.[10] This definition of abuse is adopted for two reasons. First, the data on abuse severity are richer than that on abuse frequency. Abuse severity is split into categories based on specific activities, whereas the frequency data are categorical in nature and top-coded at 11, limiting their accuracy and usefulness in estimation. Second, in contrast to high-severity abuse, a preliminary analysis of the raw data indicated that frequent, low-severity

[8] For the purpose of this article, women are recorded as married if they report being married and living with their spouse or if they report living common-law. The VAWS classifies a relationship as common-law if a woman was living with a man as husband and wife without being legally married (Statistics Canada, 1993b). Note that 8% of all currently married women are living common-law.

[9] This group of women includes those whose husbands might live in another location because of work and are removed from the sample because of our focus on behavior within the household.

[10] Information was also collected on lower severity physical abuse including threatening to hit, pushing, grabbing, shoving, or slapping. We limit our analysis to high-severity physical abuse as we found that low- severity abuse did not appear to have significant effects on marriage and employment decisions in an earlier version of the article.

abuse was not highly correlated with divorce and employment. Unfortunately, the information on the timing of domestic violence does not distinguish between high-severity and low-severity abuse. Therefore, we define abuse as an indicator equal to 1 for women reporting high-severity abuse in the marriage and any abuse during the time period of interest, zero otherwise. Below, we document several empirical regularities regarding marriage, divorce, and domestic violence that are found in the data.

The average characteristics of abusive husbands vary considerably from those of nonabusive husbands.

A number of past studies on domestic violence rely upon samples of women in abusive marriages at the time of the survey. Taking this as a starting point, we present statistics for the women that are married at the survey date in our sample, where the sample is subdivided by the presence of abuse in marriage within the past 12 months. These statistics, presented in Table 1, indicate that many characteristics

TABLE 1

SAMPLE STATISTICS FOR CURRENTLY MARRIED SAMPLE, BY ABUSE

Variable	No Abuse	Abuse Prior to Past 12 Months	Abuse during Past 12 Months
Age	38.8601	40.4124	34.2700
	(8.2438)	(8.2133)	(7.0419)
Age at first marriage	22.3040	21.3502	21.1906
	(3.8920)	(3.6942)	(4.4202)
Child	0.7409	0.7524	0.7644
	(0.4382)	(0.4333)	(0.4290)
High school	0.3307	0.2284	0.4448
	(0.4706)	(0.4214)	(0.5024)
Postsecondary or university	0.4838	0.3902	0.2977
	(0.4998)	(0.4897)	(0.4623)
Violence in family background	0.1599	0.3298	0.3624
	(0.3665)	(0.4720)	(0.4860)
Violence in current spouse's family	0.0847	0.3518	0.5743
	(0.2785)	(0.4794)	(0.4999)
Don't know current spouse's family background	0.0671	0.1624	0.0274
	(0.2502)	(0.3703)	(0.1651)
Spouse was unemployed	0.1120	0.2275	0.2990
	(0.3154)	(0.4208)	(0.4629)
Spouse worked 52 weeks	0.7866	0.6721	0.5700
	(0.4097)	(0.4713)	(0.5005)
Spouse has high school	0.2711	0.2539	0.2923
	(0.4446)	(0.4670)	(0.4599)
Spouse has postsecondary	0.2774	0.3288	0.2139
	(0.4478)	(0.4716)	(0.4146)
Spouse has university	0.2055	0.0708	0.0172
	(0.4041)	(0.2576)	(0.1314)
Observations	4386	129	46

NOTE: Standard deviations are in parentheses.

TABLE 2
MARRIAGE, DIVORCE, ABUSE, AND EMPLOYMENT BEHAVIOR

	No Current Abuse		Current Abuse	
Marital Status	Employed	Not Employed	Employed	Not Employed
	Not abused prior to the past 12 months			
Married	50.79	35.05	0.07	0.07
	(50.00)	(47.71)	(2.63)	(2.58)
Divorced	3.61	1.22		
	(18.65)	(10.98)		
	Abused prior to the past 12 months			
Married	35.72	24.34	3.48	2.52
	(47.96)	(42.96)	(18.33)	(15.68)
Divorced	20.43	13.52		
	(40.36)	(34.22)		

NOTE: Standard deviations are in parentheses.

of women differ depending on the presence of abuse: Women who experience abuse have lower levels of education and are more likely to come from violent homes than women who are not abused.[11] Abused women also marry earlier and are slightly more likely to have children than women who have not experienced violence in the past 12 months.

The average characteristics of abusive husbands vary considerably from those of nonabusive husbands.

The characteristics of abusive and nonabusive husbands in current marriages can also be compared in Table 1. Abusive spouses are much more likely to have violent family backgrounds. This finding is consistent with other studies: Strauss and Steinmetz (1980) report that men who witnessed their fathers abuse their mothers are three times more likely to abuse their wives in a sample of American couples. Many women report that they did not know whether their husbands came from violent homes. It does not appear that spouses with unknown family backgrounds are more likely to be abusive in the raw data. Abusive husbands are also more likely to have experienced unemployment in the past 12 months and are much less likely to have a university education than nonabusive spouses.

We next consider the joint relationship between marital status, employment, and abuse. Table 2 presents the fraction of women in each marital and employment state, conditional on the presence of abuse during and prior to the past 12 months. The following facts can be observed from this table:

Many abusive marriages end in divorce.

The sample of currently married women may not be an appropriate sample of women to consider when discussing domestic abuse, for women who suffered more severe abuse are more likely to divorce. The fraction of women that are

[11] Fleming (1979) also reports that one-third of abused women witnessed domestic violence against their mothers.

currently divorced is six times higher in the sample that was abused prior to the past 12 months.[12] This finding is surprising in light of the psychology literature that contends abused women tend to be caught in a cycle of violence and are unable or unwilling to leave abusive spouses. The statistics in Table 2 likely differ from past studies because of their use of nonrandom samples. Many psychological studies utilize small samples of women in shelters or in counseling. Such samples underestimate divorce rates among abused women, as they likely exclude many women who left relationships after learning of their spouse's abusive behavior.

Abusive behavior in the past is highly correlated with current abuse; however, many men stop abusing their wives.

Married women that were abused prior to the past 12 months are 40 times more likely to report current abuse than women who were not previously abused in their current marriage. Although there is a high correlation between past and current abuse in the data, it is interesting to note that only 3% of ongoing marriages that were abusive in the past are currently abusive. It therefore appears to be the case that some men stop abusing their wives before divorce occurs.

Abused women are less likely to work than nonabused women; husbands are less likely to abuse if their wives are working.

From Table 2 we can compare the likelihood of working among married women that were abused within the past 12 months to those who were not abused, where working is defined as full-year employment. The statistics indicate that abused women are less likely to choose to work than women experiencing no current abuse. It appears that women are also less likely to work if the abuse occurred prior to the past 12 months. Divorced women who were abused in the past marriage exhibit an employment rate that is 20% below that of nonabused divorced women. Comparing the abuse rates for women that are currently employed, we see that working women are slightly less likely to experience abuse in the past year than women who are not working. For example, out of the sample of women that were abused in the past, 9.4% of women who are currently not working are abused whereas only 8.9% (3.48% out of 39.2% married women abused in the past) of women who are currently working are abused. This reduced form evidence raises the possibility of a cycle of violence through employment, where abused women become less likely to work and as a result are more likely to be abused.

In summary, the sample statistics indicate that standard economic characteristics of women and their spouses differ across the abused and nonabused samples and that domestic abuse is correlated with divorce and with female employment. Whether the differences reported here are due to causal effects or due to differences in observed and unobserved characteristics determining who is abused, who divorces, and who works is a question we address in the following sections.

[12] In fact, although the divorce rate for nonabused women is 12%, women who report abuse in a first marriage have a divorce rate of 73% in our data. Lloyd (1997b) also finds that women who experienced severe abuse are more likely to be divorced in her data on low-income families.

3. MODEL AND ESTIMATION

In this section, we present a model that describes the marriage, divorce, abuse, and employment decisions of households and we show how retrospective information available in cross-sectional data can be used to estimate the model. Both partners are forward-looking in the model; they take into account how their actions today will affect their spouse's decisions, and thus their utility in the future. In order to allow for a causal effect of abuse on divorce, women receive disutility from abuse and can respond to domestic violence by divorcing their spouses in the next period. Thus, a husband must take into account his wife's preferences over abuse, and the possibility she will initiate divorce in the future, when he is deciding whether to be abusive today.

In order to capture the causal relationship between employment and abuse, we allow employment decisions and abuse to interact in several ways. For one, abuse in the previous period may directly influence a wife's preferences for work in the current period. In addition, as in Tauchen et al. (1991), the husband may both receive utility from abuse directly and use abuse as a way to influence the behavior of his wife. The wife, in turn, takes into account the effect of her current employment decision on the likelihood her spouse is abusive in the next period, a second role for dynamics in the model.[13]

The decisions of husbands and wives are modeled in a sequential manner, which simplifies the dynamic problem of married couples in a natural way. The timing in the model is as follows. Women make decisions in every odd period and men make decisions in every even period. Individuals receive a constant level of utility for the period in which they make decisions and for the subsequent period in which their spouses make decisions. One full period for a couple therefore consists of one odd and one even period. All agents are single in the first period. All single women meet a potential spouse in every odd period. Women move first and decide whether to work (h) or not (n) and whether to be married (m) or single (s). Denote the choice set for women $I = \{sn, sh, mn, mh\}$. After observing their wife's employment choice, the husband decides whether to be abusive (a) or not (na) in the marriage.[14] Denote the choice set for husbands $J = \{a, na\}$.

3.1. *Women.* Let $u_t^w(i_t, \mathbf{k}, j_{t-1}, M_t)$ denote current period utility for women. Preferences vary with the female's current choice (i_t), her type ($\mathbf{k}$), her spouse's abuse decision in the previous period (j_{t-1}), and the couples marital-specific capital (M_t). The female's type is described by a vector composed of two sets of exogenous, time invariant characteristics: characteristics observed by all agents and

[13] The dynamics of labor supply decisions have been found to be important in previous work (e.g., Eckstein and Wolpin, 1989; van der Klaauw, 1996), as well as the relationship between current employment and future divorce (Johnson and Skinner, 1986). Unfortunately, these relationships are beyond the scope of this article as no information is available in the data on employment histories and labor market experience.

[14] The employment decision of men is not incorporated in the model: Data are only available on the current employment decisions of currently married spouses, which is not sufficient to estimate the male's joint decision to abuse and work.

by the econometrician that include education, province of residence, the presence of children in the household, and female's family background ($\mathbf{k_o}$) and characteristics that are observed by the agents in the model but not by the econometrician ($\mathbf{k_u}$).[15] Preferences are thus described by

$$\begin{aligned} u_t^w(i_t, \mathbf{k}, j_{t-1}, M_t) = {} & \varphi_h[1(i_t = sh) + 1(i_t = mh)] + \varphi_m[1(i_t = mn) + 1(i_t = mh)] \\ & + \varphi_{mm} 1(M_t = 1) + \alpha_{it}^w + \gamma_{it}^w 1(j_{t-1} = a) + \alpha_{dht}^w 1(dh_t = 1) \\ & + \boldsymbol{\lambda}_{\mathbf{it}}^{\mathbf{w}} \mathbf{k_o} + \boldsymbol{\eta}_{\mathbf{i}}^{\mathbf{w}} \mathbf{k_u} + \varepsilon_{it}^w \end{aligned}$$

for $i_t \in \{sn, sh, mn, mh\}$ and for all odd periods, where $1(\cdot)$ is an indicator equal to 1 if the expression in parentheses is true, ε_{it}^w is an idiosyncratic component of utility, and dh_t is an indicator equal to 1 if divorced and working and zero otherwise. The latter is included to allow for differences in the utility for single, working versus divorced, working women.[16] M_t is an indicator equal to 1 if the woman chose marriage in $t-2$ and zero otherwise. The utility from the single, not working state is normalized to zero.

Let $V_t^w(i_t, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t)$ denote the value function for a woman of type $\mathbf{k}$ taking decision i in period t, married to a husband of type $\mathbf{l_t}$ who made decision j in period $t-1$. For single women, each element of the vector $\mathbf{l_t}$ is equal to zero. A_t is an indicator equal to 1 if the female's husband was abusive in $t-1$ and zero otherwise. The utility currently single and currently married women receive each period depends on their types and the abuse decisions of their ex-husbands or husbands, respectively, if married in the previous period.

For married women, the value of choice i in period t is described by

$$\begin{aligned} & V_t^w(i_t, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t) \\ & \quad = u_t^w(i_t, \mathbf{k}, j_{t-1}, M_t) + \varepsilon_{it}^w \\ & \qquad + \beta \left\{ \sum_{j_{t+1} \in \{a, na\}} \Upsilon_{t+1}^h(j_{t+1}, \mathbf{l_t}, \mathbf{k}, i_t, M_{t+1}, A_{t+1}) \right. \\ & \qquad\qquad \left. \cdot E_{\varepsilon_{it+2}^w}\left[\tilde{V}_{t+2}^w(\mathbf{k}, \mathbf{l_t}, j_{t+1}, 1, A_{t+2}) \,\middle|\, i_t \in \{mn, mh\}, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t \right] \right\}, \end{aligned}$$

where β is the discount factor. For single women, the value of choice i in period t is described by

[15] While most of the characteristics included in $\mathbf{k_o}$ are time invariant, some are likely to change over time, in particular the presence of children. However, due to the cross-sectional nature of the data, we do not observe time variation of individual characteristics, other than age, in the data.

[16] We suppress dh for notational convenience in what follows.

$$V_t^w(i_t, \mathbf{k}, 0, j_{t-1}, M_t, A_t)$$
$$= u_t^w(i_t, \mathbf{k}, j_{t-1}, M_t) + \varepsilon_{it}^w$$
$$+ \beta \left\{ \sum_{\mathbf{l_{t+2}} \in L} \gamma(\mathbf{l_{t+2}}) E_{\varepsilon_{it+2}^w} \left[\tilde{V}_{t+2}^w(\mathbf{k}, \mathbf{l_{t+2}}, 0, na, 0) \,\middle|\, i_t \in \{sn, sh\}, \mathbf{k}, 0, na, 0, 0 \right] \right\},$$

where $\gamma(\mathbf{l_{t+2}})$ is the probability a single woman meets a potential spouse of type $\mathbf{l}$ in period $t+2$ and where $\sum_{\mathbf{l_{t+2}} \in L} \gamma(\mathbf{l_{t+2}}) = 1$. Note that for women who do not have a current spouse each element of $\mathbf{l}$ is equal to zero and for women who do not have a previous spouse $j_{t-1} = na$, $M_t = 0$, and $A_t = 0$. The corresponding Bellman equation is

$$\tilde{V}_t^w(\mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t) = \max_{i_t \in I} \left\{ V_t^w(i_t, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t) \right\}.$$

3.2. *Men.* Let $u_t^h(j_t, \mathbf{l}, i_{t-1}, M_t, A_t)$ denote current period utility for men. Men have preferences that depend on their current abuse decision (j_t), their type ($\mathbf{l}$), the employment and marital status decision of their wives in the previous period, marriage-specific capital (M_t), and their previous decisions to abuse (A_t). The husband's type is composed of two sets of characteristics. The first is characteristics observed by the agents and the econometrician (l_o), which consists of the family background of the husband.[17] The second is characteristics observed by women but not by the econometrician ($\mathbf{l_u}$). Preferences for men taking decision j, married to women taking decision i in $t-1$, $i_t \in \{mn, mh\}$, are then specified as

$$u_t^h(j_t, \mathbf{l}, i_{t-1}, M_t, A_t) = \alpha_{ijt}^h 1(i_{t-1} = i) + \gamma_{jt}^h 1(A_t = 1)$$
$$+ \gamma_{mt}^h 1(M_t = 1) + \lambda_{jt}^h l_o + \boldsymbol{\eta}_{\mathbf{j}}^{\mathbf{h}} \mathbf{l_u} + \varepsilon_{jt}^h$$

for $j \in \{na, a\}$, $\mathbf{l} = \{l_o, \mathbf{l_u}\}$, and for all even periods. Preferences for divorced men are

$$u_{dt}^h(\mathbf{l}) = \phi_{dt}^h + \varepsilon_{dt}^h,$$

where the utility from divorce and from being married and not abusive are normalized to zero for identification purposes in estimation.

Let $V_t^h(j_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t)$ denote the value for a husband of type $\mathbf{l}$ taking decision j in t, married to a wife of type $\mathbf{k_t}$ that made decision i in $t-1$. The value of choice j is described by

[17] Information on husbands in the data varies across current and past marriages. Although there is a reasonable set of characteristics for current husbands, only limited information exists for past husbands. In particular, for past husbands the data only contain information on the presence and type of abuse in the past marriage and information regarding the presence of domestic violence in the past spouse's family of origin, both of which are also available for current husbands. Violence in one's family background is a strong predictor of abuse for men and provides important exogenous variation that is useful for identification.

$$
\begin{aligned}
&V_t^h(j_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t) \\
&\quad = u_t^h(j_t, \mathbf{l}, i_{t-1}, M_t, A_t) + \varepsilon_{jt}^h \\
&\qquad + \beta \left\{ \sum_{i_{t+1} \in \{mn, mh\}} \Upsilon_{t+1}^w(i_{t+1}, \mathbf{k_t}, \mathbf{l}, j_t, M_{t+1}, A_{t+1}) \right. \\
&\qquad\quad \cdot E_{\varepsilon_{jt+2}^h}\left[\tilde{V}_{t+2}^h(\mathbf{l}, \mathbf{k_t}, i_{t+1}, M_{t+2}, A_{t+2}) \,\middle|\, j_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t\right] \\
&\qquad\quad + \sum_{i_{t+1} \in \{sn, sh\}} \Upsilon_{t+1}^w(i_{t+1}, \mathbf{k_t}, \mathbf{l}, j_t, M_{t+1}, A_{t+1}) \\
&\qquad\quad \left. \times E_{\varepsilon_{jt+2}^h}\left[\tilde{V}_{dt+2}^h(\mathbf{l}) \mid j_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t\right] \right\},
\end{aligned}
$$

where the Bellman equation for married men is

$$
\tilde{V}_t^h(\mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t) = \max_{j_t \in J_t}\left\{ V_t^h(j_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t)\right\}.
$$

The Bellman equation for divorced men is

$$
\begin{aligned}
\tilde{V}_{dt}^h(\mathbf{l}) &= u_{dt}^h(\mathbf{l}) + \varepsilon_{dt}^h + \beta \sum_{\mathbf{k_{t+2}} \in \mathbf{K}} \gamma(\mathbf{k_{t+2}}) \Upsilon_{t+2}^w(i_{t+2}, \mathbf{k_{t+2}}, \mathbf{l}, j_{t+1}, M_{t+2}, A_{t+2}) \\
&\quad \cdot \left\{ \sum_{i_{t+1} \in \{mn, mh\}} \Upsilon_{t+1}^w(i_{t+1}, \mathbf{k_{t+2}}, \mathbf{l}, na, 0, 0) E_{\varepsilon_{jt+2}^h}\left[\tilde{V}_{t+2}^h(\mathbf{l}, \mathbf{k_{t+2}}, i_{t+1}, 0, 0) \,\middle|\, na, \mathbf{l}\right] \right. \\
&\quad + \left. \sum_{i_{t+1} \in \{sn, sh\}} \Upsilon_{t+1}^w(i_{t+1}, \mathbf{k_{t+2}}, \mathbf{l}, na) E_{\varepsilon_{jt+2}^h}\left[\tilde{V}_{dt+2}^h(\mathbf{l}) \,\middle|\, na, \mathbf{l}\right] \right\},
\end{aligned}
$$

where $\gamma(\mathbf{k_{t+2}})$ is the probability a single man meets a potential spouse of type $\mathbf{k}$. Assuming ε_{it}^w and ε_{jt}^h are distributed i.i.d. extreme value, the expected response of husbands to their wives' current decisions can now be described by

$$
\begin{aligned}
&\Upsilon_{t+1}^h(j_{t+1}, \mathbf{l}, \mathbf{k_{t+1}}, i_t, M_{t+1}, A_{t+1}) \\
&\quad = \frac{\exp\left\{V_{t+1}^h(j_{t+1}, \mathbf{l}, \mathbf{k_{t+1}}, i_t, M_{t+1}, A_{t+1}) - \varepsilon_{jt+1}^h\right\}}{\sum_{r \in J_{t+1}} \exp\left\{V_{t+1}^h(r, \mathbf{l}, \mathbf{k_{t+1}}, i_t, M_{t+1}, A_{t+1}) - \varepsilon_{rt+1}^h\right\}}
\end{aligned}
$$

and the expected response of women to their husbands' current decisions by

$$\Upsilon^w_{t+1}(i_{t+1}, \mathbf{k}, \mathbf{l_{t+1}}, j_t, M_{t+1}, A_{t+1}) = \frac{\exp\left\{V^w_{t+1}(i_{t+1}, \mathbf{k}, \mathbf{l_{t+1}}, j_t, M_{t+1}, A_{t+1}) - \varepsilon^w_{it+1}\right\}}{\sum_{r\in I_{t+1}} \exp\left\{V^w_{t+1}(r, \mathbf{k}, \mathbf{l_{t+1}}, j_t, M_{t+1}, A_{t+1}) - \varepsilon^w_{rt+1}\right\}}.$$

3.3. *Terminal Conditions.* In period $T-2$, men no longer make decisions but receive utility for one more period. The terminal value functions for husbands are

$$\begin{aligned} V^h_{T-2}(j_{T-2}, \mathbf{l}, \mathbf{k_{T-2}}, i_{T-3}, M_{T-2}, A_{T-2}) &= u^h_{T-2}(j_{T-2}, \mathbf{l}, i_{T-3}, M_{T-2}, A_{T-2}) + \varepsilon^{jh}_{T-2} \\ &+ \beta \sum_{i_{T-1}\in\{mn,mh\}} \Upsilon^w_{T-1}(i_{T-1}, \mathbf{k_{T-2}}, \mathbf{l}, j_{T-2}, M_{T-1}, A_{T-1}) \\ &\times E_{\varepsilon^h_T}\left[u^h_T(j_T, \mathbf{l}, i_{T-1}, M_{T-2}, A_{T-2}) + \varepsilon^{jh}_T\right] \\ &+ \beta \sum_{i_{T-1}\in\{sn,sh\}} \Upsilon^w_{T-1}(i_{T-1}, \mathbf{k_{T-2}}, \mathbf{l}, j_{T-2}, M_{T-1}, A_{T-1}) E_{\varepsilon^h_T}\left[u^h_{dT}(\mathbf{l}) + \varepsilon^h_T\right] \end{aligned}$$

if $i_{T-3} \in \{mn, mh\}$ and

$$V^h_{dT-2}(\mathbf{l}) = u^h_{dT-2}(\mathbf{l}) + \varepsilon^h_{jT-2} + \beta E_{\varepsilon^h_T}\left[u^h_{dT}(\mathbf{l}) + \varepsilon^h_T\right]$$

if $i_{T-3} \in \{sn, sh\}$. In period $T-1$, women no longer make decisions and receive no utility in the future. It is assumed that women move last, so that women always have the opportunity to leave a marriage and men always face the threat of divorce when making abuse decisions. The terminal value functions for women are

$$V^w_{T-1}(i_{T-1}, \mathbf{k}, \mathbf{l_{T-1}}, j_{T-2}, M_{T-1}, A_{T-1}) = u^w_{T-1}(i_{T-1}, \mathbf{k}, j_{T-2}, M_{T-1}, A_{T-1}) + \varepsilon^w_{iT-1}.$$

3.4. *Optimal Policies.* The solution to the model is based on a set of reservation values. The sequence of reservation values that form the solution to the problems faced by husbands and wives can be expressed in terms of the stochastic component of utility. For wives, define ε^{w*}_{it} such that women prefer to be single and not working for values of $\varepsilon^w_{snt} - \varepsilon^w_{it}$ above ε^{w*}_{it} and would like to choose state i for values of $\varepsilon^w_{snt} - \varepsilon^w_{it}$ below ε^{w*}_{it} for every state i, $i \in \{sh, mn, mh\}$; ε^{w*}_{it} is the value such that

$$V^w_t(i, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t) + \varepsilon^w_{snt} - \varepsilon^w_{it} = V^w_t(sn, \mathbf{k}, 0, j_{t-1}, M_t, A_t) + \varepsilon^{w*}_{it}$$

for $i \in \{sh, mn, mh\}$. Consider two possible states $i, i' \in I_t$ where I_t is the choice set available in period t. Women will choose state i in t if the value of choosing i exceeds the value of choosing state i'. The state yielding the highest level of utility therefore satisfies

$$\varepsilon_{it}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w} - \varepsilon_{it}^{w*}$$

and the optimal policy is given by

$$i = \begin{cases} sn & \text{iff } \varepsilon_{snt}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{snt}^{w*}, \forall i' \in I_t \\ sh & \text{iff } \varepsilon_{sht}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{sht}^{w*}, \forall i' \in I_t \\ mn & \text{iff } \varepsilon_{mnt}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{mnt}^{w*}, \forall i' \in I_t \\ mh & \text{iff } \varepsilon_{mht}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{mht}^{w*}, \forall i' \in I_t. \end{cases}$$

Similarly, for husbands, define ε_{nat}^{h*} such that husbands prefer to be nonabusive for values of $\varepsilon_{nat}^{h} - \varepsilon_{at}^{h}$ above ε_{nat}^{h*} and would like to be abusive for values of $\varepsilon_{nat}^{h} - \varepsilon_{at}^{h}$ below ε_{nat}^{h*}; ε_{nat}^{h*} is the value such that

$$V_t^h(a_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t) + \varepsilon_{nat}^{h} - \varepsilon_{at}^{h} = V_t^h(na_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t) + \varepsilon_{nat}^{h*}$$

for $i_{t-1} \in \{mn, mh\}$. Men will choose to abuse their wives in t if the value of an abusive marriage exceeds the value of a nonabusive marriage. The state yielding the highest level of utility satisfies

$$\varepsilon_{at}^{h} - \varepsilon_{nat}^{h} \geq \varepsilon_{nat}^{h*}$$

and the optimal policy for abuse is therefore

$$j_t = \begin{cases} a & \text{iff } \varepsilon_{at}^{h} - \varepsilon_{nat}^{h} \geq \varepsilon_{nat}^{h*} \\ na & \text{otherwise.} \end{cases}$$

3.5. *Using Retrospective Information to Estimate the Dynamic Model.* The model described above captures the sequential nature of marital status and abuse choices. If panel data were available on employment, marriage, and domestic violence, it would be straightforward to estimate the full dynamic model. However, the VAWS is a cross-sectional data set with incomplete information on past decisions. In this section, we show how the retrospective information available in cross-sectional data can be used to estimate a version of the dynamic model described above.

The VAWS contains information on age at first marriage, the length of the current marriage, when abuse in the current marriage began and ended, when abuse in a prior marriage ended, and whether the first marriage ended in divorce. This information allows us to create full marital and abuse histories for women currently in their first marriages and for never-married women. However, the data

do not contain sufficient information to determine the dates at which abuse began and marriage ended for women whose first marriage ended in divorce. For the latter group, it is necessary to integrate out those pieces of the marital history that are not observed by the econometrician. It is also necessary to integrate out the employment history for all women, as information in the VAWS is only available on the current employment status of women.

In order to balance the goal of staying as close to the model as possible in estimation against the limitations of the data, we impose the following set of assumptions regarding the timing of events and the choice sets available to individuals. First, we divide each individual's life into five *stages*, where each stage corresponds to 15 years. The first stage of life, from age 1 to 15, is an initial stage in which individuals do not make any decisions. In the fifth and final stage, from age 60 to 75, men receive utility flows from past decisions but do not make any decisions within the period. Women make a final marriage and employment decision at the very beginning of the last phase, as discussed below. In the three middle stages, marriage, abuse, and employment decisions are made. Each stage of life is composed of four *periods*, where women make marriage and employment decisions in odd periods and men make abuse decisions in even periods. Individuals then receive a constant level of utility for the period in which they make decisions and for the subsequent period in which their spouses make decisions. In the model, individuals live for 20 periods, and we estimate a 16-period model for each man and woman in the sample, starting from age 15.

For simplicity, the following restrictions on the number of decisions within a stage are made:

(i) Only three potential spouses are ever available for marriage throughout an agent's life—one in each of stages 2, 3, and 4. Potential spouses are only available at the beginning of a stage and only to those who are not already married.

(ii) Single women who decide at the beginning of a stage to reject the one available prospective spouse make only one employment decision that occurs at the beginning of the stage and cannot be changed until the next stage.

(iii) Couples who enter a stage married are restricted to a single decision-making period within the stage. That is, the wife has the opportunity to respond to the last abuse decision of her husband in the previous stage by divorcing him or not and working or not. If the marriage stays together, the husband then has the opportunity to respond to his wife's employment decision by abusing her or not.

(iv) At the beginning of the final stage, women make marital and employment status decisions in order for the divorce threat to remain present for the last abuse decision of the husbands. If a woman decides to stay married to her husband, she carries his last abuse decision with her throughout the final stage. Men do not make any decisions in the final stage.

The full sequences of decisions for single women and for married women and their spouses at the beginning of each stage are illustrated in Figures 1 and 2,

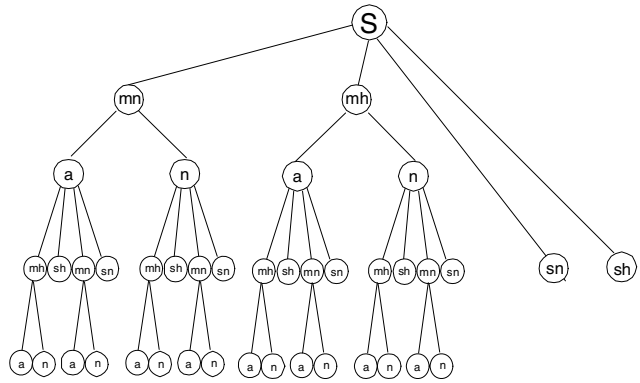

FIGURE 1

DECISION TREE FOR SINGLE WOMEN AT THE BEGINNING OF STAGES 2–4

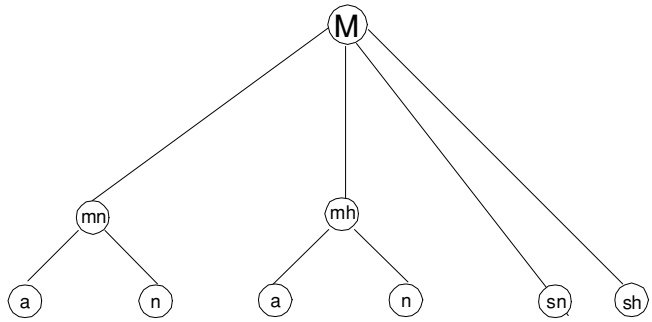

FIGURE 2

DECISION TREE FOR MARRIED WOMEN AT THE BEGINNING OF STAGES 2–4

respectively. Since the data on marital and abuse histories are limited, the above simplifications serve to reduce the number of decisions we must integrate over when estimating the model. The specification outlined above allows us to estimate the transitions to marriage and divorce, the female's employment decision, the husband's decisions to start and stop abusing his wife, the effect of domestic violence on the current employment decision, the effect of employment on the abuse decision, and the effect of abuse on divorce. The model is solved by backwards recursion and the solution to the model is used to construct the likelihood function.

3.6. *Estimation of the Choice Probabilities.* The choice probabilities are estimated according to the optimal policies described above. Assume the idiosyncratic component of preferences is distributed i.i.d. extreme value. The probability that a man of type **l** chooses alternative j in period t is

$$\Pr(j_t = a \mid \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t) = \frac{\exp\left\{V_t^h(j_t, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t)\right\}}{\sum_{r \in J_t} \exp\left\{V_t^h(r, \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t)\right\}}.$$

The probability that a wife of type $\mathbf{k}$ chooses alternative $i, i \in \{sn, sh, mn, mh\}$ in period t is

$$\Pr(i_t = i \mid \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t) = \frac{\exp\left\{V_t^w(i_t, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t)\right\}}{\sum_{r \in I_t} \exp\left\{V_t^w(r, \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t)\right\}}.$$

We must account for five features of the data when constructing the likelihood function. First, the data do not contain information on past employment decisions. We therefore integrate over the female's employment decision in all but the current period when estimating the husband's probability of abuse. Define d_m as an indicator equal to 1 if a woman in the sample reports a relationship, zero otherwise. The probability men abuse their wives in periods prior to the current period is

$$\Pr(j_t = a \mid \mathbf{l}, \mathbf{k_t}, M_t, A_t)$$
$$= \left[\sum_{i \in \{mn, mh\}} \Pr(j_t = a \mid \mathbf{l}, \mathbf{k_t}, i_{t-1}, M_t, A_t) \Pr(i_{t-1} = i \mid \mathbf{k_t}, \mathbf{l}, j_{t-2}, M_t, A_t)\right]^{d_m}.$$

Second, for some women who experienced a divorce before the current period, we do not observe whether they were married or divorced in some of the preceding periods. In these cases, we must also integrate over the female's past marital status:

$$\Pr(i_t = i \mid \mathbf{k}, \mathbf{l_t}) = \sum_{j_{t-1} \in \{a, na\}} \Pr(i_t = i \mid \mathbf{k}, \mathbf{l_t}, j_{t-1}, M_t, A_t)$$
$$\cdot \left[\Pr(j_{t-1} = j \mid \mathbf{l_{t-1}}, \mathbf{k}, M_{t-1}, A_{t-1}) \right.$$
$$\left. + \sum_{i_{t-2} \in \{sn, sh\}} \Pr(i_{t-2} = i \mid \mathbf{k}, \mathbf{l_{t-2}}, j_{t-3}, M_{t-2}, A_{t-2})\right].$$

Third, we do not observe the proportion of potential spouses that come from violent homes in the population and we do not have a random sample of men. However, we do have a random sample of women; thus, we assume that men are equally likely to come from violent homes as women. The proportion of all women in the sample from violent homes is 17.48%. The probability that single women choose i in period t is therefore

$$\Pr(i_t = i \mid \mathbf{k}) = 0.8252 \cdot \Pr(i_t = i \mid \mathbf{k}, 0) + 0.1748 \cdot \Pr(i_t = i \mid \mathbf{k}, 1), \quad i \in \{sn, sh\}.$$

In the data, some women reported that they did not possess information on their spouse's family background.[18] Instead of excluding these couples, we infer the true type for men with unknown family backgrounds from the model. In particular, for women who report that the family background of the spouse is unknown, we assume they observe other characteristics of their spouses, such as whether the family of origin is dysfunctional in other respects, that are perfectly correlated with their spouses' family background and influence their husbands' propensity to be abusive in the same manner. For the purposes of estimation, this assumption implies that the woman observes her spouse's type, whereas the econometrician does not in the absence of information on family background. We estimate the probability spouses with unknown family backgrounds are from violent homes (θ_b). Define f_b to be an indicator equal to 1 if the husband comes from a violent family, zero otherwise, and f_u an indicator equal to 1 if the woman does not report her spouse's family background. The likelihood contribution for women in period t is therefore

$$\Pr(i_t = i \mid \mathbf{k}) = [\theta_b \Pr(i_t = i \mid \mathbf{k}, 1) + (1 - \theta_b)\Pr(i_t = i \mid \mathbf{k}, 0)]^{f_u} \cdot [\Pr(i_t = i \mid \mathbf{k}, 1)]^{(1-f_u)f_b} [\Pr(i_t = i \mid \mathbf{k}, 0)]^{(1-f_u)(1-f_b)}, \quad i \in \{mn, mh\}.$$

Fourth, we integrate out the unobserved types for husbands and wives. We model the unobserved heterogeneity as follows. Women are allowed to have unobserved preferences over marriage ($k_{umr} \in \{k_{um1}, k_{um2}, \ldots k_{umR}\}$) and work ($k_{uhr} \in \{k_{uh1}, k_{uh2}, \ldots k_{uhR}\}$). For identification purposes, one type for each of k_{um} and k_{uh} is normalized to zero. Unobserved heterogeneity in each marital-employment state for a woman with unobserved type r, $r \in \{1, 2, \ldots R\}$ is then given by

$$k_{ur} = \begin{cases} 0 & \text{if } i = sn \\ k_{uhr} & \text{if } i = sh \\ k_{umr} & \text{if } i = mn \\ k_{umr} + k_{uhr} & \text{if } i = mh. \end{cases}$$

The unobserved type of a husband married to a woman of unobserved type r is specified as

$$l_{ur} = (\varphi_m + k_{umr})\delta_a,$$

where δ_a allows for unobserved preferences over abuse to be correlated with the unobserved preferences for women over marriage. The parameter φ_m enters the unobserved heterogeneity component so that the gain to abuse is correlated with both intercepts determining the gain to marriage. In essence, we assume that k_{umr} captures a characteristic of the female that is common to the marriage and directly affects the husband's propensity to abuse. We restrict the unobserved

[18] A total of 388 women reported that they did not know whether their first spouse witnessed violence in his family of origin.

TABLE 3
PREFERENCE PARAMETERS FOR HUSBANDS

	Wife Aged 15–29	Wife Aged 30–44	Wife Aged 45–59
Nonworking wife	3.9242	2.0461	3.1027
	(1.8002)	(1.9157)	(3.2403)
Working wife	−5.9015	0.0619	−2.5854
	(2.0540)	(2.0239)	(3.3102)
Family background	1.6323	1.6669	0.0725
	(0.2448)	(0.3406)	(2.5524)
Marital-specific capital			
Nonworking wife			3.2306
			(0.6369)
Working wife			−3.0279
			(0.4456)
Abuse-specific capital			8.1076
			(0.7470)
Unobserved heterogeneity			
Abuse loading factor			−0.6817
			(0.2158)
Log-likelihood value			−9540.6641

NOTE: Standard errors are in parentheses. Not abusive is the base category.

heterogeneity in this way because there is not enough information in the data on second marriages to separately identify a match-specific unobserved component and a husband-specific unobserved component.

Finally, with the exception of unobserved heterogeneity, we allow the preference parameters to vary across stages but restrict them to be the same for each period within a stage.[19] The sample likelihood is then the product of the joint decisions of husbands and wives, and the individual decisions of singles, for the entire sample period during which each female is observed, taking into account the features described above.

4. RESULTS

4.1. *Parameter Estimates.* Estimates of the preference parameters for the model are presented in Tables 3 and 4. In this instance, the model is estimated with an annual discount factor fixed at 0.95. For comparison, a myopic version of the model was also estimated. The results can be found in Section B of the Appendix. The myopic version is equivalent to a multinomial logit framework, representing a reduced form analysis of the data. Later, we compare the two specifications when assessing the importance of the dynamic structure of the model.

[19] We include age dummies for women aged 30 to 45 and 45 to 60. We restrict the time effect to be the same for women aged 45 to 60 as for women aged 60 to 75 for identification purposes.

TABLE 4

PREFERENCE PARAMETERS FOR WIVES

	Single Working	Married Not Working	Married Working	Divorced Working
		Women aged 15 to 30		
Abusive spouse		−1.6923	−1.9999	−0.0524
		(0.2352)	(0.3316)	(0.3306)
Female has violent background	0.1184	0.4086	−0.3981	
	(0.1599)	(0.1226)	(0.4586)	
Child	−1.3698	0.0116	0.2470	
	(0.2640)	(0.1461)	(0.1492)	
High school	1.2700	0.2150	0.4819	
	(0.3404)	(0.1422)	(0.1500)	
Postsecondary	1.7070	0.2573	0.7392	
	(0.3366)	(0.1496)	(0.1530)	
		Women aged 30 to 45		
Abusive spouse		−2.9041	−2.1256	−0.3955
		(0.2543)	(0.2467)	(0.2594)
Female has violent background	−0.2589	−0.3577	−0.3523	
	(0.1341)	(0.1336)	(0.1332)	
Child	−1.1637	0.2909	−0.5095	
	(0.1472)	(0.1643)	(0.1522)	
High school	0.9646	0.0393	0.5714	
	(0.1560)	(0.1434)	(0.1596)	
Postsecondary	1.6165	0.4873	1.0977	
	(0.1603)	(0.1527)	(0.1712)	
Age	0.4625	0.6149	1.2685	1.0083
	(0.3649)	(0.2018)	(0.2052)	(0.4056)
		Women aged 45 to 60		
Abusive spouse		−3.6152	−4.5195	−0.7800
		(1.9939)	(2.0318)	(3.0645)
Female has violent background	−0.1353	−0.4107	−0.7432	
	(0.1716)	(0.2809)	(0.3169)	
Child	−1.3416	−0.4449	0.3826	
	(0.2024)	(0.3253)	(0.3608)	
High school	0.1194	−0.1881	0.8313	
	(0.2157)	(0.5385)	(0.5739)	
Postsecondary	−0.0805	−1.0521	0.2461	
	(0.2184)	(0.4356)	(0.4829)	
Age	11.7319	2.1079	1.1194	1.5906
	(0.6404)	(2.0031)	(2.0910)	(1.8614)
		Intercepts		
	−0.7293	8.3840	−15.5581	−0.3778
	(0.3357)	(5.8793)	(10.7982)	(0.3765)
		Marital-specific capital		
		−6.7805	−3.0279	
		(0.5186)	(0.4456)	
		Unobserved heterogeneity		
Working, type I				−0.1873
				(0.1299)
Probability				0.2757
Married, type I				0.1049
				(6.6726)
Probability				0.8954
Probability unknown spousal type is violent family background				0.5975
Log-likelihood value				−9540.6641

NOTES: Standard errors are in parentheses. Single, not working is the base category.

Turning to the dynamic results, we first consider the determinants of abuse. The preference parameters for husbands are presented in Table 3. Observing violence as a child significantly increases the likelihood of abusing one's wife (for women under the age of 45) as illustrated in row 3. Consider the following thought experiment as an illustration of the magnitude of the effect of family background on abuse. Take a couple in which the wife is between the ages of 15 and 29. If we compute the difference between abuse propensities for men from abusive homes and for men from nonabusive homes, we find that men with violent family backgrounds are 185%, 236%, and 528% more likely to abuse their wives when they are aged 15 to 29, 30 to 44, and 45 to 60, respectively. Witnessing violence as a child reduces the disutility of domestic violence substantially and confirms the importance of the intergenerational impacts of domestic violence. The abuse propensity increases substantially with age because men who were abusive in the past are significantly more likely to abuse today. State dependence in abuse is, by far, the single most important determinant of abuse, as illustrated in row 6. In this respect, the dynamics of abuse are particularly important and are consistent with anecdotal evidence on escalating violence within abusive marriages over time. It is also interesting to note that the effect of family background is insignificant for marriages in which the wife is aged 45 to 59, suggesting a first incident of abuse is less likely to occur at older ages.

Are abusive husbands responsive to the employment decisions of their wives? The results suggest that men married to women aged 15 to 29 are significantly more likely to abuse if their wives are not working. For women aged 30 years and older, the effect of the wife's employment on her spouse's abuse propensity is positive but insignificant. Since men, if at all, are more likely to abuse nonworking wives, this finding suggests spouses do not use abuse as a means of keeping their wives out of the workforce. This result may be picking up the fact that young, nonworking wives are at greater risk of abuse as they spend more time at home. Considering the weak relationship between employment and abuse for most age groups, the results do not suggest that there exists a cycle of violence through employment within abusive marriages. Upon examination of the marital-specific capital parameters for husbands, the effects of abuse, by the employment status of the wife, are further reinforced in marriages of a longer duration by the fact that marital-specific capital further reduces the likelihood of abuse in marriages with working wives and further increases the likelihood of abuse in marriages with nonworking wives.

We next turn to the estimates for women. Is it the case that abused women are unable or unwilling to leave abusive spouses? The answer is no: The estimated effect of abuse on preferences for marriage is negative and significant for women of all age groups in the model, as illustrated by rows 1,6, and 12 in Table 4. From the parameter estimates, we can compute the difference between divorce probabilities when women are in nonviolent versus violent marriages and find that 15 to 29-, 30 to 44-, and 45 to 59-year-old women who are abused are 245%, 565%, and 171%, respectively, more likely to divorce than women in nonabusive marriages. This result suggests that women are very responsive to the presence of domestic violence, a finding contrary to the common perception that abused women

have great difficulty leaving abusive relationships. It is therefore interesting to ask whether the high divorce propensities for abused women have a deterrent effect on their husbands. To this end, we simulate the model with the discount factor set to zero and compare abuse rates in marriages for women aged 15 to 29.[20] We examine this group as they have the longest decision horizon and thus likely face the greatest deterrent effects. The results suggest that there is a deterrent effect of divorce, but abuse rates rise by only 3.5% when the possibility of a future divorce is not taken into account.

We next consider the causal effect of abuse on employment. The results in row 1 and row 12 of Table 4 indicate that domestic violence has a positive but insignificant effect on employment for the youngest and oldest groups of women who remain married after experiencing abuse, and a negative but insignificant effect on those who divorce after experiencing abuse. In contrast, for women aged 30 to 44, abuse has a relatively large and positive effect on employment: A abuse results in a 38% increase in employment for women who remain in abusive marriages. It is clear that the reason abused women have lower employment rates in the raw data has more to do with the characteristics determining who is abused and who works than with any direct effects of abuse on employment.

For women, a violent family background reduces the value of marriage in general, but the effects are small in magnitude as compared to the effects of abuse or to the effects of family background on men. The marital-specific capital parameters for women are negative, with working preferred over nonworking. The negative sign is due to the fact that divorce can only occur for women with nonzero marital-specific capital; thus this parameter captures the net effect of marital-specific capital and the gains to divorce. Finally, the estimated probabilities presented at the bottom of Table 4 indicate that 60% of married women reporting they do not know their spouse's family background behave as if their spouses have violent backgrounds. This result implies that the initial distribution of violent backgrounds for men is such that 19.13% of men came from violent homes, which is close to the corresponding 17.99% for women in the initial family background distribution.[21]

As an illustration of the importance of differences in exogenous characteristics across abusive and nonabusive couples, we next consider the predicted behavior of four hypothetical couples of each age group, presented in Table 5. In couple A, both partners come from nonviolent homes, the wife has at least a postsecondary education, and the couple has no children. In this instance, the predicted marriage rate is relatively low, in part due to the high value of the female's time in the labor market. The overall abuse rate in first marriages is low, and those marriages that do become violent are very likely to end in divorce, as women have favorable outside options in the event the marriage dissolves. For couple B, we assume both partners come from violent homes, but hold all other characteristics the same as for couple A. Changing the family background characteristics in this manner results in a 368% rise in abuse rates for women below the age of 30 and a 227% rise in abuse rates for women between the ages of 30 and 44. This change is largely driven by

[20] Results are available from the authors upon request.

[21] Calculations are available from the authors upon request.

TABLE 5
COMPARISON OF COUPLES WITH DIFFERING CHARACTERISTICS

	A	B	C	D
Violent backgrounds	No	Yes	Yes	Yes
Wife has postsecondary education	Yes	Yes	No	No
Couple has children	No	No	No	Yes
Age 15 to 29				
Fraction married	0.5795	0.5760	0.6899	0.4432
Divorce rate in abusive marriages	0.6597	0.6567	0.5984	0.3972
Divorce rate in nonabusive marriages	0.1830	0.1852	0.1553	0.0798
Employment rate for single/divorced women	0.7996	0.8178	0.7217	0.3670
Employment rate for married women	0.6571	0.5247	0.4614	0.4432
Abuse rate	0.0392	0.1835	0.2090	0.2090
Age 30 to 44				
Fraction married	0.6918	0.6533	0.6874	0.8372
Divorce rate in abusive marriages	0.3964	0.4054	0.4527	0.3438
Divorce rate in nonabusive marriages	0.1057	0.1783	0.2046	0.1565
Employment rate for single/divorced women	0.8950	0.8641	0.7483	0.4605
Employment rate for married women	0.8315	0.8574	0.8339	0.6230
Abuse rate	0.0019	0.0130	0.0103	0.0137
Age 45 to 59				
Fraction married	0.7431	0.6225	0.5492	0.9736
Divorce rate in abusive marriages	0.8022	0.8947	0.7600	0.6694
Divorce rate in nonabusive marriages	0.0268	0.0445	0.0171	0.0061
Employment rate for single/divorced women	0.8694	0.8126	0.8290	0.3205
Employment rate for married women	0.6329	0.6225	0.5492	0.6269
Abuse rate	0.0072	0.0070	0.0085	0.0077

the fact that men from violent homes are much more likely to abuse. The decline in marriage rates and the rise in divorce rates, in both abusive and nonabusive marriages, indicates that women from violent homes have lower preferences for marriage.

We next consider changing the wife's education level from postsecondary in couple B to less than high school to generate the predictions in Column C. The results suggest that women with lower levels of education are less likely to work. With the exception of women aged 30 to 44, we find these women are also less likely to divorce, as opportunities outside marriage are more limited for less educated women. As the oldest and youngest groups of women find it more difficult to leave abusive marriages, husbands are more likely to abuse their wives. In contrast, women aged 30 to 44 are more likely to divorce, and in response, their husbands are less likely to be abusive. Education therefore seems to play an important role in determining which women are abused and which women are able to leave abusive relationships. Column D presents predictions for couples with children that are the same in all other respects to the couples in Column C. As is consistent with the literature, the couples with children have much lower divorce rates, and wives

younger than 45 have lower employment rates, than childless couples. Although women with children prefer to remain married than to divorce, and men therefore face a lower chance of separation following abuse, abuse rates are not that different between couples with children and couples without children.

The predictions in Table 5 help to provide a picture of how differences in exogenous characteristics relate to the differences highlighted in the raw data. In summary, it appears that the high divorce rates and the low employment rates of abused married women are driven by differences in characteristics that help determine a woman's opportunities outside the marriage. In particular, well-educated women and women without children are more likely to work and are more likely to divorce, suggesting that the characteristics driving the employment decision are also important in determining who stays with an abusive spouse. In turn, men are less likely to abuse wives who have better outside opportunities.

The results presented above suggest that variation in observed characteristics, such as education and family background, can explain much of the differences in divorce, employment, and abuse rates across couples in the data. The next issue to consider is the importance of unobserved characteristics. The results in Table 4 suggest that the correlations between abuse, divorce, and employment cannot be attributed to unobserved heterogeneity: The estimates indicate that the second points of support for both unobserved preferences for employment and for marriage are not significantly different from zero. This result is robust to a variety of specifications for unobserved heterogeneity.[22] The loading factor on abuse is negative, as illustrated in Table 3, indicating that abuse is less attractive when marriage is more attractive to females; however, since there is no unobserved heterogeneity in preferences over marriage, all men receive the same value for the loading factor. Thus, we find the availability of information on violence in the family of origin to be a good predictor of unobserved preferences over abuse and divorce, eliminating the importance of unobserved heterogeneity in this instance.

Table 6 provides evidence on the predictive performance of the model. Considering the limitations of the data, the model is able to match the dynamics of marital status decisions well. In particular, the dynamic model matches the fractions married and single in each age grouping, as well as the high divorce rates for abusive marriages and relatively low divorce rates for nonviolent marriages. We are also able to replicate the fact that employment rates for abused married women are relatively high for women aged 30 to 44 and relatively low for abused married women aged 45 to 59. The model has difficulty fitting the data in a few dimensions for women aged 30 to 44: we overpredict the divorce rate in nonabusive marriages, the employment rate for abused women, and the abuse rate for working women. This is due to the small sample sizes used to estimate some of the choices in the data: Although information on the entire sample of women aged 30 to 44 is used to estimate the fraction of women currently employed and

[22] In particular, we estimated the model with up to four points of support for both employment and marriage, with and without correlations between marriage, employment, and abuse. We also estimated a version of the model with unobserved, but no observed, heterogeneity. The latter was the only case in which the model indicated there was more than one point of support for marriage and employment.

TABLE 6
COMPARISON OF ACTUAL AND PREDICTED CHOICES

	Actual	Predicted	Actual	Predicted
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8075	0.8112	0.8870	0.8835
Divorce rate in abusive marriages	0.4950	0.5177	0.0788	0.0937
Divorce rate in nonabusive marriages	0.1350	0.1299	0.0088	0.0645
Employment rate for single/divorced women	0.7040	0.6782	0.6990	0.7074
Employment rate for married women	0.6179	0.5873	0.5906	0.6010
Employment rate for abused married women			0.5869	0.7608
Employment rate for nonabused married women			0.5714	0.5791
Abuse rate	0.0731	0.0661	0.0326	0.0388
Fraction of working wives that are abused	0.0242	0.0153	0.0075	0.0784
Fraction of nonworking wives that are abused	0.0328	0.0829	0.0081	0.0188
	Age 45 to 59			
Fraction married	0.9069	0.8814		
Divorce rate in abusive marriages	0.5917	0.6448		
Divorce rate in nonabusive marriages	0.0000	0.0175		
Employment rate for divorced women	0.5887	0.5870		
Employment rate for married women	0.5850	0.5786		
Employment rate for abused married women	0.5088	0.4955		
Employment rate for nonabused married women	0.5870	0.5514		
Abuse rate	0.0257	0.0151		
Fraction of working wives that are abused	0.0227	0.0127		
Fraction of nonworking wives that are abused	0.0299	0.0200		

currently married, only information on women who are currently working is used to estimate the abuse rate for working women and only information on women currently abused is used to estimate the employment rate for abused women. The model has difficulties reconciling the overall divorce and employment rates with the fact that there were very few working women that were abused and very few nonabused women that divorced in the latter sample.

In order to further assess the importance of dynamics in the divorce and abuse decisions, we also consider the ability of the static model to match the transitions in the data.[23] The static model matches the abuse rates and fractions married reasonably well in each stage, as illustrated in Table C1 in the Appendix. The former is not surprising, as the estimates suggest that the deterrent effect of divorce on the abuse decisions of husbands is small in magnitude. The static model fails to match the data, especially for young women, along two important dimensions. First, the static model overestimates divorce rates. Second, the static model has difficulties matching the employment rates of married and divorced women, especially for married women who are abused. The static version of the model fails in these respects because it is unable to capture the effects of state dependence in abuse on the husband's decision to abuse in the future. Abused women in the

[23] Full estimation results on the static model are presented in Section B of the Appendix.

static model do not take into account the fact that husbands that were abusive in the past are insensitive to the employment decision of their wives when deciding whether to abuse again. As a result some abused women attempt to prevent abuse by remaining married and working. In the dynamic model, abused women take into account the strong state dependence in abuse and realize that the best they can do to prevent further abuse is to divorce.

4.2. *Policy Experiments.* A major advantage of constructing and estimating a behavioral model of domestic violence, employment, and divorce is that we can consider a variety of policy experiments aimed at reducing domestic violence. Several policy initiatives already exist in many countries that are designed to help women leave abusive marriages. Shelters, counseling services, and abuse telephone hot-lines, for example, are offered extensively as a means of lowering the costs to women of leaving abusive relationships. Other strategies, such as tougher laws prohibiting domestic violence and mandatory programs designed to re-socialize abusive spouses, have been adopted to increase the costs of domestic violence to abusers. There has also been much discussion of the intergenerational effects of domestic violence and how policy might address this issue. In this section, we describe how one can translate such policies into the parameters of our framework, and then assess the behavioral implications of four policy experiments that address the aforementioned issues.

The first two experiments consider policies adopted widely in practice. As mentioned above, several policies, such as providing shelters and counseling and legal services to abused women, have been aimed at reducing the costs of leaving violent marriages. This type of policy is examined in our model by reducing the female's preference for marriage, if abused, by 50%. The results of this experiment, reported in Table 7, suggest that such a policy would simultaneously increase the number of divorces and reduce the prevalence of domestic violence. Reducing the tolerance for abuse results in a 37%, 10%, and 47% increase in divorce rates in abusive marriages for the youngest to oldest age groups, respectively. The increase in divorce reduces abuse rates through two channels. The first is that the higher likelihood of divorce following abuse serves as a deterrent effect. The second is that there are fewer continuing marriages with abusive husbands. Since men that were abusive in the past are more likely to abuse again, abuse rates are lower because there are fewer intact marriages with repeat abusers. As a result of both factors, abuse rates fall by as little as 10% for women aged 30 to 44 to as much as 85% for women aged 45 to 59. It is also interesting to note that women who remain in abusive marriages after the policy change have higher employment rates: As husbands prefer to abuse nonworking wives, it may be that the women who decide to remain married work to try and prevent abuse, even though working is not very likely to prevent repeat abuse. For comparison purposes, we conduct the same experiment for the static version of the model.[24] Removing the possibility for women to prevent future abuse by working within marriage results in an overstatement of the rise in divorce for women aged 30 to 44 and an understatement

[24] Results are available in Table C.2 in the Appendix.

TABLE 7
EXPERIMENT 1: REDUCE WIFE'S TOLERANCE FOR ABUSE BY 50%

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8112	0.8066	0.8835	0.8850
Divorce rate in abusive marriages	0.5177	0.7294	0.0937	0.1034
Divorce rate in nonabusive marriages	0.1299	0.1330	0.0645	0.0632
Employment rate for single/divorced women	0.6782	0.6734	0.7074	0.7104
Employment rate for married women	0.5873	0.5914	0.6010	0.6005
Employment rate for abused married women	0.3392	0.3279	0.7608	0.9381
Employment rate for nonabused married women	0.6032	0.5985	0.5791	0.5730
Abuse rate	0.0661	0.0490	0.0388	0.0341
Fraction of working wives that are abused	0.0153	0.0055	0.0784	0.0906
Fraction of non-working wives that are abused	0.0829	0.0505	0.0188	0.0073
	Age 45 to 59			
Fraction married	0.8814	0.8732		
Divorce rate in abusive marriages	0.6448	0.9500		
Divorce rate in nonabusive marriages	0.0175	0.0177		
Employment rate for divorced women	0.5870	0.5556		
Employment rate for married women	0.5786	0.5781		
Employment rate for abused married women	0.4955	0.7345		
Employment rate for nonabused married women	0.5514	0.5516		
Abuse rate	0.0151	0.0023		
Fraction of working wives that are abused	0.0127	0.0026		
Fraction of nonworking wives that are abused	0.0200	0.0063		

of the rise in employment for abused married women, with the opposite trend for older women.

The second experiment we consider is one designed to directly increase the costs of violence to abusive spouses. Such policies could include longer prison sentences for domestic violence or mandatory counseling programs for abusive men. We conduct the latter policy experiment within the model by reducing the gains to repeat abuse by 50%. Results of this exercise are presented in Table 8. Although the fraction of women that initially marry does not change, and the divorce rate does not change, this policy change serves as a substantial deterrent to abuse: The abuse rate falls by approximately 45% for women under 45 and by 90% for women 45 years of age and older. As consistent with the first experiment, increasing the cost of abuse serves to increase the employment rate of abused women aged 30 to 44. Before the policy change, women married to abusive spouses are aware that previous abuse is the primary determinant of the husband's current abuse decision. Thus, her employment choice is unlikely to have a large effect on his abuse decision. Now that the effect of repeat abuse has diminished, there are larger gains to working, as she is more likely to be able to prevent future abuse while remaining married through employment than before the policy change. In the static version of the model, 30–44-year-old women that are married and do

TABLE 8
EXPERIMENT 2: REDUCING THE GAINS TO REPEAT ABUSE BY 50% FOR ABUSIVE MEN

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8112	0.8149	0.8835	0.8966
Divorce rate in abusive marriages	0.5177	0.5172	0.0937	0.0765
Divorce rate in nonabusive marriages	0.1299	0.1329	0.0645	0.0502
Employment rate for single/divorced women	0.6782	0.6738	0.7074	0.7261
Employment rate for married women	0.5873	0.5897	0.6010	0.5935
Employment rate for abused married women	0.3392	0.3555	0.7608	0.9193
Employment rate for nonabused married women	0.6032	0.5957	0.5791	0.5739
Abuse rate	0.0661	0.0387	0.0388	0.0199
Fraction of working wives that are abused	0.0153	0.0012	0.0784	0.0463
Fraction of nonworking wives that are abused	0.0829	0.0399	0.0188	0.0036
	Age 45 to 59			
Fraction married	0.8814	0.8991		
Divorce rate in abusive marriages	0.6448	0.5491		
Divorce rate in nonabusive marriages	0.0175	0.0111		
Employment rate for divorced women	0.5870	0.6108		
Employment rate for married women	0.5786	0.5714		
Employment rate for abused married women	0.4955	0.4955		
Employment rate for nonabused married women	0.5514	0.5478		
Abuse rate	0.0151	0.0015		
Fraction of working wives that are abused	0.0127	0.0016		
Fraction of nonworking wives that are abused	0.0200	0.0051		

not respond to the policy by working as in the dynamic case, as they do not take into account the likelihood of being abused in the next period, nor their ability to change the likelihood of abuse through employment.

The final two experiments we consider are those designed to reduce the intergenerational effects of domestic violence. Such policies might be implemented in practice, for example, by re-socializing children from abusive homes through counseling programs. We implement this policy in the model by setting the family background preference parameters to zero. Results of these experiments are presented in Tables 9 and 10 for women and men, respectively. Eliminating the effect of a violent family background on women's marriage, divorce, and employment choices has virtually no impact on behavior. Women are equally likely to marry, divorce, and work as in the baseline scenario. Therefore, preventing future domestic violence by re-socializing women does not appear to be an effective strategy for combating domestic violence. In contrast, as illustrated in Table 10, men are very responsive to the policy change. After re-socializing men from violent homes so that their preferences over abuse are the same as those for men from nonviolent homes, abuse rates fall by between 26% and 48% as men from violent homes are no more likely to abuse than men with nonviolent backgrounds. Re-socialization

TABLE 9
EXPERIMENT 3: ELIMINATE THE EFFECT OF FAMILY BACKGROUND ON WIFE'S PREFERENCES OVER MARRIAGE AND EMPLOYMENT

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8112	0.8103	0.8835	0.8872
Divorce rate in abusive marriages	0.5177	0.5373	0.0937	0.0929
Divorce rate in nonabusive marriages	0.1299	0.1320	0.0645	0.0587
Employment rate for single/divorced women	0.6782	0.6664	0.7074	0.7220
Employment rate for married women	0.5873	0.6165	0.6010	0.5981
Employment rate for abused married women	0.3392	0.3746	0.7608	0.7559
Employment rate for nonabused married women	0.6032	0.6249	0.5791	0.5769
Abuse rate	0.0661	0.0580	0.0388	0.0367
Fraction of working wives that are abused	0.0153	0.0135	0.0784	0.0787
Fraction of nonworking wives that are abused	0.0829	0.0713	0.0188	0.0207
	Age 45 to 59			
Fraction married	0.8814	0.8831		
Divorce rate in abusive marriages	0.6448	0.6315		
Divorce rate in nonabusive marriages	0.0175	0.0148		
Employment rate for divorced women	0.5870	0.5703		
Employment rate for married women	0.5786	0.5911		
Employment rate for abused married women	0.4955	0.4941		
Employment rate for nonabused married women	0.5514	0.5645		
Abuse rate	0.0151	0.0148		
Fraction of working wives that are abused	0.0127	0.0129		
Fraction of nonworking wives that are abused	0.0200	0.0207		

has two impacts on domestic abuse: It prevents abuse from occurring in the first place, and since abuse is less likely to occur for the first time, the large effects of repeat abuse are also diminished. The policy change has virtually no impact on marriage rates, which is not surprising considering the high marriage rates in the baseline specification and the age range of the women in the sample. Although the aggregate divorce rate falls due to the fall in the number of abusive spouses, the divorce rate conditional on the presence of abuse remains unchanged as expected. It is interesting to note that the employment rates of abused women do not increase under this experiment: Since the effect of repeat abuse does not change, if the spouse does decide to abuse, there is little she can do to prevent future abuse apart from divorce.

5. CONCLUSION

The relationship between domestic abuse, employment, and divorce is considered in this article. The dominant effect of abuse on women's behavior is through divorce, although some women prevent abuse by working in nonabusive

TABLE 10
EXPERIMENT 4: ELIMINATE THE EFFECT OF FAMILY BACKGROUND ON HUSBAND'S PREDILECTION FOR ABUSE

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8112	0.8155	0.8835	0.8893
Divorce rate in abusive marriages	0.5177	0.5107	0.0937	0.0989
Divorce rate in nonabusive marriages	0.1299	0.1303	0.0645	0.0583
Employment rate for single/divorced women	0.6782	0.6771	0.7074	0.7082
Employment rate for married women	0.5873	0.5848	0.6010	0.6007
Employment rate for abused married women	0.3392	0.3534	0.7608	0.7250
Employment rate for nonabused married women	0.6032	0.5935	0.5791	0.5831
Abuse rate	0.0661	0.0495	0.0388	0.0219
Fraction of working wives that are abused	0.0153	0.0079	0.0784	0.0437
Fraction of nonworking wives that are abused	0.0829	0.0615	0.0188	0.0093
	Age 45 to 59			
Fraction married	0.8814	0.8909		
Divorce rate in abusive marriages	0.6448	0.6680		
Divorce rate in nonabusive marriages	0.0175	0.0168		
Employment rate for divorced women	0.5870	0.6112		
Employment rate for married women	0.5786	0.5762		
Employment rate for abused married women	0.4955	0.4257		
Employment rate for nonabused married women	0.5514	0.5527		
Abuse rate	0.0151	0.0078		
Fraction of working wives that are abused	0.0127	0.0059		
Fraction of nonworking wives that are abused	0.0200	0.0136		

marriages. The evidence presented on the importance of abuse in the divorce decision highlights the fact that many women observed in representative data respond to domestic violence by leaving the relationship. This finding is in stark contrast to the conventional notion of "learned helplessness," the portrayal of abused women as unable or unwilling to leave violent relationships. The results highlight the strong intergenerational effects of domestic violence, as observing domestic violence as a child dramatically increases the likelihood of abusing one's wife. The results also suggest women's employment decisions have a causal effect on abuse, as working women are less likely to be abused by their spouses. Although the results indicate a causal effect of employment on abuse, this is not true of the effect of abuse on employment. Both the stylized facts and the estimation results indicate that much of the lower employment rates of abused women are explained by the fact that abused women tend to have characteristics, such as violent family backgrounds and lower levels of education, that differ substantially from those in nonviolent marriages and reduce the gains to working.

The policy experiments illustrate an important link between employment and domestic violence: Women can use employment as a means to prevent a first incident of abuse in marriage. However, once the marriage has become

abusive, the only means for preventing future abuse is for women to divorce their spouses. Overall, the most effective policies for reducing abuse within marriage are those that directly target the behavior of men. Re-socializing men from violent homes, in particular, is a promising strategy for preventing domestic violence.

APPENDIX

A. Comparison of Average Characteristics for the Violence against Women and 1993 Survey of Consumer Finances Samples

Table A.1 compares similar samples from the VAWS and the 1993 SCF, a supplement of the Canadian Labor Force Survey similar to the March Current Population Survey in the United States, to assess the representativeness of the VAWS. Both samples are limited to women between the ages of 25 and 55 who are not attending school. The average characteristics of women in the VAWS and SCF data are similar, with three exceptions. First, total spousal income is higher in the SCF. It is likely that the measure of spousal income reported from the VAWS is inaccurate, as spousal income was constructed as the difference between the categorical variables"Total Personal Income" and "Total Household Income." Second, the proportion of women residing in an urban area is higher in the SCF. It should be noted that P.E.I. was not assigned a "Rural/Urban" indicator in the VAWS, and was thus coded as "Rural." Finally, the proportion of women with some post-secondary education is higher in the SCF and the proportions of women with high school and university degrees are lower. This latter difference could stem from coding or nonresponse pattern differences across the data sets. However, given the many similarities between the VAWS and the SCF especially in terms of employment patterns,[25] it does not appear that the high nonresponse rate for the VAWS resulted in an unrepresentative sample.

[25] In the VAWS, full-time employment applies to respondents reporting full-time work in the past year; in the SCF full-time employment applies to those reporting "mostly" working full-time in the reference year.

TABLE A.1

COMPARISON OF AVERAGE CHARACTERISTICS FOR THE VIOLENCE AGAINST WOMEN SURVEY AND THE SURVEY OF CONSUMER FINANCES (1993) SAMPLES

Variable	SCF93 (1992 Income)	VAW (1993)
Married	0.7643	0.7362
	(0.4245)	(0.4407)
Total personal income	20,448.48	21,933.72
	(130.0261)	(214.0748)
Total spousal income	39,439.08	30,404.59
	(286.5227)	(257.1105)
Age of respondent	38.6668	38.9941
	(0.0582)	(0.1038)
Respondent resides in Nfld., N.S.,	0.0819	0.0859
N.B. or P.E.I.	(0.0019)	(0.0034)
Respondent resides in Quebec	0.2555	0.2694
	(0.0030)	(0.0054)
Respondent resides in Ontario	0.3793	0.3624
	(0.0034)	(0.0059)
Respondent resides in AB., SK.,	0.1575	0.1657
or MN.	(0.0025)	(0.0045)
Respondent resides in B.C.	0.1191	0.1165
	(0.0022)	(0.0039)
Respondent resides in an urban area	0.8260	0.7456
	(0.0026)	(0.0053)
Highest level of education is less than high school	0.2311	0.2071
	(0.0029)	(0.0050)
Highest level of education is high school	0.2632	0.3197
	(0.0030)	(0.0057)
Highest level of education includes	0.3571	0.2964
some postsecondary education	(0.0033)	(0.0056)
Highest level of education is a	0.1486	0.1767
university degree	(0.0025)	(0.0047)
Respondent worked in the reference year	0.7882	0.7685
	(0.0028)	(0.0052)
Respondent worked or looked for work	0.8129	0.8165
in the reference year	(0.0027)	(0.0047)
Number of weeks worked for respondents	0.8767	0.8906
who reported working	(0.0020)	(0.0033)
Respondent worked full time	0.7652	0.7365
	(0.0036)	(0.0061)
Respondent worked part time	0.2212	0.2635
	(0.0035)	(0.0061)

NOTE: Standard deviations are in parentheses.

B. Estimation Results for Myopic Model

TABLE B.1

PREFERENCE PARAMETERS FOR WIVES

	Single Working	Married Not Working	Married Working	Divorced Working
		Women aged 15 to 30		
Abusive spouse		−2.1424	−1.0118	−0.3195
		(0.3127)	(4.1563)	(0.2234)
Female has violent background	−0.2967	0.1557	−0.7436	
	(0.1505)	(0.1015)	(3.3096)	
Child	−2.9033	0.3670	−0.8190	
	(0.2987)	(0.0843)	(3.4286)	
High school	0.8156	−0.0609	−0.1208	
	(0.0742)	(0.1707)	(1.9554)	
Postsecondary	1.2236	0.0951	−34.0461	
	(0.0746)	(0.0695)	(29.4153)	
		Women aged 30 to 45		
Abusive spouse		−3.6006	−1.9841	−0.4942
		(0.3967)	(0.7271)	(0.2050)
Female has violent background	0.1567	−0.0068	0.1489	
	(0.0940)	(0.1051)	(0.0804)	
Child	−0.6460	1.8845	0.7469	
	(0.1652)	(0.1050)	(0.0970)	
High school	1.2213	0.0193	0.6505	
	(0.0946)	(0.1036)	(0.1085)	
Postsecondary	2.1701	0.6695	1.4167	
	(0.0906)	(0.1032)	(0.1021)	
Age	1.0027	−0.6336	−0.0470	−0.8950
	(0.1369)	(0.2209)	(0.1354)	(0.1272)
		Women aged 45 to 60		
Abusive spouse		−6.1962	−6.7566	−1.0618
		(0.4106)	(0.5811)	(0.3014)
Female has violent background	2.6223	−1.6732	0.2397	
	(0.3065)	(0.1446)	(0.4610)	
Child	0.3532	1.3047	2.5500	
	(0.3515)	(0.2287)	(0.0982)	
High school	2.5993	−0.2300	1.3028	
	(0.5465)	(0.3828)	(0.4013)	
Postsecondary	2.6223	−1.6732	0.2397	
	(0.3713)	(0.1460)	(0.2638)	
Age	1.0027	4.1320	1.9935	−0.8950
	(0.1369)	(0.2428)	(0.3253)	(0.1272)
		Intercepts		
	0.6755	1.9812	−26.9644	0.0478
	(0.0911)	(0.0583)	(16.0000)	(0.0883)
		Marital-specific capital		
		−0.1396	−0.6989	
		(0.0953)	(0.1428)	
		Unobserved heterogeneity		
Working, type I				−2.3288
				(8.0000)
Probability				0.2606
Married, type I				0.0008
				(12.2243)
Probability				0.0478
Probability unknown spousal type is violent family background				0.5928
Log-likelihood value				−9737.7022

NOTE: Standard errors are in parentheses. Single, not working is the base category.

TABLE B.2
PREFERENCE PARAMETERS FOR HUSBANDS

	Wife Aged 15–29	Wife Aged 30–44	Wife Aged 45–59
Nonworking wife	−0.7562	1.7018	−0.0656
	(0.5178)	(0.0439)	(0.4199)
Working wife	3.7407	2.9234	3.5345
	(0.0945)	(0.2776)	(0.4563)
Family background	1.4531	2.1990	0.7754
	(0.0504)	(0.0963)	(0.1645)
Marital-specific capital			
Working wife			−0.1561
			(0.2790)
Nonworking wife			−3.9758
			(0.3142)
Abuse-specific capital			7.8881
			(0.2263)
Unobserved heterogeneity			
Abuse loading factor			−2.9777
			(0.0854)
Log-likelihood value			−9737.7022

NOTE: Standard errors are in parentheses. Not abusive is the base category.

C. *Simulation Results for Myopic Model*

TABLE C.1
COMPARISON OF ACTUAL AND PREDICTED CHOICES

	Actual	Predicted	Actual	Predicted
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8075	0.8054	0.8870	0.8887
Divorce rate in abusive marriages	0.4950	0.5842	0.0788	0.0817
Divorce rate in nonabusive marriages	0.1350	0.1300	0.0088	0.0660
Employment rate for single/divorced women	0.7040	0.6681	0.6990	0.7402
Employment rate for married women	0.6179	0.4593	0.5906	0.6291
Employment rate for abused married women			0.5869	0.8015
Employment rate for nonabused married women			0.5714	0.6038
Abuse rate	0.0731	0.0675	0.0326	0.0437
Fraction of working wives that are abused	0.0242	0.0150	0.0075	0.0651
Fraction of nonworking wives that are abused	0.0328	0.0618	0.0081	0.0174
	Age 45 to 59			
Fraction married	0.9069	0.9565		
Divorce rate in abusive marriages	0.5917	0.5112		
Divorce rate in nonabusive marriages	0.0000	0.0116		
Employment rate for divorced women	0.5887	0.7092		
Employment rate for married women	0.5850	0.5701		
Employment rate for abused married women	0.5088	0.6062		
Employment rate for nonabused married women	0.5870	0.5304		
Abuse rate	0.0257	0.0251		
Fraction of working wives that are abused	0.0227	0.0208		
Fraction of nonworking wives that are abused	0.0299	0.0350		

TABLE C.2
EXPERIMENT 1: REDUCE WIFE'S TOLERANCE FOR ABUSE BY 50%

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8054	0.7988	0.8887	0.8888
Divorce rate in abusive marriages	0.5842	0.7604	0.0817	0.1907
Divorce rate in nonabusive marriages	0.1300	0.1302	0.0660	0.0648
Employment rate for single/divorced women	0.6681	0.6538	0.7402	0.7361
Employment rate for married women	0.4593	0.4671	0.6291	0.6251
Employment rate for abused married women	0.2012	0.2645	0.8015	0.8407
Employment rate for nonabused married women	0.4616	0.4639	0.6038	0.5991
Abuse rate	0.0675	0.0591	0.0437	0.0285
Fraction of working wives that are abused	0.0150	0.0142	0.0651	0.0492
Fraction of nonworking wives that are abused	0.0618	0.0353	0.0174	0.0079
	Age 45 to 59			
Fraction married	0.9565	0.9593		
Divorce rate in abusive marriages	0.5112	0.6582		
Divorce rate in nonabusive marriages	0.0116	0.0108		
Employment rate for divorced women	0.7092	0.6768		
Employment rate for married women	0.5701	0.5780		
Employment rate for abused married women	0.6062	0.9595		
Employment rate for nonabused married women	0.5304	0.5315		
Abuse rate	0.0251	0.0153		
Fraction of working wives that are abused	0.0208	0.0166		
Fraction of nonworking wives that are abused	0.0350	0.0207		

TABLE C.3
EXPERIMENT 2: REDUCING THE GAINS TO REPEAT ABUSE BY 50% FOR ABUSIVE MEN

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8054	0.8060	0.8887	0.9004
Divorce rate in abusive marriages	0.5842	0.5757	0.0817	0.1290
Divorce rate in nonabusive marriages	0.1300	0.1323	0.0660	0.0519
Employment rate for single/divorced women	0.6681	0.6716	0.7402	0.7546
Employment rate for married women	0.4593	0.4563	0.6291	0.6180
Employment rate for abused married women	0.2012	0.1943	0.8015	0.8236
Employment rate for nonabused married women	0.4616	0.4655	0.6038	0.5972
Abuse rate	0.0675	0.0510	0.0437	0.0247
Fraction of working wives that are abused	0.0150	0.0040	0.0651	0.0467
Fraction of nonworking wives that are abused	0.0618	0.0179	0.0174	0.0081
	Age 45 to 59			
Fraction married	0.9565	0.9633		
Divorce rate in abusive marriages	0.5112	0.4854		
Divorce rate in nonabusive marriages	0.0116	0.0118		
Employment rate for divorced women	0.7092	0.7217		
Employment rate for married women	0.5701	0.5691		
Employment rate for abused married women	0.6062	0.7182		
Employment rate for nonabused married women	0.5304	0.5301		
Abuse rate	0.0251	0.0078		
Fraction of working wives that are abused	0.0208	0.0050		
Fraction of nonworking wives that are abused	0.0350	0.0200		

TABLE C.4

EXPERIMENT 3: ELIMINATE THE EFFECT OF FAMILY BACKGROUND ON WIFE'S PREFERENCES OVER MARRIAGE AND EMPLOYMENT

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8054	0.8032	0.8887	0.8884
Divorce rate in abusive marriages	0.5842	0.5823	0.0817	0.0950
Divorce rate in nonabusive marriages	0.1300	0.1353	0.0660	0.0648
Employment rate for single/divorced women	0.6681	0.6762	0.7402	0.7351
Employment rate for married women	0.4593	0.4674	0.6291	0.6227
Employment rate for abused married women	0.2012	0.2163	0.8015	0.8000
Employment Rate for nonabused married women	0.4616	0.4810	0.6038	0.5981
Abuse rate	0.0675	0.0656	0.0437	0.0428
Fraction of working wives that are abused	0.0150	0.0185	0.0651	0.0620
Fraction of nonworking wives that are abused	0.0618	0.0584	0.0174	0.0177
	Age 45 to 59			
Fraction married	0.9565	0.9596		
Divorce rate in abusive marriages	0.5112	0.4900		
Divorce rate in nonabusive marriages	0.0116	0.0102		
Employment rate for divorced women	0.7092	0.7013		
Employment rate for married women	0.5701	0.5785		
Employment rate for abused married women	0.6062	0.5799		
Employment rate for nonabused married women	0.5304	0.5397		
Abuse rate	0.0251	0.0243		
Fraction of working wives that are abused	0.0208	0.0204		
Fraction of nonworking wives that are abused	0.0350	0.0335		

TABLE C.5

EXPERIMENT 4: ELIMINATE THE EFFECT OF FAMILY BACKGROUND ON HUSBAND'S PREDILECTION FOR ABUSE

	Baseline	Policy	Baseline	Policy
	Age 15 to 29		Age 30 to 44	
Fraction married	0.8054	0.8095	0.8887	0.8938
Divorce rate in abusive marriages	0.5842	0.5668	0.0817	0.0746
Divorce rate in nonabusive marriages	0.1300	0.1326	0.0660	0.0590
Employment rate for single/divorced women	0.6681	0.6796	0.7402	0.7454
Employment rate for married women	0.4593	0.4505	0.6291	0.6222
Employment rate for abused married Women	0.2012	0.1951	0.8015	0.8048
Employment rate for nonabused married women	0.4616	0.4576	0.6038	0.6021
Abuse rate	0.0675	0.0477	0.0437	0.0246
Fraction of working wives that are abused	0.0150	0.0100	0.0651	0.0311
Fraction of nonworking wives that are abused	0.0618	0.0437	0.0174	0.0070
	Age 45 to 59			
Fraction married	0.9565	0.9643		
Divorce rate in abusive marriages	0.5112	0.5316		
Divorce rate in nonabusive marriages	0.0116	0.0118		
Employment rate for divorced women	0.7092	0.7482		
Employment rate for married women	0.5701	0.5681		
Employment rate for abused married women	0.6062	0.5586		
Employment rate for nonabused married women	0.5304	0.5315		
Abuse rate	0.0251	0.0143		
Fraction of working wives that are abused	0.0208	0.0105		
Fraction of nonworking wives that are abused	0.0350	0.0238		

REFERENCES

DUTTON, D. G., *The Domestic Assault of Women: Psychological and Criminal Justice Perspectives* (Vancouver: University of British Columbia Press, 1995).

ECKSTEIN, Z., AND K. WOLPIN, "Dynamic Labor Force Participation of Married Women and Endogenous Work Experience," *Review of Economic Studies* 56 (1989), 375–90.

FARMER, A., AND J. TIEFENTHALER, "An Economic Analysis of Domestic Violence," *Review of Social Economy* 55 (1997), 337–58.

FLEMING, J. B., *Stopping Wife Abuse* (Garden City, NY: Anchor, 1979).

JOHNSON, W. R., AND J. SKINNER, "Labor Supply and Marital Separation," *American Economic Review* 76 (1986), 455–69.

KINGSTON-RIECHERS, J., "Does Economic Status Affect the Frequency of Domestic Abuse?" Mimeo, McMaster University, 1997.

——, "The Association Between the Frequency of Wife Assault and Marital Dissolution in Canada," *Journal of Population Economics* 14 (2001), 351–65.

LLOYD, S., "The Effects of Domestic Violence on Women's Employment," *Law and Policy*, 19 (1997a) 139–670.

——, "The Effects of Violence on Women's Employment," Institute for Policy Research Working Paper 97-4, 1997b.

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

POLLAK, R., "An Intergenerational Model of Domestic Violence," *Journal of Population Economics*, 17 (2004), 311–29.

RATNER, P. A., "Modelling Acts of Aggression and Dominance as Wife Abuse and Exploring Their Adverse Health Effects," *Journal of Marriage and the Family* 60 (1998), 453–65.

STATISTICS CANADA, "The Violence Against Women Survey: Highlights," *The Daily,* Thursday, November 18, 1993a.

——, *Violence Against Women Survey, Control Form*, 1993b.

——, *Violence Against Women Survey, Public Use Micro Data File Documentation and User's Guide*, 1994a.

——, "Wife Assault in Canada," *Canadian Social Trends* (1994b).

STRAUS, M. A., AND R. J. GELLES, "Societal Change and Change in Family Violence from 1975 to 1985 as Revealed in Two National Surveys," 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 Books, 1992), 113–27.

——, AND S. STEINMETZ, *Behind Closed Doors: Violence in the American Family* (Garden City, NY: Anchor/Doubleday, 1980).

TAUCHEN, H. V., A. D. WITTE, AND S. K. LONG, "Domestic Violence: A Nonrandom Affair," *International Economic Review* 32 (1991), 491–511.

THOMPSON, M. P., L. E. SALTZMAN, AND H. JOHNSON, "Risk Factors for Physical Injury among Women Assaulted by Current or Former Spouses," *Violence against Women* 7 (2001), 886–99.

VAN DER KLAAUW, W., "Female Labor Supply and Marital Status Decisions: A Life-Cycle Model," *Review of Economic Studies* 63 (1996), 199–235.

WALKER, L., *The Battered Woman* (New York: Harper & Row, 1979).

WEIS, J. G., "Family Violence Research Methodology and Design," in L. Ohlin and M. Tonry, eds., *Family Violence* (Chicago: University of Chicago Press, 1989), 117–62.

WILSON, M., H. JOHNSON, AND M. DALY, "Lethal and Nonlethal Violence against Wives," *Canadian Journal of Criminology* 37 (1995), 331–61.