Domestic Violence, Employment and Divorce

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Abstract

Conventional wisdom on domestic abuse suggests that the typical abused woman gets caught in a 'cycle of violence' and is unable or unwilling to leave her abusive spouse. We set out to study such phenomena in this paper, and in doing so, make two contributions to the literature. First, using unique, representative data on domestic violence, we show that conventional wisdom is false: the vast majority of violent marriages end in divorce and many husbands stop abusing their wives. Second, we construct a sequential model of employment, divorce, and abuse to study the patterns of behavior observed in the data. The results indicate abuse is the primary factor in the decision to divorce and witnessing violence as a child is a strong predictor of becoming an abusive spouse. Further, although husbands are more likely to abuse women that are not working, there is no evidence to suggest that women change their employment decisions as a result of domestic violence. Policy experiments suggest men are more responsive to policies designed to reduce the gains to repeat abuse than women are to policies reducing the cost of leaving violent marriages and policies designed to eliminate the inter-generational effects of domestic violence on men may be a promising strategy for preventing abuse.

1 Introduction

Domestic abuse[1] is a social issue of concern to individuals and policy makers alike. The magnitude of the problem may be surprising: estimates from the Canadian Violence Against Women Survey (VAWS) indicate that 29% of ever-married Canadian women (Statistics Canada, 1993a, p.4) and 50% of divorced women have been victims of abuse.[2] 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. For example, Dutton (1995, p.167) comments:

> *Casual discussion with police or other professionals typically generates an account of a woman who needed police intervention to save her life, who agreed to charge her husband, and who was given shelter in a transition home. After a few weeks, despite the support of transition house staff and in the absence of face-to-face contact with her husband, she decides abruptly to return to the marriage and drop the charges. The state is left without its key witness if it proceeds to trial, the police mutter knowingly about 'these women always dropping the charges,' and inexperienced transition-home workers wonder what they did wrong.*

The goal of this paper is to study the behavior of men and women in abusive relationships using unique, representative data on domestic violence. We set out to determine who abuses, who is abused, and who decides to leave violent marriages. We also study the relationship

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[1]The expressions domestic abuse and domestic violence shall be used interchangeably in this paper.

[2]The VAWS defines domestic violence as including any of the following activites: threatening to hit, pushing, grabbing, shoving, slapping, kicking, hitting, biting, beating, choking, threatening to use or using a gun or knife or sexual assault.

between abuse and employment, as employment decisions could break, or reinforce, a cycle of violence or learned helplessness. In doing so, our paper makes two contributions to the literature on domestic violence. First, using unique data on domestic abuse, we document several stylized facts about abuse using the 1993 VAWS. The VAWS, which contains a large, random sample of women, is one of the most representative data sets currently available on domestic violence.[3] This is in direct contrast to most data sources on domestic violence that contain small, select samples. 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 (1) the vast majority of violent marriages end in divorce, and (2) many husbands stop abusing their wives before divorce occurs. We also find that (3) the average characteristics of abused wives and abusive husbands are markedly different from their counterparts in non-violent marriages. Finally, there is some limited evidence of a cycle of abuse through employment as (4) abused women have slightly lower employment rates and (5) men are slightly more likely to abuse non-working wives.

The sample statistics we present raise several questions: Does a 'cycle of violence' arise due to causal effects of employment on abuse and causal effects of abuse on employment? Are there causal effects of abuse on divorce and of the threat of divorce on abuse? Alternatively, are the correlations in the data merely driven by correlations in the observed and unobserved characteristics determining who abuses, who is abused and who works? The second contribution of our paper is to construct and estimate a model that is able to answer these questions. Such a model needs to incorporate the sequential nature of the choices fac-

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[3]Several studies outside the economic literature have studied these data extensively. For example, Thompson, Saltzman and Johnson (2001) and Ratner (1998) document the determinants of suffering injury from physical abuse in the VAWS and the health effects of abuse, respectively. Wilson, Johnson and Daly (1995) consider the demographic correlates of domestic violence.

ing women and their partners, allow both partners to be forward looking such that they take into account the potential responses of the other party to their actions, and endogenize the main decisions of marriage, employment, and abuse. To develop such a model we build a dynamic, structural framework that incorporates features from previous economic models of domestic violence but also goes beyond these frameworks to take advantage of the data we have at our disposal. We then estimate the underlying structural parameters and use them to illustrate the impact of various policy initiatives.

Important features of the model include the following. First, 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. Second, to capture the relationship between domestic violence and divorce, men and women make decisions sequentially in the model: women make employment decisions taking into account how their behavior influences the likelihood of experiencing abuse in the future and men decide whether to abuse taking into account the likelihood their wives will divorce them. Third, we also incorporate both observed and unobserved heterogeneity in characteristics that determine the female's preferences for marriage and employment and the male's predilection for violence in the model to reflect the heterogeneity evident in the samples of abusive and non-abusive relationships. To estimate the model, we use data from the VAWS on initial marriage formations, 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.

One of our main innovations is the use of the available data to estimate a dynamic structural model. The ordering we impose in the model is fairly intuitive and has the feature that individuals are affected by past choices of their spouse and take into account future choices when making their current decisions. We note that this analysis would not be possible without the retrospective information in the VAWS, which allows us to use a cross-section data set to study a dynamic problem. We estimate the transitions into marriage, from marriage to divorce, and the full sequence of abuse decisions. While there is adequate information on marital and abuse histories, there is only current information on employment. Therefore, we estimate current employment decisions and integrate out all earlier employment decisions. As such, we are limited in the degree to which we can study the dynamic relationships between employment and abuse. Finally, because we have limited information on men in the survey, we simplify the analysis by modelling the choices of husbands and wives as sequential rather than simultaneous. Information on the timing of events in the data, as well as information on violence in the family of origin, allows us to separately identify the causal relationships between abuse, divorce, and employment from the correlations between the characteristics determining divorce, employment, and abuse.

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 non-violent marriages. What is also important in explaining the high divorce rates among abused women, however, is the strong correlation between the observed individual characteristics of women who are abused and those of women who divorce. 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 woman's age. This highlights the importance of inter-generational effects of domestic violence. Third, we find very little evidence of causal relationships between employment and abuse. On the one

hand, the lower employment rates of abused women observed in the raw data are attributed to differences in exogenous characteristics, as we find no evidence of a negative causal effect of abuse on employment. In fact, the age group (30-44) where we find any significant effect, the effect is positive. On the other hand, employment is found to reduce the likelihood a husband abuses his wife, but only in the case of women under the age of 30. Finally, results from policy experiments highlight the potential of policies aimed at reducing the inter-generational effects of violence for husbands and reducing the gain to repeat abuse for spouses to reduce domestic violence rates.

Our work is related to a small but growing literature that studies the economic implications of abuse. Tauchen, Witte and Long (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 tranfer 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, Witte and Long, 1991; Farmer and Tiefenthaler, 1997; Kingston-Riechers, 1997). The papers in this literature, while providing an important first step in our understanding of domestic violence, tended 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 learning their spouse's behavior, and may therefore present 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). While 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 likely have important

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consequences for any inference regarding domestic violence and are addressed in our paper.

The remainder of the paper 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. We outline our approach for estimating the model in Section 4. The estimation results and policy experiments are presented in Section 5. Section 6 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, Witte and Long, 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 under-reporting. 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 non-response 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 non-response 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 under-reporting of domestic violence is diminished to a large extent.[4]

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.[5] In this context, violence in the family of origin refers to whether the respondent or 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.

To conduct our analysis, we impose the following restrictions on the sample. First, to

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[4]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 in terms of educational attainments. See Appendix A for further details.

[5]For the purpose of this paper, 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 reported as living common-law.

reduce the number of women currently receiving schooling and women not participating in the labor force for retirement reasons, the age range of the sample is restricted to women aged 25-55 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 but not living with their spouse (112) and widows (87) are eliminated from the sample. Women who are remarried more than one 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% remain single, 74% remain in their first marriage, 8% are divorced and currently single and 10% are remarried. Below, we document several empirical regularities regarding marriage, divorce and domestic violence that are found in the data.

The average characteristics of abused women vary considerably from those of non-abused women

A number of past studies on domestic violence rely upon samples of women in abusive marriages at the time of the survey. As a starting point, we therefore 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. For the purposes of our analysis, abuse is defined as an indicator equal to one if the highest level of reported abuse involves kicking, biting, beating, choking, threatening to use or using a gun or knife, or sexual assault.[6] The sample statistics are presented in Table 1. Many characteristics of women differ depending on the presence of abuse: women who experience abuse have lower

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[6]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 paper.

levels of education and are more likely to come from violent homes than women who are not abused.[7] 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 non-abusive husbands

The characteristics of abusive and non-abusive 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, Gelles 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 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 twelve months and are much less likely to have a university education than non-abusive spouses.

Most 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 may be more likely to divorce. Table 2 supports this claim, as divorce rates for women abused in first marriages are dramatically different than those for non-abused women: while the divorce rate for non-abused women is 12%, women who report abuse in a first marriage have a divorce rate of 73%.[8] 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

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[7]Fleming (1997) also reports that one-third of abused women witnessed domestic violence against their mothers.

[8]Lloyd (1997b) also finds that women who experienced severe abuse are more likely to be divorced in her data on low-income families.

of their use of non-random samples. Many psychological studies utilize small samples of women in shelters or in counselling. 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.

Many husbands stop abusing their wives before a divorce occurs

For all marriages ongoing at the survey date, the VAWS contains information on the starting and ending dates of abuse in current marriages. We use this information to determine the duration of abuse within marriage. Table 3 presents the duration since the last incident of abuse, in years, for current marriages that are abusive at some point in the relationship. It is particularly interesting to note that over 39.5% of violent husbands start and stop abusing their wives within the same year. Further, in only 23% of ongoing marriages that were abusive at some point did abuse occur within the past 12 months. The statistics therefore indicate that domestic violence may in fact end within marriage before a divorce occurs and that abuse, therefore, may not be an innate characteristic beyond the control of abusive men.

Abused women are less likely to work than non-abused women; Husbands are less likely to abuse if their wives are working

Table 4 presents comparisons of current labor force behavior for abused and non-abused women. To examine the relationship between current domestic violence and current employment, we define abuse as an indicator equal to one if the respondent reported that the most recent incident of abuse occurred within the past 12 months. The statistics indicate that abused women are less likely to choose full-year employment than women experiencing no abuse. It appears that women are also less likely to work if the abuse occurred prior to the past 12 months. In particular, divorced women who were abused in the past marriage exhibit an employment rate that is 16% below that of non-abused divorced women. Table 5 considers abuse rates within the past 12 months for women who are currently working as

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compared to those who are not currently working. Although abuse rates within the past twelve months are very low in all cases, it is still the case that working women are slightly less likely to experience abuse in the past year than women who are not working. 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 non-abused samples and that domestic abuse is correlated with divorce and with women's 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.

3   Model

In this section, we present a model that describes the marriage, divorce, abuse and employment decisions of households. Building on the work of Tauchen, Witte and Long (1991), our model explicitly considers the husband's decision to abuse his wife. It also incorporates important aspects of the wife's divorce and employment decisions within a multi-state, finite horizon framework.

The model is designed to account for the empirical regularities outlined above as follows. First, the stylized facts indicate a strong correlation between abuse and divorce. To account for the causal effect of abuse on divorce, we allow women to receive disutility from abuse and to respond to domestic violence by divorcing their spouses in the next period. Divorce is clearly a decision that is dynamic in nature and is a primary motivation for the dynamics in the framework adopted here. Since both partners are forward-looking in the model, husbands must take into account their wives' preferences over abuse and the possibility

they will initiate divorce in the future when husbands are deciding whether to be abusive today. This feature of the model allows us to capture both the high divorce rate for abusive marriages and the fact that many men start and then stop being abusive within marriage.

Second, 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, Witte and Long (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. In particular, married women may be more or less likely to work in the next period to avoid future abuse in the marriage. This feature of the model allows future domestic violence to play a role in the determination of the wife's current employment status and allows the employment decisions of wives to influence the abuse decisions of husbands.[9]

Finally, the model also allows men and women to assume several discrete, time invariant, exogenous types, $l \in L$ and $k \in K$, respectively. Each individual has type-specific preferences over his/her own behavior in the current period and over the decisions taken by their spouse in the previous period. Individuals do not have preferences over their spouse's type but know how types are related to a husband's propensity to abuse and a wife's propensity to work and divorce. Women thus use information on a potential spouse's type, observed before marriage, when deciding to match. Individual heterogeneity is introduced in the model to capture the differences in characteristics of husbands and wives across abusive and non-abusive marriages that are highlighted in Section 2. The introduction of individual

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[9]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 paper as no information is available in the data on employment histories and labor market experience.

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heterogeneity also allows us to assess whether the low employment rates of abused women can be attributed to causal effects of abuse on employment or to different individual characteristics, either observed to the econometrician or unobserved, that jointly determine who works and who marries an abusive spouse.

The decisions of husbands and wives are modelled 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.[10] Denote the choice set for husbands $J = \{a, na\}$.

3.1 Women

Let $V^w(i_t, k, l, j_{t-1}, M_t, A_t)$ denote the value function for a woman of type k taking decision i in period t, married to a husband of type l who made decision j in period $t-1$. For single women, l is equal to zero. M_t is a measure of marital-specific capital, an indicator equal to one if the woman chose marriage in $t-2$ and zero otherwise. Finally, A_t is an indicator equal to one 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

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

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period. Women do not experience abusive behavior before marriage. However, they do observe their (potential) spouses' exogenous types and take into account the relationship between spousal type and the expected future response of husbands to their wives' actions when the wives are deciding whether to marry and work today. For women, the value of choice i in period t is described by:

$$V^w(i_t, k, l, j_{t-1}, M_t, A_t) = u^w(i_t, k, j_{t-1}, M_t) + \varepsilon_{it}^w$$
$$+ \beta E\left[\tilde{V}^w(k, l, j_{t+1}, M_{t+2}, A_{t+2}) | i_t, k, l, j_{t-1}, M_t, A_t\right], \quad (1)$$

where β is the discount factor and ε_{it}^w is an idiosyncratic component of utility. The corresponding Bellman equation is:

$$\tilde{V}^w(k, l, j_{t-1}, M_t, A_t) = \max_{i_t \in I}\left\{V^w(i_t, k, l, j_{t-1}, M_t, A_t)\right\}. \quad (2)$$

Denote $\gamma(l)$ the probability a single woman meets a potential spouse of type l. After observing the potential spouse's type, she decides whether to marry and to work in the future. The expected future value for a woman that is single today is described by:

$$E\left[\tilde{V}^w(k, l, j_{t+1}, 0, 0) | i_t \in \{sn, sh\}, k, 0, na, 0, 0\right] =$$
$$\sum_{l \in L} \gamma(l) E_{\varepsilon_{it+2}^w}\left[\tilde{V}^w(k, l, j_{t+1}, 0, 0) | i_t, k, 0, na, 0, 0\right]\Big\}, \quad (3)$$

where $\sum_{l \in L} \gamma(l) = 1$. Note that for women who do not have a current spouse $l = 0$ and for women who do not have a previous spouse $j_{t-1} = na$, $M_t = 0$ and $A_t = 0$.

After a marriage is formed, men decide whether to abuse their wives. Past abuse directly influences the utility women receive in the current period. The expected future value for women who are married today is:

$$E\left[\tilde{V}^w(k, l, j_{t+1}, 1, A_{t+2}) | i_t \in \{mn, mh\}, k, l, j_{t-1}, M_t, A_t\right] =$$
$$\sum_{j_{t+1} \in \{a, na\}} \Upsilon^h(j_{t+1}, l, k, i_t, k, M_{t+1}, A_{t+1}) E_{\varepsilon_{it+2}^w}\left[\tilde{V}^w(k, l, j_{t+1}, 1, A_{t+2}) | i_t, k, l, j_{t-1}, M_t, A_t\right]\Big\},$$
$$(4)$$

where the expected value of future utility depends not only on the past choices of her spouse through j_{t-1} and A_t but also on the realization of ε^w_{it+2}, her husband's expected choices conditional on her actions today ($\Upsilon^h(j_{t+1}, l, k, i_t, M_{t+1}, A_{t+1})$), and the length of her current marriage, M_t.

3.2   Husbands

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

$$V^h(j_t, l, k, i_{t-1}, M_t, A_t) = u^h(j_t, l, i_{t-1}, M_t, A_t) + \varepsilon^h_{jt}$$
$$+ \beta E\Big[V^h(j_{t+2}, l, k, i_{t+1}, M_{t+2}, A_{t+2})|j_t, l, k, i_{t-1}, M_t, A_t\Big], \quad (5)$$

and the Bellman equation is:

$$\tilde{V}^h(l, k, i_{t-1}, M_t, A_t) = \max_{j_t \in J}\Big\{V^h(j_t, l, k, i_{t-1}, M_t, A_t)\Big\}. \quad (6)$$

The Bellman equation for a divorced man is:

$$\tilde{V}^h(d_t, l) = u^h_d(l) + \varepsilon^h_{dt} + \beta \sum_{k \in K} \gamma(k) E_{\varepsilon^h_{jt+2}}\Big[\tilde{V}^h(l, k, i_{t+1}, 0, 0)|na, l, 0, i_{t-1}, 0, 0\Big], \quad (7)$$

where $\gamma(k)$ is the probability a single man meets a potential spouse of type k. The expected future value of utility for men is then described by:

$$E\Big[\tilde{V}^h(l, k, i_{t+1}, M_{t+2}, A_{t+2})|j_t, l, k, i_{t-1}, M_t, A_t\Big] =$$
$$\sum_{i_{t+1} \in \{mn, mh\}} \Upsilon^w(i_{t+1}, k, l, j_t, M_{t+1}, A_{t+1}) E_{\varepsilon^h_{jt+2}}\Big[\tilde{V}^h(l, k, i_{t+1}, M_{t+2}, A_{t+2})|j_t, l, k, i_{t-1}, M_t, A_t\Big]$$
$$+ \sum_{i_{t+1} \in \{sn, sh\}} \Upsilon^w(i_{t+1}, k, l, j_t, M_{t+1}, A_{t+1}) E_{\varepsilon^h_{jt+2}}\Big[\tilde{V}_h(d_{t+2}, l)|j_t, l, k, i_{t-1}, M_t, A_t\Big]. \quad (8)$$

It depends on the realization of ε^h_{jt+2} and the expected response of his wife in the next period, $\Upsilon^w(i_{t+1}, k, l, j_t, M_{t+1}, A_{t+1})$, including the probability she chooses to divorce. The

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female's tolerance of abuse and the ease with which she can leave the marriage thus becomes a key issue in determining whether he decides to abuse her.

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

$$\Upsilon^h(j_{t+1}, l, k, i_t, M_{t+1}, A_{t+1}) = \frac{exp\{V^h(j_{t+1}, l, k, i_t, M_{t+1}, A_{t+1}) - \varepsilon_{jt+1}^h\}}{\sum_{r \in J} exp\{V^h(r_{t+1}, l, k, i_t, M_{t+1}, A_{t+1}) - \varepsilon_{rt+1}^h\}}, \quad (9)$$

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

$$\Upsilon^w(i_{t+1}, k, l, j_t, M_{t+1}, A_{t+1}) = \frac{exp\{V^w(i_{t+1}, k, l, j_t, M_{t+1}, A_{t+1}) - \varepsilon_{it+1}^w\}}{\sum_{r \in I} exp\{V^w(r_{t+1}, k, l, j_t, M_{t+1}, A_{t+1}) - \varepsilon_{rt+1}^w\}}. \quad (10)$$

3.3 Terminal Conditions

In period $T - 1$, men no longer make decisions and receive no utility in the future. The terminal value functions for husbands are

$$V^h(j_{T-1}, l, k, i_{T-2}, M_{T-1}, A_{T-1}) = u^h(j_{T-1}, l, i_{T-2}, M_{T-1}, A_{T-1}) + \varepsilon_{T-1}^{jh}$$

$$+ \beta \sum_{i_T \in \{mn, mh\}} \Upsilon^w(i_T, k, l, j_{T-1}, M_T, A_T) E_{\varepsilon_{T+1}^h}[u^h(j_{T-1}, l, i_T, M_{T-1}, A_{T-1}) + \varepsilon_{T+1}^{jh}]$$

$$+ \beta \sum_{i_T \in \{sn, sh\}} \Upsilon^w(i_T, k, l, j_{T-1}, M_T, A_T) E_{\varepsilon_{T+1}^h}[u^h(d_{T+1}, l) + \varepsilon_{T+1}^h], \quad (11)$$

if $i_{T-2} \in \{mn, mh\}$ and

$$V^h(d_{T-1}, l) = u^h(d_{T-1}, l) + \varepsilon_{jT-1}^h + \beta E_{\varepsilon_{T+1}^h}[u^h(d_{T+1}, l) + \varepsilon_{T+1}^h], \quad (12)$$

if $i_{T-2} \in \{sn, sh\}$. In period T, 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

$$V^w(i_T, k, l, j_{T-1}, M_T, A_T) = u^w(i_T, k, j_T, M_T, A_T) + \varepsilon_{iT}^w.$$

$$(13)$$

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_{it}^{w*} such that women prefer to be single and not working for values of $\varepsilon_{snt}^{w} - \varepsilon_{it}^{w}$ above ε_{it}^{w*} and would like to choose state i for values of $\varepsilon_{snt}^{w} - \varepsilon_{it}^{w}$ below ε_{it}^{w*} for every state $i, i \in \{sh, mn, mh\}$; ε_{it}^{w*} is the value such that

$$V^{w}(i_t, k, l, j_{t-1}, M_t, A_t) + \varepsilon_{snt}^{w} - \varepsilon_{it}^{w} = V^{w}(sn_t, k, l, j_{t-1}, M_t, A_t) + \varepsilon_{it}^{w*} \tag{14}$$

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

$$\varepsilon_{it}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{it}^{w*}, \tag{15}$$

and the optimal policy is given by:

$$i_t = \begin{cases} sn & \text{iff } \varepsilon_{snt}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{snt}^{w*}, \ \forall i' \in I \\ sh & \text{iff } \varepsilon_{sht}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{sht}^{w*}, \ \forall i' \in I \\ mn & \text{iff } \varepsilon_{mnt}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{mnt}^{w*}, \ \forall i' \in I \\ mh & \text{iff } \varepsilon_{mht}^{w} - \varepsilon_{i't}^{w} \geq \varepsilon_{i't}^{w*} - \varepsilon_{mht}^{w*}, \ \forall i' \in I. \end{cases} \tag{16}$$

Similarly, for husbands, define ε_{nat}^{h*} such that husbands prefer to be non-abusive 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

$$V^{h}(a_t, l, k, i_{t-1}, M_t, A_t) + \varepsilon_{nat}^{h} - \varepsilon_{at}^{h} = V^{h}(na_t, l, k, i_{t-1}, M_t, A_t) + \varepsilon_{nat}^{h*} \tag{17}$$

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 non-abusive marriage. The state yielding the highest level of utility satisfies

$$\varepsilon_{at}^{h} - \varepsilon_{nat}^{h} \geq \varepsilon_{nat}^{h*}, \tag{18}$$

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and the optimal policy for abuse is therefore:

$$j_t = \begin{cases} a & \text{iff } \varepsilon_{at}^h - \varepsilon_{nat}^h \geq \varepsilon_{nat}^{h*} \\ na & \text{otherwise.} \end{cases} \tag{19}$$

4   Econometric Specification

The model outlined in Section 3 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. In combination with information on current age, we have sufficient information to estimate a dynamic model of behavior for both sets of 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 therefore 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 available on the current employment status of women, but no information is available on the employment history.

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 5 *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, individuals are assumed to make marriage, abuse, and employment decisions. Each of these stages of life is composed of 4 *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.

The heart of the model occurs within stages 2 to 4 when all decisions are made. Women are assumed to control the marital status decision, where all men prefer marriage to remaining single. To limit the number of potential spouses, we assume that during each person's life only three potential spouses are ever available for marriage - one in each of stages 2, 3, and 4. It is further assumed that the potential spouse is only available at the beginning of a stage and only to those who are not already married. Thus, if a man or a woman enters a stage married, they forego the alternative spouse available in that stage of life. Similarly, women or men who divorce during a stage must wait until the next stage to meet a new spouse. And single men or women can only marry at the beginning of each stage; otherwise, they forego that opportunity until the next stage. Finally, women or men who enter the 5th and final stage unmarried have no choice but to remain unmarried. The full sequence of decisions for single women and for married women and their spouses at the beginning of each stage is illustrated in Figures 1 and 2, respectively.

Once a marriage is established, the spouses are assumed to move through a series of

decisions. If a woman decides to marry, she also makes a decision to work or not. After observing his wife's employment decision, the husband decides whether to be abusive or not. Following her husband's abuse decision, a married woman decides whether to divorce her husband or remain married and whether to work or not. If the marriage remains together, the husband again decides whether or not to abuse his wife in the fourth and final period of the stage.

For simplicity, the following restrictions on the number of decisions within a stage are made. Single women, as illustrated in Figure 1, who decide at the beginning of a stage to reject the one available prospective spouse, make only one employment decision, which occurs at the beginning of the stage and can not be changed until the next stage. Couples who enter a stage married are restricted to a single period instead of the two described above. 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. Since the data on marital and abuse histories is limited, the above simplifications serve to reduce the number of decisions we must integrate over when estimating the model. Finally, although men do not make decisions in the final stage of life, we do allow women to make marital and employment status decisions at the very beginning of the final stage 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.

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, as discussed in the previous section, and the solution to the model is used to construct the likelihood function.

4.1 Specification for Husbands

As mentioned above, husbands decide whether to abuse in even periods, following the decisions of women to marry or remain married, and abuse is defined as an indicator equal to one if the husband inflicts high severity abuse on his wife. 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, while 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 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. We, therefore, define abuse in each model period as an indicator equal to one for women reporting high severity abuse in the marriage and any abuse during the model time period, zero otherwise.

Information on husbands in the data varies across current and past marriages. While 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. Thus we allow for two types of men based on observed characteristics - those from non-violent and those from violent homes. In essence, we use family background as an instrument for abuse by assuming that it affects the husband's propensity to abuse, and through abuse

affects the wife's utility, but does not have a direct effect on the utility of the wife.

In the data, some women reported that they did not possess information on their spouse's family background.[11] 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, while the econometrician does not in the absence of information on family background.

Some characteristics of husbands may be observed to women but not to the econometrician. To this end, we allow for unobserved heterogeneity in the husband's predilection for abuse. We divide the husband's type into two components, those which are observed to the econometrician and those unobserved characteristics that determine the husband's preferences for abuse, $l = \{l_o, l_u\}$, respectively. Preferences for men taking decision j of type l', married to women taking decision i in $t-1$, $i \in \{mn, mh\}$, are then specified as:

$$\alpha_{ijt}^h \, 1(i_{t-1} = i) \, t + \gamma_{jt}^h \, 1(A_t = 1) + \gamma_{mt}^h \, 1(M_t = 1) + \lambda_{jt}^h \, 1(l_o = l_o') + \eta_j^h \, 1(l_u = l_u') + \varepsilon_{jt}^h \tag{20}$$

for $j \in \{na, a\}$ and $t \in \{10, 12, 14, 16\}$,[12] where $1(\cdot)$ is an indicator equal to one when the expression in parentheses is true. Note the slight abuse of notation: with the exception of unobserved heterogeneity, we allow the preference parameters to vary across stages but not across periods within the same stage. Preferences for divorced men are:

$$\phi_d^h + \varepsilon_{dt}^h, \tag{21}$$

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

4.2 Specification for Wives

A richer set of information is available for female respondents in the data set and is included in estimation. Current employment information is available, where working is defined by an indicator equal to one if women reported working 52 weeks in the past year and zero otherwise. Information on the age, education, province of residence, the presence of children in the household and the family background of women is also available. This information is used to define the exogenous types of women in the marriage market. While most of these characteristics are time invariant, some are likely to change over time, in particular the presence of children. Due to the cross-sectional nature of the data, we do not observe time variation, other than age, in the data used to construct types. Implicitly, we are therefore assuming that a woman carries her type at the time of the survey throughout the decision process of the model, i.e. both forward and backward in time. As with men, we allow for unobserved (k_u) and observed (k_o) components of the female's type, where $k = \{k_o, k_u\}$.

Preferences for marriage and employment vary with each of the aforementioned characteristics for women and with past abuse. Preferences for wives of type k' taking decision i, married to a spouse taking decision j in $t-1$, are therefore specified as:

$$\varphi_h \, 1(sh_t + mh_t = 1) + \varphi_m \, 1(mn_t + mh_t = 1) + \varphi_{mm} \, 1(M_t = 1) + \alpha_{it}^w \, t + \gamma_{it}^w \, 1(j_{t-1} = a)$$
$$+ \alpha_{dht}^w \, 1(dh_t = 1) + \lambda_{it}^w \, 1(k_o = k_o') + \eta_i^w \, 1(k_u = k_u') + \varepsilon_{it}^w \quad (22)$$

for $i \in \{sn, sh, mn, mh\}$ and $t \in \{9, 11, 13, 15\}$, where dh_t is an indicator equal to one if divorced and working and zero otherwise. The latter is included to allow for differences in the utility for single, working and divorced, working women. The utility from the single, not working state is normalized to zero. As in the case for men, 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.

4.3 Estimation of the Choice Probabilities

The choice probabilities are estimated according to the optimal policies described by (16) and (19). 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:

$$\Pr(j_t = a | l, k, i_{t-1}, M_t, A_t) = \frac{exp\{V^h(j_t, l, k, i_{t-1}, M_t, A_t)\}}{\sum_{r \in J} exp\{V^h(r_t, l, k, i_{t-1}, M_t, A_t)\}}. \qquad (23)$$

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

$$\Pr(i_t = i | k, l, j_{t-1}, M_t, A_t) = \frac{exp\{V^w(i_t, k, l, j_{t-1}, M_t, A_t)\}}{\sum_{r \in I} exp\{V^w(r_t, k, l, j_{t-1}, M_t, A_t)\}}. \qquad (24)$$

We must account for four features of the data when constructing the likelihood function. First, the data do not contain information on the 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 one 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:

$$\Pr(j_t = a | l, k, M_t, A_t) =$$

$$\left[\sum_{i \in \{mn, mh\}} \Pr(j_t = a | l, k, i_{t-1}, M_t, A_t) \Pr(i_{t-1} = i | k, l, j_{t-2}, M_t, A_t) \right]^{d_m}. \qquad (25)$$

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. Using equation (25)

$$\Pr(i_t = i|k,l) = \sum_{j_{t-1}\in\{a,na\}} \Pr(i_t = i|k,l,j_{t-1},M_t,A_t)\cdot\Big[\Pr(j_{t-1}=j|l,k,M_{t-1},A_{t-1})$$

$$+ \sum_{i_{t-2}\in\{sn,sh\}}\Pr(i_{t-2}=i|k,l,j_{t-3},M_{t-2},A_{t-2})\Big]. \quad (26)$$

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:

$$\Pr(i_t = i|k) = 0.8252\cdot\Pr(i_t = i|k,0) + 0.1748\cdot\Pr(i_t = i|k,1), \quad (27)$$

$i\in\{sn,sh\}$. Finally, as mentioned above, we assume that the wife, but not the econometrician, observes her spouse's type even though she reports that she does not know whether he had a violent family background. We, therefore, estimate the probability spouses with unknown family backgrounds are from violent homes (θ_b). Define l_b to be an indicator equal to one if the husband comes from a violent family, zero otherwise, and l_u an indicator equal to one if the woman does not report her spouse's family background. The likelihood contribution for women in period t is therefore:

$$\Pr(i_t = i|k) = \Big[\theta_b\Pr(i_t = i|k,1) + (1-\theta_b)\Pr(i_t = i|k,0)\Big]^{l_u}$$

$$\cdot\Big[\Pr(i_t = i|k,1)\Big]^{(1-l_u)l_b}\Big[\Pr(i_t = i|k,0)\Big]^{(1-l_u)(1-l_b)}, \quad (28)$$

$i\in\{mn,mh\}$.

Finally, 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 ($k_{um}\in\{1,2\}$) and work ($k_{uh}\in\{1,2\}$) for a combination of four unobserved

types. 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 $r, r \in \{1, 2, 3, 4\}$ is then given by:

$$
k_{ur} = \begin{cases} 0 & \text{if } i = sn \\ k_{uhr} & \text{if } i = sh \\ k_{umr} & \text{if } i = mn \\ k_{umr} + k_{uhr} & \text{if } i = mh. \end{cases} \tag{29}
$$

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

$$
l_{ur} = (\varphi_m + k_{umr}) \, \delta_a, \tag{30}
$$

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 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. The sample likelihood is then product of the joint decisions of husbands and wives, and the individual decisions of single, for the entire sample period during which each female is observe, taking account of the features described above.

5 Results

5.1 Parameter Estimates

Estimates of the preference parameters for the model are presented in Tables 6 to 9. In this instance, the model is estimated with an annual discount factor fixed at 0.95.[13] For

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[13]As reported by others, for example van der Klaauw (1996), difficulties were encountered when attempting to estimate the discount factor.

comparison, a myopic version of the model was also estimated. The results can be found in Appendix B. The myopic version is equivalent to a multinomial logit framework and thus presents a reduced form analysis of the data. Later, we compare the two specifications when assessing the importance of the dynamic structure of the model.

Turning to the dynamic results, we first consider the causal effect of domestic abuse on divorce. As expected, 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 and 5 in Table 6 and row 1 of Table 7. From the parameter estimates, we can compute the difference between divorce probabilities when women are in non-violent versus violent marriages and find, for example, that 15-29, 30-44, and 45-59 year old women who are abused are 245%, 565%, and 171%, respectively, more likely to divorce than women in non-abusive 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.

We next consider the causal effect of abuse on employment. The results in row 1 of Tables 6 and 7 indicate that domestic violence has an insignificant effect on employment for the youngest and oldest groups of women who remain married after experiencing abuse, and those who divorce after experiencing abuse. In contrast, for women aged 30-44, abuse has a relatively large and positive effect on employment: 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 has more to do with the characteristics determining who is abused and who works than with any direct effects of abuse on employment: in fact, the effect of abuse on employment is positive if at all.

We now turn to the causal effect of the wife's employment status on abuse. The preference parameters for husbands are presented in Table 9. The results suggest that men

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married to women aged 15-29 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 is positive but insignificant. Since men, if at all, are more likely to abuse non-working 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, non-working 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 there exists a cycle of violence through employment within abusive marriages. The primary relationship between divorce, employment and abuse is the direct effect that domestic violence has on the woman's decision to divorce her husband.

It is therefore interesting to ask whether divorce has a deterrent effect on abuse. To answer this question, we simulate the model with the discount factor set to zero and compare abuse rates in marriages for women aged 15 to 29.[14] We examine this group as they have the longest decision horizon and thus they likely face the greatest deterrent effects. The results suggest that the deterrent effect of divorce is small: abuse rates rise by only 3.5% when the possibility of a future divorce is not taken into account.

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 non-working wives. The marital-specific capital parameters for women are negative, with working preferred over non-working. This negative result is due to the fact that divorce can only occur for women with non-zero marital-specific capital; thus this parameter captures the net effect of marital-specific capital and the gains to divorce.

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

Previous abuse in the marriage, as measured by the abuse-specific capital component, is a strong predictor of violence in the current period, as men who abused their wives in the past and are still married are significantly more likely to abuse their wives in the current period than men who were not abusive in the past. This is, by far, the single most important determinant of abuse. The second most important determinant of violence is the family background of the husband. Observing violence as a child significantly increases the likelihood of abusing one's wife, as illustrated in Row 3 of Table 9. Computing the difference between abuse propensities for men from abusive homes and for those from non-abusive homes, we find that men with violent family backgrounds are 185%, 236% and 528% more likely to abuse wives aged 15 to 29, 30 to 44, and 45 to 60, respectively. This result suggests that witnessing violence as a child may reduce the disutility of domestic violence substantially and confirms the importance of the inter-generational impacts of domestic violence. It is also interesting to note that the effect of family background, and the wife's employment decision are insignificant for marriages in which the wife is aged 45 to 59, suggesting that the propensity to abuse tends to fade as couples age. This finding provides an explanation for the fact that many men start and stop abusing their wives over time. 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. Finally, the estimated probabilities presented at the bottom of Table 8 indicate that 60% of married women reporting they do not know their spouse's family background behave as if he had a violent background. 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.[15]

Women's tolerance of abuse appears to only tell part of the story, as the preference

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

parameters alone cannot explain all of the difference in divorce rates and any of the difference in employment rates across abused and non-abused women in the data. Differences in exogenous individual characteristics thus may also play an important role in determining who is abused and who is likely to work and to divorce. As an illustration of the importance of differences in exogenous characteristics across abusive and non-abusive couples, we consider the predicted behavior of four hypothetical couples of each age group, presented in Table 10. In couple A, both partners come from non-violent homes, the wife has at least a post-secondary 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 fall in marriage rates, a large rise in abuse for women below the age of 45, and a rise in divorce rates. This change is largely driven by the fact that men from violent homes are more likely to abuse. The fact that marriage rates decline and divorce rates, in both abusive and non-abusive marriages, increase indicates that women from violent homes have lower preferences for marriage.

We next consider changing the wife's education level from post-secondary 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 30-44, we find women are also less likely to divorce. These results are likely due to the limited opportunities outside marriage faced by 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, especially women who were not working in the previous

period. In contrast, women aged 30-44 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 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 10 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. Men do face a deterrent effect, as men are less likely to abuse wives that have better outside opportunities. Both results are consistent with the burgeoning literature that examines the positive link between current employment and future divorce decisions (Johnson and Skinner, 1986; van der Klaauw, 1996).

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 8 suggest that the correlations between abuse, divorce, and employment can not 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 appears to be robust to a variety of specifications for unobserved heterogeneity.[16] The loading factor on abuse is negative, 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. The availability of information on violence in the family of origin is a good predictor of unobserved preferences over abuse and divorce and appears to eliminate the importance of unobserved heterogeneity in this instance.

Table 11 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 econometric specification 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 non-violent marriages. We also able to replicate the fact that employment rates for abused married women are relatively high for women aged 30-44 and relatively low for abused married women aged 45-59. The model has difficulty fitting the data in a few dimensions for women aged 30-44: we over-predict the divorce rate in non-abusive 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. Information on the entire sample of women aged 30-44 is used to estimate the fraction of women currently employed and currently married. In contrast, only information on women who are currently working is used to estimate the two moments related to employment that the model fails to match. Further, the model has difficulties reconciling the overall divorce

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[16]In particular, we estimated the model with up to four points of support for both employment and marriage and 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.

and employment rates with the fact that there were very few working women that were abused and very few non-abused women that divorced in the latter sample.

To 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.[17] While the static model matches the abuse rates and fractions married reasonably well in each stage, it fails to match along two important dimensions. First, the static model overestimates divorce rates for young women and underestimates divorce rates for the oldest group of women. Second, the static model has difficulties matching the employment rates of married women, especially those who are abused. The static version of the model fails in these respects because an important channel has been shut down in the model: in the dynamic model she can try to prevent future abuse by remaining married and working instead of choosing divorce.

5.2 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, counselling 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 inter-generational 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

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[17]Full results on the static model are presented in the Appendix.

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 counselling 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 are reported in Table 12. They 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. Abuse rates fall by as little as 10% for women aged 30-44 to as much as 85% for women aged 45-59, reflecting the deterrence effect of divorce. 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 non-working wives, it may be that employment also serves as a deterrent to future abuse. For comparison purposes, we conduct the same experiment for the static version of the model.[18] 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 of the rise in employment for abused married women, with the opposite trend for older women. It appears that ignoring the role of dynamics in abusive relationships changes the policy implications of this type of intervention substantially.

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 counselling 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 13. While the fraction of women that initially marry does not change, and divorce rates do not change, this policy change serves as a substantial

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[18]Results are available in Appendix C.

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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 30-44; again this finding likely captures the deterrent effect of abuse.

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 counselling or mentoring programs. We implement the policy in the model by setting the family background preference parameters to zero. Results of these experiments are presented in Tables 14 and 15 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. 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 15, 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 non-violent homes, abuse rates fall by between 26% and 48% as men from violent homes are no more likely to abuse than men with violent backgrounds. 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.

6   Conclusion

The relationship between domestic abuse, employment and divorce is estimated in this paper. The dominant effect of abuse on women's behavior is through divorce, although some women prevent future abuse by working in abusive 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 or by working. This finding is in stark contrast to the conventional notions of 'learned helplessness,' the portrayal of abused women as unable or unwilling to leave violent relationships, and an increasing cycle of violence. The results highlight the strong inter-generational 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 strong 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 can be explained by 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 non-violent marriages. Therefore, we find no evidence that abuse hinders women's ability to work and no evidence of a cycle of violence through employment.

Together, the findings suggest that policies aimed at addressing domestic violence should not ignore the important links between abuse, marriage and employment. If the costs of program implementation across men and women are the same, our policy experiments suggest targeting the behavior of men is a more effective means of reducing or preventing domestic violence; abused women are less responsive to reductions in the cost of leaving abusive marriages and to eliminating the effect of violent family backgrounds on preferences.

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In contrast, increasing the costs of domestic abuse to husbands and reducing the intergenerational effects of violence for men appear to be promising strategies for preventing abuse.

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	22.3040	21.3502	21.1906
marriage	(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)
Post-secondary or	0.4838	0.3902	0.2977
university	(0.4998)	(0.4897)	(0.4623)
Violence in family	0.1599	0.3298	0.3624
background	(0.3665)	(0.4720)	(0.4860)
Violence in current	0.0847	0.3518	0.5743
spouse's family	(0.2785)	(0.4794)	(0.4999)
Don't know current spouse's	0.0671	0.1624	0.0274
family background	(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 post-secondary	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: Divorce Rates by Abuse

No Abuse	High Abuse
0.1235	0.7267
(0.3290)	(0.4461)

Note: Standard deviations are in parentheses.

Table 3: Duration Since Most Recent Incident of Abuse in Ongoing Marriages

Years Since Most Recent Incident of Abuse	Percent
Within past 12 months	22.52
1 year ago	9.43
2 years ago	12.06
3 years ago	6.14
4 years ago	6.63
5 years ago	10.01
6 years ago	2.01
7 years ago	2.82
8 years ago	3.80
9 years ago	1.01
10 years ago	3.80
11+ years ago	19.77
% of abusive marriages in which abuse lasted less than one year	39.5
% of women abused at some point in current marriage	14.76

Table 4: Employment Rates by Abuse

Marital State	Worked 52 Weeks
No Abuse	
Married	0.5929
	(0.4913)
Divorced	0.7554
	(0.4310)
Most recent incident within past 12 months	
Married	0.5675
	(0.5009)
Most recent incident prior to past 12 months	
Married	0.5562
	(0.5016)
Divorced	0.5978
	(0.4918)

Note: Standard deviations are in parentheses.

Table 5: Current Abuse by Employment Status of Wife

Wife worked 52 weeks	0.0078
	(0.0881)
Wife did not work 52 weeks	0.0086
	(0.0926)

Note: Standard deviations are in parentheses.

Table 6: 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	0.1184	0.4086	-0.3981	
background	(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)	
Post secondary	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	-0.2589	-0.3577	-0.3523	
background	(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)	
Post secondary	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)
Log-likelihood value				-9540.6641

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

Table 7: Preference Parameters for Wives, Continued

	Single Working	Married Not Working	Married Working	Divorced Working
Women Aged 45 to 60				
Abusive spouse		-3.6152	-4.5195	-0.7800
		(1.9939)	(2.0318)	(3.0645)
Female has violent	-0.1353	-0.4107	-0.7432	
background	(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)	
Post secondary	-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)	
Log-likelihood value				-9540.6641

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

Table 8: Preference Parameters for Wives, Continued

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

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

Table 9: Preference Parameters for Husbands

	Wife Aged 15-29	Wife Aged 30-44	Wife Aged 45-59
Non-working 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		
Working Wife			-3.0279
			(0.4456)
Non-Working Wife			3.2306
			(0.6369)
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.

Table 10: Comparison of Couples with Differing Characteristics

	A	B	C	D
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 Non-Abusive 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 Non-Abusive 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 Non-Abusive 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

Table 11: 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0299	0.0200		

Table 12: 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 Non-Abusive 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 Non-Abused 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0200	0.0063		

Table 13: 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0200	0.0051		

Table 14: 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0200	0.0207		

Table 15: 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0200	0.0136		
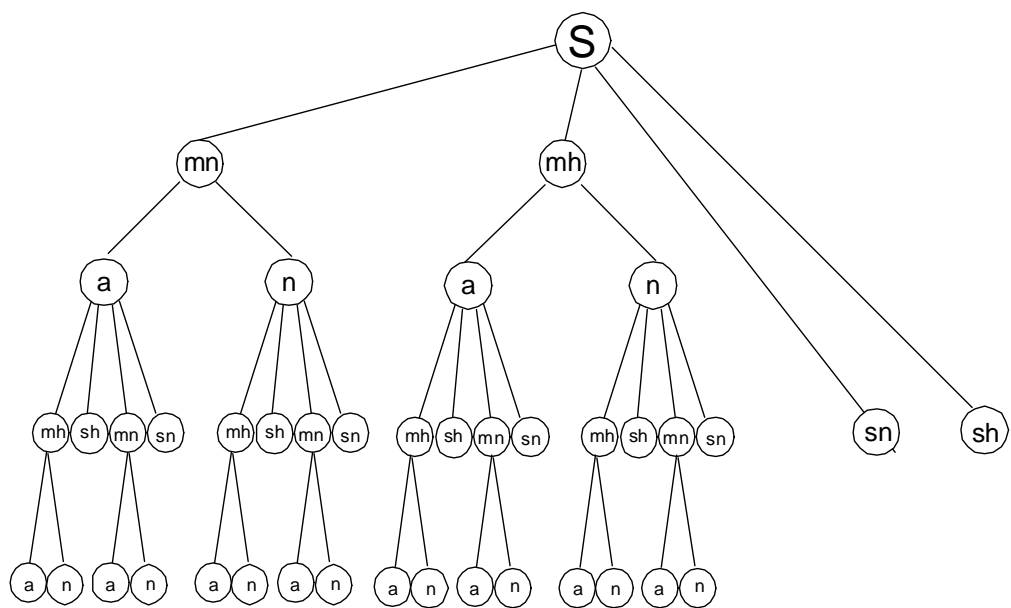
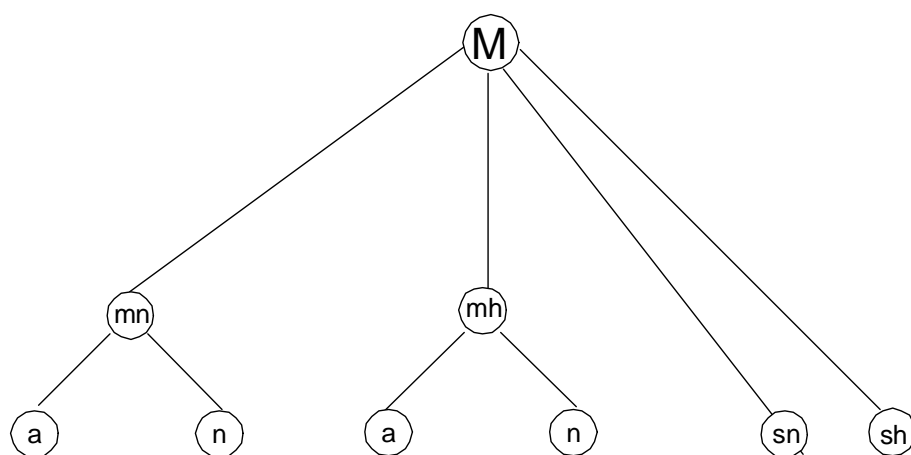Figure 1: **Decision Tree for Single Women at the Beginning of Stages 2-4**

Figure 2: **Decision Tree for Married Women at the Beginning of Stages 2-4**

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

Table A1 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 U.S., to assess the representativeness of the former data set. 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 is lower. This latter difference could stem from coding or non-response pattern differences across the data sets. However, given the many similarities between the VAWS and the SCF especially in terms of employment patterns,[19] it does not appear the high non-response rate for the VAWS resulted in an unrepresentative sample.

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[19]In the VAW, 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 A1 Comparison of Average Characteristics for the Violence Against Women and 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., N.B. or P.E.I.	0.0819	0.0859
	(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., or MN.	0.1575	0.1657
	(0.0025)	(0.0045)
Respondent resides in B.C.	0.1191	0.1165
	(0.0022)	(0.0039)
Respondent resides in an urban area[3]	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 some post-secondary education	0.3571	0.2964
	(0.0033)	(0.0056)
Highest level of education is a university degree	0.1486	0.1767
	(0.0025)	(0.0047)
Respondent worked in the reference year	0.7882	0.7685
	(0.0028)	(0.0052)
Respondent worked or looked for work in the reference year	0.8129	0.8165
	(0.0027)	(0.0047)
Number of weeks worked for respondents who reported working	0.8767	0.8906
	(0.0020)	(0.0033)
Respondent worked full-time[4]	0.7652	0.7365
	(0.0036)	(0.0061)
Respondent worked part-time	0.2212	0.2635
	(0.0035)	(0.0061)

Note: standard errors in parentheses.

B   Estimation Results for Myopic Model

Table B1 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	-0.2967	0.1557	-0.7436	
background	(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)	
Post secondary	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	0.1567	-0.0068	0.1489	
background	(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)	
Post secondary	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)
Log-likelihood value				-9737.7022

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

Table B1 Preference Parameters for Wives, Continued

	Single Working	Married Not Working	Married Working	Divorced Working
Women Aged 45 to 60				
Abusive spouse		-6.1962	-6.7566	-1.0618
		(0.4106)	(0.5811)	(0.3014)
Female has violent	2.6223	-1.6732	0.2397	
background	(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)	
Post secondary	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)	
Log-likelihood value				-9737.7022

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

Table B1 Preference Parameters for Wives, Continued

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 B2 Preference Parameters for Husbands

	Wife Aged 15-29	Wife Aged 30-44	Wife Aged 45-59
Non-working 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)
Non-Working 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 C1 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0299	0.0350		

Table C2 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0350	0.0207		

Table C3 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0350	0.0200		

Table C4 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0350	0.0335		

Table C5 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 Non-Abusive 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 Non-Abused 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 Non-Working 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 Non-Abusive 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 Non-Abused 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 Non-Working Wives that are Abused	0.0350	0.0238		

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