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THE DYNAMICS OF DOMESTIC VIOLENCE: DOES ARREST MATTER?

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ABSTRACT

In this paper, we estimate a stochastic-dynamic model for domestic violence using data collected by the Minneapolis Domestic Violence Experiment. Our primary finding is that arrest deters domestic violence, but the effect wears off quite quickly. We find also that current employment for the male is associated with lower levels of violence. Like arrest, the effect of employment is transitory. If the male becomes unemployed, the level of violence will increase quite rapidly. Violence in one period is associated with higher probabilities of violence in subsequent periods.

From a methodological perspective, our results suggest that policy evaluation and deterrence research would benefit from using models that allow examination of the dynamic path of intervention effects. The effect of private and social programs need not be constant over time, and applying traditional, static models that necessarily impose such an assumption may produce misleading results. For Minneapolis, static models produced the result "arrest works." The dynamic model suggests a different conclusion "arrest buys us a little time."

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The Dynamics of Domestic Violence

The O.J. Simpson affair is only the latest in a series of events that have focused attention on domestic violence. Since this type of violence often occurs "behind closed doors", there is no way to know the exact number of families experiencing some form of violence. Using data collected by Strauss and his colleagues, Sherman (1992) estimates that each year there are 18 million incidents of domestic violence fitting the criminal-justice classification of an assault and that police officers handle at least two million cases of domestic violence involving a spouse or lover. Domestic violence assault is more common than all other forms of violence combined.

Recognizing that domestic violence is a social as well as a private issue, a number of police departments have participated in experiments designed to learn how they can best handle domestic violence calls. In this paper, we use data from the experiment in Minneapolis to determine how police treatments in cases of domestic violence affect the couple's subsequent violence. We also examine how socioeconomic factors such as race, age and employment are related to domestic violence. The socioeconomic factors are considered in part because they may affect the police actions. Our model is a stochastic dynamic model that allows the effects of the police actions and of the individuals' employment and previous violence to vary over time. In brief, we find that arrest is more effective than short-term separation or advising but that the differential effect is transitory.

The organization of the remainder of the paper is as follows. In the next section of the paper, we describe the data and the dynamic model. Section II includes a discussion of the results and the final section explains the role of dynamic analysis in the evaluation of public programs.

I. Data and Dynamic Model

Our data are from the Minneapolis Domestic Violence Experiment sponsored by the U.S. Department of Justice, the Police Foundation, and the Minneapolis Police Department. The experiment involved incidents of misdemeanor domestic violence in which women were assaulted by their male romantic partners. Police officers participating in the project carried a pad of report forms, color coded for the three possible treatments: (1) advising the couple, (2) separating the individuals by ordering the offender out of the residence for eight hours, or (3) arresting the suspect. The forms on the pad were numbered and arranged in random order for each officer. When called to a situation fitting the experiment's criteria, the officer was to take the action indicated by the report form on the top of the pad. Researchers interviewed the victim shortly after the incident and conducted telephone interviews every two weeks for the next six months.

Our model is a dynamic probit model for the probability of observing violence in the follow-up periods.[1] As in the standard probit model, the basis of the model is an unobservable, latent variable which might be interpreted as the family's underlying propensity towards violence. In the dynamic model, family i's propensity towards violence in follow-up period t (λ_t^i) depends on socioeconomic variables such as age, education, and employment (x_{it}), on the police treatment p_t at the initial contact, and on the family's recent experience with violence. We allow both the actual violence and propensity towards violence in the previous period (λ_{t-1}^i) to affect the current propensity.

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[1]We use a binary measure of whether there was violence during the two-week follow-up period since only one to two percent of the follow-up interview periods had more than one incident.

The latent variable for the probit model is

$$\lambda_t^i = \alpha_0 + \alpha_v v_{t-1} + a_\lambda \lambda_{t-1} + \alpha_x^f x_{it}^f$$

where v_t^i is a binary for whether there was violence in period t, x_{it}^f is a vector of socioeconomic variables that can vary across the follow-up periods (e.g., employment status), x_{it}^c is a vector of socioeconomic variables that remain constant over the follow-up periods (e.g., race), and the α's are the parameters to be estimated. For the first follow-up period, the lagged latent variable λ_o^i is

$$\lambda_o^i = \frac{\alpha_0 + \alpha_v v_o^i + \alpha_x^c x_i^c + \alpha_x^h x_i^h + \alpha_p p_i}{1 - \alpha_\lambda}$$

where x_{it}^h denotes the component of the socioeconomic variables that relate to the family's history shortly prior to the initial incident (e.g., extent of violence in the previous six months or number of times that the assailant was arrested in the recent past). Note that the coefficients on the socioeconomic variables that cannot vary across the follow-up periods (x_{it}^c) are proportional but not identical. The initial propensity λ_o^i is specified in order that the effects of variables such as race that are components of x_{it}^c remain constant over time. Since the initial violent incident triggered each family's entry in the sample, v_o^i equals one.

The stochastic latent variable is $\hat{\lambda}_t^i \equiv \lambda_t^i + \epsilon_t^i$ where ϵ_t^i is a normally distributed random variable with mean zero and standard deviation one. The violence binary is

$$v_t^i = \begin{cases} 1 \text{ if } \hat{\lambda}_t^i \geq 0 \\ 0 \text{ otherwise.} \end{cases}$$

The probability that family i experiences violence in follow-up period t is $\Phi(\lambda_t^i)$ where Φ is the standard normal probability distribution function. Family i's contribution to the log likelihood function is $\sum v_t^i \ln\Phi(\lambda_t^i)+(1-v_t^i)\ln(1-\Phi(\lambda_t^i))$.

II. Results

The literature on family violence[2] suggests that a number of factors related to a couple's background and to their current experiences might affect the level of violence. In previous work, researchers posit that the level of violence in the relationship might depend on background variables such as each individual's age, racial/ethnic group, employment history, income, and education, on the number and age of the children in the household, on the history of violence in the relationship, on the suspect's police record, and on the availability of alternative living arrangements when the victim is threatened. In addition, the extent of violence might depend on new circumstances resulting from changes in work status, health, non-wage income, or financial stress such as disconnection of the utilities. We included each of these variables in our model; the only variables that are significantly related to the violence in any specification are those descriptive of the man's employment. The estimated coefficients on the other variables are not even marginally significant. For this reason, the only socioeconomic variables included in the models presented in the remainder of the paper are the employment variables. Although only the male's employment is significantly related to the violence, we include the female's employment status variables for symmetry.

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[2]See Ohlin and Tonry (1989) for a good compilation.

Our base model includes the police treatments, the male's previous arrest history, and both individuals' current and previous work history. Table 1 contains the parameter estimates for the base model. The dynamics of the model are captured by the coefficients on the lag of the latent variable λ and the actual violence. The coefficient on the lag of the underlying violence latent variable α_λ is between zero and one and is significantly different from both at the .001 level. An event that occurs in one follow-up period and increases the probability of domestic violence in that period (e.g., his becoming unemployed) also increases the chances of violence in later periods. The effect dies off very quickly. About 60 percent of the effect on the latent variable λ carries over to the next two-week follow-up period (α_λ=.579), but less than one percent of the effect remains at the end of the six-month follow-up period.

The estimated coefficient on the lag of violence from the previous period is also positive and significant. It appears that a violent incident in one follow-up period serves to heighten rather than release tensions. Overall, our results for the dynamics suggest that while the effects of events leading to violence are persistent, they dampen quickly.

The police treatment variables for the specification given in Table 1 are three binaries for the intended advise, separation, and arrest treatments.[3] Given the numerical values of the estimated coefficients, the ordering of the treatments from the least violence to the most violence is arrest, separation and advise. The difference between the effects of arrest and the other two treatments is statistically significant. Using the standard χ^2 tests, we fail to reject

[3]If this were a static model, then including the three police treatment variables and the constant would result in perfect collinearity. With the police treatments appearing only in the initial latent variable, this does not occur in the dynamic model.

the null hypothesis for equality of advise and separate coefficients. We reject the null hypothesis for the equality of the advise, separate and arrest coefficients at the .05 level. The finding that arrest has more of a deterrent effect than do the other treatments is robust; the same pattern occurs for all specifications of the model.

In practical terms though, the differential effect of arrest on violence is very short-lived. The dynamics of the model, as described above, imply that the differential effect of arrest on the probability of violence has completely dissipated by the 12th follow-up period and most of the effect is eliminated well before then. For example, the estimated probabilities of violence in the first follow-up period for nonworking men are .01, .05, and .09 for the arrest, separation, and advise treatments. By the 12th follow-up period, the probabilities for the treatments are the same to three decimal places. While arrest may initially be more effective in deterring subsequent violence than are the other treatments, there is no long-lasting difference in the effects of the treatments. We note also that the initial deterrent effect was not an incapacitation effect. At the time of the initial interview only one of the men who had been arrested was still in jail.

One complication in the analysis of how the police treatments affect the subsequent violence is that the sample design allowed police officers to upgrade the advise or separation treatments to arrest if the assailant attempted to assault a police officer, if a victim insisted upon arrest, or if both partners were injured. In our data sample, the police officers upgraded 23 percent of the randomly-assigned advise cases and 27 percent of the randomly-assigned separation cases to arrest. As pointed out by Rubin (1978) and others, the treatment variables used in empirical work should fully describe the treatment process. When the

random assignments are followed, binaries for the randomly assigned treatments are sufficient. When there are departures from the random assignments, then both the randomly assigned treatments and any factors related to an upgrade must be considered.

The factors that might lead to an upgrade in this experiment are the characteristics of the incident and of the individuals involved in it. In examining this issue, we surveyed the previous literature and estimated models for the probability of an upgrade for our data sample. Several features of the incident, including whether one of the individuals assaulted a police officer, are significantly related to the chances of an upgrade. Of the characteristics of the individuals, only the woman's education matters. An upgrade is significantly more likely if she has a high school education.[4] We re-estimated our model with these variables included. None of the estimated coefficients on the additional variables were significant.[5] Neither the findings for the police treatments nor for any other variables changed.[6]

In the model described above, all of the dynamics including the effects of the police treatments at the time of the initial contact and the effects of repeat violence or of

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[4]There is no way to discern whether education matters because it is related to how the police officers react, to her willingness to press charges, or to the nature of the violent incident.

[5]In one alternative model that we considered, the estimated coefficient on the binary for her high school education was marginally significant. The arrest effect was unchanged.

[6]We also estimated the model using actual rather than the randomly-assigned police treatments and found the same results. With this approach, however, the coefficients on the police treatment are not necessarily indicative of a pure treatment effect. When the actual police treatment is used as the measure of what the police do, the arrest category includes two groups -- those for whom the randomly-assigned treatment was arrest and those for whom the treatment was upgraded. If the police upgraded the more difficult cases, then the actual arrest treatment category might be overrepresentative of the more violent-prone cases.

employment changes and other factors occur through the one autoregressive parameter λ. This forces the rate of decline or acceleration in the effects of the initial police treatments and of any events that occur during the follow-up periods to be the same. We want to be sure that this aspect of the dynamics is not responsible for our finding that the differential effect of arrest wears off quickly. The required features of the dynamic model are that the timing of the three police treatments effects be allowed to differ from one another and from the effects of events occurring during one of the follow-up periods. To accomplish this, we modified the latent variable λ in period t to include a term $\gamma\beta^t$ with separate β and γ coefficients for each of the police treatments. This, combined with the previous police treatment terms, allows for a complex dynamic pattern. In particular, the effect of any one of the treatments can be increasing (e.g., $\gamma>0$ and $\beta>1$), constant (e.g., $\gamma>0$ and $\beta=1$), or decreasing (e.g., $\gamma>0$ and $0<\beta<1$). We estimated models that included the additional parameters for each of the police treatments individually and jointly. As with the previous specification, arrest initially has a significant differential effect in deterring violence but the effect is short-lived.

Of the other variables in our model, only the coefficient on the binary for whether or not the man is working during the current follow-up period is significantly different from zero. The coefficient on this variable is negative indicating that currently employed men are less likely than unemployed men to beat their partners. Other studies report similar findings. Previous suggestions for why his employment is associated with less violence are that (1) the couple is together less when he works, (2) income is higher and financial stresses lower, (3) the type of men who work don't beat their partners, and (4) working men have more power

in the relationship and have less energy for fighting.[7] With the dynamic model we are able to sort through these hypothesis and explain which of them individually or in combination could explain the observed relationship between male's employment and violence.[8]

The first hypothesis is that the greater time-at-risk when he is unemployed causes more violence. This study and other studies (Tauchen, Witte and Long, 1991; Sherman, 1992) find, however, that the woman's employment does not have a significant effect on the violence. If time-at-risk were the primary cause for the connection between the violence and the male's employment, then her employment status should also be related to the violence. Likewise, our results suggest that the income effect is not the only factor involved in the connection between his employment and violence. As mentioned above, we found that neither the individuals' incomes in the six months prior to the initial police call nor the financial stresses during the follow-up period (e.g., rent increases, utilities being cut-off, and medical bills) were significantly related to the violence. Further, the high-school education variables are not significantly related to the violence. If income were the primary connection between his employment and domestic violence, then variables related to greater human capital and higher wages should also be associated with less violence.

The third common explanation for the connection between his working and being violent is that both are unobservable manifestations of the same individual characteristics. Although this may be part of the reason, it does not fully explain the employment results.

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[7]Men receiving disability payments were excluded from the sample.

[8]Our findings for the effect of the police treatments are not sensitive to how the employment variables are handled.

While the man's current employment status is significantly related to the domestic violence, his longer-range employment history has no effect on the violence. Further, if employment were measuring some omitted third factor, then the employment status for each male should be relatively constant over time. In this sample, however, a number of men change employment status. Between each of the two-week periods, 5.2 percent of the men change employment status on average. Two men were particularly prone to switching status. Even with them omitted, 4.5 percent of the men change employment status between each of the two-week follow-up periods. Likewise, if employment were measuring some omitted third factor related to the male's ability to deal successfully with the job market and with relationships, then his police record might also be associated with the violence.

Our model offers no specific evidence about the validity of the fourth hypothesis. There are apparently some important elements other than time-at-risk, income, and "third" factors. It remains unclear though whether these are related to the nature of the relationship or to outside influences.

III. Conclusion

The primary finding of this paper is that the action taken by the police in domestic violence settings matter. Specifically, arrest is more effective in deterring subsequent violence than is counseling or separation of the couple. The differential effect is statistically significant and robust but not persistent. Three to six months after a police call for domestic violence, men who were arrested are just as likely to beat their partners as men who received the other treatments. Arrest is more like an aspirin than an immunization.

From a methodological perspective, our results suggest that policy evaluation and deterrence research would benefit from using models that allow examination of the dynamic path of intervention effects on individual behavior. The effects of private and social programs need not be constant over time, and applying traditional, static methods that necessarily impose such an assumption may produce misleading results. In the case of the Minneapolis experiment, traditional static models yield the result that arrest deters.[9] This conclusion led some police departments to adopt a presumptive arrest policy for domestic violence. The dynamic model implies though that arrest deters only temporarily. This is an important distinction for policy. If the effects of arrest are short-lived, then arrest might be regarded as a way of buying time until more permanent solutions to the domestic violence problem are identified.

[9]See Sherman (1992) and Garner, Fagan, and Maxwell (1994) for comprehensive summaries of this work.

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TABLE 1

DYNAMIC MODEL FOR THE PROBABILITY OF VIOLENCE
IN THE FOLLOW-UP PERIOD
(Prob Values for the χ-Squared Test Statistics in Parentheses)

Variable	Type of Coefficient* in the Dynamic Model	Estimated Coefficient
Constant	α_0	-.711 (.00)
Lagged Violence (v_{t-1})	α_v	.873 (.00)
Lagged Latent Variable (λ_{t-1})	α_λ	.579 (.00)
Binary Equal to One if the Randomly Assigned Treatment is Advise	α_p	-1.061 (.02)
Binary Equal to One if the Randomly Assigned Treatment is Separate	α_p	-1.259 (.00)
Binary Equal to One if the Randomly Assigned Treatment is Arrest	α_p	-1.918 (.00)
Binary Equal to One if He Has a Police Record	α_x^h	.094 (.42)
Binary Equal to One if He Worked Steadily in the Previous Year	α_x^h	-.153 (.69)
Binary Equal to One if She Worked Steadily in the Previous Year	α_x^h	-.208 (.56)
Binary Equal to One if He is Working in the Current Follow-Up Period	α_x^f	-.237 (.00)
Binary Equal to One if She is Working in the Current Follow-Up Period	α_x^f	.003 (.96)

*The type of coefficient is indicated by the second column. See specification of the dynamic probit model for how each of these enter the model.