

# The Determinants of Deadly Force: A Structural Analysis of Police Violence<sup>1</sup>

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Political or threat explanations for the state's use of internal violence suggest that killings committed by the police should be greatest in stratified jurisdictions with more minorities. Additional political effects such as race of the city's mayor or reform political arrangements are examined. The level of interpersonal violence the police encounter and other problems in departmental environments should account for these killing rates as well. Tobit analyses of 170 cities show that racial inequality explains police killings. Interpersonal violence measured by the murder rate also accounts for this use of lethal force. Separate analyses of police killings of blacks show that cities with more blacks and a recent growth in the black population have higher police killing rates of blacks, but the presence of a black mayor reduces these killings. Such findings support latent and direct political explanations for the internal use of lethal force to preserve order.

What factors determine the amount of violence used by democratic states when they try to control their citizens? State coercion, particularly in the most developed societies, is rarely studied by sociologists, yet it may be a powerful explanation for social order. As Weber pointed out long ago, the

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crucial defining element of the state is its ability to call upon superior force in any dispute with internal or external rivals. Without this supremacy governments cease to exist. Even contemporary democratic states frequently command scarce resources from unwilling subjects with at least the threat of violence. Although modern democratic states avoid the military and employ domestic agencies like the police to control internal miscreants and dissidents, the primary activity that makes police organizations distinct is their use of force (Bittner 1990).

Perhaps what appears as a consensus within modern societies is deceiving because much of the domestic tranquillity we so frequently observe is based on accommodation rather than consent. Sociologists often respond by asserting that a society based on pure coercion would be inefficient. Goode (1972, p. 510) agrees, but answers that "sociologists have felt that force was a weak reed to lean on and no regime or society can rest on force alone. Indeed it cannot, but neither must it do so. None ever need try; rulers and conquerors . . . always command other resources." According to Goode, scholars who use the pure coercion argument to dispute the importance of force as a prerequisite for order have rejected an empty claim.

Although violence by social control agencies in advanced states is comparatively unusual, that does not make it ineffective. We may have been misled by the relative absence of conspicuous force in these societies. In any case, the discipline has neglected coercion and its chilling effects on nonconforming behavior, particularly in the most advanced industrial democracies. While we do not believe that coercion or its threat is the only important explanation for order, we suspect that further study of the conditions that lead to state violence will increase our understanding of how order is maintained in advanced societies.

Developments in historical political sociology have established the importance of political violence, but theoretical advances in the sociology of law and social control based on the work of Vold (1958), Dahrendorf (1959), Turk (1969), and Black (1976) furnish some of the more useful explanations for this outcome. Sociologists who stress coercive explanations for order often see the control agencies of the state as principally serving the interests of the privileged. According to this political threat view, a primary (but not the only) use of criminal law and law enforcement agencies is to maintain control over the "dangerous classes" who threaten public order.

Many Weberian and most neo-Marxist theorists who see coercion as a major way to preserve order think that differences in rewards are based on power (Lenski 1966; Collins 1975). According to this view, the privileged benefit greatly from existing arrangements while many citizens receive much less; inequality is an unstable condition that must be sustained by

sanctions or their threat. If racial or economic disparities are at least partly sustained by coercion, enhanced state violence can be expected in areas where economic disparity and the menace of an underclass are greatest. We study such political explanations (and many others) for variation in the amount of internal state violence by looking at rates of lethal force within political subunits. This study assesses the determinants of the rate of killings committed by the police in 170 U.S. cities.

The conventional assumption is that police violence is a reaction to the violence the police encounter, so killings by police officers are a necessary response to the brutality they must control. A political approach suggests instead that police violence should be especially likely in areas where racial or economic divisions with political consequences are severe. If the privileged are threatened by the disorderly potential of a racial or economic underclass with little to lose and much to gain from redistributive violence, diminished efforts to control the police or demands that they be unfettered should be likely in racially or economically divided cities. Political explanations suggest that police killings will be most common in economically stratified cities with larger percentages of minorities because dominant groups have much to lose from threats to public order by a racial or economic underclass.

In this article we see if the police use of lethal force can be explained by political arrangements or by social divisions that are likely to have political consequences, but we also assess reactive accounts that stress interpersonal violence and other problems officers encounter in the urban environments they must police. Because race is such an important consideration in a study of police violence and because our initial results suggest that the determinants of police killings of blacks deserve separate study, we analyze the factors that explain these race-specific lethal force rates as well. Results from studies that assess many competing hypotheses are more accurate (Johnston 1984), so we use an inclusive strategy. This means the theoretical section that follows cannot focus on just a few explanations.

## SOME TESTABLE HYPOTHESES

### The Empirical Literature

Studies of the effects of racial and economic stratification on social control have examined the size of police departments. Some find minority threat to be the strongest explanation. Research by Liska, Lawrence, and Benson (1981) and Huff and Stahure (1980) on the per capita number of police, or Jackson's (1989) research on expenditures, shows that the percentage of blacks in a city is related to police strength. An analysis of metropolitan statistical areas (MSAs) found that, while percentage black mattered, eco-

conomic inequality was a stronger explanation for department size (Jacobs 1979). Also, inequality explains shifts in police strength over time (see Jacobs and Helms 1997). Disputes in this literature about the relative importance of inequality or minority presence have not been resolved.

The statistical studies of police killings are problematic. Kania and Mackey (1977) computed killings by the police in U.S. states. They ignore minorities and use welfare recipients to measure inequality, although the states with the greatest economic inequality had the smallest welfare roles (Dye 1969). Such problems make Kania and Mackey's rank order correlations too misleading to report. A reanalysis of the Kania and Mackey data (Jacobs and Britt 1979) using multiple regression finds that income inequality is the strongest explanation for police killings, but state-level data are not the ideal for this work, as they inappropriately combine many kinds of police departments that operate in disparate environments.

We use disaggregated city data (for a discussion of bias caused by aggregation, see Thiel [1971]), an imperfect unit of analysis that has advantages. This unit lets us treat police killings as an organizational outcome and analyze the environmental determinants of the lethal behavior of many individual departments.

Sherman and Langworthy (1979) and Liska and Yu (1992) appear to be the only multivariate city-level investigations. Both studies measured police killings by combining data from *Vital Statistics* with surveys of police departments, but the *Vital Statistics* estimates are about half as large as the estimates from either survey. The shared variance in the merged data that formed the dependent variables is extremely modest in both studies. In Sherman and Langworthy's study of 32 cities, the correlation between the estimates from their survey and the *Vital Statistics* estimates of police killings is .56; in Liska and Yu this correlation is .45. The problematic construction of both dependent variables plus the small number of cases and other difficulties make the inconsistent findings of these two investigations too questionable to report.

The problems identified in other studies suggest that an analysis of police killing rates in 170 cities based on a single comprehensive data source should yield more accurate results for the following reasons:

1. Information from disparate sources need not be combined to calculate the number of these lethal events.
2. Killings by the police need not be averaged across disparate departments that operate in extremely dissimilar environments because we analyze city rather than state data.
3. The large number of cases should produce superior statistical inferences and allow for the control of more explanations than those in the earlier research.

4. Local conditions, made invisible by state-level data, can now be examined.

Finally, in contrast to past studies, we use an estimator designed to handle the censored dependent variables produced by using rates computed on these infrequent events.

### Alternative Ways to Account for Police Killings

The theories we assess in this article fall into two broad categories: political explanations and reactive explanations. We begin by discussing *political threat explanations*. Killings by police officers may be especially likely where divisions based on racial or economic differences are greater because such divisions threaten dominant groups and undercut effective community controls over the police.

Second, reactive hypotheses that have nothing to do with social or political divisions may explain police violence. Reactive accounts suggest that the use of lethal force by the police should be most likely in areas where the police must control a violent population or where they must react to urban conditions that make their work difficult. We begin our theoretical discussion by talking about hypotheses that focus on social divisions that have political implications and hypotheses that are explicitly political. We finish by discussing some plausible reactive explanations for the use of lethal force by the police.

## THREAT THEORIES

### Race and Police Violence

The menace of a racial or economic underclass with an interest in redistributive violence may lead to violent law enforcement. Blalock (1967) argues that dominant populations will be threatened in areas with a larger racial underclass. Liska, Lawrence, and Sanchirico (1982) find that, with the crime rate held constant, fear of crime is associated with the percentage of African-Americans in cities. Departments should be more likely to use lethal force in cities with greater percentages of minorities because the threat posed by a large racial underclass may lead to harsh law enforcement measures. Threat theories also suggest that law enforcement should be more coercive in cities that have recently experienced growth in the percentage of black residents, because as the population of African-Americans increases, concerns about the prevalence of crime increase as well.

This and other versions of the threat hypothesis are plausible ways to

explain at least some killings committed by the police as long as a disavowal is kept firmly in mind. It is *not* necessary to claim that privileged groups make direct demands that the police use greater amounts of deadly force. Without restraints, police violence is probable (Chevigny 1995). Officers are expected to preserve order rather than enforce the law (Bittner 1990), and violence is an efficient (but unfortunate) way to achieve this end. Police behavior is not readily observed, yet extreme personal risks are an inseparable part of this work. These personal risks give officers reasons to use violence when it may not be warranted. Where the perceived threat of underclass violence is greater, all that is required for political explanations for police killings to hold is for the powerful to be less willing to interfere with police methods. Hughes (1963) argues that a willingness to remain ignorant about the activities of the “dirty workers” is a compelling explanation for much official brutality. Dominant groups in cities with greater racial or economic disparities who are threatened by these conditions *may* demand that the police be unfettered, but the political threat explanations tested in this article do not require such active participation. Political divisions would still explain police killings if privileged groups only are less likely to interfere with police violence in cities where they feel threatened by an underclass.<sup>2</sup>

The use of lethal force may be associated with political arrangements as well. Wilson (1971) claims that cities with progressive “good government” reforms have police departments that are comparatively insulated from political restraints because reform administrative arrangements are less responsive to majority pressure than more conventional political arrangements. This insulation may reduce community control over police violence, so cities with city manager or commission governments may have higher police killing rates.<sup>3</sup>

We test a second explicitly political hypothesis by looking at the race of the mayor. Police chiefs, who often originate and always enforce departmental policies that regulate officer proclivities to use force, serve at the

<sup>2</sup> Hence, external institutionalized controls on the police may be less effective in jurisdictions where privileged groups who could restrain the police use of deadly force choose to remain ignorant about the methods these “dirty workers” use to maintain order. Unfortunately, we cannot find systematic information about the presence of external review boards.

<sup>3</sup> Chevigny (1995) and others claim that officers in Los Angeles were likely to use violence because civil service policies made the removal of the chief extremely difficult. The public and their elected representatives in this exceptional city could not control police violence because they could not remove the primary police administrator. Sampson and Cohen (1988) find that active police departments that make greater numbers of arrests are likely to be found in cities with reform governments. It is reasonable to believe that the more aggressive officers in these cities also may be more likely to use lethal force.

option of the mayor in almost all jurisdictions. If the mayor is black and probably dependent on minority votes, police administrators should have greater incentives to curb police violence. This condition should make them particularly likely to revise internal policies to achieve this goal. In our data, blacks are the victims of 53% of all killings by police, so the race of the mayor should matter.

Ethnographic and other work on the police shows that departmental regulations exercise strong controls on officer behavior (Rubenstein 1973; Fyfe 1982; Sherman 1983). It follows that police killings should be reduced in cities with a black mayor because the officer on the street should realize that violence against African-Americans will be more closely investigated and perhaps more severely sanctioned than it will be in cities with white mayors.

### Inequality and Police Violence

Following Jacobs and Britt (1979), economic stratification should explain the amount of deadly force used by the police. The economic version of the political perspective on state violence holds that disparities in economic rewards produce a potentially unstable social order that must be maintained by force. Chambliss and Seidman (1980, p. 33) write that “the more economically stratified a society becomes, the more it becomes necessary for dominant groups to enforce through coercion the norms of conduct that guarantee their supremacy.” Many neo-Marxists believe that, without the threat of coercion, unequal arrangements cannot be sustained.

Neo-Marxists do not have a monopoly on this view. Turk (1966, p. 349) observes that when there are greater differences in resources “normal legal procedures are likely to be unofficially abrogated in favor of summary and less costly procedures” because procedural law is expensive. For all of these reasons we expect that cities with greater economic differences between the affluent and the poor should have higher rates of killing by the police.

Theorists who stress coercion often see inequality as a potentially unstable condition that must be sustained by force or by its threat. Many of these theorists also hold that economic resources are a source of power. Because power is a relational asset that rests on differences in resources, inequality is unlikely to give the lower class or minorities greater control over the police for several reasons. First, because they have less power, people with the least resources should have a reduced ability to protect themselves from police violence in unequal areas. Second, if racial or economic inequality must be sustained by force, privileged groups in unequal cities will have less reason to interfere with police violence, and third, in unequal areas the privileged may indirectly encourage police killings

by demanding that restraints be removed so the police can maintain order.

Yet hypotheses that focus only on economic inequality ignore the relative economic position of minorities. Such explanations assume that economic divisions between either poor whites or poor blacks and the affluent have identical effects on social control agencies. We overcome this problem by looking at the effects of economic disparities between blacks and whites. In cities where the ratio of black to white mean incomes most favors whites, the relative number of police killings should be greater for several reasons.

First, the greater the differences between black and white economic resources, the more a relatively poor black underclass with less to lose from redistributive violence should threaten privileged whites who, in this situation, may be less willing to curb police violence. Second, both neo-Marxists and sociologists who are not Marxists (e.g., Blalock 1967) view power as at least partly based on differences in economic resources. Substantial differences in the economic resources of blacks and whites should reduce the black population's political influence and thus their control over police violence. Finally, racial inequality may lead threatened whites to make direct demands that the police be unfettered to deal with the threat posed by a potentially violent racial underclass.

Hence theorists who stress coercion often see inequality as a potentially unstable condition that must be sustained by force or by its threat. Many of these theorists also hold that economic resources are a source of power. Because power is a relational asset that rests on differences in resources, inequality is unlikely to give the lower class or minorities greater control over the police for several reasons. First, because they have less power, people with the least resources should have a reduced ability to protect themselves from police violence in unequal areas. Second, if racial or economic inequality must be sustained by force, privileged groups in unequal cities will have less reason to interfere with police violence, and third, in unequal areas the privileged may indirectly encourage police killings by demanding that restraints be removed so the police can maintain order.

In his review of field studies that examined the use of lethal force, Sherman (1980*b*) concludes that about half of the people fired on by the police did not have guns. The percentage shot while fleeing also was substantial. He claims that these "executions without trial occur in response to crimes against property without any defense justification" (p. 89). Sherman's conclusion that such deaths often result from overreaction leaves much variance for political (and other) hypotheses to explain after violence in departmental environments is held constant.



## REACTIVE HYPOTHESES

## Civilian Violence and Violent Police Responses

Some police killings undoubtedly are a reaction to difficult conditions in departmental environments. If findings about social divisions or direct political hypotheses are to be credible, it is crucial to include extensive controls for these problematic urban conditions. For example, the police should be especially likely to use violent methods where they must deal with a violent population. This most fundamental reactive explanation suggests that police departments in cities with higher civilian murder rates should be more likely to use deadly force.

## Family Strife and Police Violence

Sampson (1987) and others find that broken families lead to violent crime. We assess this effect in two ways. First, police killing rates may be greater in cities with larger percentages of female-headed families. Second, because much police work involves coping with violent domestic disputes and because these interventions often require force (Rubenstein 1973), police departments in cities with substantial divorce rates should be more likely to use lethal violence. For these reasons, we use both divorce rates and broken families to measure the intrafamily strife that may lead to more killings by police officers.

## Population Density and Police Violence

Poverty or crowding, measured by dwelling units with more than a threshold number of people per room, may produce violent behavior that leads to violent responses by the police. Deadly force also may be likely in jurisdictions where departments have fewer officers relative to the population they must control. Finally, the police encounter heightened difficulties in larger cities in part because anonymity is enhanced. This relationship and the effectiveness of inexpensive informal controls in smaller cities suggests that greater amounts of deadly force can be expected in the most populous jurisdictions.

## A SUMMARY OF THE HYPOTHESES

*Political threat theories.*—Police may use deadly force because they protect the interests of the privileged by keeping the redistributive violence of subordinate racial or economic groups in check. If the *economic* version is correct, the most economically unequal cities will

have the most police killings. If the *racial* version of this political threat approach is correct, the following four relationships should hold. (1) Police killing rates will be higher in cities with more blacks or (2) in cities where growth in the percentage of black residents has been pronounced. (3) We can expect a greater use of lethal force where there are larger differences in the economic resources of blacks and whites. (4) The police should not use lethal force as often in cities with a black mayor.

*Reactive hypotheses.*—The police may kill because they must protect all groups from violence. If reactions to civilian violence explain police violence, we can expect more police killings in the cities with the most murders or in cities that are especially difficult to police for other reasons, including family strife, poverty, and crowding. But, according to the reactive view, law-abiding citizens benefit from the public safety provided by this seemingly necessary use of lethal violence.

## METHODOLOGY

### Research Design, Dependent Variable, and Estimation

Because the environmental approach has been so productive, most empirical studies of organizations stress environmental explanations. Sherman (1986a) applies this logic to the police behavior when he says, “Theoretically the community level should be given the most attention. . . . Rossi [Berk, and Edison] (1974) found that in comparing city of employment and officer’s personal characteristics as explanations of the use of aggressive detection tactics, 67 percent of the variance was uniquely attributable to the city” (p. 94).

Environmental factors ought to explain a police department’s propensity to use lethal force as well, so we analyze the rate of police killings in 1980 in the 170 U.S. cities with a population greater than 100,000. The data come from supplementary homicide reports that police departments filed with the FBI. This information is likely to be accurate because such homicides are difficult to conceal. The alternative information on police killings relies on the erratic behavior of coroners and medical examiners (Sherman and Langworthy 1979).

Police killings are unusual events.<sup>4</sup> We therefore compute the total rate

<sup>4</sup> The mean number of *total* police killings across all 170 cities, 1980–86 is 9.68 compared to a mean of 1.99 for the *rates* per 100,000. The five cities with the highest rates are Fort Lauderdale, 7.41; Dallas, 7.30; St. Louis, 7.17; Newark, 7.02; and New Orleans, 6.83. It is interesting that Los Angeles ranked twentieth with a police killing rate of 4.23, placing this city in the eighty-eighth percentile.

of police killings per 100,000 residents in a city over seven years starting in 1980 and ending at 1986.<sup>5</sup> This aggregation is not novel (see Kania and Mackey 1977; Jacobs and Britt 1979; Liska and Yu 1992), but after computing these averages, 31 cities (18.3%) still had no police killings. Because ordinary least squares (OLS) gives inconsistent estimates when the dependent variable has many zero values, Tobit frequently is employed to deal with such censored dependent variables.

Tobit uses two formulas to predict values of the dependent variable—one for cases at the limit value (zero in this study) and another for cases above the limit (Roncek 1992, p. 503), so this procedure jointly calculates two effects. Tobit combines probit estimates of the probability that a case will have a nonlimit value for cases at the limit on the dependent variable with estimates of the effects of the explanatory variables on values of the dependent variable for cases with a nonlimit value on the dependent variable. We capitalize on the properties of this estimator because it is the most appropriate when the dependent variables are censored rates with large numbers of zeros (Roncek 1992; Greene 1993).<sup>6</sup>

We provide separate analyses of the rate of blacks killed by the police in the same period, but we must deal with an added methodological difficulty. Cities with a tiny black population can have extremely high rates of police killings of blacks. If a city has a small number of blacks, enormous rates can result from just one or two incidents over the entire seven-year period. To remove this distortion, we weight the Tobit equations explaining police killings of blacks by the number of blacks in a city. This procedure substantially reduces the effects of cities with few blacks and appropriately increases the influence of cities with a large number of black

<sup>5</sup> If we add three years and compute mean police killings from 1980 to 1989, the theoretical implications of the findings do not change, but we are dubious about such long lags. In any case, using these additional years to reduce the number of zeros in the dependent variable is ineffective. For example, 28 zeros remain in total police killing rates if police killings are averaged from 1980 to 1989 compared to 31 when the last year used is 1986. For these reasons, we handle zeros in the dependent variable by using Tobit. We do *not* average data for the regressors across multiple years because some theoretically important independent variables (e.g. Gini or the black/white income ratio) are available only for 1979. Averaging an independent variable over many years almost invariably increases that variable's explanatory power. Because multiple-year averages cannot be computed for every independent variable, they *must not* be used for any. We use city means for missing killings in 1982 for Houston and in 1984 and 1985 for Chicago, but these changes have infinitesimal effects on the results.

<sup>6</sup> For additional discussion and references to the many studies that have used Tobit, see Greene (1993) or any other standard econometrics text. For precedent in the use of this procedure by sociologists, see Walton and Ragin (1990), Roncek and Maier (1990), and Mosher and Hagan (1994). We use the Tobit routine in STATA ver. 5.0.

residents.<sup>7</sup> To correct skewed distributions, “1” is added to dependent variables and they are transformed into natural log form.

### Measurement of Explanatory Variables

We measure minority presence with the percentage of blacks in a city (%BLACK). Squaring this variable weights the highest %BLACK values more heavily and puts greater emphasis on the largest black populations that should be most threatening (for precedent, see Jacobs and Helms [1996]). This transformation captures a crucial part of the threat hypotheses we are testing. We assess the effects of shifts in %BLACK with percentage change in %BLACK (indicated as %CHANGE) as measured from 1970 to 1980. To correct for a modestly skewed distribution, this variable is in square root form.<sup>8</sup>

In supplemental (but unreported) analyses, we use the percentage of nonwhite population instead, but this measure gives almost identical results. If the separate combined percentage of white Hispanics and other racial minorities who are not black is added to equations that already contain the %BLACK variable, the nonwhite variable is insignificant. For these reasons, we measure minority effects with data on blacks.

We operationalize racial inequality with the ratio of black-to-white mean family incomes (ratios of medians give similar results) while aggregate inequality is measured with a Gini index calculated on household incomes as reported by the 1980 census. We include a dummy scored “1” for the presence of black mayors and a dummy for location in the South.<sup>9</sup> We measure poverty with the percentage of all families below the poverty line or with the percentage of impoverished black families. Following Sampson (1987), breakdowns in the family are assessed with the percentage of the population that is divorced or by the percentage of female-

<sup>7</sup> When we analyze police killings of blacks, we therefore follow econometric precedent and weight by the number of blacks to remove the effects of heteroscedasticity. Such weights appropriately reduce the effects of cities with few blacks and with extremely high police killing rates. Seventy cases, or 41.2% of the 170 cities, had no police killings of blacks, but weighting by the number of blacks substantially reduces the effects of these cases with zero values.

<sup>8</sup> Some variables are in square root or natural log form to correct for skewed distributions. These transformations reduce the effects of outliers and increase the likelihood of bivariate normality (Fox 1991).

<sup>9</sup> Dayton, Ohio, shifted from a black to a white mayor in the early 1980s during the years when yearly police killings were combined. If we alter the value of this case from “1” to “0” to reflect this shift, the results remain virtually identical. Unfortunately, we could not find data on the race of police chiefs or the racial makeup of departments in 1979 or 1980.

headed black families. Crowding is measured with the natural log of the percentage of housing units with more than 1.01 residents per room.

We assess police strength with the number of police employees per 100,000 residents. We use total number of employees because departments substitute unsworn personnel for uniformed officers, but this choice does not matter. We measure violence in departmental environments with the murders per 100,000 residents.<sup>10</sup> Attempts to use violent crime rates or the robbery rates indicate that the murder rates are the best control. Murder rates (and the other explanatory variables in these 170 cities) are highly correlated from one year to the next, so we find that using either 1979 or 1980 rates furnishes almost identical results.

In the analyses of the police killings of blacks, we use the percentage of black families with a female head (because this variable has stronger effects than the black divorce rate), the black murder rate, which is computed by dividing the number of black offenders by the black population, and the percentage of black families who have incomes below the poverty line. Explanatory variables are measured in 1980.

### Model Specification

One general specification of the Tobit model that predicts total police killings is

$$\begin{aligned}
 \text{POLKILL}_i = & b_0 + b_1\%BLACK_i^2 + b_2\%CHANGE B_i \\
 & + b_3\text{BLK/WHITEINC}_i + b_4\text{MURDRT}_i \\
 & + b_5\text{POP}_i + b_6\text{DIVRC}_i \\
 & + b_7\text{BLKMAYOR}_i + b_8\text{SOUTH}_i \\
 & + b_9\text{CITYGOV}_i + b_{10}\text{CROWDING}_i \\
 & + b_{11}\text{GINI}_i \text{ (or) } b_{11}\text{POV}_i + \text{RESIDUAL}_i,
 \end{aligned}
 \tag{1}$$

where POLKILL is the natural log of the rate of police killings per 100,000 citizens plus one, %BLACK is the square of the percentage of blacks in the population, %CHANGE B is the square root of the percentage change in the percentage of blacks in the population, BLK/WHITEINC is black mean family income divided by white mean family income, MURDRT is the number of murders per 100,000 population, CITYGOV is a dummy scored "1" if a city has a city manager or a commission form of govern-

<sup>10</sup> Deaths caused by the police are removed from all independent variables that measure killings. Killings by police officers are eliminated from both the total murder rate and the black murder rate.

ment, POP is the natural log of population, DIVRC is the percentage of divorced persons in the population, BLKMAYOR is a dummy variable for a black mayor, SOUTH is a dummy for the South, CROWDING is the natural log of the percentage of housing units with more than 1.01 persons per room, GINI is the index of income inequality, and POV is the percentage of families with incomes below the poverty line.

Because they are too collinear to be used in the same equation, GINI and POV are given the same subscript and separated by *or*. In additional equations we enter the number of police employees per 100,000 population. Only the coefficients on the black/white income ratio, black mayors, and police employees per capita should be negative.

A general equation for the weighted (by the number of blacks) Tobit model predicting police killings of blacks is

$$\begin{aligned}
 \text{POLKILLB}_i = & b_0 + b_1\% \text{BLACK}_i + b_2\% \text{CHANGEB}_i \\
 & + b_3 \text{BLK/WHITEINC}_i + b_4 \text{BLKMURDRT}_i \\
 & + b_5 \text{POP}_i + b_6 \text{BLKFMLHD}_i \\
 & + b_7 \text{BLKMAYOR}_i + b_8 \text{SOUTH}_i \\
 & + b_9 \text{CITYGOV}_i + b_{10} \text{CROWDING}_i \\
 & + b_{11} \text{GINI}_i \text{ (or) } b_{11} \text{POV}_i + \text{RESIDUAL}_i,
 \end{aligned}
 \tag{2}$$

where POLKILLB is the natural log of the police killing rate of blacks per 100,000 blacks plus one, BLKMURDRT is the black murder rate, BLKFMLHD is the percentage of black families headed by a female, and the remaining variables are defined as above. Again we expect that only the black/white income ratio, black mayors, and police employees per capita should be inversely related to police killing rates of blacks.

## ANALYSIS

Table 1 gives means and standard deviations for the variables. There is substantial variation in the dependent variable. Seven-year mean police killing rates across these 170 cities range between zero and 7.41 police killings per 100,000 residents.

## Tobit Results

*Total killings.*—Table 2 presents the Tobit estimates of total police killing rates. Equation (1) in table 2 shows a restricted six-variable model. In equation (2) we add the black mayor measure and the dummy for location in the South. In equation (3) we add police employees per 100,000, reform

TABLE 1  
MEANS AND SDs OF VARIABLES

	Mean	SD
POLKILL <sub><i>i</i></sub> .....	.921	.602
BLK/WHITEINC <sub><i>i</i></sub> .....	.676	.134
%BLACK <sup>2</sup> .....	631.460	940.786
%CHANGE <sub>B</sub> .....	10.422	4.456
DIVRC .....	10.035	2.457
MURDRT .....	14.524	11.029
Police employees per 100,000 population .....	259.347	96.746
POP .....	12.291	.752
GINI .....	.368	.036
BLKMAYOR .....	.065	.247
CITYGOV .....	.568	.497
CROWDING .....	1.431	.538
SOUTH .....	.361	.462
POV .....	11.066	4.788

NOTE.—Computed on 170 U.S. cities with population over 100,000. Except for the income data used to compute inequality scores, explanatory variables are based on 1980 data.

political arrangements (CITYGOV), and the measure of income inequality (Gini). In equation (4) we drop police strength and add crowding. In equation (5) we substitute percent below the poverty line for Gini in an equation otherwise identical to equation (4).

These results show that murder rates, population, and divorce rates are consistent predictors of the use of lethal force by the police, but other environmental conditions that make police work more difficult do not matter.<sup>11</sup> Neither crowding, poverty, nor the relative size of departments explain this outcome. Some indicators of political divisions also do not predict these deaths. In contrast to Jacobs and Britt's (1979) results using state data, economic inequality is unrelated to police killings. Other racial and political variables that do not appear to influence the total rate of police killings include %BLACK, %CHANGE<sub>B</sub>, CITYGOV, and the presence of a black mayor.

Regardless of how the specifications are altered, the same four explana-

<sup>11</sup> Substituting the robbery rate or the violent crime rate in a specification otherwise the same as that used in eq. (4) of table 2 leads to identical theoretical implications, but the explanatory power is reduced. The robbery rates and the murder rates are too collinear to be used together, but forcing them into the same analysis does not alter the theoretical conclusions. The evidence strongly suggests that murder rates are the best indicator of the primary reactive explanation for police killing rates.

TABLE 2  
TOBIT ANALYSES OF ALL KILLINGS BY POLICE OFFICERS

	(1)	(2)	(3)	(4)	(5)
Intercept .....	-1.9636*	-1.9887*	-2.2758	-2.3965	-2.5481**
	(-2.31)	(-2.27)	(-1.69)	(-1.76)	(-2.76)
%BLACK <sup>2</sup> .....	-.0568	-.0110	-.0187	.0021	-.0257
	(-.09)	(-.16)	(-.27)	(.03)	(-.35)
%CHANGEGB .....	.0076	.0076	.0087	.0071	.0108
	(.74)	(.74)	(.82)	(.65)	(1.00)
BLK/WHITEINC .....	-1.4921***	-1.4692***	-1.4181**	-1.4001**	-1.5341***
	(-3.72)	(-3.33)	(-3.02)	(-2.77)	(-3.39)
MURDRT .....	.0262***	.0261***	.0252***	.0241***	.0210***
	(4.58)	(4.50)	(4.15)	(3.72)	(3.13)
POP .....	.2278***	.2291***	.2309***	.2411***	.2459***
	(3.65)	(3.63)	(3.56)	(3.72)	(3.81)
DIVRC .....	.0580***	.0573**	.0534**	.0529**	.0661**
	(3.16)	(3.01)	(2.63)	(2.52)	(2.89)
BLKMAYOR .....	.0292	.0292	.0232	.0147	.0221
	(.14)	(.14)	(.11)	(.70)	(.11)
SOUTH .....	.0148	.0148	...	-.0060	-.0280
	(.14)	(.14)	...	(-.06)	(-.27)
CITYGOV .....	...	...	.1373	.1141	.1329
	...	...	(1.46)	(1.22)	(1.40)
Police per 100,000 population .....	...	...	.0006	...	...
	...	...	(1.16)	...	...
GINI .....	...	...	.1057	.3240	...
	...	...	(.96)	(.16)	...
CROWDING .....	...	...	...	.0671	.0326
	...	...	...	(.74)	(.35)
POV .....	...	...	...	...	.0226
	...	...	...	...	(1.31)
Log likelihood .....	-138.55	-138.53	-137.05	-137.44	-136.59
$\chi^2$ .....	95.89***	95.93***	98.89***	98.11***	99.81***

NOTE.—%CHANGEGB is in square root form while %BLACK<sup>2</sup> has been divided by 10,000. Nos. in parentheses are *t*-values.  
\*  $P \leq .05$ ; \*\*  $P \leq .01$ ; \*\*\*  $P \leq .001$ .



tory variables account for variation in police killings. The results suggest that the police use of deadly force is greatest in the most populated cities and in cities with the highest murder rates. Officers in communities with larger divorce rates also are more likely to use lethal violence, but the findings indicate that an important social division that is likely to have political consequences explains this outcome as well. Police killings are especially likely in cities where economic differences between blacks and whites are most pronounced.

Because the racial inequality measure is theoretically important and such a consistent predictor of the total rate of police killings and because blacks are the victims of 53% of all of the police killings in our sample, we next present separate analyses of the police use of lethal force against African-Americans.

*Police killings of African-Americans.*—Table 3 shows the results of the Tobit analyses of the use of lethal force against blacks. The explanatory variables are similar to those in table 2, but we substitute the black murder rate (BLKMURDRT) for the total murder rate and the black poverty rate (BLKPOV) for the total poverty rate. Because the black divorce rate does not explain police killings of blacks, we use the percentage of black families headed by a female instead. All models again are estimated with Tobit. In these analyses, however, the equations are weighted by the number of blacks in a city to correct the heteroscedasticity that results from a few cases with extremely high black victimization rates that is largely an effect of extremely small black populations in some cities.<sup>12</sup>

The specifications follow the pattern employed in table 2. Equation (1) in table 3 presents another restricted model limited to six explanatory variables. In equation (2) we again add the presence of a black mayor and the dummy for location in the South. In equation (3) we add police employees per 100,000, reform political arrangements, and the aggregate measure of income inequality (Gini). In equation (4) we drop police strength, and add crowding. In equation (5) we substitute the percentage of black families below the poverty line for Gini in an equation otherwise identical to equation (4).<sup>13</sup>

<sup>12</sup> Cities with the highest scores on police killings of blacks per 100,000 blacks are Torrence, Calif., 228.65; Sunnyvale, Calif., 39.22; Amarillo, Texas, 22.48; Long Beach, Calif., 21.18; Oklahoma City, 19.22; Arlington, Texas, 18.87; and Jacksonville, Fla., 17.45. Both Torrence and Sunnyvale have fewer than 1,000 black residents and just one (Sunnyvale) or two (Torrence) police killings between 1980 and 1986. This means that a weighting scheme like the one we use that reduces the influence of these two cases is appropriate. The mean *number* of police killings of blacks across these seven years is 5.13. The mean *rate* of police killings of blacks is 5.94 per 100,000 blacks.

<sup>13</sup> The unweighted means and SDs for variables introduced in the analysis of police killings of blacks are as follows: the mean of the natural log of police killing rates of

The explanatory variables that mattered when all police killings are analyzed continue to explain police killings of blacks despite the weighting and other changes. Blacks are more likely to be killed by the police in larger cities with higher black murder rates and more broken families, although the measure of broken families is different in these equations. Unreported findings show that the percentage of all female-headed families does not explain the total rate of police killings, but the results in table 3 show that the percentage of black families headed by a female is positively associated with police killings of blacks. The coefficients on these race-specific variables provide additional support for reactive explanations.

Some theoretically interesting contrasts are revealed by comparing the coefficients on the measures of political divisions and the coefficients on the direct measures of political effects in tables 2 and 3. The racial inequality variable is significant in both analyses, but the presence or absence of a black mayor does not influence total police killings. When the analysis is confined to the use of lethal force against blacks, however, we find that police killings are likely to be reduced when the most powerful political official in a city is an African-American. Finally, when we analyze all police killings, neither the percentage of blacks nor the percentage change in the percentage of the population that is black is significant. Yet when the police killing rates of blacks are at issue, both of these racial threat measures predict these deaths.

#### ALTERNATIVE TESTS

Because these findings provide insight about such an important outcome, we conducted sensitivity tests. The effects of additional explanatory variables were assessed in unreported equations. Residential segregation is not associated with either dependent variable. Unemployment rates, unemployment disaggregated by race, change in unemployment rates, either the rate or the number of police officers who were killed, and the presence of young males disaggregated by race have the same negligible effects on the total rates of police killings and police killings of blacks.<sup>14</sup> Using different combinations of the explanatory variables also does not alter the results. Finally, we could find no evidence for departures from linearity.

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blacks plus one is 1.22 (SD 1.13); the mean of the black murder rate is 38.11 (SD 30.14); the mean of the percentage of female-headed black families is 27.49 (SD 7.05).

<sup>14</sup> Collinearity is not problematic in any of these analyses. *All* VIF scores are well below the threshold value of 10 that conservative statisticians advocate as an indicator of collinearity. This outcome and the stability of the results despite the many diverse specifications support a conclusion that this difficulty is not distorting our findings.

TABLE 3  
WEIGHTED TOBIT ANALYSES OF POLICE KILLINGS OF BLACKS

	(1)	(2)	(3)	(4)	(5)
Intercept .....	-1.0300 (-1.50)	-2.0636* (-2.22)	- .8489 (- .60)	-1.4832 (- .98)	-1.9560 (-1.88)
%BLACK <sup>2</sup> .....	.1015** (2.93)	.1798*** (3.51)	.1752** (2.50)	.1855*** (3.27)	.1802*** (3.27)
%CHANGEB .....	.0680* (1.71)	.0707* (1.79)	.0791* (1.94)	.0680* (1.69)	.0695* (1.73)
BLK/WHITEINC .....	-1.6968*** (-3.54)	-1.5364** (-2.78)	-1.9731*** (-3.25)	-1.6803** (-2.62)	-1.5559** (-2.71)
BLKMURDR .....	.0160*** (5.79)	.0192*** (5.95)	.0202*** (6.23)	.0193*** (5.82)	.0194*** (5.75)
POP .....	.1219*** (3.20)	.1456*** (3.29)	.0988* (1.79)	.1495** (2.55)	.1416* (2.26)
BLKFMLHD .....	.0266* (2.20)	.0379** (2.90)	.0288* (2.00)	.0402** (2.71)	.0401** (2.51)
BLKMAYOR .....	...	-.3517* (-1.95)	-.4036* (-2.26)	-.3378* (-1.84)	-.3627* (-1.90)
SOUTH .....	...	.2003 (1.39)	...	.2121 (1.44)	.2167 (1.36)
CITYGOV .....	...	...	-.0193 (-1.14)	-.0257 (-1.19)	-.0322 (-1.24)
Police per 100,000 population .....	...	...	.0003 (.45)	...	...
GINI .....	...	...	-.3579 (-1.12)	-1.4271 (-4.45)	...
CROWDING .....	...	...	...	.0078 (.05)	-.0029 (-.02)
BLKPOV .....	...	...	...	...	-.0036 (-.24)
Log likelihood .....	-158.93	-155.05	-155.88	-154.93	-155.00
$\chi^2$ .....	60.63***	68.39***	66.74***	68.64***	68.49***

NOTE.—%CHANGEB is in square root form while %BLACK<sup>2</sup> has been divided by 10,000. Nos. in parentheses are *t*-values.  
\*  $P \leq .05$ ; \*\*  $P \leq .01$ ; \*\*\*  $P \leq .001$ .

To see if weighting leads to the contrasts between the unweighted findings reported in table 2 and the weighted findings reported in table 3, we weighted the Tobit equations that predict total police killings by city population. But when these weighted results are compared to the equivalent unweighted results in table 2, the same explanatory variables are significant.

We use principal components to combine Gini, the total (and, where appropriate, the race-specific) poverty rates, and crowding to create a comprehensive measure of the presence of an underclass, but these scales have insignificant effects when their component variables are dropped and the scales are added to the equations. When we reestimate the models using White's (1980) correction for heteroscedasticity, the corrected *t*-values do not contradict the reported results.<sup>15</sup> The Tobit equations in the tables also pass the link test (Pregibon 1980) for specification error.

In accord with the conventional wisdom, we find that measures of interpersonal violence in departmental environments and other problematic urban conditions lead to more police killings, but racial threat effects and one explicitly political indicator matter as well.

## DISCUSSION

### A Review of the Results

These findings are robust. When we substitute explanatory variables, the results persist. The findings also hold when various sensitivity tests are conducted. Plausible contrasts appear when different police killing rates are analyzed. One explanation for these stable findings is the comparative accuracy of supplemental homicide data on police killings. The number of cities employed in this study probably contributes to the stability of the findings as well and allows us to assess many competing explanations. According to Johnston (1984), estimates based on comprehensive models are less likely to be biased.<sup>16</sup>

<sup>15</sup> We analyze police killing rates rather than simple counts because the likelihood of being killed by the police is theoretically more interesting. Analyses of the *number* of police killings using negative binomial regression (an estimator similar to Poisson regression but without such restrictive assumptions about the distribution of the dependent variable) nevertheless give results with the same theoretical implications as those found using Tobit. Another check for distributional problems like heteroscedasticity involves transforming the dependent variables to ranks by rounding to the nearest integer and then reestimating with ordinal probit. When this is done, the Tobit findings reported in the tables persist.

<sup>16</sup> Johnston says, "It is more serious to omit relevant variables than to include irrelevant variables since in the former case the coefficients will be biased, the disturbance variance overestimated, and conventional inference procedures rendered invalid, while in the latter case the coefficients will be unbiased, the disturbance variance properly estimated, and the inference procedures properly estimated. This constitutes

The findings suggest that many of these lethal events stem from problematic urban conditions. The appropriate murder rates explain both total police killings and police killings of blacks. Population matters in all equations as well, so a conclusion that the police are more likely to use lethal force in the most populous cities seems warranted. This finding is plausible because anonymity and other conditions that increase the difficulties faced by the police are enhanced in larger cities.

Some of the remaining measures of problematic conditions in departmental environments do not influence the use of lethal force. Poverty rates, the number of police employees per 100,000, and crowding are unrelated to police killings. Higher divorce rates are associated with larger total police killing rates, however, and the presence of female-headed black families also predicts the police use of deadly force against blacks.

In contrast to Jacobs and Britt's (1979) state-level analysis, we find no evidence that aggregate inequality measured by the Gini index explains police killings. But studies that use cities often do not find that economic inequality predicts criminal justice outcomes. When the affluent suburbs and the central cities are combined by using data from MSAs, coefficients on economic inequality typically become stronger (Jacobs 1979). Limiting an analysis to cities excludes many prosperous residents who live in the suburbs, so community inequality probably is underestimated when researchers use city data. Yet it must be remembered that this is a post hoc explanation for a hypothesis that was ineffective.

The findings instead suggest that, at least during the 1980s, racial inequality (BLK/WHITEINC) is the kind of economic stratification that best explains the use of deadly force by the police. The results are consistent with a view that greater differences in the economic resources of blacks and whites reduce the black population's political influence and their ability to curb police violence. These findings also support a parallel hypothesis derived from threat theory that the willingness of dominant groups to interfere with harsh law enforcement methods is diminished in cities where differences in the economic resources of blacks and whites are most pronounced.

We also find that minority presence matters. While the percentage of blacks in the population is unrelated to total police killings, it has positive relationships with the use of deadly force against blacks. The latter result supports prior findings about the determinants of formal social control.

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a fairly strong case for including rather than excluding relevant variables in equations. There is, however, a qualification. Adding extra variables, be they relevant or irrelevant, will lower the precision of estimation of the relevant coefficients" (1984, p. 262), so inclusive specifications typically provide more conservative significance tests.

According to these findings, cities with greater numbers of blacks tend to have stronger law enforcement agencies that operate in a more punitive fashion. The standard interpretation for such results hinges on threat effects. Following Blalock (1967), threat theorists argue that, where blacks are relatively numerous, white dominance is threatened, so whites use social control agencies to maintain their ascendant position. Our finding that change in the percentage of blacks in a city's population is positively associated with police killings of blacks after other factors are controlled provides additional support for this racial threat account.

Since they are often victims of crime, many blacks may support a stronger police force or other policies that offer the hope of reducing these risks. Studies of social control that find a positive relationship between the presence of blacks and police strength or arrest rates do not offer unequivocal support for the racial threat hypothesis because many African-Americans may see such measures as desirable. In contrast to the studies that analyzed these control outcomes, this study focuses on behavior that is far more likely to hurt blacks. A comparison of racial victimization rates shows that the rate of police killings of blacks per 100,000 blacks is much greater than the the same rate for non-Hispanic whites (5.13 vs. .977). Because African-Americans have far less reason to condone the absence of restraints on police violence, an analysis of police killings offers a better test of racial threat theory than analyses of police strength or arrests.

Perhaps this disproportionate probability that blacks will be killed by the police is the main reason why the race of the mayor matters. While the relationships between the presence of reform political arrangements and police killings are negligible, our findings show that cities with a black mayor have fewer police killings of blacks. This finding is plausible because black mayors, who hire and fire police administrators, are likely to be dependent on black votes. Hence, black mayors have both the motive and the political resources to reduce police killings of blacks. These results suggest that social scientists should not overlook political factors when they analyze the determinants of police violence.

## IMPLICATIONS AND CONCLUSIONS

The results reported above challenge views that focus only on economic inequality and ignore racial minorities. Arguments that economic gaps between either poor whites or poor blacks and the affluent have identical effects on repressive efforts to maintain order are not corroborated by findings that racial hypotheses explain police killings or by the weak associations between economic inequality and these lethal events, but they do show that racial inequality accounts for both the total rate of police kill-

ings and the rate of blacks killed by the police. The persistence of all of these racial results after murder rates and other difficult urban conditions have been held constant, moreover, does not fit with the conventional wisdom that the use of deadly force by the police is only a reaction to the interpersonal violence they must control.

Macro studies such as this one can isolate general relationships, but aggregate data are unlikely to furnish information about the intervening links between structural explanations and political outcomes. The links between structural arrangements that give dominant races greater influence and outcomes that are consistent with their interests often must be inferred. In this case, we have suggested plausible mechanisms that explain how racial inequality and the other structural effects isolated in this study may lead to a greater use of deadly force.

We acknowledge, however, that ideological factors enumerated by Garland (1990) or by Savelsberg (1994) may complement our structural accounts. In racially stratified cities social distance and fear of an underclass may reduce an ability to see minorities and the poor as equally deserving of protection from executions without trial. Liska et al.'s (1982) finding that there is a positive association between minority presence and fear of crime that persists after the crime rates have been held constant fits with this view, but we have no evidence about beliefs.

This study nevertheless has important implications. Sociologists have not stressed coercion as an explanation for order in advanced societies. Perhaps the ubiquity of market exchanges has directed our attention away from force or its threat (Collins 1975). Because the violence used by contemporary control agencies is modest compared to times when rulers constructed states by forcefully subduing domestic rivals, students of advanced societies neglect these critical events (Tilly 1978).

Yet those who assume that state violence is unimportant forget that coercion, if used to regulate market exchanges, is the ultimate source of control in market economies. If most people realize that visible defiance of the state's coercive supremacy will be unprofitable, that does not mean that the threat of state violence no longer is an important explanation for social order. It suggests instead that we look closely at the political processes that determine how these critical resources are employed.

According to Weber, politics is the struggle for control over the coercive resources of the state. Since the police are to the state as the edge is to a knife (Bayley 1985), political explanations for police violence should be fruitful. Yet the political determinants of the behavior of social control agencies rarely are studied because social scientists often assume that state agencies charged with using domestic coercion serve universal interests. The results of this study and those found in other studies motivated by

a political approach to law enforcement challenge this view. By uncovering the racial and economic divisions that lead to harsh law enforcement methods, a relatively new research area that might be called the *political sociology of social control* has increased our knowledge about the coercive determinants of social order in modern societies.

This study extends this tradition by assessing the environmental determinants of police killings. A finding that the police use of lethal force varies with the degree of inequality between the races, the presence of blacks, and local political arrangements that increase black control over the behavior of law enforcement personnel supports political explanations for these violent events. Such results are consistent with claims that state violence is used in racially unequal jurisdictions to preserve the existing order. They also suggest that sociologists should not neglect the coercive foundations of domestic order particularly in advanced but racially divided societies like the United States.

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