PUBLIC AND PRIVATE PROTECTION:

SUBSTITUTABILITY OR COMPLEMENTARITY?

by

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Will individuals reduce their self-protection measures when the community raises its level of police protection? Will business firms replace public protection by increasing their expenditures on private protection when the public lowers its expenditures on police? These questions seem to be of interest to the state or local government which decides on its budget allocation and police expenditures. Assuming that the community desires to achieve a certain level of protection or safety, it has to be decided how much protection will be provided collectively by the public authorities and what role will be left to self-protection by individuals.

In effect, when the local government determines its expenditures on protection, it also allocates the community's protection resources between the private and public sector. In order to achieve an optimal allocation it has to know what effect its decision will have on the decisions made by individuals. Even though self-protection devices are available to households as well as to business, we consider in this study private protection by business firms. We try to estimate empirically how individual businessmen react to public protection.

Before analyzing this question, it is important to examine the economics of the problem: what is the optimal allocation of protection-resources between the public and private sectors. The standard economic justification for public provision of protection lies in the argument that safety is a public good: a given "unit of safety" yields benefits that can be enjoyed by more than one individual because one person's use of public good services

does not prevent simultaneous use by others. It has been shown by Demsetz (1970) that, given the ability to exclude nonpurchasers, private producers can produce public goods, so defined, efficiently. However if there is no way to exclude individuals who fail to pay for protection from consuming the public good and therefore the private market will provide a sub-optimal amount of safety. In my view, this point is important for crime in public places (street crime), but is less relevant for crime against business. Firms that invest in self-protection collect most of the returns to their investment: they not only reduce the direct loss from robbery, burglary, larceny and shoplifting but they also benefit from the safety of their customers and employees through higher prices and lower wages. Payment for protection services which benefit a group of firms can be enforced in shopping centers, medical centers and other market organizations which supply joint-services.

Let us return now to the main question of this study, namely the effect of the public decision on the private expneditures of firms. Kakalik and Wildhorn (1971) argue on a priori grounds that public and private police (except reserve and "special purpose" police) supplement each other. The purpose of this study is to examine the question of complementarity or substitutability by an empirical investigation. The source of the data is the 1968 Small Business Administration's survey of crime against business, which includes information on private protection measures such as alarm systems, guards, reinforcing devices and firearms, for twenty-five hundred firms.

Basically, the relationship we estimate here is the effect of public protection on private protection, holding constant the crime rate. Obviously it is important to include crime in the equation because crime and public protection are positively correlated. This specification is econometrically proper if we assume that given his choice of location, the individual businessman is facing an exogenous crime rate in his community and also he is assumed to have no effect on the level of public protection. This abstracts from the fact that he may choose the crime rate and public protection level by choosing the community in which his business is located. Also, we abstract from whatever influence he might have on the level of public protection through the political process. The firm is trying to minimize its expected loss from crime by choosing its optimal level of private protection. This choice will be affected by the level of public protection set by the community. In general, we do not have a priori expectations about complementarity or substitutability but one would think that the productivity of some private devices is very much dependent on the availability of public protection. For example, the usefulness of a local alarm depends on whether there are enough police on patrol. This is also the case, but less so, for central alarm systems, because the central alarm station notifies both private security and public police in case of alarm.

Discussion of Results

As expected, we find a positive and significant effect of the crime

TABLE 1

Definitions of Variables

Dependent variables:

The following dummy variables equal one if the specified condition holds; otherwise they equal zero:

BA = the firm has a local alarm system

CA = the firm has a central alarm system

RD = reinforcing devices such as window gates, bars or special locks were installed

FA = firearms were kept at the place of business

GD = a guard is employed by the firm

PR = the firm subscribes to a protective service

Explaining variables:

CRIME: The number of burglaries, robberies and larcenies per 1,000 inhabitants in the state and the type of locality (metropolitan, other cities, rural) in which the ith firm is located. (This classification is taken from FBI, UCR, 1967.)

PUBEXP: State and local expenditures on police protection per capita in the state in which the firm is located, divided by 100.

POLEMP: The number of policemen per capita in the state in which the firm is located.

NOEMP: The number of employees in the firm.

GUNCONTROL: An index of state gun control laws developed in M.S. Geisler et al, "The Effectiveness of State and Local Regulations of Handguns: A Statistical Analysis," Duke Law Journal, 1969

ANYBURG: A dummy variable which equals one if the firm has been burglarized during twelve months preceding the interview.

CORP: A dummy variable which equals one if the firm is a corporation.

TABLE 2

Private Protection Regressions

(t-values in parentheses)

N = 2413*

BA = .00 + .00409 CRIME + .00211 PUBEXP
(4.92) (2.47)

BA = -.00 + .00420 CRIME + .02441 POLEMP
(5.19) (2.60)

CA = -.00 + .00295 CRIME + .00124 PUBEXP
(4.55) (1.86)

CA = -.01 + .00297 CRIME + .01583 POLEMP
(4.71) (2.17)

RD = .14 + .00691 CRIME + .00076 PUBEXP
(5.55) (.59)

RD = .12 + .00676 CRIME + .01546 POLEMP
(5.58) (1.10)

FA = .25 - .00233 CRIME - .00289 PUBEXP
(2.05) (2.46)

FA = .27 - .00248 CRIME - .03364 POLEMP
(2.23) (2.61)

N = 846 firms in non-suburban metropolitan areas

FA = .15 + .00570 CRIME - .00585 PUBEXP
(2.21) (3.28)

FA = .26 - .00222 CRIME - .00253 PUBEXP - .00070 GUNCONTROL
(1.94) (2.08) (1.11)

FA = .24 + .02905 ANYBURG - .00386 PUBEXP
(1.28) (3.55)

GD = .05 + .00325 CRIME - .00103 PUBEXP
(4.22) (1.30)

GD = .03 + .00244 CRIME - .00155 PUBEXP + .00336 NOEMP
(3.31) (2.05) (15.20)

GD = .05 + .00306 CRIME - .00719 POLEMP
(4.08) (.83)

GD = .04 + .00224 CRIME - .01372 POLEMP + .00336 NOEMP
(3.12) (1.65) (15.19)

PR = .01 + .00530 CRIME + .00068 PUBEXP
(6.51) (0.81)

PR = .00 + .00527 CRIME + .01009 POLEMP
(6.65) (1.10)

*Sample criterion: firms whose type of location is reported.

TABLE 3

Private Protection Regressions

(t-values in parentheses)

BA = -.00 + .00333 CRIME + .00179 PUBEXP + .00079 NOEMP + .08239 CORP
(4.03) (2.12) (3.00) (5.87)

CA = -.02 + .00207 CRIME + .00083 PUBEXP + .00147 NOEMP + .07641 CORP
(3.28) (1.28) (7.31) (7.12)

RD = .12 + .00593 CRIME + .00036 PUBEXP + .00087 NOEMP + .11177 CORD
(4.78) (.28) (2.19) (5.30)

FA = .26 - .00173 CRIME - .00262 PUBEXP - .00074 NOEMP - .06214 CORP
(1.51) (2.24) (2.02) (3.20)

FA = .16 +.00582 CRIME - .00574 PUBEXP - .00048 NOEMP - .02323 CORP, N = 846
(2.26) (3.22) (1.06) (0.80)

GD = .03 + .00207 CRIME - .00165 PUBEXP + .00289 NOEMP + .07133 CORP
(2.81) (2.19) (12.29) (5.70)

PR = -.01 + .00406 CRIME + .00012 PUBEXP + .00178 NOEMP + .11758 CORP
(5.16) (.15) (7.71) (8.78)

TABLE 4

Private Protection Regressions

(t-values in parentheses)

Sub-Sample: Retail Trade

BA = .00 - .00433 CRIME + .00365 PUBEXP
(2.50) (1.98)

CA = -.02 + .00203 CRIME + .00335 PUBEXP
(1.66) (2.57)

RD = .16 + .00907 CRIME + .00282 PUBEXP
(3.63) (1.06)

FA = .35 + .00199 CRIME - .00682 PUBEXP
(.83) (2.65)

GD = .04 + .00287 CRIME - .00018 PUBEXP
(1.97) (.11)

GD = .03 + .00314 CRIME - .00052 PUBEXP + .00287 NOEMP
(2.20) (.34) (5.69)

PR = .01 + .00745 CRIME + .00094 PUBEXP
(4.44) (.52)

rate -- burglaries, robberies and larcenies -- on the use of private protection devices (the case of firearms is discussed below). Public protection has a positive and significant effect on local alarms while its effect on central alarms is positive but smaller, as expected. Public protection appears to have no significant effect on the use of reinforcing devices such as locks, bars, window gates, and so on. The results show a strong negative effect of public expenditures on the ownership of firearms, which suggests that the use of firearms by businessmen is a substitute for public protection (further discussion of this is presented below). We also get a negative effect of public protection on the employment of guards. This result shows up when we introduce firm size into the equation and hereby reduce the "noise" in the regression. The effect of size on GD is particularly strong because of the indivisibility of this input and the discrete nature of the survey-question; the introduction of size has no important effect in any of the other regressions.

It is puzzling of course that the effect of the crime rate on firearms in the whole sample is negative. I am inclined to believe that the reason lies in the regional pattern of gun ownership: the SBA survey reveals that the percentage of gun ownership among businessmen is much higher in rural than in urban areas, and that those percentages are higher in the south than in the northeast. Similar results are reported about the percent of households with firearms by city size and region (see Newton and Zimring, 1969). Although it is possible that rural households keep more firearms because they use firearms for hunting as well as for self-protection, this cannot explain

the regional pattern for firms because the survey specifically asked about firearms kept at the place of business. One could argue, however, that, due to other uses of guns in rural areas, rural businessmen are more knowledgeable about guns and therefore use them more. For my purposes, the relevant point is that in the low-crime rural areas gun ownership among businessmen is higher due to an exogenous reason and this may account for the negative effect of crime on firearms. I ran the firearms regression in a sub-sample of non-suburban metropolitan firms and in fact the effect of crime on firearms, which is significantly negative in the whole sample, becomes positive and significant. Also, the negative effect of public protection on firearms is larger (in absolute value) and more significant in the sub-sample of urban firms. One would also note that in the whole sample, NOEMP and CORP have negative effects on FA, which differ from the positive effects of these variables on all the other protection devices. In the sub-sample of urban firms these effects are smaller and no longer significant; this result suggests that in this case, as well as in the case of crime, the positive correlation of NOEMP and CORP with community size account for the negative effects that we find in the whole sample.

Although I believe that the regional and city size patterns are more important in exploring the negative effect of crime in firearms, I report below two other attempts to handle this problem. One explanation could have been that states with high crime rates have more gun-control laws and this discourages the ownership of firearms by businessmen. For

example, New York and New Jersey, whose crime rates were among the highest in 1968, had more stringent gun control laws than other states and also had very low rates of gun ownership. In order to test for this possibility, I introduced into the regression an index of gun control legislation (Geisler et al, 1969), but the results are not encouraging: the coefficient of crime is smaller but still negative and the coefficient of GUNCONTROL is negative, as expected, but insignificant.

In another attempt to handle this problem, I use a different measure of the threat faced by the firm: instead of using the crime rate in the firm's location, I use a dummy variable which equals one if the firm has been burglarized during the preceding year. Using the firm's robbery experience is of course inappropriate because the firm's own victimization is endogenous to our problem. Therefore I use burglary instead of robbery on the assumption that burglary is exogenous with respect to the decision to keep firearms. It turns out that this variable -- ANYBURG -- has a positive but insignificant effect on the use of firearms. However, the negative effect of public protection on firearms becomes stronger when we introduce ANYBURG instead of CRIME into the regression. Using ANYBURG is however suspect because the choice of any self-protection device is interdependent with the other devices and therefore if ANYBURG is endogenous in the choice of GD or BA, it is also endogenous in the choice of FA.

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