

## THE EFFECT OF CRIME ON RESIDENTIAL RENTS AND PROPERTY VALUES: A COMMENT

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In the Spring 1979 issue of this Journal, Mario J. Rizzo (8) presented an interesting quantitative analysis of the value placed by households on avoiding crime. He used a technique currently popular among researchers for estimating the value of a whole array of impacts which impinge upon property values. This note does not quarrel with the legitimacy of using such a technique for capturing household marginal willingness to pay for crime avoidance. Instead, it focuses on two questions about *how* Rizzo used the technique. First, should income be used, even as a proxy for other variables, in estimating an essentially reduced form equation which relates housing characteristics (quantity measurements) to their implicit prices? Second, if a liberal estimate of the value of crime avoidance is generated, why not a conservative one also?

The first question is a troublesome one. Traditional use of property values to capture willingness to pay by households for the characteristics embodied in them can be thought of as a two-stage procedure.<sup>1</sup> The first stage involves estimating the implicit equilibrium marginal prices for specific amounts and/or levels of characteristics existing both within each residence and within the entire market.<sup>2</sup> The second stage involves using certain shift parameters, like income, along with the first-stage, estimated prices to trace out bid and offer functions, of buyers and sellers respectively, for various levels of a particular characteristic. Rizzo does not follow this procedure. This may in part explain his difficulty with collinearity between his crime and income variables. This does not mean that he should use this procedure; it only suggests that interpretations from regression results which do not have income as an independent variable may be more reliable. In the first place, by using income "as a proxy variable for quality elements of housing," Rizzo obviates the possibility of specifying a more robust (first-stage) implicit marginal price function for housing attributes. In the second place, he risks the possibility of having a more serious problem of biased results and interpreta-

tions by foresaking a full two-stage procedure, yet including income.

The second question is equally troublesome and it relates to the significance and interpretation of regression results. Multicollinearity in regression analysis normally creates the problem of disentangling the relative influences of the various independent variables and of misinterpreting the significance of included variables. One method used to deal with that problem is that suggested by Ridker and Henning (7). They use property value data, in a manner similar to Rizzo, in order to capture the value placed by households on avoiding mobile air pollution. Like Rizzo, they employ a two-stage method to estimate a liberal valuation of a particular housing characteristic. That is, they residualize or purge the variable of interest to them (the level of mobile air pollution) of its combined (multicollinear) influence with other included independent variables, so that such influence is attributed to the pollution variable alone. Their variable, like Rizzo's crime variable, then gives the most liberal coefficient valuation. However, unlike Rizzo their analysis goes one step further. They derive a conservative estimate. This estimate, in effect, attributes any joint explanatory power existing between the variable of interest and other included independent variables to the other variables.<sup>3</sup> The use of such a conservative estimate, the original estimate, and the liberal estimate could then give a more meaningful range of possible values placed by households on avoiding crime.<sup>4</sup> Further, given the problem with tests of significance under conditions of multicollinearity, it could provide a more certain determination of crime's impact. In other words, proof of crime's influence on property value could be confirmed with greater certainty if such a conservative estimate were to be statistically significant.

### Notes

1. For a more extensive discussion of this point, see Rosen (9) and Freeman (1). For actual applications of the procedure, see Nelson (4) and Harrison and Rubenfeld (2).

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2. The procedure also involves making a variety of assumptions about the capitalization of all consumer and produce surpluses in property values and of a partial equilibrium condition where all property market changes are marginal. For an explanation of these points, see Freeman (1) and Polinsky and Shavell (6).
3. In Rizzo's case, for example, this should be done by regressing all the variables, except for the crime variable, with the dependent variable, and purging or residualizing that variable of all other influences except for crime. In turn, this newly purged dependent variable could be regressed with the crime variable in order to derive the most conservative estimate of the marginal valuation of crime avoidance.
4. There are, of course, other procedures which could be used to deal with the problem of multicollinearity in property value studies. See for example the work of Harrison and Rubinfeld (2) and Polinsky and Rubinfeld (5).

### References

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