# WILLINGNESS-TO-PAY FOR CRIME CONTROL PROGRAMS*

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*This paper reports on a new methodology to estimate the "cost of crime." It is adapted from the contingent valuation method used in the environmental economics literature and is itself used to estimate the public's willingness to pay for crime control programs. In a nationally representative sample of 1,300 U.S. residents, we found that the typical household would be willing to pay between $100 and $150 per year for programs that reduced specific crimes by 10 percent in their communities. This willingness amounts, collectively, to approximately $25,000 per burglary, $70,000 per serious assault, $232,000 per armed*

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*robbery, $237,000 per rape and sexual assault, and $9.7 million per murder. The new figures are between 1.5 and 10 times higher than prior estimates and are thought to more fully represent social costs.*

## INTRODUCTION

Cost-benefit analysis is a well-developed methodology that has become an important component of regulatory and policy development for many government agencies. Since the early 1980s, federal government regulatory agencies have been required to conduct cost-benefit analyses on major regulatory initiatives—requirements adopted by Executive Order and implemented by the Office of Management and Budget.[1]

Recent Congressional proposals would mandate similar requirements.[2] Such analyses have thus become a routine tool in the development of environmental, health and safety regulations. Unlike regulatory programs, however, criminal justice programs have rarely been examined using the cost-benefit framework, in large part because there has not been enough data to do so.

This study provides new estimates on the cost of crime that can assist criminal justice researchers and policy analysts in comparing the costs of criminal justice policies to their crime control benefits. While tallying the costs of a criminal justice program is relatively straightforward, estimating the benefits is often much more difficult. Unlike criminal justice costs, which involve buying goods and services, hiring employees and so on, the benefits of criminal justice programs involve many nonmarket goods such as reduced pain and suffering to crime victims and reduced fear to the public. Those nonmarket goods are valuable but more difficult to quantify. Indeed, we know they are valuable because people are willing to pay to avoid being victimized and to avoid that fear.

Prior methodologies for estimating the cost of crime have relied largely on estimating the costs of various components of crime—victim medical fees, lost wages, police and prison expenditures, and even intangible items such as pain, suffering and lost quality of life to victims—and totaling those figures. Cohen (1988) developed a methodology for estimating the cost of individual crimes based partly on jury awards for pain, suffering

1. President Reagan promulgated the first such requirement in 1981, Executive Order 12291 (46 Federal Register 13193). In 1993, President Clinton issued Executive Order 12866 (58 Federal Register 51735). Although these Executive Orders cannot supercede statutory provisions, they have had a dramatic effect on the manner in which regulatory agencies draft and analyze proposed rules.
2. For example, see Senate Bill S. 981, 105th Congress (1997), which would require all major rules to be accompanied by a cost-benefit analysis.

and reduced quality of life, an approach later used in a study commissioned by the National Academy of Sciences (Cohen, Miller and Rossman, 1994) and in subsequent NIJ-funded research (Miller, Cohen and Wiersema, 1996). While jury awards are one way to capture some of the intangible costs of crime that previous approaches had ignored, the method is not entirely appropriate for use in cost-benefit analysis. Conceptually, when deciding whether to fund a program, we want to know how much the public expects to benefit—hence how much they would be willing to pay. Thus, economists generally prefer *ex ante* measures of "willingness-to-pay" (WTP) when conducting cost-benefit analysis (Cook and Graham, 1977) as opposed to the *ex post* analysis of victim costs and jury awards used in previous studies.

This paper reports on a new approach to valuing crime based on the WTP concept, using the "contingent valuation" (CV) methodology developed in the environmental economics literature. The methodology has been used extensively to place dollar values on nonmarket goods such as improvements in air quality, saving endangered species and reducing the risk of early death—social benefits that do not have direct market analogs. There have been literally hundreds of CV studies, meta-analyses and textbooks written on the subject.[3] Although used in many different policy contexts, contingent valuation has not generally been employed in criminal justice research. One exception is Cook and Ludwig (2000) and Ludwig and Cook (2001), who use the CV method to estimate the amount that the average household would be willing to pay to reduce the gun violence of criminals and juvenile delinquents. Similarly, Zarkin, Cates and Bala (2000) report on a pilot study in which they use the CV method to value drug treatment programs. We employ a similar methodology to study the public's willingness to pay to prevent the crimes of burglary, armed robbery, assault, rape or sexual assault, and murder.[4]

Overall, we find crime costs to be significantly higher than previous estimates that did not use the CV methodology. As Nagin (2001a, 2001b)

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3. For an overview of the contingent valuation method, see Mitchell and Carson (1989).
4. Another approach to estimate WTP often favored by economists is to examine "revealed preferences" of actual market transactions. This has been attempted in the "cost of crime" literature by examining property value differentials in high-crime versus low-crime neighborhoods. While a revealed preference approach might be preferred in theory, researchers have not found a market-based approach that adequately captures the cost of crime. For example, housing price differentials do not include costs covered by third parties such as insurance and government agencies, lost productivity of victims, fear to the public at large, costs borne by business and so on. These studies also suffer from empirical identification problems, for example, because houses in high crime neighborhoods are also likely to be in neighborhoods that suffer from other disamenities such as noise and pollution.

noted, the prior estimates of Cohen (1988) and Miller, Cohen and Wiersema (1996) are based on the cost to an individual victim—and thus ignore the external social costs associated with crime that those who are not victims endure, in particular, the reduced quality of life to neighborhoods, nonvictims and society in general. Because our survey asked people to consider a program that reduces crime by 10 percent in their community, respondents might reasonably consider the external benefits to nonvictims (including themselves).

The next section of the paper describes our survey design process and interview methodology. The third section presents our main survey results on the public's willingness to pay for crime control programs. The fourth section provides further insights into the nature and robustness of our results and examines how willingness to pay varies by demographic characteristics. The fifth section compares these estimates to previous estimates of the cost of crime. Concluding remarks are reserved for the final section.

## SURVEY DESIGN AND METHODOLOGY

In designing this study we closely followed guidelines established by a distinguished panel of social scientists (Arrow et al., 1993) commissioned by the National Oceanic and Atmospheric Administration (NOAA) to assess the contingent valuation methodology. This panel was brought together because NOAA had drafted regulations calling for the use of the methodology when estimating natural resource damages in legal proceedings involving compensation for damaged public property. The panel concluded that CV is a valid approach and provided a set of guidelines for conducting a reliable survey.

The survey instrument was drafted using an extensive design process including consultation with a panel of experts, three professionally selected and moderated focus groups designed to be demographically representative, 12 hour-long cognitive interviews and professional interviewer training and monitoring. The survey design process is described in detail in Cohen, Rust and Steen (2002).

Most of the NOAA panel recommendations were followed. One that was not is noteworthy. Arrow et al. (1993) caution CV researchers to describe the program under consideration thoroughly. However, their report is primarily concerned with environmental amenities and programs designed to mitigate environmental harm. Thus, for example, researchers might be interested not only in the value of saving a particular endangered species, but also in the value of "no mining" versus "no logging" options that protect habitat. We are not interested in one particular crime control policy. We are interested instead in valuing crimes themselves.

In the focus groups we used to pretest questions, one of the key concerns expressed was that survey respondents would not be able to separate their desire for reduced crime from the way it is reduced. For example, though everyone might agree that fewer assaults would be a good thing, there would be significant disagreement over whether a policy mandating life in prison for third-time offenders should be implemented if it were shown to deter assaults. In evaluating preliminary survey questions, some focus group participants noted that they had trouble separating their cynicism for the ability of the government to effectively control crime from their own willingness to pay. The final survey was therefore worded carefully to ensure that a crime control policy was not specified. Instead, respondents were told that a crime prevention strategy had worked last year and that the program had community support.

Respondents were asked if they would be willing to vote for a proposal requiring each household in their community to pay a certain amount to be used to prevent one in ten crimes in their community.[5] They were then randomly given three of five crimes; the order of the questions was randomized to avoid any systematic bias associated with "anchoring" to the first crime. The crimes were (1) burglary, (2) serious assault, (3) armed robbery, (4) rape or sexual assault and (5) murder. Given the time limitations of our survey, we identified five of the most commonly understood and important crimes. However, the crimes were not defined for the respondents, and no information was provided on the prevalence, risk of victimization, average tangible losses or severity of injuries normally associated with the violent offenses. Instead, respondents were asked to respond based on their understanding of these crimes.

Our approach thus attempts to measure individual willingness to pay based on actual levels of fear and concern in the community—not on what people might pay if they fully understood the risks and consequences of victimization. The text of the survey follows:

> "Now I want to ask you how much of your own money you would be willing to pay to reduce certain crimes. In each case, I am going to ask you to vote 'yes' or 'no' to a proposal that would require your household and each household in your community to pay money to prevent crime in your community. Remember that any money you agree to spend on crime prevention is your money that

5. The term "community" was purposefully left ambiguous because we wanted respondents to value crime reduction that affects them in some manner—whether through their own household, their families, friends or coworkers. Further, crime reductions might spur economic development in their communities. While use of a term like "neighborhood" would be too limiting, reducing crime in a large "city" might be too broad and would dilute the amount some people are willing to pay.

could otherwise be used for your own food, clothing or whatever you need...

Last year, a new crime prevention program supported by your community successfully prevented one in every ten [INSERT CRIME] from occurring in your community. Would you be willing to pay [INSERT AMOUNT] per year to continue this program?"

The amounts inserted into the text were randomized between $25 and $225 (in $25 intervals). The maximum annual cost of $225 was selected based on focus group discussions in which participants indicated $200 would be the most they would consider paying for such programs. Once an amount was chosen for a particular respondent, the same amount was used for all three crime types for that respondent.[6] After the first question was finished, the following was read:

"Now please disregard the crime prevention strategy that we just discussed and think of this. Last year, a new crime prevention program supported by your community successfully prevented one in every ten [INSERT CRIME] from occurring in your community. Would you be willing to pay [INSERT AMOUNT] per year to continue this program?"

The process described above was then repeated for the second and third crimes. The respondent was specifically asked to disregard the earlier question in order to eliminate any "income effects" associated with the earlier response. That is, a respondent might be willing to pay $200 per year to prevent murders and assaults individually, for example, but might not be willing to pay $400 combined to prevent both. To determine whether we could add the three bid levels together, or if there were any income effects associated with adding their responses, we asked a final follow-up question at the end of the third crime type:

"I realize that I asked you to evaluate each crime prevention strategy individually. However, now I'd like you to think of adding all of the money you have spent on each strategy together. You said that you'd pay up to [INSERT AMOUNT] to prevent one in ten [INSERT CRIME], up to [INSERT AMOUNT] to

6. A follow-up question was also asked either raising or lowering the bid level by one increment depending upon whether the respondent answered "yes" or "no." While we have analyzed these data, the ultimate WTP amounts are almost identical. Because analyzing the second round raises new methodological issues concerning the independence of the estimates and truncation of the response distribution, and because the results are nearly identical, we have only used the first round estimates in our study.

prevent one in ten [INSERT CRIME], and up to [INSERT AMOUNT] to prevent one in ten [INSERT CRIME] in your community. Now, if I were to add all that up it comes to [INSERT AMOUNT]. Would you be willing to pay this amount out of your own pocket to prevent all of the crimes we have just talked about?"

Telephone interviews were conducted with a sample that is representative of the entire U.S. population of adults (those aged 18 or older). A random digit dial sample of 4,966 telephone numbers yielded a total of 3,055 estimated "eligible" numbers (excluding business, disconnected numbers, fax lines and so on) and a total of 2,228 actual households we contacted. Of these, 1,300 completed interviews. Depending on the definition used, the "response rate" ranged from 43 percent (1,300/3,055) to 58 percent (1,300/2,228).

The data are weighted to adjust for probabilities of selection and to adjust for nonresponse on age, sex, education and race. Results of this study can be projected to the English-speaking population 18 years of age or older living in households in the fifty United States and the District of Columbia.[7]

The survey was designed with numerous checks to ensure that respondents understood the questions, could respond with some rationality and consistency, and were not biased by the wording of previous questions. We also tested for (and rejected) any potential interviewer bias,[8] temporal changes in responses and potential bias due to

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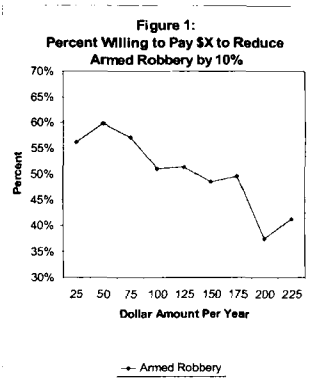
7. A comparison of our sample to the U.S. Census, however, indicates that we might have underrepresented Hispanics and the very poor. Whereas 10.0 percent of the 18 and older U.S. population is Hispanic, only 6.4 percent of our sample (and 4.8 percent of our weighted sample) is. One part of that difference is apparently due to language barriers. Sixty-four people originally contacted were deemed ineligible on that basis. If all of them were Hispanic, for example, that would represent 4.9 percent of our sample, which would bring our sample up to the estimated population ratio. There is also some noticeable difference in reported household income. The main difference appears to be in the percentage of our sample that report household income below $15,000. While 16.5 percent of the U.S. household population reportedly has an income under $15,000, only 9.0 percent of our sample reports that level of income (9.6 percent of the weighted sample). One potential reason for this difference is that 13.8 percent of our sample refused to provide detailed household income information (as compared to the typical refusal rate for most of the questions in our survey that was well below 5 percent). If these refusals are clustered at the low end of the income distribution, our sample might look much more like the U.S. population. Finally, we note that because the lowest income families will be those without telephones, and 5.9 percent of U.S. households do not have telephones, this could account for the bulk of the difference in our sample.

8. To assess whether any particular interviewer had systematically different responses, we included a dummy variable for each interviewer in regression equations

external media attention on crime issues that might have occurred around the time of the survey.[9]

## WILLINGNESS-TO-PAY ESTIMATES

Respondents were willing to pay different amounts to prevent each type of crime (see Table 1).[10] At the lowest bid level ($25), 75 percent were willing to pay to prevent murder, 69 percent for rape or sexual assault, 60 percent for serious assaults, 56 percent for armed robbery and burglary. At the highest bid level ($225), 59 percent were willing to pay to prevent rape and sexual assault, 46 percent for murder, 41 percent for robbery, 35 percent for assault and 27 percent for burglary. To be conservative, we have recoded all "don't know" and "refused" responses as "no."[11]




The percentage of individuals willing to pay for crime prevention generally declined with each bid level increase (see Table 1). Figure 1 illustrates this for armed robbery. In some cases, however, it increased. Such apparently inconsistent percentages can generally be explained by sampling error, because the maximum of the 95 percent confidence interval of the smaller bid level

explaining responses. None had any significant explanatory power in these regressions.

9. To assess news media effect, we searched and coded all crime-related stories that appeared in national or major regional newspaper headlines by date. Including these dates as dummy variables in regression analyses explaining responses led to no significant explanatory effects. Similarly, we included a time trend in regression equations and found no change in responses over time. Interestingly, we found that there was some slight increase in the number of respondents in the highest income categories and in urban areas over time. We attribute this to our interviewing technique whereby we were persistent in calling people back until we found someone home. We view this as a positive feature of our survey design as it results in a more representative respondent population.
10. While we report weighted estimates here, the unweighted estimates do not vary significantly. For details on the unweighted estimates, see Cohen et al. (2002).
11. The results are only marginally different if we exclude those who respond "don't know" or refuse to respond. These individuals make up between 2.3 percent and 3.4 percent of respondents for any given question.

almost always exceeds the minimum of the confidence interval of the next larger bid level.[12]

Table 1. Percent of Respondents Willing to Pay for Crime Prevention (Weighted)

| Initial Bid | Burglaries | Armed Robbery | Serious Assaults | Rape & Sexual Assault | Murder |
|---|---|---|---|---|---|
| $ 25 | 56% | 56% | 60% | 69% | 75% |
| 50 | 59% | 60% | 71% | 61% | 58% |
| 75 | 62% | 58% | 61% | 66% | 77% |
| 100 | 44% | 51% | 47% | 56% | 73% |
| 125 | 34% | 52% | 49% | 42% | 59% |
| 150 | 50% | 48% | 56% | 59% | 63% |
| 175 | 47% | 50% | 51% | 72% | 61% |
| 200 | 51% | 38% | 57% | 56% | 60% |
| 225 | 27% | 41% | 35% | 59% | 46% |
| # of Respondents | 787 | 798 | 746 | 777 | 792 |

To convert these yes/no responses to a WTP estimate, several steps are required (see Haab and McConnell, 1997, for complete details on our methodology). First, the method assumes that WTP decreases monotonically as the bid level increases. As noted, despite an overall downward trend there are several "local" fluctuations where WTP increases between adjacent bid levels. At these points the responses for the adjacent bid levels are consolidated, effectively smoothing the function downward as the bid range is expanded to encompass both bid levels. Next, a choice must be made as to what dollar value to affix to a given bid range. A lower bound estimate is based on the actual bid level, and is conservative in its assumption that we know only that respondents would be willing to pay "at least" X dollars. An upper bound estimate is based on the upper end of the bid range and assumes that we don't know that

12. The only exception is the comparison of $125 and $175 for rape and sexual assault. In that case, the 95 percent confidence interval for $125 ranges from 29 percent to 55 percent, while the confidence interval for $175 ranges from 60 percent to 84 percent.

individuals wouldn't pay up to the next bid level. The third approach, and the one followed here, is to assign the mid-point as the dollar value.[13]

The third step is to calculate the probability density function (PDF) at each bid level. The PDF measures the marginal increase in the percentage of people unwilling to pay at a given bid level. For example, while 40.4 percent are unwilling to pay $175 or more for murder, 54.4 percent are unwilling to pay $200 or more. Thus, the PDF for murder at the $200 bid level is 14.0 percent (54.4 percent minus 40.4 percent). The final step requires multiplying the PDF by the corresponding dollar figure—mid-point of the range—and summing across all categories, yielding an estimate of the willingness-to-pay.[14]

Table 2. Implied Willingness-to-Pay per Crime

| Crime | 10% Crime Reduction [confidence interval] | WTP for 10% Reduction [confidence interval] | Implied WTP per Crime | Confidence Interval | |
|---|---|---|---|---|---|
| Burglary | 426,113 [395,769-456,457] | $104 [$93, $116] | $ 25,000 | $ 21,000 | $ 30,000 |
| Armed robbery | 48,681 [39,994-57,367] | $110 [$97, $122] | $ 232,000 | $ 174,000 | $ 314,000 |
| Serious Assaults | 177,836 [157,478-198,193] | $121 [$109, $132] | $ 70,000 | $ 57,000 | $ 86,000 |
| Rape and Sexual Assaults | 54,747 [44,273-65,220] | $126 [$117, $134] | $ 237,000 | $ 185,000 | $ 313,000 |
| Murder | 1,553 [1,475-1,630] | $146 [$134, $158] | $ 9,700,000 | $ 8,500,000 | $ 11,000,000 |

Sources: BJS (2001a, 2001b) and FBI. Confidence intervals based on BJS (2001a) and from this survey. See text and footnote 16 for details. Number of households estimated to be 103 million in 2000 from Census data.

The mean WTP (see Table 2) ranges from $104 annually per household for a 10-percent reduction in burglary to $146 for a 10-percent reduction in murder. The 95 percent confidence intervals around these estimates (see Table 2) are generally plus or minus 10–20 percent.[15]

13. This intermediate approach is commonly adopted in the literature. It is still conservative as it ignores the fact that some respondents would pay more than $225.
14. This method is spelled out in detail in Haab and McConnell (1997).
15. Throughout this paper, we have calculated the standard errors of our estimates

These figures can be converted into an implied "cost per crime" based on the number of crimes and households in the United States. To construct these cost estimates, we first estimated the number of crimes that a 10-percent reduction implies.[16] For example, as shown in the first column of Table 2, we estimate that a 10-percent reduction in burglaries would prevent 426,123 burglaries. Because the average household is willing to pay $104 for a program that reduces burglaries by 10 percent and there are 103 million households in the United States,[17] collectively $10.7 billion would be spent on such a program ($104 x 103 million = $10.7 billion). Dividing this figure by the 426,123 crimes averted yields WTP per crime of $25,000. Similar calculations yield estimates for serious assaults ($70,000), armed robbery ($232,000), rape and sexual assaults ($237,000) and murder ($9.7 million). Note that these figures do not mean that the average household would be willing or able to pay $200,000+ to avert being an armed robbery victim. Instead, they mean that (a) the average household would be willing to pay $110 to reduce their local community rate of armed robbery by 10 percent, and (b) the collective WTP in the United States to prevent one armed robbery at the margin is $200,000. This is no different than saying the average citizen cannot afford to buy a new police car, for example, but would be willing to pay $10 towards a police car knowing that their safety is increased. Table 2 also reports the 95 percent confidence intervals around these estimates. Those confidence intervals take into account both the range of estimates for the WTP and the range of estimated crime rates.

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taking into account the fact that the survey respondents have an unequal probability of being sampled and the fact that there is weighting for nonresponse. We note that this approach yields larger standard errors than those traditionally used by many researchers; hence our findings are conservative. However, this approach is more appropriate for the survey data we employ. See Chapter 6 of Lohr (1999) for details.

16. The main sources of data on crime are the FBI's Uniform Crime Reports (UCR) for murder and the National Criminal Victimization Survey (NCVS) for other crimes (including series victimizations). These estimates were increased to take into account underreporting and exclusion of victims under age 12. Thus, series assaults were increased by 14.3 percent over the NCVS estimates and rape and sexual assaults were increased by 34.2 percent (see Miller, Cohen and Wiersema, 1996). Armed robberies were estimated from the total NCVS estimate of robberies multiplied by the 58.3 percent of robberies involving firearms reported in the UCR. We use this figure instead of the NCVS estimate of robberies involving firearms because of the documented bias against armed robberies being reported in NCVS (see Cook, 1985). This results in a more conservative estimate of the "per crime" costs for armed robbery than if we had used the NCVS armed robbery estimates. Further details can be found in Cohen, Rust and Steen (2002).

17. This figure is taken from U.S. Census Bureau data (www.census.gov), estimated number of households in the year 2000.

## DETAILED ANALYSIS OF RESPONSES

In this section, we analyze the willingness-to-pay responses in more detail to assess the extent to which they vary by the demographic characteristics of respondents. We also consider whether methodological or other survey-specific factors might have biased the responses. Table 3 reports on multivariate logistic regression equations for each of the five crime types. The dependent variable is the yes/no vote for a 10-percent reduction in the indicated crime type. In addition to the bid level, we included numerous demographic characteristics as independent variables such as age, sex, race, education, presence of children in the household, rural/urban distinctions and income.

Table 3. Logistic Regression Analysis of Willingness-to-Pay for Crime Prevention

| | Burglary | Armed robbery | Serious Assault | Rape & Sexual Assault | Murder |
|---|---|---|---|---|---|
| Bid amount | -0.005*** | -0.005*** | -0.004*** | -0.003** | -0.004*** |
| Age | -0.005 | -0.006 | -0.012** | -0.018*** | -0.018*** |
| Male | -0.252 | 0.100 | -0.034 | -0.067 | -0.007 |
| Hispanic# | -0.035 | 0.294 | 0.851** | -0.013 | 0.031 |
| Black | 0.798*** | 0.556* | 0.489 | 0.054 | 0.333 |
| High school | -0.045 | 0.162 | -0.433 | 0.403 | -0.088 |
| College | 0.099 | 0.102 | -0.212 | 0.555 | 0.105 |
| Children | 0.018 | -0.216 | -0.133 | -0.220 | -0.045 |
| Rural | -0.103 | -0.309 | 0.136 | -0.358 | -0.122 |
| Town | -0.191 | -0.087 | 0.083 | -0.147 | -0.133 |
| Suburb | -0.239 | -0.072 | -0.036 | -0.009 | -0.071 |
| Low income (household < $35,000) | -0.458** | -0.446** | -0.37* | -0.049 | -0.389** |
| Constant | 1.082** | 1.035** | 1.642*** | 1.476*** | 2.036*** |
| Sample size | 671 | 668 | 628 | 659 | 665 |
| Pseudo $R^2$ | .070 | .062 | .066 | .050 | .060 |

Notes: # The Hispanic category excludes one Black Hispanic (out of 82 Hispanics), who is included in the Black category. Due to survey limitations, it excludes non-English speaking Hispanics.

The sample size in Table 3 is approximately 650–700 respondents, because each of the 1300 respondents was randomly asked about only 3 out of the 5 crimes. In addition, about 13% of respondents refused to answer the income question.

The sample was unweighted and "don't knows" and "refused" for the willingness-to-pay question were counted as "no" responses. * $p < .10$; ** $p < .05$; *** $p < .01$

Pseudo $R^2$ is based on the procedure proposed by N. Nagelkerke (1991), "A Note on a General Definition of the Coefficient of Determination," 78 *Biometrika* 691-692.

In all cases, WTP decreases with the bid level (consistent with the figures shown in Table 1). For example, the coefficient on the bid amount is -0.005 for armed robbery ($p < .01$). That is, respondents demand less crime prevention as the cost of crime prevention increases. We tried both curvilinear and piece-wise linear specifications of the bid levels. However, we could not reject the hypothesis that willingness-to-pay is linear over our range of $25 to $225.

WTP is higher for blacks, with burglary and armed robbery being statistically significant (see Table 3). This is consistent with the apparent higher victimization risk facing blacks.[18] We also find that WTP decreases with age (with three crimes being statistically significant) and is lower for low-income individuals (and statistically significant in four out of the five crimes). That low-income individuals in households with annual income less than $35,000 would be willing to pay less is not entirely surprising. Although low-income individuals generally have higher risks of victimization, ability to pay and other priorities apparently override any potential concern due to this higher risk. This raises potential distributional equity concerns if policymakers use WTP estimates yet also want to use crime reduction policies as a form of wealth redistribution. One way this could be done is to adjust the estimates based on the "median" income or higher income household WTP. In our case, this would slightly increase the cost of crime estimates shown in Table 2.[19]

Although not reported here, additional variables were also included in similar logistic regression equations. First, numerous checks of the data were made to determine whether we introduced bias in our survey design. One common concern with CV studies is often termed "anchoring," whereby responses depend on either earlier questions or the actual bid level. To control for this problem, we randomly rotated the order of the crimes to each respondent. Further analysis revealed that there was no ordering effect. For example, if we restrict the data to the first crime given to each respondent, there is no statistically significant difference in the

18. For example, according to BJS (2001b), the victimization rate for burglary is 47.6 per 100,000 for blacks compared to only 29.4 for whites. According to 1999 FBI Uniform Crime Reports, the murder rate is 20.6 for blacks compared to 3.5 for whites.

19. Based on the logistic regression analysis, we can predict the probability of a "yes" vote based on the mean respondent characteristics. For example, at the mean bid level of $124.90, 53.6 percent of respondents would vote in favor of reducing armed robbery. However, 21 percent of respondents were classified as "low income," with household income below $35,000. If we change this to zero respondents with income under $35,000, the probability of a yes vote increases to 55.9 percent. Similar results hold for other crime types. Thus, at least for the bid levels used in this study, income does not appear to have a dramatic effect on the vote.

estimated WTP between the first crime scenario and the second or third. We also tested to see if any particular ordering significantly changed the results and found that it did not.

Earlier in the survey, respondents were asked other questions about their preferred sentences for various criminal offenses. In half of the surveys, respondents were provided information about the cost of a year in prison ($25,000); in the other half, they did not. We found no evidence of any statistically significant differences in willingness-to-pay responses based on whether this prison cost information was provided.

Respondents were also asked another set of questions in which they had to allocate tax dollars among various crime prevention programs or to offer residents a tax rebate. Half of respondents were asked to allocate $100 per resident, the other half, $1,000. There was some evidence of anchoring for the crime of rape/sexual assault. Respondents asked to allocate $1,000 were more likely to be willing to spend their own money to reduce rape and sexual assault than those who were asked to allocate $100. Because this problem did not arise in any of the other four crime categories, we do not know if this was a chance occurrence or evidence of anchoring. We have some doubt about the anchoring hypothesis, however, because we showed in Table 3 that rape/sexual assault is the least sensitive crime to income.

We also observed considerable consistency across other questions in our survey. For example, we included a variable to measure the percentage of the $100 or $1000 that the respondent preferred to be given back to residents as a tax rebate. Presumably, respondents who preferred to allocate a larger percentage of tax dollars to a rebate instead of additional crime prevention programs would be less willing to pay for additional crime prevention programs out of their own pockets. Indeed, a variable measuring the percentage of taxes allocated to a rebate was the most highly significant variable explaining the yes/no vote in the WTP logistic regressions.

Finally, note that these figures are based on a 10-percent reduction in one crime type. Due to wealth constraints and diminishing marginal utility, it is not clear that respondents would pay the same amount per crime for larger reductions. As detailed earlier, the survey specifically instructed respondents to view each of the three (out of five) crimes they were asked about independently and to ignore any money they indicated they would be willing to pay for the earlier crime type. However, after the third crime, they were asked if they would be willing to pay the sum of the three amounts they settled on for all three (or two if they were only willing to pay for two) programs. In response, 81.0 percent said they would be willing to pay the sum of all three, 16.2 percent said no and 2.8 percent said they did not know. The percentage of yes respondents did not vary by

either the total bid amount or income of the respondent. Thus, at the bid levels introduced in this survey (ranging from $25 to $250 per year), we did not find significant income or wealth effects.

## COMPARISON TO PREVIOUS COST OF CRIME ESTIMATES

Table 4. Comparison of Implied Willingness-to-Pay to Previous Estimates of Crime Costs

| Crime | Prior Estimates | | | Current Study | | Ratio (Current to Prior) | |
|---|---|---|---|---|---|---|---|
| | Victim Costs | Criminal Justice Costs | Total Cost | Low | High | Low | High |
| Burglary | $1,780 | $2,580 | $4,360 | $21,000 | $30,000 | 4.8 | 6.9 |
| Armed robbery | $24,100 | $7,730 | $31,800 | $ 174,000 | $ 314,000 | 5.5 | 9.9 |
| Serious Assaults | $30,480 | $5,150 | $35,600 | $57,000 | $86,000 | 1.6 | 2.4 |
| Rape and Sexual Assaults | $110,490 | $3,250 | $114,000 | $185,000 | $313,000 | 1.6 | 2.7 |
| Murder | $3.7 mil. | $183,000 | $3.9 mil. | $8,500,,000 | $11,000,000 | 2.2 | 2.8 |

Sources: Victim costs taken from Miller, Cohen and Wiersema (1996), updated to 2000 dollars. "Armed robbery" is based on the "Robbery with injury" category in Miller, Cohen & Wiersema, and "Serious Assaults" is based on the "Assault with injury" category. Criminal justice costs are based on the probability that an offender will be detected and punished, and are based on Table 3 of Cohen (1998). See text.

The CV findings were compared to prior estimates of victim costs in Miller, Cohen and Wiersema (1996) and criminal justice-related costs in Cohen (1998), inflated to 2000 dollars (see Table 4).[20] In all cases, the estimates from the contingent valuation survey are higher than the prior estimates, ranging from 1.5 to 10 times higher. The estimates for serious assaults, rape and sexual assault, and murder are between 1.5 and 3 times higher. Armed robbery and burglary are about 5 to 10 times higher. Note that the estimate for murder ($8.5 to $11 million) is at the upper end of the range of Viscusi's (1998) most recent range for the value of a statistical life, between $3 million and $9 million. To put these figures into perspective, if we simply multiplied the total number of crimes by these cost estimates, they would imply a total social burden of $625 billion for these five crimes (compared, using prior estimates, to about $215 billion).

20. An inflation factor of 1.27 was used for 1993–2000 dollars and 1.12 to convert from 1997 to 2000 dollars, based on the growth in hourly wages for the typical hourly worker in the United States as reported by the Bureau of Labor Statistics, (http://www.bls.gov/webapps/legacy/cesbtab4.htm).

This represents about $6,000 per household or about 10 percent of average household income in 2000.[21] A 10-percent reduction in these crimes would be valued at about $600—or 1 percent of household income.

Theoretically, some economists have argued that the WTP estimates should be smaller because they are based on *ex ante* estimates and they are willingness to *pay*, compared to prior estimates that are *ex post* compensation (willingness to *accept*) measures (see, for example, Cook and Graham, 1977). At this point, we can only conjecture why the implied WTP estimates are significantly higher than previous cost of crime estimates. Part of the reason might simply be due to lack of information by survey respondents about the magnitude and severity of current crime rates. Thus, for example, if the typical survey respondent overestimated their risk of being a crime victim, they would tend to overstate their willingness to pay to prevent crime. Even if true, however, it is not clear that the WTP estimates should be ignored if they relate to fear of crime and public well-being.

A study by Anderson (1999) estimates and aggregates many of these external costs, including the cost of the criminal justice system, private security costs, the opportunity cost of time spent by people in locking homes and other prevention measures. Anderson estimates the aggregate burden of crime to be between $1.1 and $1.7 trillion, compared to the $450 billion of victim costs estimated by Miller, Cohen and Wiersema (1996)—about three to four times the victim costs. Thus, the per crime figures estimated here are plausible and consistent with the Anderson (1999) study and the Nagin (2001a, 2001b) critique of earlier crime cost estimates.

The fact that crime costs are 1.5 to 10 times previous estimates is of more than academic interest. As Cohen (1988) showed, early cost-benefit analyses in the criminal justice arena calculated the cost of crime using the amount of out-of-pocket losses to victims. In one example, Cohen (1988) described a prior cost-benefit analysis of an early release program that concluded, based on an extensive study of the recidivism rate of prisoners let out early, that reduced prison costs saved taxpayers more than the added cost of new crimes. However, once the monetary value of pain, suffering and reduced quality of life to victims was included in the cost of these new crimes, the cost-benefit ratio switched signs and the early release program was shown to be a failure. The higher cost estimates

21. While such calculations are of some interest to get a feel for the magnitude of the problem and to see how "credible" the estimates are, it is not necessarily correct to assume that people would pay 10 times as much for a 100-percent decrease in crime as they would for a 10-percent decrease in crime. In fact, they might pay more or less than 10 times this amount, depending on how much this cost relative to their wealth and how many additional benefits there would be from "no crime" as opposed to only a slight reduction in crime.

found in this study further raise the threshold for such early release programs (that is, the benefits in terms of crime prevention would have to be higher than previously thought to meet or exceed the cost of increased crime). On the other side of the equation, costs involved in crime prevention strategies would be more readily justifiable given these higher estimates of the social costs of crime. This could also significantly alter previous findings. For example, Levitt (1997) found that increased hiring of police reduces crime. However, based on the cost of hiring a sworn officer and the monetary value of crimes averted, he concluded that only in one of his model specifications did the benefits unequivocally exceed the costs. Thus, while Levitt was particularly cautious about drawing policy conclusions from his analysis, the case for more police officers would be significantly strengthened if these new crime cost estimates were substituted in his cost-benefit ratios.

## CONCLUSION AND FUTURE RESEARCH

This study has demonstrated the applicability of the contingent valuation method of valuing nonmarket goods to the criminal justice arena. In our nationally representative sample of 1,300 U.S. residents, we found that the typical household would be willing to pay between $100 and $150 per year for crime prevention programs that reduced specific crimes by 10 percent in their communities, with the amount increasing with crime seriousness (for example, $104 for burglaries, compared to $146 for murders). In the aggregate, these amounts imply a marginal willingness-to-pay to prevent crime of about $25,000 per burglary, $70,000 per serious assault, $232,000 per armed robbery, $237,000 per rape and sexual assault, and $9.7 million per murder. This compares to an estimate of about $200 per year that Cook and Ludwig (2000) and Ludwig and Cook (2001) estimate the average household would be willing to pay to reduce gun violence caused by criminals and juvenile delinquents by 30 percent, which translates into about $1 million per injury. Our estimates of $232,000 for armed robbery and $9.7 million for murder are very consistent with their estimate of $1 million per nonfatal gunshot injury.

These figures—based on a WTP approach—are between 1.5 and 10 times higher than prior estimates of the cost of crime to victims. By focusing exclusively on costs to victims of crime and the criminal justice system, previous studies have ignored other social costs of crime. Such costs include prevention expenditures for personal security, averting behavior by potential victims (for example, taking taxis instead of walking home and avoiding certain neighborhoods), third-party costs of insurance (for example, parking lot owners insuring against claims by victims that there was inadequate lighting) and government welfare programs. There

are other, nonmonetary costs of crime that may also factor into individuals' willingness to pay for crime prevention, such as general concerns about community safety. It seems likely that our estimates reflect in part willingness to pay for the ability to live in safe communities. We find that people value more than just the reduced costs of victimization—they are also willing to pay for reductions in these other social costs of crime.

WTP appears to vary by both income and demographic characteristics. Lower income respondents generally were willing to pay less for equivalent crime reductions despite being generally more at risk. However, all else being equal, blacks are generally willing to pay more than whites to reduce the incidence of crimes for which they face a higher risk of victimization. Given these preliminary findings, future studies should focus on the relationship between risk of victimization and willingness-to-pay.

The results of our pilot study of willingness-to-pay provide support for continuing this line of research. Respondents appeared to be able to distinguish between crime types and to vary their willingness-to-pay accordingly. Preliminary estimates of the cost per crime using this methodology appear to be reasonable—and considerably higher than previous estimates that focused primarily on victim costs and not on other costs to the community.

The estimates derived in this study are based on the public's willingness to pay for crime reductions. It is well known, however, that the public often misunderstands the actual risk (or consequences) of victimization. Thus, we might have obtained different results if the survey explicitly described the risks of victimization (and respondents fully understood those risks). Which approach is better is a philosophical question. People respond to perceived risks. They decide whether to walk home at night or take a cab, whether to install a burglar alarm, and whether to vote for a candidate promising to spend more (or less) on crime control programs based on perceived risks and fears. Our approach is therefore to learn from the public what value it puts on these perceived risks. The alternative approach of attempting to value actual risks also has merit in the policy arena and is one direction that future research should explore.

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