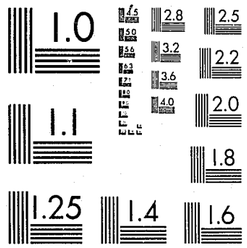

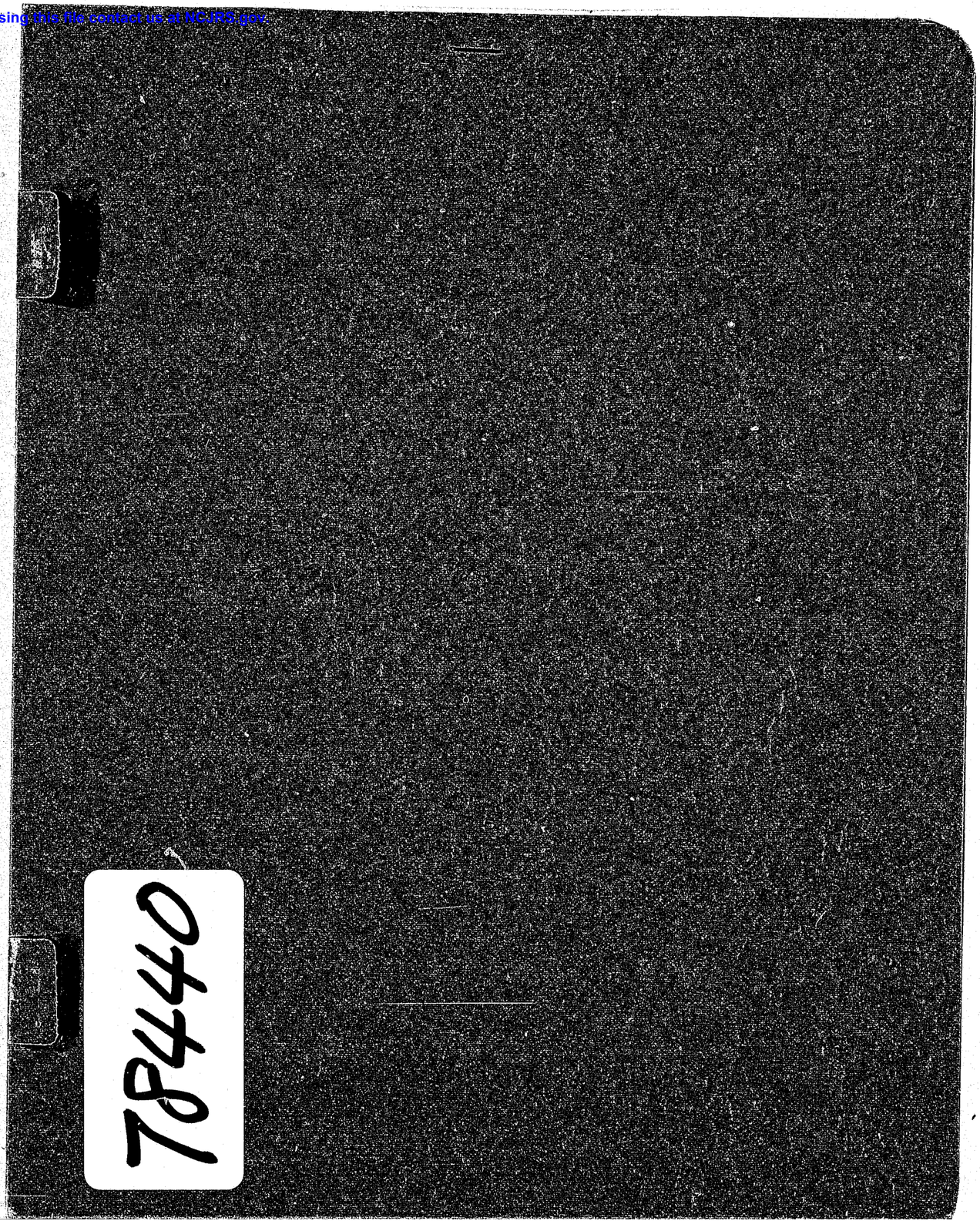

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WHO CALLED THE COPS?

An Empirical Study of Burglary Reporting Behavior

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1. Introduction

Roughly half of the burglary incidents described in the National Crime Panel city surveys were reported to police. The police departments solve approximately twenty percent of reported burglaries and recover a very small percentage - approximately five percent - of the articles reported stolen. However, police efforts are not the only avenue of recovery open to victimized households since insurance and, in some cases, tax offsets are available if the event is reported.

In this paper we try to model the household's decision to report. We use as explanatory variables the household's demographic and socioeconomic characteristics as well as the particulars of the burglary itself. In the next section we describe the data briefly while the succeeding section contains our empirical results. We offer conclusions in the final section.

2. Description of the Data

Certain adaptations of our 1974 and 1975 NCS city survey data were required in order to yield the variables of the model in a form acceptable for our estimation procedure. Many records were missing one piece of information or another, so that our 22,000 burglaries were reduced to a sample of from 16,000 to 18,000, depending on the set of variables we chose to use. It should be pointed out that incidents in which more than one type of crime occurred were classified by NCS according to a hierachy which gave precedence to violent crimes. A burglary in which a household member was assaulted would have been called an assault. Since our sample includes only those incidents classified as burglaries, those involving acts of violence are excluded.

It was decided not to include wealth as a variable in the estimation, but rather to divide the sample into categories on the basis of wealth, and to estimate the model separately for each category. This method allows us to observe variations in the response to other variables, such as the size of the loss, among victims at different levels of wealth. The victimization surveys provide data on the annual income of each household in the sample, and we have used this income figure as a proxy for the victim's wealth level. The survey data break income into thirteen categories. These were collapsed into nine in order to make them compatible with the divisions used by the Census Bureau, and on the basis of some preliminary estimation it was decided to combine these further into five categories, as follows:

Category 1: Less than $3,000
Category 2: Between $3,000 and $6,000
Category 3: Between $6,000 and $10,000
Category 4: Between $10,000 and $25,000
Category 5: Greater than $25,000

For the reasons discussed in Section 3, the value of property damaged will be treated as a separate variable, so that the variable "loss" will include only the value of cash or property stolen. It is represented by six dummy variables covering the ranges $0, $1 - 100, $101 - 200, $201 - 350, $351 - 500, and greater than $500. Property damage is covered by three dummies for the values $0, $1 - 50, and greater than $50. The value recorded for stolen of damaged property is that given by the victim.

The survey admits of several answers to the question, "Were the police notified of the crime?" The crime may have been reported by a member of the household, or by some other person. A police officer may have been on the scene. After working with the data for some time, we concluded that reports by other people or by police on the scene are essentially random events, upon which the variables in our model have little bearing. "Reports" as treated in this paper means reports by members of the household.

3. The Reporting Model

The reporting model was estimated with victimization data for the years 1973 and 1974. There were eighteen cities surveyed in those years. We decided at the outset that we wanted to produce a model capable of making accurate predictions of behavior and consequently we withheld the data from four cities to allow for prediction. We had two reasons for this approach. First, we wanted to develop a model which we could use for imputing reporting behavior to households which were, in fact, not burglarized. Second, we felt that the abundance of data allowed us to test the reasonableness of our selection of variables.

The simple underlying behavioral model of reporting we employ has behavior determined by the gain an individual expects due to reporting and the cost of doing so. We assume that the individual gains from reporting mainly by recovery of losses and compensation for damages sustained. The channels of recovery and compensation are mostly insurance policy recovery and tax credits for damages and losses. In light of this reasoning, we include in our regression the following two variables: the value of items stolen and property damage.[1] The two were not combined into an aggregate dollar value variable because clearly the potential for recovery is different for the two types of loss. Obviously, the potential for compensation depends on whether or not the household was insured against theft. Such insurance policies generally stipulate that the crime must be reported to the authorities in order for the insurance coverage to be operative. We expect therefore that losses, damage, and insurance will have a positive effect on reporting.

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[1] All variables are precisely defined in a glossary in Appendix 1 along with the corresponding survey questions.

So far we argued that reporting is aimed at recovery and compensation for the losses from the incident which has already taken place. However, if the victim believes that reporting of this incident will deter future burglaries, he will have another incentive to report. It is difficult to approximate this incentive, but we hypothesize that since victims who own their residence, as opposed to renters, have a long-run interest in the residence and its neighborhood, they may be more inclined to take this deterrence argument into account. In addition, home owning individuals are more likely to itimize deductions and consequently are able to use the casualty loss provision of the tax code. The variable RENT should have a negative effect on reporting.

Reporting, as much as any economic activity, has opportunity costs. The main cost is probably the opportunity cost of time; the latter may be non-negligible since reporting has to be done in person and in some cases may involve police visits, trips to police headquarters, and days in court. The empirical task of approximating the victim's cost of time is however not an easy one. Our income measure is based on household income and there is no information on the wages of individual household members. Therefore, in addition to income, we introduce two variables which may help to identify the cost of time: we include the variable AGE < 25 since households whose head is younger than 25 years often consist of only one member who is generally in the labor force. The variable AGE > 55 is included because households with older heads tend to include adult individuals who are not

in the labor force. These members might, in turn, have a low opportunity cost of time leading to increased reporting rates.

It was felt that income might have an effect on reporting beyond its effect on the cost of time. For example, one could argue that the effect of losses in reporting might be different in different income groups because higher income households might have a different marginal evaluation of the loss. Such effects might distort some of the relationships we are interested in, and it was decided therefore to estimate a different set of parameters for each of five income classes.

The last variable to be considered has a rather mechanical influence but may be of practical importance. It is our impression that one of the main considerations in the decision whether to report a crime is that in many cases it is not obvious to the victim whether or not he was in fact burglarized. This may obviously happen when nobody was present at home when the burglary has presumably taken place and when there is no easily determined loss. When asked about the reasons for nonreporting, some of the victims claimed that they were not sure or feared not being believed by the police. This problem leads us to introduce two variables: PRESENT is an indication of whether there was anybody at home when the incident occured. Also, we introduce an interaction term between low loss and damages because when a low loss was sustained, damage affects reporting not only due to the compensation motive but because it serves as additional evidence that a burglary, in fact, took place.

Tables 1 and 2 contain the estimated reporting model for five income categories.[2] Interesting likelihood ratio tests can be performed using the information in Tables 1 and 2. First, we can test whether splitting into income categories instead of using income as a variable can be defended. The sum of the likelihood functions for the model presented in Table 1 is 17679.92. Then the appropriate likelihood ratio test is performed by determining P_r (CHISQUARE(56) > 17783.2 - 17679.92 = 103.28). This probability is less than .001 and so we conclude that combining the income category models and treating income as a variable is an unattractive approach. Second, we can test whether income is an important influence when it is treated as a variable. The likelihood ratio test leads to the calculation P_r (CHISQUARE(4) > 11.2). The .02 critical value is 11.67 and so there is some evidence that the income catagories collectively have some influence.

[2] A concerted effort was made to introduce city wide variables with such candidates as: clearance rates for burglary, clearance rates for property crimes, major crime clearance rates, percentage of property stolen in burglaries recovered through police activity, average salary for police officers, the expected prison sentence for burglary, and police budget per capita. All of these variables were intended to get at either the recovery aspect of reporting or the ease with which such reports might be made. The performance of these variables was generally unimpressive. Since five separate models of reporting behavior were estimated, we occasionally found a significant effect in this list of candidates. However, the effects were weak and unstable, often vanishing or reversing direction when, for example, PROPDAM and LOSS were treated separately. Since the estimated model ultimately appeared stable and able to predict, we conclude that such influences on reporting were weak, if they existed at all.

Table 1

Estimated Reporting Model[1]

Category	INCOME=0-3K	INCOME=3-6K	INCOME=6-10K	INCOME=10-25K	INCOME>25K
Explanatory Variable					
LOW.LOSS,DAMAGE	0.448	0.647	0.593	0.538	---
	(1.952)	(2.826)	(3.431)	(3.389)	
PROPDAM=1-50	0.304	---	0.288	0.480	0.537
	(2.680)		(3.230)	(6.038)	(2.635)
PROPDAM>50	0.839	1.296	1.390	1.361	1.029
	(3.258)	(4.050)	(6.921)	(8.168)	(2.887)
LOSS=1-25	0.344	---	---	---	---
	(3.085)				
LOSS=26-75	1.434	0.986	1.623	1.123	1.054
	(9.696)	(6.033)	(13.182)	(10.705)	(4.471)
LOSS=76-250	1.691	2.124	2.031	1.723	1.735
	(10.248)	(10.027)	(13.042)	(12.162)	(5.290)
LOSS=251-500	2.311	1.863	2.316	2.020	1.557
	(10.147)	(8.564)	(13.558)	(11.801)	(4.576)
LOSS>500	2.412	2.349	2.682	3.239	2.746
	(12.957)	(11.478)	(18.225)	(19.447)	(8.360)
WITH.INS	1.539	1.303	0.982	0.985	0.882
	(6.896)	(5.764)	(8.169)	(11.955)	(5.037)
AGE<25	-0.273	---	-0.164	-0.205	---
	(-2.954)		(-1.721)	(-1.695)	
AGE>54	---	---	---	0.199	---
				(2.288)	
SOMEONE.PRESENT	0.757	0.645	0.779	0.908	1.241
	(6.721)	(5.010)	(7.755)	(9.558)	(4.817)
RENT	---	-0.344	-0.162	---	---
		(-3.149)	(-2.098)		
CONSTANT	-1.053	-0.701	-0.901	-1.131	-1.152
-2*LN(L)	3444.84	2523.75	4880.20	5897.36	933.77

[1]These estimates are for 14 of the cities surveyed in 1973 and 1974.

Table 2

Estimated Reporting Model[1]

Explanatory Variable	Model with Income Categories Pooled	Income Pooled-Income as a Variable
INCOME=0-3K		-0.033
		(-0.597)
INCOME=3-6K		-0.103
		(-1.719)
INCOME=10-25K		-0.010
		(-2.076)
INCOME>25K		-0.266
		(-2.943)
LOW.LOSS,DAMAGE	0.456	0.452
	(4.552)	(4.503)
PROPDAM=1-50	0.384	0.382
	(7.806)	(7.761)
PROPDAM>50	1.276	1.277
	(12.352)	(12.353)
LOSS=1-25	0.131	0.132
	(2.595)	(2.618)
LOSS=26-75	1.314	1.316
	(20.216)	(20.229)
LOSS=76-250	1.879	1.880
	(23.209)	(23.204)
LOSS=251-500	2.134	2.133
	(22.723)	(22.689)
LOSS>500	2.784	2.786
	(32.829)	(32.831)
WITH.INS	0.962	0.982
	(16.311)	(16.443)
AGE<25	-0.133	-0.148
	(-2.523)	(-2.771)
AGE>54	0.140	0.125
	(3.026)	(2.615)
SOMEONE.PRESENT	0.816	0.816
	(15.532)	(15.494)
RENT	-0.036	-0.062
	(-0.893)	(-1.450)
CONSTANT	-1.094	-1.008
-2*LN(L)	17794.4	17783.2

[1]These estimates are for 14 of the cities surveyed in 1973 and 1974.

Detailed tests of the ability of the models to predict the four withheld cities are contained in Tables 3 and 4. Those tests included likelihood ratio tests on the parameters and chi squared goodness of fit tests on sufficiently populated categories of withheld households to permit meaningful calculations. From other types of test we conclude that the model estimated for fourteen cities can successfully predict the burglary reporting rates in the four withheld cities.

The results of these estimated reporting models for the entire sample of 18 cities appear in Table 5. The major aspects of these reporting models are clear from a cursory examination of the table. First, loss and property damage are the major influences in the reporting decision, regardless of income level. In addition, the magnitude of the effect increases as either the level of the loss or the level of property damage increase, increasing the probability that the household will report the incident.[3,4] Insurance has the anticipated positive effect, as does presence. Age of the household head and rent appear to have a relatively weak influence when significant but are more often than not insignificant.

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[3]There is one minor exception for the group with income in excess of 25,000. The variable LOSS = 76 - 250 has a coefficient of 1.816 and LOSS = 251 - 500 has a coefficient of 1.603. However, the difference between the coefficients is small compared to the estimated standard error of the difference, which is .4414.

[4]This general statement applies under any apportionment of the coefficient on the interaction term LOW.LOSS,DAMAGE to PROPDAM = 1 - 50 and LOSS = 1 - 25.

Table 3

Likelihood Ratio Tests of the Stability of Coefficients
for the Reporting Models:

Income Category	Value of -2*LN(L) 14 City Sample	Value of -2*LN(L) 4 City Sample	Value of -2*LN(L) Combined Sample	Test Stat.[1]	Level of Signif.[2]
INCOME=0-3K	3444.84	914.31	4373.02	13.87	.40
INCOME=3-6K	2523.75	716.51	3265.81	25.55	.02
INCOME=6-10K	4880.20	1299.48	6194.73	15.05	.30
INCOME=10-25K	5897.36	1882.58	7795.04	15.10	.30
INCOME>25K	933.77	238.57	1181.90	9.56	.70

[1]The Test Stat. has a Chisquare Distribution with 14 Degrees of Freedom.
[2]The level of significance is roughly the Type One Error which can be used and still conclude in favor of the Null Hypothesis.

Table 4

Tests of the Ability of the Estimated Reporting Models to Predict Outside of the Sample:[1]

Income Category	Number of Households	Percent Covered[2]	Degrees of Freedom	Test Stat.	Level of Signif.[3]
INCOME=0-3K	768	72.5	13	14.07	.30
INCOME=3-6K	637	84.1	9	14.47	.10
INCOME=6-10K	1172	71.0	18	17.81	.40
INCOME=10-25K	1671	73.9	19	17.94	.50
INCOME>25K	240	60.0	5	8.75	.10

[1]The estimates used in these calculation are based on the 14 city sample and the sample predicted is the data from the 4 cities withheld.
[2]This give the percentage of household which were included in the calculation of the test statistic. Such households were in groups with a size sufficient to make the Normal approximation to the Binomial reasonably accurate.
[3]The level of significance is roughly the Type One Error which can be used and still conclude in favor of the Null Hypothesis.

Table 5

Estimated Reporting Model[1]

Category	INCOME=0-3K	INCOME=3-6K	INCOME=6-10K	INCOME=10-25K	INCOME>25K
Explanatory Variable					
LOW.LOSS,DAMAGE	0.402	0.646	0.515	0.435	---
	(1.945)	(2.782)	(3.029)	(3.173)	
PROPDAM=1-50	0.315	0.231	0.373	0.477	0.603
	(3.064)	(2.051)	(4.484)	(6.908)	(3.405)
PROPDAM>50	0.791	1.269	0.791	1.406	1.084
	(3.552)	(4.774)	(8.420)	(9.771)	(3.575)
LOSS=1-25	0.404	0.225	0.179	---	---
	(4.121)	(1.932)	(2.088)		
LOSS=26-75	1.406	1.164	1.667	1.133	1.088
	(10.800)	(7.836)	(14.780)	(12.354)	(4.987)
LOSS=76-250	1.641	2.168	1.989	1.728	1.816
	(11.249)	(11.432)	(14.358)	(13.740)	(6.013)
LOSS=251-500	2.221	2.066	2.411	2.027	1.603
	(11.098)	(10.077)	(15.145)	(13.251)	(4.979)
LOSS>500	2.494	2.392	2.834	3.149	2.909
	(14.643)	(12.744)	(20.512)	(21.441)	(9.422)
WITH.INS	1.377	1.369	0.851	1.022	0.893
	(7.343)	(6.480)	(7.783)	(14.223)	(5.624)
AGE<25	-0.340	---	---	-0.245	---
	(-4.231)			(-2.405)	
AGE>54	---	0.265	---	0.162	---
		(2.489)		(2.141)	
SOMEONE.PRESENT	0.760	0.622	0.867	0.838	1.251
	(7.500)	(5.334)	(9.594)	(9.920)	(5.561)
RENT	---	-0.215	-0.206	---	---
		(-1.994)	(-3.102)		
CONSTANT	-1.026	-1.000	-0.986	-1.082	-1.130
-2*LN(L)	4373.02	3265.81	6194.73	7795.64	1181.90

[1]These estimates are for the 18 cities surveyed in 1973 and 1974.

Conclusion

We have developed and estimated a simple model of reporting behavior for the households which have been burglarized. That model used as explanatory variables the socioeconomic and demographic characteristics of the household but excluded measures of the attitude of members of the household towards the police and criminal justice system.

We found that this estimated model was capable of accurately predicting reporting behavior in cities not used in the primary estimation. While this finding does not necessarily indicate that attitudes are irrelevant in determining reporting behavior, it does suggest that either the magnitude of their effect is small or that the variation in attitudes is small across the SMSAs we studied.

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APPENDIX

GLOSSARY OF VARIABLES

NAME	VARIABLE DEFINITION AND REFERENCES
AGE<25	1 if the household head has age below 25; 0 otherwise. (Question 1)
AGE=25-55	1 if the household head has age from 25 to 55; 0 otherwise. (not use directly -- effects thrown on constant) (Question 1)
AGE>55	1 if the household head has age above 55; 0 otherwise. (Question 1)
INC=0-3K	1 if the household income is in the range from $0 to $3000; 0 otherwise. (Question 2)
INC=3-6K	1 if the household income is in the range from $3000 to $6000; 0 otherwise. (Question 2)
INC=6-10K	1 if the household income is in the range from $6000 to $10000; 0 otherwise. (not used directly in loss estimation - effects thrown on constant) (Question 2)
INC=10-25K	1 if the household income is in the range from $10000 to $25000; 0 otherwise. (Question 2)
INC>25K	1 if the household income is above $25000; 0 otherwise. (Question 2)
LOSS=0	1 if no cash or property was taken; 0 otherwise. (not used directly in reporting estimation - effects thrown on constant) (Question 3)
LOSS=1-25	1 if the value of cash and property taken was in the range $1 to $25; 0 otherwise. (Question 3)
LOSS=26-75	1 if the value of cash and property taken was in the range $26 to $75; 0 otherwise. (Question 3)
LOSS=76-250	1 if the value of cash and property taken was in the range $76 to $250; 0 otherwise. (Question 3)

NAME	VARIABLE DEFINITION AND REFERENCES
LOSS=251-500	1 if the value of cash and property taken was in the range $250 to $500; 0 otherwise. (Question 3)
LOSS>500	1 if the value of cash and property taken was above $500; 0 otherwise. (Question 3)
LOW.LOSS.DAMAGE	1 if nothing was taken or damaged; 0 otherwise. (Questions 3 and 4)
SOMEONE PRESENT	1 if a household member was present during the incident; 0 otherwise. (Question 5)
PROPDAM=0	1 if no property was damaged; 0 otherwise. (not used directly in reporting estimation - effects thrown on constant) (Question 4)
PROPDAM=1-50	1 if the cost of property damage was in the range $1 to $50; 0 otherwise. (Question 4)
PROPDAM>50	1 if the cost of property damage was above $50; 0 otherwise. (Question 4)
RACE=BLACK	1 if the household head is black; 0 otherwise. (Question 6)
RENT	1 if the residence is rented; 0 otherwise. (Question 7)
VICT	1 if the household had a burglary victimization; 0 otherwise. (Question 8)
WITH.INS	1 if the household was insured against theft; 0 otherwise. (Question 9)

NCP Questions Used to Produce Variables

*Question 1

Age of Head

01	Noninterviewed households
12-98	Actual age
99	99 or older

*Question 2

Family Income

01	Under $1,000	09	$10,000 to 11,999
02	$1,000 to 1,999	10	$12,000 to 14,999
03	$2,000 to 2,999	11	$15,000 to 19,999
04	$3,000 to 3,999	12	$20,000 to 24,999
05	$4,000 to 4,999	13	$25,000 and over
06	$5,000 to 5,999	14	Residue
07	$6,000 to 7,499	15	Out of universe
08	$7,500 to 9,999	16	No entry provided

*Question 3

Amount Taken

What was taken?

000001 - 009999	Amount of cash in whole dollars
010000	Residue
010001	Out of universe (UNIVERSE: 179 = 1)

Value of Property Taken

Altogether, what was the value of the property that was taken?

000000 - 009999	Value in whole dollars
010000	Residue
010001	Out of universe

UNIVERSE: 179 = 1, 200 ≠ 0

*Question 4

Cost to Repair or Replace Damaged Items

How much would it cost to repair or replace the damaged item(s)?

000001-009999	Actual amount in dollars
010000	Don't know
010001	Residue
010002	Out of universe

(This question is asked only if items were damaged but not repaired or replaced.)

UNIVERSE: 237 = 2; 238 = 2

Actual Cost to Repair or Replace Damaged Item(s)

How much was the repair or replacement cost?

000001-009999	Actual amount in whole dollars
01000	No cost or don't know
010001	Residue
010002	Out of universe

UNIVERSE: 237 = 2; 238 = 1

*Question 5

Presence of Household Member During Incident

1	No	3	Residue
2	Yes	4	Out of universe

*Question 6

Race of Head

1	White	3	Other
2	Negro	4	Residue
		9	Noninterviewed household

*Question 7

Tenure

1 Owned or being bought
2 Rented for cash
3 No cash rent
4 Residue
5 Out of universe

*Question 8

Type of Crime Code

Crimes Against Property - Household Crimes

20 Burglary, forcible entry, nothing taken, property damage
21 Burglary, forcible entry, nothing taken, no property damage
22 Burglary, forcible entry, something taken
23 Burglary, unlawful entry without force
24 Burglary, attempted forcible entry

*Question 9

Insurance Against Theft

Was there any insurance against theft?

1 No
2 Don't know
3 Yes
4 Residue
5 Out of universe

UNIVERSE: 179 = 1

END