Observable Private Precaution and Its Effect on Crime: The Case of Burglar Alarms

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Abstract

Homeowners exercise property rights by engaging in private precaution to supplement public protection offered by police and courts. When these private precautionary measures are observable to criminals, as in the case of burglar alarms, they have the beneficial effect of increasing the probability of apprehension should an alarmed home be burgled. However, because a burglar is rational in his criminal activity, he will avoid protected homes and target those without alarms. Observable private precautionary measures therefore incorporate both the deterrence (Clotfelter 1978) and diversion (Shavell 1991) effects. I contribute to the literature on the economics of crime by empirically examining the diversion effect associated with burglar alarms. Lacking data on burglar alarms, I use security system services sales by county as a proxy for burglar alarm adoption. Estimation shows that although burglar alarms have a statistically significant and negative effect on burglary rates, burglary rates respond inelastically to burglar alarms. This finding of inelasticity is consistent with diversion muting the effectiveness of burglar alarms. A continuation of this research goes a step further by taking two approaches to estimating the separate effect of diversion. Both applications use a unique dataset consisting of homeowners' insurance company market shares, base premiums, and protective device discounts from the state of Illinois, where insurance pricing has been deregulated. This case study in the effectiveness of burglar alarms in lowering burglary rates provides a better understanding of how seemingly beneficial observable private precautionary measures can also be costly to society.

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I: Introduction

Property rights exist to facilitate socially efficient exploitation of resources. By providing individuals with the exclusive right to use their resources as they see fit, property rights yield incentives for owners to take full account of the costs and benefits of employing these resources. Property rights related to homeownership are no different. An individual has the right to protect his or her home and the property surrounding it in any legal way possible. Often, public protection of homes is not adequate and owners find it in their interest to engage in private precautionary measures. Empirically, private protection is important and growing. According to a Wall Street Journal report cited by Sherman (1995), the security guard industry grew eleven percent in 1994, which is more than twice the rate of police expenditures in recent years (Ayres and Levitt 1998).

Homeowners engage in private precaution in various ways, including installing burglar alarms or deadbolt locks, placing bars on windows, or even staying home during the day. Rational burglars will respond to such measures (Blackstone and Hakim 1997). Homeowners benefit from employing private precaution because it decreases the likelihood that their homes will be victimized. However, homeowners also incur the costs of taking these measures. A homeowner will increase the use of private precaution until the marginal benefit equals marginal costs.

The social effects of private precautionary measures are two-fold. Precautionary measures benefit society because they deter criminals, thereby lowering the expected loss due to crime. Precaution can also be costly if it diverts crime to property that is not protected. Precautionary measures that are visible to a burglar, such as burglar alarm systems, incorporate both the beneficial and costly effects of private protection by not only reducing crime for protected households, but also displacing it to unprotected households. Such measures exhibit what have been identified by the literature as the deterrence (Clotfelter 1978) and diversion (Shavell 1991) effects, respectively. Unobservable measures, such as hidden video cameras, generally only have the beneficial effect of reducing crime and therefore exhibit the deterrence effect alone. Clearly, the overall effect of private precautionary measures on the level of crime in a community is largely determined by the type of precaution taken by households.

Although considerable literature in the fields of criminology, sociology and economics agree on the existence of the diversion and deterrence effects associated with observable private precaution, measuring the size of each is notoriously difficult. Measurement of the separate diversion effect lacks a standardized method. Following the econometric analysis of Levitt and Ayres (1998) on the social effects of the Lojack, a form of unobservable private precaution for automobiles, I produce an estimate of the net effect of burglar alarms on county burglary rates in the United States. Since most burglar alarms are observable to burglars, this net effect encompasses both the diversion and deterrence effects. While it is not possible to separate the two component effects using this technique, I find a small but significant negative net effect of burglar alarms on burglary rates. This is consistent with a large deterrence effect and a diversion effect that is nearly as large. However, this finding is also consistent with a small deterrence effect and a negligible diversion effect. Continuing research seeks to separate the two effects so as to extract the actual size of the diversion effect.

This paper is organized as follows: Section II justifies interest in the effect of burglar alarms on burglary rates by providing a brief overview of the literature regarding observable private precaution and the diversion and deterrence effects. This section is followed by a presentation of the empirical specification used to measure the net effect and the data employed in estimation. Section IV details my results. The fifth section discusses my continuing research, which employs two different methods for measuring the separate diversion effect associated with observable precautionary measures. A brief conclusion ends the paper.

II: Literature Review

Observable precautionary measures are those that are visible to a burglar contemplating entry. Observable private security, such as an alarm system, is often advertised to the burglar in the form of a sign or sticker on a window or mailbox. A rational burglar will tend to avoid homes that are protected by this form of security. By increasing both the probability of apprehension and the difficulty of entry for the burglar, observable security measures increase the expected cost of criminal activity to the burglar and therefore engender the deterrence effect. Despite its ability to deter criminals, not all homes engage in observable private precaution (Hakim, Rengert, and Schachmurove 1995). A rational burglar will find these unprotected homes more attractive and tend to make them his target. Therefore, as the fraction of protected homes within a community increases, the likelihood of burglary in unprotected homes in that community also increases. This is the diversion effect, a negative externality, associated with observable security measures.

Unobservable private precautionary measures, such as silent alarms, do not allow a burglar to determine a household's level of protection. Assuming that rational burglars gain a general idea of how many households are protected, unobservable private precaution serves two purposes: one is to stop the burglary of protected homes, and the second is to deter burglary of unprotected homes (Hakim, Rengert, and Schachmurove 1995). Since such measures leave potential criminals unaware of which households are protected, unobservable private security does not divert crime, but rather generates positive externalities for the entire community. Unobservable precautionary measures exhibit only the deterrence effect, and therefore unambiguously lead to an overall decrease in crime.

Empirical evidence of the deterrence of burglar alarms has been documented. A study in Cedar Rapids, Iowa in 1972 shows that when compared to non-alarmed homes, there is a fifty-five percent reduction in burglaries, as well as a reduction in financial losses, in alarmed residences. Using a household questionnaire and review of police files in Philadelphia's metropolitan area, Buck and Hakim (1992) determine that non-alarmed homes are 2.7 times more likely to be victimized than alarmed homes under equal environmental conditions.

Empirical evidence of the diversion effect is rare and informal. Clarke, Hough, Mayhew and Sturman (Home Office Research Study No. 34) find that steering column locks, a form of observable precaution in automobiles, lead to an increase in the number of offenses related to vehicle theft. They attribute the increase in crime to a redirection of thieves to vehicles without the device. In another study, LeBeau and Vincent use evidence that burglaries tend to be a single-address phenomenon as reason to suggest that alarmed premises may be responsible for diverting crimes to non-alarmed locations.

While empiricism is rare, diversion has been examined theoretically by a number of researchers. Shavell (1991) shows that the level of observable precaution taken by households will be higher than the level of unobservable precaution, due to the negative externality that diversion imposes. Since unobservable private precaution benefits the entire community, not just those who incur the costs of engaging in protection, fewer homes are likely to protect when security is unobservable. Clotfelter (1978) argues that since successful crimes result in losses to victims that are probably not offset by gains to criminals, security measures that divert crime constitute a class of externalities that result in an inefficient number of households employing them. What is the efficient number when the diversion effect is present? De Meza and Gould (1992) suggest that social efficiency requires all or no households to install burglar alarms. This result follows from their assumption that the expected loss from burglary is an increasing function of the number of households installing burglar alarms.

III: Empirical Specification and Data Sources

My purpose is to estimate the net effect (the combined deterrence and diversion effects) of burglar alarms on burglary rates. This estimation is the first step in eventually teasing out the separate effect of diversion associated with burglar alarm use.

The empirical specification I estimate to measure the net effect of burglar alarms on burglary rates is:

$$ln(BURGLARY_i) = \alpha + \beta ALARM_i + \lambda CONTROL_i + \varepsilon_i \quad , \quad (1)$$

where i indexes county. Analysis is conducted at the county level in the United States because crime displacement is likely to occur within short distances (Bowers and Johnson 2003). BURGLARY represents the per capita burglary rate, α is the intercept, ALARM represents the fraction of homes with burglar alarms, CONTROL is a vector of control variables affecting the likelihood of residential burglary, and ε_i is an error term. As the BURGLARY variable is logged, β is interpreted as the percentage change in the per capita burglary rate associated with a unit change in the fraction of homes using burglar alarms. β is the measure of the net effect of burglar alarms on burglary rates. Given the empirical evidence on the deterrence of burglar alarms that already exists and that the diversion effect is unlikely to be larger than the deterrence effect, ALARM is predicted to be statistically significant and negatively related to burglary rates.

To measure BURGLARY, I employ per capita burglary rates, which are calculated using total number of burglaries and total population from Uniform Crime Reports County Data. Per the Uniform Crime Report, burglary is defined as "the unlawful entry of a structure to commit a felony or theft, where the use of force is not necessary for entry." The FBI does not distinguish between residential and commercial burglaries.

Data on ALARM, the primary variable of interest, are not readily available. Previous empirical studies on the effectiveness of burglar alarms, including those mentioned earlier, rely on burglar alarm data from household questionnaires and police files. Such data are not available for my research. Contact with trade associations for the licensed security alarm industry and companies that insure households installing burglar alarms also failed to generate data sources. Therefore, as a reasonable proxy for the fraction of homes with burglar alarms in each county, I employ data on the annual receipts of establishments selling security system services (per $1,000) from the U.S. Census, Business and Industry Statistics Sampler, North American Industry Classification System (NAICS) 56162. NAICS 56162 is the industry classification that is comprised of establishments "engaged in selling security systems, such as burglar and fire alarms and locking devices, along with installation, repair, or monitoring services or remote monitoring of electronic security alarm systems." Since Business and Industry Statistics are only available every five years, the scope of this research is necessarily limited to the years of 2002, 1997 and 1992. These data from the U.S. Census do not distinguish between the sale of residential and commercial security systems, fire and burglar alarms, or observable and unobservable devices. However, a significant amount of revenue from security sales originates from residential burglar alarms: 58% of revenue comes from burglar alarms (Blackstone and Hakim 1997) and roughly 60% of new burglar alarms installed each year are residential (Blackstone, Hakim and Spiegel 2000). Nominal security system services sales are converted to real sales using the CPI (1982-84 dollars). Real sales are divided by the total number of housing units in each county so that ALARM represents the fraction of protected homes. Data on housing units are available only from decennial 100-percent U.S. Census reports, so annual data are linearly interpolated. The U.S Census defines a housing unit as "a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or, if vacant, is intended for occupancy) as separate living quarters."

I face two significant obstacles when using U.S. Census data on security system services sales as a proxy for burglar alarm use. Since it is unlikely that all security system services used throughout the year are purchased that year, total sales is not a direct measure of burglar alarm use. I assume that burglar alarm use is related to security system services sales through the following relationship:

$$ALARM_{it} = SALES_{it} + (1\text{-}\delta)ALARM_{it\text{-}5} \quad , \qquad (2)$$

where i refers to county and t refers to year. ALARM represents the total number of homes with burglar alarms (before it is divided by housing units to become a fraction), δ is the five-year depreciation rate and assumed to be 0.3[1], and SALES represents the annual receipts of establishments selling security system services. ALARM is lagged by five because of the frequency with which U.S. Census data on sales are available. (2) suggests that the current year's use of burglar alarms is the sum of the current year's sales and last period's use, taking depreciation into account. Recursively substituting $ALARM_{it-5}$, …., $ALARM_{it-5n}$ into (2), where n is the number of years prior to time t for which data are available, $ALARM_{it}$ is defined as:

$$ALARM_{it} = SALES_{it} + (1\text{-}\delta)SALES_{it\text{-}5} + \ldots\ldots + (1\text{-}\delta)^n SALES_{it\text{-}5n} \qquad (3)$$

[1] Other values for the five-year depreciation rate are considered, as discussed in section IV.

The second obstacle I face in using U.S. Census data to measure burglar alarm use is that in order to use (3), data on security system services sales are required for several years. Strictly looking at the years of 2002, 1997 and 1992, the most recent years in which the U.S. Census collected sales data, the cross section of counties for which data are available for NAICS 56162 is quite small. The fact that security system services establishments do not operate in all U.S. counties explains this unavailability of data. Data are also suppressed for counties with low sales in order to maintain company anonymity. Furthermore, NAICS 56162 did not even exist until 1997.

To overcome the problem of a small sample size, I employ a straightforward method for estimating security system services sales for counties with missing data using murder rates. This approach focuses on the perception that homeowners have of the prevalence of violent crime. The evening news and local newspaper are more likely to broadcast violent, rather than property, crime. Violent crimes are also more likely to shock homeowners into thinking that they live in a dangerous neighborhood, inducing the employment of private precautionary measures, such as burglar alarms. Using murder to predict SALES is econometrically sound because I do not use murder as a CONTROL variable in my specification measuring the net effect of burglar alarms on burglary rates. Employing this argument, as well as a pooled sample of counties for which I am able to obtain data on security system services sales from the U.S. Census in 2002 and 1997, I estimate the following specification to measure the effect of murder rates on burglar alarm sales:

$$ln(SALES_i) = \zeta + \varphi ln(MURDER_i) + \theta INCOME_i + \gamma UNITS_i + \upsilon_i \quad , (4)$$

where i corresponds to county, SALES represents security system services sales, ζ is the intercept, MURDER is the number of murders, INCOME is real median family income, UNITS represents the number of housing units, and υ_i is an error term. Each of the three explanatory variables should be positively related to burglar alarm sales. Data on MURDER are obtained from Uniform Crime Reports County Data. Per the Uniform Crime Report, murder is considered to be a violent crime and is defined as "the willful (nonnegligent) killing of one human being by another." Data on nominal median family income and the total number of housing units are linearly interpolated from decennial sample and 100-percent U.S. Census reports, respectively. Data on nominal income are converted to real values using the CPI (1982-84 dollars). The parameters obtained from (4) via Ordinary Least Squares (OLS) are then used in conjunction with data on MURDER, INCOME and UNITS in 2002, 1997 and 1992 to generate SALES for counties without U.S. Census sales data in the same years. Table 1 presents the parameters used for these calculations. Although the results presented in Table 1 are not the focus of this paper, it is interesting to note that murder is statistically significant and positively related to security system services sales. The coefficient on MURDER is an elasticity measure of the responsiveness of SALES to instances of murder.

Literature on property crime and security dictates that several control variables be included in the specification measuring the net effect of burglar alarms on burglary rates. According to the literature on private security, determinants of residential burglary include home value, income of the homeowner, race of the homeowner, and age of the home. Buck, Hakim, and Rengert (1993) suggest that homes of higher value are more likely to be burgled, but previous literature differs on how homeowner income affects burglary rates. The Bureau of Justice Assistance Annual Crime Victim Survey (1999) reports that residential burglaries tend to concentrate around low-income families, but Buck, Hakim and Porat (1992) argue that households with higher income are more susceptible to theft. Finally, newer houses and those owned by African Americans are more likely to be burgled (Hakim and Gaffney, 1995). Data on nominal median family income, median age of housing units, nominal median value of housing units, and the number of African American homeowners are obtained from decennial sample U.S. Census reports. Annual data are linearly interpolated. Nominal median income data are converted to real values using the CPI, as before. Data on real median value of housing units are preferred, but an annual housing price index at the county level is difficult to obtain. Data on the number of African American homeowners are converted to percentages of the population using population data from the Uniform Crime Reports County Data.

Other explanatory variables suggested by property crime literature include the unemployment rate, age distribution, and size of the police force. Chiricos (1987) and Freeman (1996) argue that property crime is negatively related to labor market conditions, Blumstein et al (1986) suggest that the prevalence of criminal involvement drops after the teen years, and Levitt (1997) and Marvell and Moody (1986) further argue that increased numbers of police reduce crime. Data on the unemployment rate are obtained from the Bureau of Labor Statistics, and the total number of sworn officers is available from the FBI's 2002 "Crime in the United States" and city and county police department websites. Data are converted to per capita values using total populations from Uniform Crime Reports County Data. To represent age distribution, I use percentages of the population aged 0-17, 18-24, and 25-44. The percentage of the population aged 44+ is omitted from the sample. Annual data are linearly interpolated from decennial data from County and City Data Books. Finally, dummy variables are included to represent the geographical region of the counties in the sample because FBI statistics show that the prevalence of burglary differs between national regions, with more than 40% of all burglaries occurring in the South. The geographical regions of Northeast, South, Midwest and West are defined by the FBI.

Summary statistics for the data used in the measurement of the net effect of burglar alarms on burglary rates are presented in Table 2. In order to employ the use of (3), estimation is only conducted for 2002, which means that data on security system services sales from 1997 and 1992 are also used in the construction of ALARM. The final sample consists of data for 219 U.S. counties. Although previous literature establishes the theoretical importance of income and size of the police force in explaining burglary rates, both variables are ultimately omitted from the specification. Income is not included because of its correlation with ALARM. Intuitively, correlation between ALARM and real median family income is probably due to the fact that wealthier homeowners are more likely to employ burglar alarm services. The variable representing the size of the police force is not included in the specification because of its correlation with ALARM and the variable representing the percentage of African American homeowners.

IV: Empirical Results and Discussion

Although an estimate of β from (1) is initially obtained using OLS, it is likely that the employment of burglar alarm services in a given county is endogenous. That is, although burglar alarms likely induce a change in county-level burglary rates, it is also possible that higher burglary rates motivate the use of burglar alarms. This endogeneity makes OLS estimates inconsistent. As a result, I also employ Two-Stage Least Squares (2SLS) analysis and use the number of security system services establishments in a county in 2002 and in 1997 as separate instruments for ALARM. The number of security system services establishments is considered a valid instrument because counties with higher burglary rates are likely to have more security system services establishments. County-level data on the number of security system services establishments are obtained through the U.S. Census Bureau, Business and Industry Statistics Sampler, NAICS 56162. For counties without data on the number of establishments in either 2002 or 1997, the number of establishments from the year in which data are available is used, since the number of establishments in a county is unlikely to change drastically within a 5-year period. Summary statistics for the data used as instruments are also included in Table 2.

Table 3 presents estimation results. Column A provides OLS results, column B provides 2SLS results using the number of security system services establishments in 2002 and in 1997 as separate instruments, and column C provides 2SLS results using the average number of security system services establishments between the years of 2002 and 1997 as one instrument. As seen from Table 3, OLS estimation finds that ALARM is statistically significant and negatively related to burglary rates. The 2SLS regressions find that the coefficient on ALARM has the expected negative sign, but ALARM is statistically insignificant. Since the determination of which estimation technique is consistent depends on whether or not ALARM is really endogenous, a Hausman Test is conducted. The Hausman Test shows that ALARM is not endogenous, as verified by the similarity in coefficients on ALARM among the three specifications. Although this result is surprising, it is consistent with the violent crime theory used to predict sales data. That is, perhaps violent, rather than property, crime has a significant impact on burglar alarm use. Confidence is therefore placed in OLS estimation of the net effect of burglar alarms on burglary rates.

According to the OLS results, a one unit increase in the fraction of homes using burglar alarms leads to roughly a 73% decrease in burglary rates. This statistic exaggerates the effect of burglar alarms on burglary rates because burglary rates are logged and burglar alarm use is measured as a fraction of homes. Therefore, a measure of elasticity of burglary rates with respect to the fraction of homes with burglar alarms is calculated for each of the three regressions in Table 3. According to Column A, a 1% increase in the fraction of homes installing burglar alarms leads to a 0.10% decrease in burglary rates. Since empirical evidence overwhelmingly shows that burglar alarms deter crime, the fact that burglary rates respond inelastically to burglar alarms suggests that diversion is likely muting the effectiveness of burglar alarms. Further investigation into the separate effect of diversion is merited.

With the exception of age of housing unit, nominal median house value, and the first two age groups, the CONTROL variables included in the specification are statistically significant. The explanatory power of age of housing unit and house value may already be captured by the ALARM variable, as newer and more expensive homes are more likely to install alarms. For those CONTROL variables that are statistically significant, all except the age group 25-44 have the predicted effect. Calculations of elasticities measuring the responsiveness of burglary rates to changes in each significant CONTROL variable reveal that burglary rates respond inelastically to changes in all, except for the 25-44 age group (relative to the omitted age group). Finally, it is important to note that changes in the value of depreciation for burglar alarms do not affect whether or not ALARM is significant in explaining burglary rates. However, ALARM does become less significant in OLS estimation when I assume a larger value for depreciation.

V: The Next Step: Separating the Diversion Effect

The finding of a small net effect of burglar alarms on burglary rates merits further investigation into the size of the diversion effect. I now describe the two methods and data that I employ in current research to measure the separate diversion effect associated with burglar alarms. Both methods use a unique dataset consisting of homeowners' insurance company market shares, base premiums, and protective device discounts. Data are collected from the Illinois Division of Insurance at the zip code level for approximately 65 homeowners' insurance companies operating in Illinois. I use data from Illinois because the state is well-known for successfully deregulating insurance pricing. In fact, Illinois insurance pricing has not been governed by insurance rating law since 1971 because free market competition has worked so well. Studies show that Illinois has more homeowners' insurance companies competing for business than any other state (Whitman 1973).

Homeowners' insurance companies subsidize household adoption of burglar alarms. This subsidy comes in the form of a percentage discount off the base premium charged by insurance companies. Assuming that competition in the insurance industry leads to zero-profit equilibrium, simple cost/benefit analysis suggests that an insurance company should be willing to offer a discount to alarmed customers if the savings generated by the deterrence effect are greater than the costs generated by the diversion effect. Since companies insuring more non-alarmed customers face larger costs due to diversion, companies with more non-alarmed customers should offer smaller discounts. In this first method, I measure the diversion effect associated with burglar alarm use by regressing the dollar value of protective device discounts offered to homeowners, divided by the average insured loss due to burglary, on (the non-alarmed portion of) insurance company market shares. Analysis is also conducted for the case in which the average loss from burglary in alarmed homes is assumed to be larger than the average loss to non-alarmed homes, since homeowners who take private precautionary measures are likely those who expect a larger insured loss from theft. Estimation shows that the value of property at risk is an additional determinant of the diversion effect.

The second way that I empirically examine the separate diversion effect associated with burglar alarm use is by constructing a structural model of equilibrium in an oligopolistic setting and measuring supply and demand parameters to predict the probability of burglary in two different scenarios. In the first scenario, some, but not all, homes are assumed to install burglar alarms. The second case is a counterfactual where all homes are non-alarmed. The difference in these predicted probabilities represents the change in the probability of burglary in non-alarmed homes due to an increase in alarm adoption, or the diversion effect. The counterfactual assuming complete elimination of burglar alarms is extended to generate an understanding of how market shares and premiums charged by homeowners' insurance companies would be affected if, for example, policy banned burglar alarm use in order to eliminate the diversion effect. This method is based on the influential empirical work of Berry, Levinsohn, and Pakes (1995) in the field of industrial organization, which presents a procedure for estimating supply and demand parameters in an oligopolistic differentiated product setting without using consumer-level data.

VI: Conclusion

Homeowners employ private precautionary measures to decrease the likelihood that their property will be burgled. When these precautionary measures are observable to criminals, they likely also divert crime to unprotected households. Both these deterrence and diversion effects arise when burglar alarms are installed. I find that increases in the fraction of households with burglar alarms are associated with slight decreases in burglary rates. My research overcomes a significant hurdle in data collection by using sales of security system services as a proxy for the fraction of households with burglar alarms and generating missing data using murder rates. The finding that burglary rates respond inelastically to burglar alarms is consistent with the diversion effect muting the effectiveness of observable precautionary measures. The size of this diversion effect is not discernable from my measure of the net effect of burglar alarms on burglary rates, but it is important to consideration of policy. My ongoing research is devoted to estimating the size of the diversion effect.

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Table 1: Parameters Used in Generation of Sales Data

Variable	
INTERCEPT	5.88
	0.25
MURDER, 2002 and 1997: Total Number of Murders	0.37
	0.05
INCOME, 2002 and 1997: Real Median Family Income	0.0000684
	0.0000057
UNITS, 2002 and 1997: Total Number of Housing Units	0.000000775
	0.000000156
No. of Observations	216
Adjusted R-squared	0.62

* Standard errors are in itallics

Table 2: Summary Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
BURGLARY, 2002: Burglary per capita (x1000)	0.99	0.54	0.07	3.28
ALARM, 2002: Fraction of homes with burglar alarms	0.14	0.10	0.04	1.03
CONTROL, 2002:				
Real Median Family Income	27,349.35	6,870.61	14,727.63	48,007.12
% African American Homeowners (of population)	4.76	5.13	0.06300	23.62
Median Age of House (since built)	28.22	8.51	7.80	54.80
Nominal Median House Value	153,166.21	74,250.60	55,700.00	546,680.00
Unemployment Rate	5.65	1.64	3.00	15.00
Sworn Officers per capita (x1000)	0.75	0.79	0.0031	5.16
% Aged 0-17 (of population)	26.10	2.82	14.30	34.80
% Aged 18-24 (of population)	9.25	3.21	2.02	32.02
% Aged 25-44 (of population)	30.62	3.04	21.92	43.14
INSTRUMENTS				
No. Security System Services Establishments, 1997	23.63	31.35	3.00	349.00
No. Security System Services Establishments, 2002	24.47	31.77	3.00	344.00
Avg. No. Security System Services Establishments, 1997 and 2002	24.05	31.46	3.00	346.50
No. of Observations	219			

Table 3: Regression Results on the Net Effect of Burglar Alarms on Burglary Rates

Variable	A	B	C
INTERCEPT	1.3882	1.5563	1.5798
	0.6313	*0.6369*	*0.6450*
ALARM, 2002: Fraction of homes installing alarms	-0.7307	-0.9286	-1.3651
	0.3462	*1.5692*	*1.6209*
CONTROL, 2002:			
% African American Homeowners (of population)	0.0361	0.0351	0.0353
	0.0079	*0.0079*	*0.0080*
Median Age of House (since built)	-0.0048	-0.0038	-0.0036
	0.0060	*0.0060*	*0.1161*
Nominal Median House Value	-1.11E-07	-1.33E-07	-1.13E-07
	5.35E-07	*5.30E-07*	*5.46E-07*
Unemployment Rate	0.1040	0.1055	0.1056
	0.0262	*0.0264*	*0.0267*
% Aged 0-17 (of population)	-0.0097	-0.0075	-0.0072
	0.0148	*0.0151*	*0.0152*
% Aged 18-24 (of population)	-0.0156	-0.0144	-0.0144
	0.0120	*0.0121*	*0.0122*
% Aged 25-44 (of population)	-0.0478	-0.0551	-0.2544
	0.0130	*0.0126*	*0.0128*
Dummy Variable - Located in Northeast Region of U.S.	-0.3100	-0.3221	0.3248
	0.1369	*0.1387*	*0.1401*
Dummy Variable - Located in Southern Region of U.S.	-0.2001	-0.2290	-0.2306
	0.1166	*0.1183*	*0.1192*
Dummy Variable - Located in Midwest Region of U.S.	-0.3661	-0.3799	-0.3813
	0.1256	*0.1279*	*0.1287*
No. of Observations	219	219	219
Adjusted R-squared	0.3212	0.3101	0.3052
Elasticity of BURGLARY with respect to ALARM (evaluated at mean of ALARM)	-0.0994	-0.1263	-0.1857

* Omitted age group is % aged 44+. Omitted geographical region is Western Region of the U.S. Standard errors are in itallics.