Social Indicators Research (2007) 80: 361–378
DOI 10.1007/s11205-006-6011-3

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ON THE RELATIONSHIP BETWEEN THE PUBLIC'S WORRY ABOUT SAFETY FROM BURGLARY AND PROBABILITIES OF BURGLARY: SOME EVIDENCE FROM SIMULTANEOUS EQUATION MODELS

(Accepted in revised form 4 January 2006)

ABSTRACT. The increase in burglary crimes, along with the rise in the citizens' worry about burglary crimes, has brought new challenges to the criminal justice systems in developed nations over the last decade. Crime surveys often point to a substantial dissonance between the actual likelihood of burglary and the perceived likelihood of victimization. This paper utilized data from the British Crime Survey to examine the relationship between (actual and perceived) probabilities of burglary and respondents' worries about burglary by means of a system of two-stage least squares models. The empirical results show a strong relationship exists between households' worries about burglary and their actual likelihood of being victimized by burglars in England and Wales. These findings suggest that households' worries about burglary may not, afterwards, be misplaced.

KEY WORDS: burglary, objective probability, perceived probability, public safety, two-staged least squares, worry about burglary

1. INTRODUCTION

Fear of criminal victimization has become a major concern for public policy in developed countries, not only because of its effect on people's well-being and quality of life, but also because of the substantial amount of public and private resources diverted to dealing with the causes and consequences of the problem. Crime and fear of crime impose high physical, emotional and financial cost on law-abiding citizens (see Cohen, 1988; McDougall et al., 2003; Swaray et al., 2005). A legion of studies including many sweeps of the British Crime Survey (hereafter BCS) have concluded that fear of crime victimization can significantly affect people's well-being (see *inter alia* Skogan, 1990; Kinsley and Anderson, 1992).

Criminal victimization, especially of violent acquisitive nature, impose immense pain and suffering on victims. They also put victims and non-victims

through interminable cycle of worry (fear) about personal victimization and fear of victimization of family members and friends. The very thought of a likelihood of criminal victimization can create a feeling of worry and anxiety about one's personal safety, the safety of loved ones and safety of personal belongings which may have an adverse effect on people's quality of life. The question that runs to mind is whether the public's perception of the risk of victimization by some crimes strongly correlates with the actual risk of victimization. Crime survey studies have revealed a wide gulf between actual likelihood of victimization by some crimes and respondents perceived risk of victimization of those crimes. For example let us consider the commonest type of acquisitive crime, burglary. Approximately 24% of respondents in the 2001 sweep of the BCS thought it was ''very likely or fairly likely'' that their homes would be burgled in the following 12 months. However, empirical evidence shows that only 3.4% of homes were actually burgled in 2000 (see Kershaw et al., 2002, p. 35).

Government investments in policing and crime control programmes provide a general level of safety from burglary. However, the 'blanket' safety from burglary, and worry about burglary, that public investment in policing and crime control programmes offer is not customized to meet the safety needs and safety requirements of many private households. Therefore, individuals are willing to allocate some portion of their private wealth towards purchasing extra protection from burglary over and above the level provided by the government. This demand for extra safety is met by investment in personalized protection devices such as burglar alarms, sensor lighting and target hardening devices (e.g. fitting double locks and security chains), which could presumably reduce the purchaser's actual and perceived risk of burglary victimization. These individual actions will make a contribution to general safety from burglary as well as reveal the household's safety concern. The argument is similar to the decision of a car owner to invest in anti-theft security devices. This personal security expenditure conform with the notion that people can allocate private resources to improve safety in situations where they are themselves the beneficiaries of the extra safety provided by the spending.

The purpose of this paper is to (empirically) examine the relationship between the respondent's worry about burglary, the subjective (perceived) likelihood of burglary victimization and the objective (actual) likelihood of burglary in England and Wales. The presence of a relationship between these variables can hardly be disputed in theory because rational individuals seeking to make subjective estimates of probabilities will begin by finding out what they can about the objective probabilities. However, the precise

forms of the relationships are more complex to capture by simple linear regression models. Therefore, this paper seeks to take into account the interdependence among household's worry about burglary and the perceived and actual probabilities of burglary victimization against the backdrop of various home security features and neighbourhood characteristics.

The rest of the paper is organized as follows: section 'Review of the literature' reviews the literature on fear of crime. Section 'Data sources and coding procedure' briefly describes data sources and coding procedures. Section 'The model' presents a description of the models used in the paper. Section 'Empirical results and discussion' presents and discusses the empirical results. And finally, section 'Concluding remarks' offers some concluding results.

2. REVIEW OF THE LITERATURE

Citizens' vulnerability to crimes has been measured in terms of their perception of safety (Ito, 1993) and (Warr, 1991). Criminal vulnerability is a sub-set of fear of crime which is a complex multi-dimensional multi-faceted phenomenon that pertains to peoples' perception and emotional responses to crime and risk of victimization (Rountree, 1998). According to Grabosky (1995, p. 1) such emotions "fails to distinguish between perception of general risk, fear of personal victimization, concern about crime as a public policy issue, and anxiety about life in general."

Research into fear of crime tends to focus on personal, environmental and causal variables that influence citizens' fear of crime (Yin, 1985). Studies show that the multi-dimensional and multi-faceted nature of fear of crime stem from a motley of personal and vicarious experiences as well as environmental factors collude to explain what cause fear. The personal variables include, but not limited to, people's perception of their vulnerability and their neighbourhood conditions. Environmental variables encompass physical and social dimensions of neighbourhoods and public places that people frequent during the course of their daily activities. Garofalo and Laub (1978) notes that "fear of actual criminal victimization is inseparable from the unease generated by other more minor forms of public deviance". Thus the (physical) presence of damaged or abandoned buildings, graffiti, vandalism and rubbish all give the impression of lack of control or incivility. In social terms, the presence of drunks or tramps, loitering teenagers, illegal drug dealing and drug use, commercial sex, noisy neighbours and loud music also suggest lack of control. In short, any threat (actual or perceived) to people's vision of moral rectitude, equanimity and general control can

evoke concern about crime and worry (fear) about personal safety and safety of chattels. Van der Wurff and Stringer (1986) relate fear of crime to the "loss of valued object, which in this case would be the loss of a community as it was and as it ought to be".

Personal victimization and knowledge or news of other people's victimization can also evoke worry (fear) of crime. Likewise socio-economic and demographics characteristics such as age, gender, race, education and income, and neighbourhood condition have been shown to influence people's vulnerability to crime and fear of crime. Smith (1985) found that personal crimes accounted for 5.4% of police recorded crimes in the West Midlands in a 7-month-period, but such crimes occupied 72.7% press reports. Moreover, Williams and Dickinson (1993) show that "low-market tabloids" allocate more space to personal violent crimes and their readership is largely from the lower socio-economic class. They, however, note that the higher level of fear among tabloid readers is "independent of social class".

Other studies show that woman and the elderly exhibit disproportionately high levels of fear of crime (Donnelly, 1988; Carcach and Mukherjee, 1999). However, some researchers have cast doubts on the significance of age and gender as determining factors in fear of crime (see Baumer, 1985; Ortega and Myles, 1987). They suggest that socio-demographic variables such as genders and age are related to physical and social vulnerability. Other researchers suggest the interaction effect between gender, age and social environment as the leading contributors to fear and vulnerability to crime (Maxfield, 1984; Ortega and Myles, 1987; McGarrell et al., 1997). Income tend relate inversely with fear of crime perhaps due to the fact that high-income people could afford to move to safe neighbourhoods (Skogan and Maxfield, 1980; Yin, 1985). Salmi et al. (2004) police visibility play a positive role in reducing fear of crime. They note that the "simple act for the police, such as stepping out of the car every now and then, i.e. not only in crime-related situations, has a positive impact on the fear of crime as expressed by the public." Kelling (1981) found no crime reduction effect in the Newark police patrol experiment but citizen's fear of crime decreased.

A study by Atkins et al. (1991) found little or no evidence that a street lighting project in the London Borough of Wandsworth did contribute to reducing crimes. However, there was some evidence that better street lighting increased women's perceived safety and provided "reassurance to some people who were fearful in the use of public space." Similarly, Ito (1993) suggests that programmes designed to reduce fear of crime does not necessary reduce crime itself. This indicates that a reduction in fear of crime does not necessary cause a reduction in fear of crime or perception of crime.

The model of suggests a direct relationship between being a victim of crime and fear of crime. However, empirical tests of the model have received mixed results (Evens and Fletcher, 2000). Research shows that people least likely to be victimized (e.g. women and elderly) show high levels of fear, while those most likely to be victimized (e.g. young males) show low levels of fear (Garofalo and Laub, 1978). Thus, Garofalo (1979) suggests that "being a victimized does appear to increase the fear of crime but the number of victims in the population is so relatively small that their higher level of fear does not have a great effect on the overall fear level in the population." (p. 95). People's perception of fear of crime, and public safety, have been difficult to measure statistically from crime survey data. Smith (1983) study of north-central Birmingham (UK) showed that fear does associate statistically with victimization but does not cluster with fear in a hierarchical cluster of fear variables. Maxfield (1984, p. 8) used data from the first BCS to conclude that "though victims of offences other than assault are both more worried and more fearful than non-victims, the absolute differences are not significant".

Some researchers have cast doubt on the methodological accuracy of crime surveys (see, *inter alia*, Bernard, 1992; Bowling, 1993; Fattah, 1993). Farrell et al. (1997) listed four problems that limit the accuracy of previous research on the fear of crime. They attempted to solve the problems by interviewing respondents at one point in time using a close-ended survey format, followed by another interview that required unrestricted responses. Hough (1985, p. 25) found that 36% of respondents in the 1994 sweep of the BCS stated that they fell 'a bit unsafe' or 'very unsafe' when walking alone in their neighbourhood after dark. The same report notes that burglary and rape topped the list of contemporary life worries; even coming on top job loss, road accident, illnesses and debt. Later sweeps of the BCS, however, put the proportion of respondents "very worried" about burglary to around 20%, indicating that the 1994 result was a statistical "blip". Other studies based on advanced statistical techniques have contradicted survey findings. Michalos and Zumbo (2000) used step-wise multi-variate regression analysis to examine the relationship between crime-related variables and key indicators of quality of life in the city of Prince George, British Colombia (Canada). They conclude that "crime-related issues have relatively little impact on people's satisfaction with the quality of their lives, with life satisfaction or happiness here."(p. 245). However, this result appears to contradict an earlier survey report by the same authors which lists crime reduction among the top three measures respondents recommended to improve quality of life (see Michalos and Zumbo, 1999).

Nevertheless, crime surveys from many industrialized societies have reported high levels of fear of crime. Van Kesteren et al. (2000) noted that in some countries, close to 40% of respondents reported to feeling unsafe outside their homes. The literature on crime, victimization and fear of crime supports a clear interrelationship between variables used in this paper. For example, Garofalo and Laub (1978) and Garofalo (1979) results form the basis of the *indirect model*, which is synonymous to respondents' perceived probability of burglary considered in this paper. The indirect models "posits that perceived vulnerability has much to do with levels of fear." (Crank et al., 2003). The model considers social vulnerability such as low income, race, and inner-city areas as inversely related with likelihood of victimization.

3. DATA SOURCES AND CODING PROCEDURE

Most of the data for this study was extracted from the year 2000 sweep of the BCS. Two other variables namely, the objective probability of burglary and government spending on police per head of population, in 42 Police Force Areas (PFAs) in England and Wales were compiled from the Recorded Crime Statistics (RCS). The BCS is perhaps the most authoritative crime survey currently carried out in England and Wales. The BCS attempts to document crimes committed against persons of age 16 years or over living in private accommodation in England and Wales. Thus, the BCS can be viewed as a victimization survey which attempts to capture respondents' experiences of personal and property crimes in their households. The BCS 2000 was conducted by a consortium of the National Centre for Social Research and the Social Survey Division of the Office for National Statistics of the Home Office.

Households in the BCS 2000 sweep were randomly selected from the Post Office national list of addresses. The survey questions were administered to a single randomly selected adult member of the pre-selected households. The core sample was stratified by PFAs and boosted for the ethnic minority population. (see Hales et al., 2000, p. 4). The ethnic minority booster sample was drawn from "high density ethnic minority" areas. The BCS survey data are guided by strict codes of ethics and considerable attention is paid to maintaining the confidentiality of the interviewees. No information about the identity or address of the respondents is disclosed to users of the BCS data. The primary data are organized at different levels (*viz*. households, individuals and incidents) and comprise of many sub-samples that are asked specific questions.

On the other hand, the RCS is a compendium of 'notifiable offences' compiled by police forces across England and Wales. The crimes

are classified on the basis of Home Office guidelines for identifying and recording offences. The notifiable offences in the BCS 2000 are aggregated at PFA levels spanning a period of 12 months prior March 2000. Unlike the BCS, the RCS exclude unreported and unrecorded crimes. Since the proportion of crimes reported and recorded vary over time, the recorded crime measure can give unreliable measure of crime. Kershaw et al. (2002) tabulated some major conceptual and methodological differences between BCS data and RCS data. The data for some variables obtained from the RCS database were not disaggregated beyond PFA levels. Therefore uniform set of data on relevant explanatory variables were obtained by re-aggregating the data from the BCS 2000 to PFA level as briefly explained below.

The data on security features of households and socio-demographic characteristics of inhabitants of PFAs were mostly recorded in the form of discrete or count data. Therefore it was necessary to re-code them into a format suitable for modelling. The survey questions on burglary in the BCS 2000 normally have a list of qualitative responses based on ordinal scales running from 1 to 5 (at times more). For example, respondents were asked "How worried are you about ... having your home broken into and something stolen?" The responses and codes for question were as follows: – 1. Very worried, 2. Fairly worried, 3. Not very worried, 4. Not at all worried, 5. (Not applicable). We developed a simple coding rule (manual) that re-coded these responses (and similar responses) by truncating them into dichotomous variables. The rule assigned dummy variable 1 to responses that indicate that household is "very" and "fairly" about burglary (i.e. first-two responses in the BCS 2000) and 0 to those options that indicates that the household is "not" worried about burglary. Responses matching 5 above were dropped from the data. A similar coding rule was applied to similar multiple-choice responses to questions that were relevant to this paper. The codes were executed in *SPSS for Windows (Release 10.0.5)* syntax commands and cross tabulations relevant data were obtained across PFAs.

We proceeded to calculate the proportion of households in each PFA that expressed worry about burglary by summing up the total number of respondents that affirmed their worry about burglary and dividing by the overall number of interviewees in that PFA.

4. THE MODEL

We posit that some interdependence exists among respondent's worry about burglary and the (subjective and objective) probabilities of burglary against a backdrop of existing household security features and neighbourhood

characteristics. This section describes the structure of the simultaneous equation models that will be used to explain the underlying relationships among these variables. The literature on crime–fear relationships has not, in general, met on a common and unambiguously grounds that empirically spell out the exact scope and direction of the relationships among these variables. Perhaps the reason for this lack of definitiveness or so-called "loose linkage" often found in the crime–fear relationship can be traced beyond common conceptual problems in crime surveys and the research literature (see Farrell et al. 1997).

The relationships among worry about burglary and the (objective and subjective) probabilities of burglary that we will attempt to address here is a typical one. The cognitive (i.e. risk perception) and emotional (i.e. worry) aspects of the problem are intricately intertwined. Therefore, an attempt model both the cognitive and emotional aspects of the problem in a system of simultaneous equations could throw further light on the problem. Suppose we symbolically express aggregate worry about burglary in PFA, i, as a function of the following household and neighbour level variables as follows:

$$(1) \qquad w_i = f(p_i^{o}, p_i^{s}, N, H, e_i, Z), \quad i = 1, 2, ..., 42$$

where w_i denotes the aggregate proportion of respondents worried about burglary in PFA i; p_i^{o} denote the aggregate objective (actual) probability of burglary in PFA i; p_i^{s} denotes the aggregate subjective (perceived) probability of burglary in PFA i; N denotes aggregate PFA neighbourhood level factors; H denotes the aggregate household security features; e_i denotes the expenditure on police per head of population; and Z denotes the aggregate socio-economic and socio-demographic characteristics of PFAs.

The technique of linear regression analysis, involving ordinary least squares and limited dependent variable models (i.e. logit and probit), is frequently used to obtain empirical estimates variables in Equation (1). However, models consisting of separate equations and assuming independence of error terms may not capture the interdependence among the variables in Equation (1) above. This is mainly due to the two-way interdependence between people's worry about burglary and the probabilities of burglary. Households' worry about burglary, other things remaining the same, is a product of (rational) assessment of their perceived probability of being burgled given knowledge of their home security features and of their neighbourhood characteristics (e.g. drug activities, anti-burglary devices, hard targeting etc.) that may affect their risk of.

Moreover, households' actual and perceived probabilities of likelihood of burglary victimization is heavily dependent on the neighbourhood level characteristics including home security level, government expenditure on policing per head of the population, and a host of socio-economic and demographic factors. All of these factors are exogenous variables in Equation (1). However, perceived probabilities of burglary are driven by actual probabilities of burglary because burglary offences within neighbourhoods do influence resident's perception of their vulnerability to burglary or repeat burglary. A linear function of these relationships can be expressed as follows:

$$p_i^{o} = g(N, H, e_i, Z) \tag{2}$$

$$p_i^{s} = j(p_i^{o}, N, H, e_i, Z) \tag{3}$$

Equations (1)–(3) form a system of simultaneous equations that entails a better theoretical depiction of the underlying relationships than a single linear equation can offer.

If it is possible to show that households in PFAs with high proportion of burglary security devices such as a burglar alarm, and 'hard targeting' devices such as double locks and deadlocks, window grilles and bars, indoor lights with timer and sensor, and security chains are highly unlikely to be burgled and are less worried about burglary. Then we could say that householders' willingness to purchase extra security against burglary beyond what is provided by the state has received a dividend in the form of a higher degree of safety from burglary and therefore less worry about burglary. Moreover, we can hypothesize that the householder's willingness to pay for these security devices is in itself a signal of their worry about burglary given knowledge of their neighbourhood conditions and the level of state burglary prevention resources (e.g. police presence) in their neighbourhood.

If a household's worry about burglary was a function of actual and perceived probabilities of burglary, then the expected signs of p_i^{o} and p_i^{s} in Equation (1) will be positive. Also, if PFAs with higher neighbourhood drug problems had higher worry about burglary, then the expected signs of coefficients on the variable that depicts the commonality of drug problems in the neighbourhood will be positive in Equations (1) and (2). Likewise, if the installation of burglar alarms and other security devices (e.g. double locks, security chains, grille bars etc.) have an influence on the burglary rate, then the expected sign of coefficients of these variables will be negative.

However, the expected sign of household security features when the perceived probability of burglary is considered Equation (1) is less

straightforward. On the one hand, the installation of extra household burglary security devices may result from households' worries about burglary. But, on the other hand, the presence of these security features could increase households' perception of safety from burglary, and thus contribute to reduction in their worry about burglary. The expenditure on policing per head of population is another variable whose *a priori* sign is difficult to establish. This is because a high amount of policing expenditure per head of population is likely to translate into a relatively generous amount of policing resources allocated to combating burglary and related crimes. If this hypothesis is correct then the expected sign of the policing expenditure variable will be negative. An alternative hypothesis is that government expenditure on policing increases in response to a general increase in burglary and related crimes, thus generating a positive correlation between the two variables. For these reasons, the relationship between the public's worry about burglary and expenditure on policing per head of population is an open question to be resolved by empirical tests.

The expected sign of the coefficient on the proportion of people who "know" at least one victim of a recent burglary is positive. This follows from a common conjecture that people get more concerned about an acquisitive crime like burglary if their neighbours and/or family member have been recent victim.

Gender and age are two personal attributes that are thought to influence physical and social vulnerability to crimes, hence fear of crimes. Many studies suggest that women are more fearful of crimes than men (Stafford and Galle, 1984; Tulloch, 2000); and the elderly more fearful of crimes than younger people (Clarke and Lewis, 1982; Stafford and Galle, 1984). If these findings were correct, then the sign of the gender and age variables would be negative and positive, respectively.

5. EMPIRICAL RESULTS AND DISCUSSION

The first part of the empirical results consists of separate logistic regression estimates of Equations (1)–(3) as explained in section 'The model'. The restricted form of the models presented in Table I include explanatory variables that are judged to be statistically significant and some less statistically significant variables whose deletion could adversely affect the overall robustness of the model as suggested by the Schwartz criterion of model selection. The signs of all coefficients are in agreement with *a priori* expectations stated in section 'The model'. The empirical results of the three models reported in Table I show that the odd ratios for worry about

TABLE I

Results of logistic regression models

Explanatory variables	Dependent variables			
	Worry about burglary (w_i^*)		Objective probability of burglary (p_i^{o*})	Perceived probability of burglary (p_i^{s*})
Objective probability of burglary	0.408 (5.260)	–	–	0.567 (4.980)
Perceived probability of burglary	–	0.449 (4.510)	–	–
Commonality of drug problems	0.720 (2.450)	0.941 (3.080)	–	–
Burglar alarm	−0.129 (−2.120)	−0.178 (−2.970)	−0.338 (−3.420)	–
Know someone burgled	–	–	–	0.392 (1.960)
Double locks/deadlocks	–	–	−0.772 (−2.320)	–
Security chains	–	–	−0.503 (−2.250)	–
Constant	2.573 (8.380)	2.280 (7.380)	−1.432 (−6.330)	0.932 (3.450)
Diagnostics statistics				
R-Square	0.829	0.808	0.778	0.686
Schwartz	−3.935	−3.817	−2.769	−2.891

Note: The dependent variables for models in this table were transformed as follows $w_i^* = w_i/(1 - w_i)$, w_i^* denotes the "log-odds ratio" or "logit" of worry about burglary in PFA *i*. Similarly, probabilities of burglary were transformed as follows: $p_i^{o*} = p_i^o/(1 - p_i^o)$, $p_i^{s*} = p_i^s/(1 - p_i^s)$ where $p_i^{o*}$and p_i^{s*}denote log-odds ratios of objective and perceived probabilities of burglary, respectively. Schwartz denotes the Schwartz Criterion for model selection.

TABLE II

Results of the 2SLS model of worry about burglary and objective probability of urglary

Worry about burglary	Coefficients	*t*-Values
Objective probability burglary	0.565	8.320
Commonality of drug problems	1.000	2.480
Constant	2.815	9.850
Objective probability burglary		
Burglar alarm	−0.366	−2.470
Know someone burgled	0.746	3.980
Police expenditure per head	0.571	2.470
Constant	−4.528	−3.95
Diagnostic statistics		
Log-likelihood	33.316	
LR test of over-identifying restrictions χ^2 (7)	8.539 (0.288)	
Schwarz	−6.672	
Vector Normality test χ^2 (4)	3.435 (0.488)	
Vector hetero. test $F(66,15)$	1.002 (0.487)	

burglary are statistically significantly related to (actual and perceived) probabilities of burglary, commonality of drug problems and presence of a burglar alarm. The result shows that PFAs with high level of worry about burglary generally experienced higher level of actual and perceived likelihood of burglary crime. This result seems to corroborate Toseland (1982) findings that ''of the crime-related variables, being a victim of a burglary was the only variable which was significant in predicting respondents' fear of crime.'' (p. 204). Toseland further notes that ''having been mugged, threatened with a gun, or beaten as a child or an adult all appeared to be unrelated to respondents' fear of crime.''

The commonality of drug problems in PFAs was another factor that contributed to increasing worry about burglary. Also the result indicates that PFAs with high proportion of burglary alarm installations had a smaller proportion of respondents that expressed worry about burglary. This could imply that installation of burglar alarms manifested households' worry about burglary.

The last two columns of Table I contain logit models of actual and perceived probabilities of burglary against common security percussions in place across PFAs. The result supports a strong positive relationship between the actual likelihood of burglary and perceived likelihood of burglary across PFAs in England and Wales. It also shows that PFAs with higher proportion hard targeting devices such as double locks (deadlocks) and

security chains experienced a significant reduction in the likelihood of burglary victimization. The model of perceived probability of burglary suggests a highly significant relationship between the proportions of respondents who perceived themselves as potential victims of a burglary and the actual rise in burglary offences. This result further shows that 'knowing' victims of recent burglary increased respondents' perception of their risk of burglary victimization.

Both probabilities of burglary are statistically significant in the logistic regression model of respondents worry about burglary in Table I. This confirms the earlier suggestion of interdependence between households' worry about burglary and actual and perceived probabilities of burglary. To explore this relationship further, we proceeded to estimate a system of two-staged least square (2SLS) regressions. The results of the estimations are reported in Tables II and III.

We use the 'general-to-specific' method of model selection was used to arrive at robust sets of estimates (see Hendry and Richard, 1983; Doornik and Hendry, 1995). Thus, some explanatory variables that are consistent with the theory but found to be empirically unviable in the modelling framework, as indicated by *t*-tests and the Schwartz criteria, were progressively removed from the model, and the model re-estimated. The final models contain stable variables whose removal could breach key diagnostic features the Schwartz criterion, linear restriction tests (see Doornik and Hendry, 1995). The expected signs of nearly all variables in the two models were consistent with *a priori* expectations.

According to results in Table II, there is a strong relationship between peoples worry about burglary and the actual probability of burglary. The result shows that respondents worry about burglary actually correspond with actual burglary offences. This result reinforces the results of the logistic regression models in Table I. The high degree of statistical significance of the coefficient of this variable confirms simultaneity in the relationship between the objective probability of burglary variable and worry about burglary. Further results from the model show a statistically significant relationship between drug problems in a PFA and respondents worry about burglary.

Table II contains the results of Equations (1) and (2). The results show that PFAs with low proportion of burglar alarms experienced significant increase in the likelihood of burglary offences. Also PFAs in which high proportion of respondents acknowledged to knowing victims of recent burglaries had a significant increase in actual likelihood of burglary. Moreover, the coefficient of the variable for police expenditure per head is

TABLE III

Results of the 2SLS model of worry about burglary and subjective probability of burglary

Worry about burglary	Coefficients	*t*-Values
Commonality of drug problems	0.893	2.490
Perceived probability burglary	0.851	7.730
Constant	2.625	6.810
Perceived probability burglary		
Know someone burgled	0.313	1.980
Burglar alarm	−0.128	−1.560
Objective probability of burglary	0.331	2.820
Constant	−0.119	−0.616
Diagnostic statistics		
Log-likelihood	47.731	
LR test of over-identifying restrictions χ^2 (8)	6.053 (0.109)	
	−7.325	
Vector Normality test χ^2 (4)	8.215 (0.084)	
Vector hetero. test $F(66,15)$	0.716 (0.819)	

positive and statistically significant. This result may imply that PFAs with high incidence of burglary generally have greater police resources per head of population than those with a lower incidence of burglary. The corollary to these findings is that burglary offences are important determinant of policing resource allocation among PFA in England and Wales.

Table III contains empirical results of Equations (1) and (3). We can see that the coefficients of commonality of drug problems in the neighbourhood and the subjective probability variable are both positive and statistically significant. This result suggests a significant relationship exists between drug problems across PFAs and increase in respondents worry about burglary. Thus, PFAs with high drug problems had higher proportion of household worried about burglary. Much of the literature shows perceived beliefs about crime, whether expressed as a probability of victimization or as the emotion fear, to be unrelated to the objective crime rate and it has been a challenge to find what mediating variables may account for this dissonance (Heath, 1984; Chiricos, Hogan, and Gertz, 1997). However, in the case of burglary, the findings in this paper support a strong positive relationship between actual and perceived likelihood of burglary in England and Wales. Both variables have a strong overall impact on the public's worry about burglary.

Some socio-demographic respondents sex and age mentioned in section 'The model' were originally included in the unrestricted form of the models

were not statistically robust enough to merit their inclusion in the restricted models. Their inclusion in the model was not support by *t*-values and the Schwartz criteria of model selection. Indeed some researchers that have cast doubt on significance of age and gender as determining factors in fear of crime (see Baumer, 1985; Ortega and Myles, 1987).

6. CONCLUDING REMARKS

This paper used data from the BCS and RCS to empirically explain the relationship between respondents worry about safety from burglary, and actual and perceived probabilities of burglary in England and Wales. The paper uses the logistic regression model and a system of 2SLS to explore the interdependence among respondents' worry about burglary and the probabilities of burglary against the backdrop of key household security and neighbourhood variables.

The findings from this paper suggest the existence of strong interdependence between households worry about burglary and actual and perceived probabilities of burglary. Thus, real burglary crimes do have strong influence on people's perception of the likelihood of becoming victims of burglary. Moreover, the results in this paper show a strong relationship between respondents' perceived probabilities of burglary and actual probabilities of burglary in all PFAs in England and Wales. Contrary to common notions, these findings show that respondents' worries about burglary are not unfounded because respondents worry about burglary is fuelled by real increases in burglary crimes across PFAs in England and Wales. Also, PFAs with high incidence of drug problems, and where large proportion of inhabitants know victims of recent burglaries were found to be significantly related to increases in both actual and perceived probabilities of burglary.

In addition, PFAs with high proportion of household security and hard targeting devices such as a burglar alarms and the use of security chains to protect moveable belongings had households with lower probabilities of burglary, and lower worries about burglary. These findings are generally in line with Rountree's (1998) model, which show that "burglary", and "safety precautions" as having a statistically significant impact on fear of burglary.

ACKNOWLEDGEMENTS

This piece of work was undertaken while I was employed as Research Fellow at the Centre for Criminal Justice Economics and Psychology, University of York, Heslington, York, YO10 5DD, UK. I am very grateful

for useful comments and suggestions received from an anonymous reviewer of the earlier of this paper. I am also grateful to Roger Bowles, Cynthia McDougall, Huw Dixon and Raphaël Akamavi for relevant comments and suggestions on various drafts of this paper. However, all remaining errors are solely my responsibility.

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