

Evaluating Neighbourhood Policing using Bayesian Hierarchical Models

No Cold Calling in Peterborough, England

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Evaluating neighbourhood policing initiatives

Neighbourhood policing programs in general are best evaluated with a “local focus” (Mason 2009¹) and those evaluations based on quantitative data need to be able to examine such data rigorously to provide statistical evidence of changes over time and with reference to well defined control groups.

¹Mason, M. (2009), Findings from the second year of the national neighbourhood policing programme evaluation. Home Office, research report No. 14., Technical report, Research, Development and Statistics Directorate, London.

Outline

Background

Evaluation framework

Results and Conclusions

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Background: Cold Calls

- ▶ “Cold calling” is defined as a visit, or in the first place a telephone call that may be followed by a visit, by a trader (or someone linked to a trader whether or not they supply goods or services) and which takes place without the consumer expressly requesting the initial contact.
- ▶ “Cold calling” is often associated with rogue trading and distraction burglary.

Background: The NCC project

- ▶ Initiated by the Cambridgeshire and Peterborough Distraction Burglary and Rogue Trader Task Force, the “No Cold Calling” (NCC) project aims to reduce the impacts of distraction burglary and rogue trading in terms of (i) the number of incidents and (ii) the public’s fear of crime.
- ▶ The NCC project in Peterborough (popn. 160,000) was first implemented in selected areas during 2005 and extended to more areas in 2006.
- ▶ In addition to setting up signage to discourage cold calling, every resident was visited in the targeted areas and given an information pack containing literature advising how to avoid becoming a victim and the steps to take when answering the door.
- ▶ An initial assessment of the scheme by the Cambridgeshire Police reported high levels of satisfaction amongst residents in the NCC-targeted areas who generally expressed increased confidence in dealing with cold callers.
- ▶ **However, to date, there has been no assessment of the scheme based on offence data.**

Data on “No Cold Calling”

COA_code	Postcode	Area name	Number of targeted dwellings	Started	Number of dwellings in COA	Coverage (%)	
NCC 2005							
1	00JANC0016	PE3 8JU	Hanover Court, Bretton	42	10/03/2005	122	34
2	00JANE0006	PE1 2NL	Kimbolton Court, Millfield	48	28/01/2005	150	32
3	00JANE0010	PE1 3RR	Eaglesthorpe, New England	28	28/01/2005	151	19
4	00JANG0013	PE1 5JD	Mellows Close, Eastfield	12	25/01/2005	131	9
5	00JANH0003	PE6 7TZ	Boxgrove Close, Eye	8	03/06/2005	126	6
6	00JANQ0023	PE2 6XN	Napier Place, Orton Wistow	54	17/03/2005	103	52
7	00JANT0027	PE4 7PS	Bevishall, Paston	45	20/07/2005	127	35
8	00JANY0010	PE4 6QT	Dudley Avenue, Walton	10	20/12/2005	122	8
NCC 2006							
9	00JANG0025	PE1 4SL	Keys Park Mobile Home Park	100	22/08/2006	168	60
10	00JANH0003	PE6 7XF	Woad Court	28	19/10/2006	126	22
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Outcome measure

- ▶ Rogue trading is an under reported crime and the number of cases is small;
- ▶ Distraction burglary events are also very few in number.

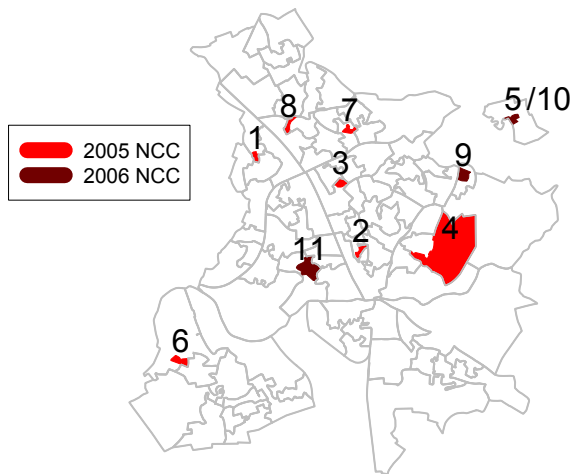
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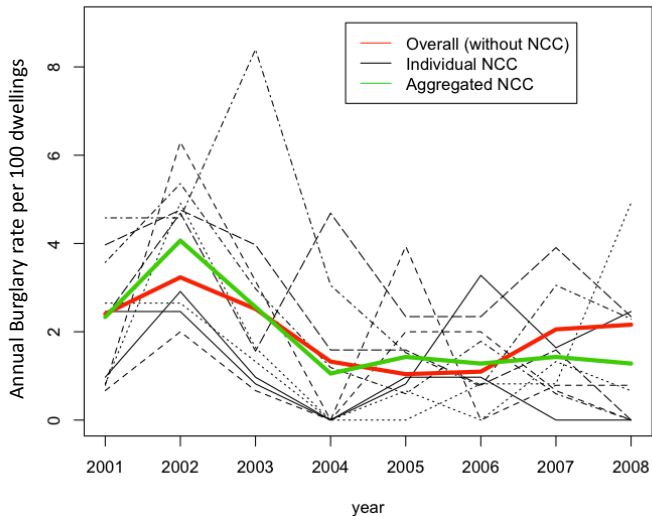
- ▶ Rogue trading is an under reported crime and the number of cases is small;
- ▶ Distraction burglary events are also very few in number.
- So, analysis here is based on all reported burglary in a dwelling events, acting as a surrogate measure for rogue trading and distraction burglary, two household-related acquisitive offences.
- ▶ Unit of analysis: the Census Output Area (COA) level

Locations of the NCC-COA



Trend patterns from raw data

2005/2006 NCC groups (10 COA)



Positive impact of policy?

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 1. data aggregation → assessing the overall impact.
 2. hierarchical/multilevel modelling of local impacts → assessing **both** overall and local impacts.
 - separate signal from noise

Constructing the control group

- ▶ To form the control group, areas are selected on the basis of having similar local characteristics (e.g., burglary rates or deprivation scores) to those in the NCC-targeted group.
- ▶ In order to obtain a reliable control trend, Lower Super Output Area (LSOA) is the basic areal unit for the control group.

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ID	Matching criterion	No. of LSOAs
1	All LSOAs in Peterborough	88
2	$\pm 10\%$ burglary rate of the NCC group in 2005	9
3	$\pm 20\%$ burglary rate of the NCC group in 2005	20
4	$\pm 30\%$ burglary rate of the NCC group in both 2004 and 2005	8
5	LSOAs containing the NCC-targeted COAs (but excluding the NCC-targeted COAs)	10
6	LSOAs that had "similar" multiple deprivation scores (MDS) as those for the NCC LSOAs in 2004	46

Evaluation procedure

Data from
control group

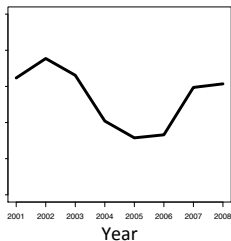
Data from
NCC group

Evaluation procedure

Data from
control group



Control trend pattern



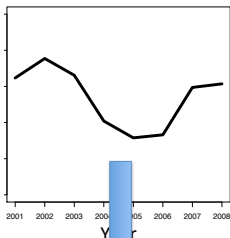
Data from
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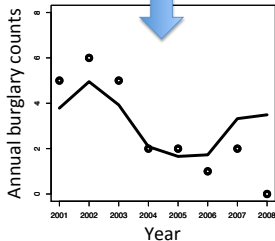
Data from control group



Control trend pattern



Data from NCC group

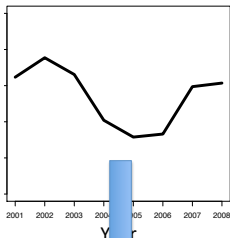


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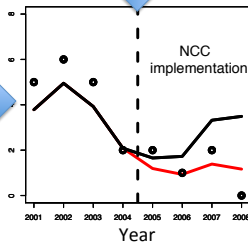
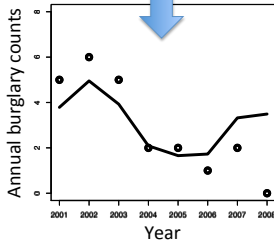
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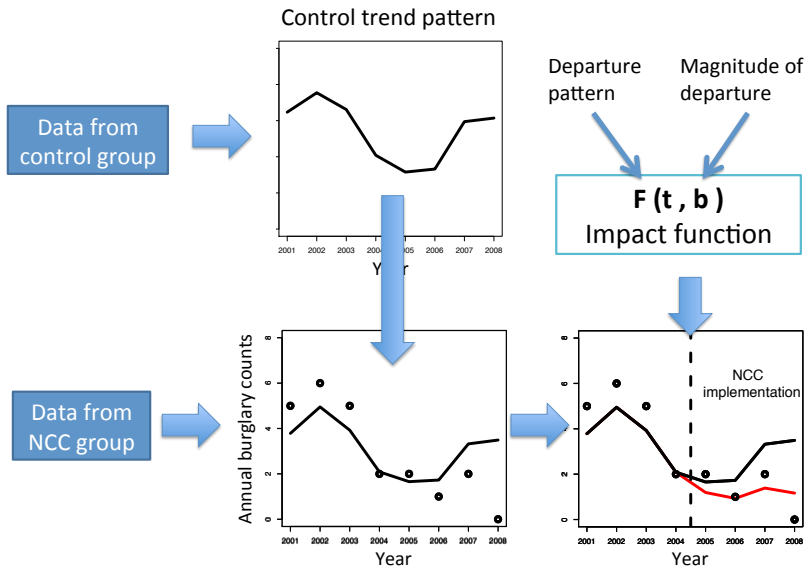
$F(t, b)$
Impact function



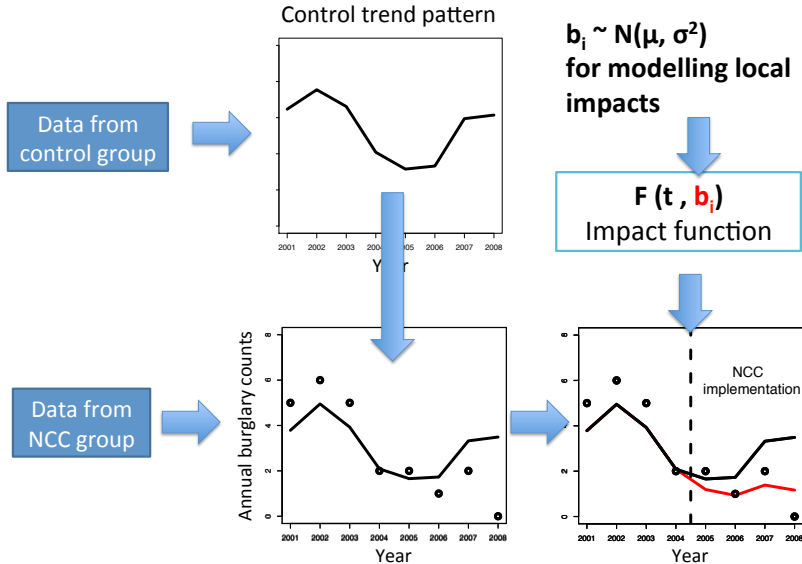
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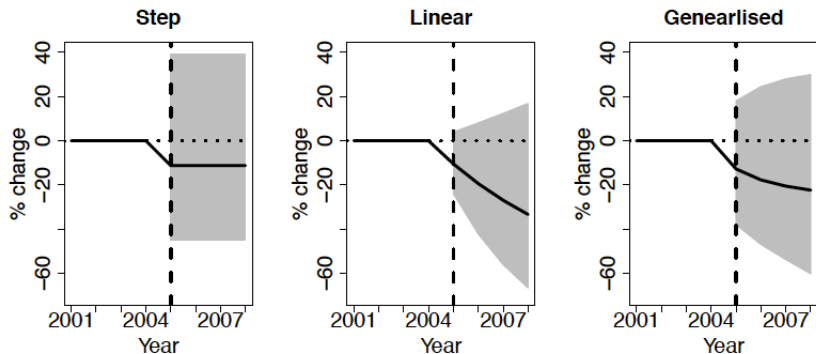
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Overall NCC impact

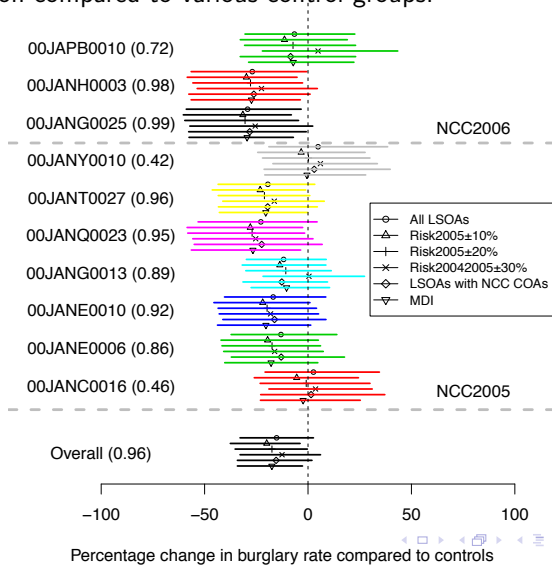
Figure: Percentage change in burglary rate in the NCC group relative to control group 1, which consists of all 88 LSOAs in Peterborough. These changes are estimated from the aggregated NCC data.



All three impact functions consistently reveal an overall positive effect associated with the NCC-targeted areas.

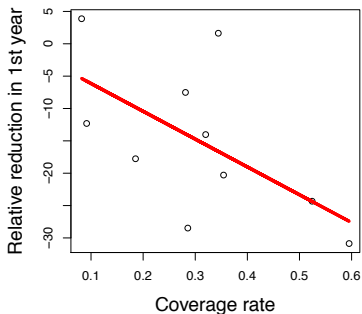
Local and overall impacts (using the linear function)

Figure: Percentage change in burglary rates after the first year of NCC implementation compared to various control groups.



Heterogeneity of local impacts

Figure: The relationship between local impacts and coverage rates.



Some of the variability in local NCC impacts may be due to the coverage rates.

- ▶ The larger the proportion of properties in a COA that were visited the greater the impact of the NCC scheme.

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2. “A dilution effect”

- Because COA is the unit of analysis here, the NCC impact, even though it is present, could be “diluted” when the NCC areas constitute only a tiny proportion of the households in that COA.

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 2. “A dilution effect”
 - Because COA is the unit of analysis here, the NCC impact, even though it is present, could be “diluted” when the NCC areas constitute only a tiny proportion of the households in that COA.
- ▶ Neither of these explanations for the coverage rate effect undermines our overall assessment of the policy’s success.

Conclusions: The NCC scheme

- ▶ NCC scheme led to an overall success
 - an overall 16% (95% CI: -2%, 34%) reduction per year in burglary rate was estimated.
- ▶ This suggests a positive impact of the NCC policy which had the effect of stabilising the burglary rate in the targeted areas while overall burglary rates were going up.
- ▶ The linear impact function is better in describing the data than the other two, suggesting a gradual and persistent change.
- ▶ There exists different impacts between targeted-COAs, perhaps due to local differences in implementing the scheme.

Conclusions: The evaluation framework

- ▶ We have presented a methodology for evaluating small area neighbourhood policing initiatives, paying close attention to
 - (a) “local focus” (assessing local impacts)
 - (b) providing statistical evidence of changes over time and
 - (c) making comparisons to well defined control groups.
- ▶ To deal with the sparse local data, a hierarchical framework is used to borrow information across areas/time points;
- ▶ Placing the analysis in a Bayesian framework means that uncertainty associated with the reference trend estimates can be propagated into measuring the policy’s impact.
- ▶ Another advantage of the Bayesian framework is that direct quantitative answers to policy-relevant questions can be easily obtained
 - for example, the probability that the NCC scheme was successful in a particular area.

Acknowledgement

- ▶ This work was supported by the Economic and Social Research Council (ESRC) through the National Centre for Research Methods, BIAS II node (This report is available for download at www.bias-project.org.uk).
- ▶ Thanks to Cambridgeshire Constabulary for making available to us its recorded offence data.

