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# An overview of attrition patterns

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Home Office Online Report 45/05

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## Executive summary

This report presents an overview of the pattern of detections, in 2002/3, for four types of 'volume crime' – by force and basic command unit (BCU). Specifically, the paper focuses on: domestic burglary, non-domestic burglary, thefts of motor vehicles (TOMVs) and thefts from motor vehicles (TFMVVs)<sup>1</sup>.

By way of backdrop, the report first outlines the trends and patterns in overall detection rates. In particular, it observes that differences in the 'crime mix' between forces limit the value of overall detection rates as a good comparative measure of police performance. Comparisons of detections for particular offence groups are believed to hold greater merit.

Turning to 'volume crimes' in 2002/3 alone, the report presents a quite complex picture, but the broad lessons are as follows:

- In 2002/3 just over a half of all detections for these four volume crimes were dealt with by charge or summons, just over a third by offences taken into consideration (TICs), five per cent by caution and the remaining nine per cent by 'other means', where the police take no further action.
- Theft from motor vehicles constituted the largest of the four 'volume crime' offences, making up a little more than a third of the total, while the two classes of burglary each make up just under a quarter. The remainder comprised thefts of a motor vehicle.
- Overall, just under ten per cent of all recorded volume crimes were subject to sanction detections<sup>2</sup>. Just over five per cent of offences led to a charge or summons. Residential burglaries and thefts of vehicles were more likely to be cleared up and result in a charge or summons (at around 8%). The performance in relation to non-residential burglaries was lower (6% charged/summons) and that in relation to TFMVs was markedly lower (at 3%). TICs play a larger part in the detection of TFMV than for the other offence types.
- There was variation between forces in terms of both their overall detection rates, and indeed their sanction detection rates. Focusing only on the rate of charge/summons, all but four forces fell within a five per cent to ten per cent range. Only one force fell below this band (at 4%) and three forces each achieved rates of over 20 per cent.
- The variability between forces was much reduced when looking at sanction detections excluding TICs. The implication of this is that an important source of variability in sanction detection rates lies in different forces' use of TICs.
- Looking at sanction detections excluding TICs, the data show that the rates for individual BCUs tend to cluster around force averages.
- Only a relatively small part of the differences in detection rates between BCUs can be accounted for by variations in BCU 'family attributes'.
- Forces seem to be more important than families in shaping BCU variations in the rate at which TICs are acquired (in relation to non-TIC detections).
- Variations in overall headline detection rates may – in some cases and to some degree – reflect variations in the use of administrative detections.

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<sup>1</sup> The term 'volume crime' has been used in this report to describe these four crime types.

<sup>2</sup> Sanction detections include all detections associated with either a caution or charge/summons (or a TIC). They do not include so-called 'other' ('administrative') detections.

Moving from these broad patterns, analysis was carried out which sought to explain differences in detection rates.

- There was quite a close association between rates of detection for the four volume crimes and with all four types combined: in short, BCUs did not tend to perform badly, or well, on a random basis.
- The effect of resource availability, or officer workload, was examined in some detail, and the analyses indicated that:
  - the higher the number of volume crimes per police officer available to detect in a BCU, the higher the number of offences detected per officer; and
  - on the other side of the coin, detection *rates* by police forces were lower where the number of volume crimes per officer was higher. For every additional ten crimes per officer, the detection rate will fall by 1.54 per cent.
- These relationships are not incompatible. While some forces seemed to be relatively ineffective in terms of numbers of non-TIC detections *per 100 recorded crimes*, they were relatively efficient in terms of non-TIC detections *per officer*.
- One possible explanation for these patterns is that some individual crimes will be much easier to detect than others. In any large population of crimes some will veer towards the 'easy to detect' end of the spectrum, whilst others will be 'impossible to detect'. BCUs with high numbers of crimes per police officer will benefit from a higher number of detections obtained from 'easy to detect' cases, but have less opportunity to derive detections from cases that could be solved with additional input (reducing their 'detections per officer'). Those with low numbers of crimes per officer will have fewer 'easy to detect' cases, but may have the facility to solve some 'intermediate' cases. Put another way:
  - A relatively high number of detections per officer, but a low detection rate, is likely where there are large numbers of crimes per officer. The high number of detections per officer may be expected because of the large supply of easy-to-detect cases. The low detection rate may be expected because of lack of time to investigate more difficult-to-detect cases.
  - A relatively low number of detections per officer, and high detection rate, is likely where there are small numbers of crimes per officer. The low number of detections per officer may be expected because of the small supply of easy-to-detect cases. The high detection rate may be expected because there is more time available to investigate more difficult-to-detect cases.

# 1. Introduction

This analysis was undertaken as background to a study that tracked investigation and attrition processes in detail across 3,000 volume crime cases randomly selected from eight high-crime family BCUs, and should be read alongside the report of that study (Burrows *et al.*, 2005).

The primary purpose of this paper is to outline the patterns of detection for four volume crime types across England and Wales – domestic burglary; non-domestic burglary; theft of motor vehicles (TOMV) and theft from motor vehicles (TFMV). These four crime types were the focus of the sister study and will be described as ‘volume crimes’ in this report. The analysis that follows is principally undertaken by force and by Basic Command Unit (BCU) family. The paper also identifies some of the factors that seem to explain variations in attrition patterns, in particular in the proportions of offences with sanction detections excluding offences ‘taken into consideration’ (TICs).

Broad trends and patterns in detection rates are summarised annually in the publication *Crime in England and Wales*. This has generally shown a downward trend in detection rates since 1980. As Simmons and Dodd (2003) put it, “in simple terms, the number of detections achieved has failed to keep pace with the rise in recorded crime...or when crime numbers have fallen, the number of detections has fallen more”. The overall detection *rate* stood at 23.5 per cent in 2002/3, which was very slightly higher than the rate for the previous year (23.4%). The 2002/03 figure was however unadjusted for the effect of the National Crime Recording Standard (NCRS), which is thought to have depressed the detection rate. In 2004/05, the overall detection rate stood at 26 per cent (Nicholas *et al.*, 2005).

*Crime in England and Wales* summarises the overall variation in detection rates between forces, but does not provide a detailed comparison because it recognises that the ‘crime mix’ differences between forces limit the value of overall detection rates as a good comparative measure of police performance (this factor was identified as the primary influence on variations in overall detection rates by Burrows and Tarling, 1982). On this basis it recommends that comparisons are better directed at detections *for particular offence groups*, which is the focus of the current exercise.

## 2. Data used in the overview

The data drawn on for the current exercise provide considerably more detail about detection rates than those routinely published by the Home Office, and thus offer more scope to highlight patterns and identify explanatory factors. Data were made available for rates and types of detection by Basic Command Unit for all 43 territorial police services in England and Wales, with the exception of two forces which were unable to provide any breakdown<sup>3</sup>. Data were also made available for numbers of police officers per BCU for 40 of these 41 services. The commentary here relates to 2002/2003 and excludes those three BCUs that comprise airports because they are not typical of other BCU areas. Where issues of police numbers are not relevant, analyses relate to 266 BCUs and, where they are, to 262 of them.

The data refer to domestic burglary, burglary other than a dwelling, TFMV and TOMVs. These offences accounted for 32 per cent of all recorded crime in 2002/03. For the 41 forces included in this overview the two classes of burglary each made up just under a quarter of all the main recorded volume crime (24% each), whilst TFMVs made up a little more than a third (36%) and TOMVs about a sixth (16%).

The data set used indicates each of the principal methods used by the police to clear up crime. Overall, just over a half of all volume crime detections were dealt with by charge or summons (52%), just over a third by TIC (34%), five per cent by caution and the remaining nine per cent by 'other means' (those where no further action is taken by the police). Two types of TIC are distinguished in the data: those that relate to previously recorded crimes and those that relate to previously unrecorded crimes, and these are shown separately. Two per cent of clear-ups were for offences detected as TICs that had not previously been recorded whilst 32 per cent were for TIC offences that had been recorded.

*Sanction detections* include all detections associated with either a caution, charge/summons or TICs. 'Other' or administrative detections are not included. *Crime in England and Wales* shows that variations in overall detection rates were to some extent due to the different use of detection methods, and particularly what are labelled as 'administrative' detections: for example in 2002/03 more than 30 per cent of all detections were administrative in three forces while, at the other end of the spectrum, one force had ceased counting other detections altogether. The report, however, noted that there was no strong relationship between overall detection rates and the proportion of overall administrative detections (Simmons and Dodd, 2003).

For much of this report a distinction is made between sanction detections typically achieved through interview (by TICs) and those that are achieved through primary investigation; the latter more readily reflects investigative effort.

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<sup>3</sup> There are 278 BCUs in England and Wales.

### 3. Patterns of attrition

This chapter looks at the overall pattern of detection as it relates to the four volume crime categories – initially in the context of the differences between BCUs, then between forces and finally between BCU ‘families’.

#### Detections across all BCUs

Tables 3.1 summarises detection patterns across all the BCUs included in this overview. It covers all the four volume offence types being examined in this study – domestic burglary, burglary other than a dwelling, TFMV and TOMV. The first column of Table 3.1 shows that of the total 429,496 domestic burglaries recorded in 2002/3 in the 266 BCUs included in this overview:

- 14.6 per cent were detected in some way or another;
- 13.3 per cent led to sanction detections (1.3% being ‘other’ detections);
- 13.1 per cent were sanction detections of offences that had been recorded by the police (0.2% being TICs for previously unrecorded crimes);
- eight per cent were detected other than through TICs (5.1% being TICs of previously recorded crimes); and
- 7.6 per cent led to a charge/summons (0.4% leading to a caution).

The columns that follow should obviously be read in like manner. The last column shows that, of the combined recorded volume crimes, slightly more than one in ten were detected, and that just over half of these detected offences (5.5% overall) led to a charge/summons.

The overall detection rates for the differing volume crimes varied, however, as shown in the second row of Table 3.1. Domestic burglary and TOMV both had overall detection rates at about one in seven of all recorded incidents. Just over one in ten recorded burglaries other than in a dwelling were detected. The corresponding figure for TFMV was about one in 16. When it comes to sanction detections the patterns change a little. But focusing on sanction detections excluding TICs, as shown in the penultimate row of Table 3.1, it is evident that the highest rate was for TOMV, with one in 11, followed by domestic burglary with one in 13, burglary other than a dwelling at one in 15 and TFMV at just one in 34.

**Table 3.1: Attrition across 266 BCUs 2002/3 (per cent)**

	Domestic burglary N=429,496	Other burglary N=439,491	TFMV N=646,029	TOMV N=300,727	Total N=1,815,743
Number recorded crimes	100	100	100	100	100
Detected	14.6	10.5	6.1	13.4	10.4
Sanction detections	13.3	9.8	5.7	12.1	9.6
Detections excluding unrecorded crime TICs	13.1	9.6	5.5	12.0	9.4
Sanction detections excluding all TICs	8.0	6.6	2.9	9.3	6.1
Offences leading to charge/summons	7.6	6.0	2.5	8.3	5.5



Since not all crimes are reported to (or recorded by) the police, the detection rate measured using recorded crime statistics as the base does not reflect the likelihood of an offender getting caught. This would need to take into account actual levels of crime and the differential rates of reporting/recording of different crime types. Offences with a high rate of reporting/recording (such as theft of motor vehicles) will, self-evidently, have 'recorded crime' detection rates that are most similar to those estimated using an 'all crime measure' as a base.

As noted above, overall sanction detection rates are made up of two components: crimes that are detected by charge/summons or caution, and other crimes that are taken into consideration in connection with the detected crimes. For every sanction detection *excluding TICs* there were:

- for domestic burglary, an additional 0.7 TICs;
- for burglary other than a dwelling, an additional 0.5 TICs;
- for TFMV, an additional 1.0 TICs; and
- for TOMV, an additional 0.3 TICs.

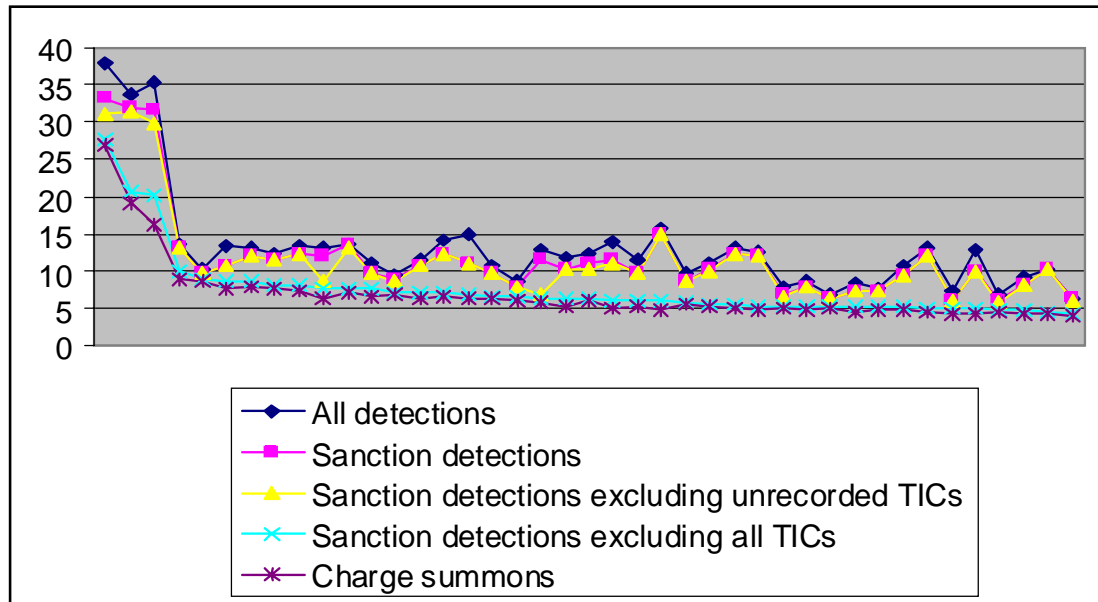
*In short, TICs clearly play a larger part in the detection of TFMV than in the other offence types.*

### Variation in the extent of attrition between police forces

Figure 3.1 shows the attrition patterns for all volume crimes for each of the 41 police forces providing data. The top line shows all detections of all volume crimes, the second line all sanction detections, the third line sanction detections excluding unrecorded TICs, the fourth line sanction detections excluding all TICs, and the bottom line charge/summons, in each case as a percentage of all recorded crimes. Forces have been ordered left to right from the highest to lowest in terms of the percentage of all crimes leading to a non-TIC sanction detection.

*Focusing on this particular rate – all but four forces fell within a five per cent to ten per cent range, with one at four per cent and three forces each achieving rates of over 20 per cent. It is clear that charge-summons followed closely the line for sanction detections excluding TICs. Proportions of all detections involving other forms of clear-up varied widely.*

**Figure 3.1: Detection patterns by force for the four categories of volume crime, combined (percentages)**



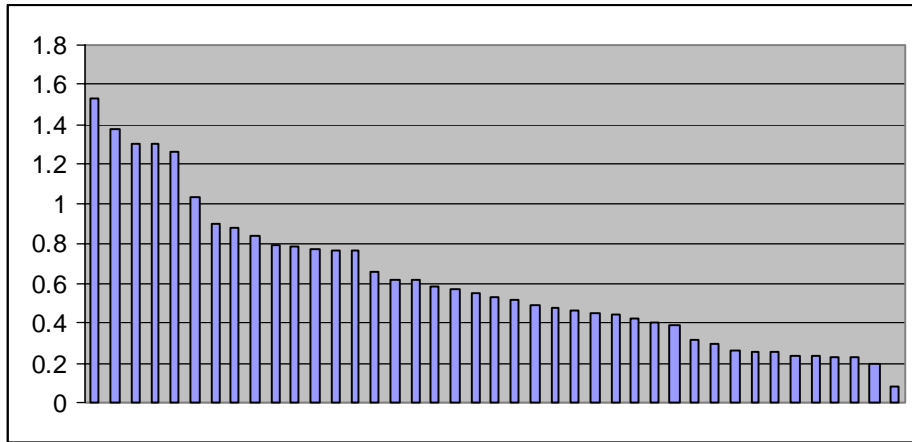
Five forces had consistently high rates of non-TIC sanction detections across all four crime types. One of these was The City of London, which is clearly something of a special case, is a very small force with a very distinctive crime profile. All but one of the other high detection forces were low crime rural areas. The large metropolitan forces, and several of the forces circling the Metropolitan Police Service area, tended to have low rates of detection, although there were exceptions. For example one metropolitan force was in the top half of the table for all volume offence types, and another had amongst the ten highest rates of non-TIC sanction detection rates for burglary other than a dwelling. At the other end of the continuum, three forces had consistently low rates of non-TIC detection across all volume crime types. For each crime type they were amongst the ten with the lowest sanction detection rate, excluding TICs.

### The impact of TICs on detection rates

The overall number of sanction detections is a product of the number of non-TIC sanction detections, and the number of TICs per non-TIC detection. The patterns found in the use of TICs thus warrant special attention.

*In view of the fact that there is considerable variation in both overall and sanction detection rates, but that this variability is much reduced when looking at sanction detections excluding TICs, the implication is that a major source of variability lies in different forces' use of TICs.* Figure 3.2 shows the number of TICs per non-TIC detected crime for all volume crimes by police force. It shows that a number of forces make substantial use of TICs. In six forces there were at least as many TICs as non-TIC detections. At the other end of the continuum, in two of them there were 0.2 or fewer TICs per non-TIC sanction detection.

**Figure 3.2: TICs per non-TIC sanction detection, all four volume crimes, combined**



Several forces with low overall non-TIC sanction detection rates had middling overall sanction detection rates because of their relatively high numbers of TICs.

Across the 266 BCUs where data were available, for each volume crime type there was an inverse relationship between the non-TIC sanction detection rate and the number of TICs per non-TIC sanction detection, although the relationship was very weak and not statistically significant for TOMVs.<sup>5</sup> In other words, as the non-TIC detection rate increases, the number of TICs per non-TIC detection decreases.

The relatively high use of TICs in relation to sanction detections obtained for one volume crime type is associated with their relatively high use for another. Table 3.2 shows that across the 266 BCUs, the ratios of all sanction detections to non-TIC detections were all statistically significantly correlated with one another. The weakest relationship was consistently with domestic burglary, which may receive distinctive attention given the priority attached to this offence.

**Table 3.2: Correlations between ratio of all sanction detections and non-TIC sanction detections for each volume crime, 266 BCUs**

	Ratio of all burglary other sanction detections to burglary other detections excluding TICs	Ratio of all TFMV sanction detections to TFMV detections excluding TICs	Ratio of all TOMV sanction detections to TOMV detections excluding TICs
Ratio of all domestic burglary sanction detections to domestic burglary detections excluding TICs	.377(**)	.174(**)	.167(**)
Ratio of all burglary other sanction detections to burglary detections excluding TICs		.407(**)	.431(**)

<sup>5</sup> For domestic burglary  $r=-0.273$ ,  $p<0.01$ ; for non-domestic burglary  $r=-0.14$ ,  $p<0.05$ ; for TFMVs  $r=-0.131$ ,  $p<0.05$ ; and for TOMVs  $r=-0.024$ , ns

Ratio of all TFMV sanction detections to TFMV detections excluding TICs			.465(**)

\*\* Correlation (Pearson) is significant at the 0.01 level (two-tailed).

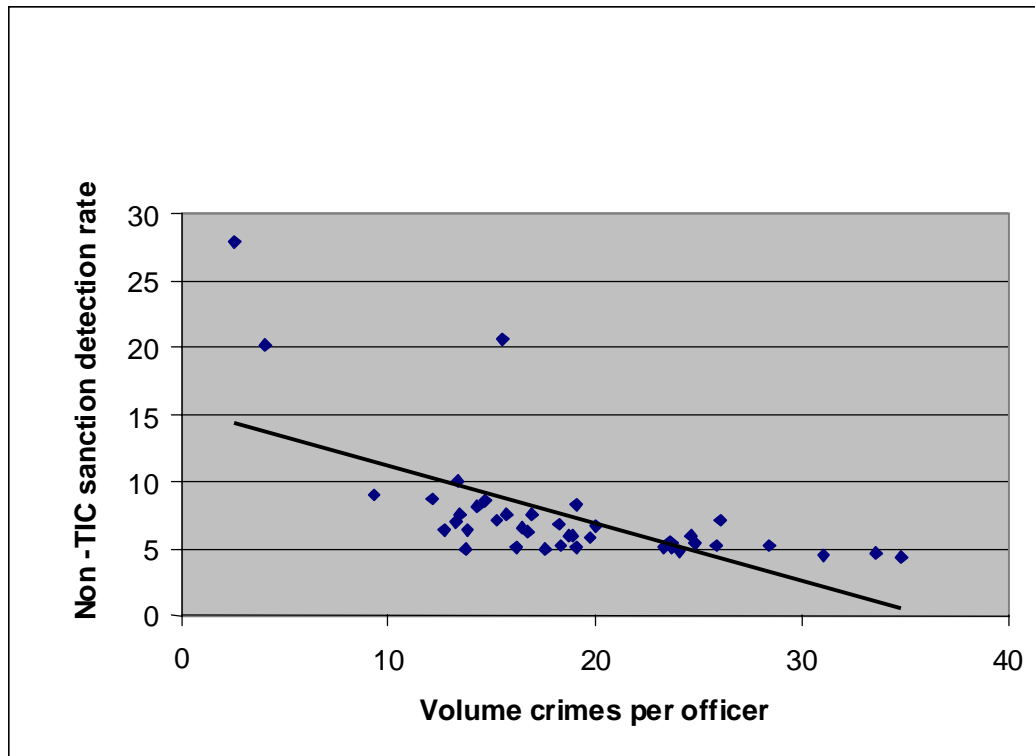
## Assessing the effect of officer workload at force level

The potential effect of officer workload on detection patterns is explored here, by examining the relationship between numbers of detections and number of offences per officer attached to each BCU. It is recognised that the police-officer availability measure used here (volume crimes per officer) is not by any means a perfect measure of relative officer availability per volume crime. Rates of attendance to certain volume crimes vary markedly across BCUs. Officers have other crimes to investigate and they carry out many other activities unrelated to the investigation of crimes. These other calls are likely to vary by BCU and may explain some of the systematic departures from the patterns identified in the analysis below. In addition to these factors it may be that the quality of investigative efforts may vary by BCU. Where new and inexperienced officers prevail, for example, because of the strength of the local job market, officer capacity may be less than in other areas with older experienced officers where policing is a relatively attractive occupational choice. In short, the simple availability of numbers of officers may not capture all the capability to detect crime. It provides, though, a rough measure of potential human resource availability.

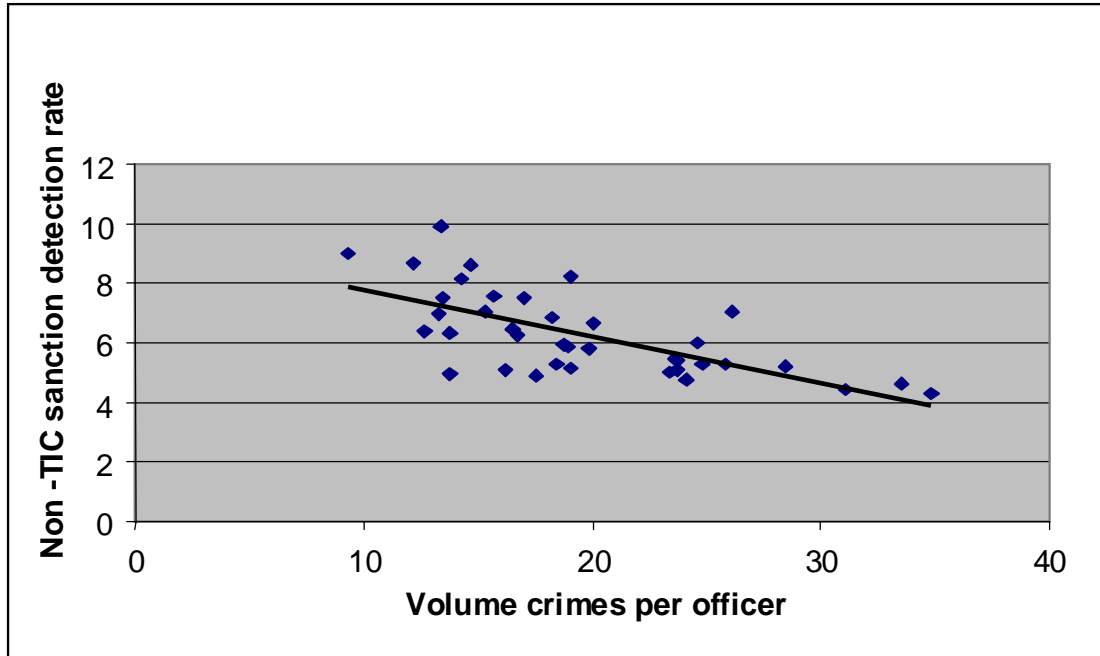
Figure 3.3 plots the number of volume crimes per police officer against sanction detection rates (excluding TICs) for all volume crime for 41 forces. There are three clear outliers at the top of the figure. Figure 3.4 removes the outliers. It shows there to be quite a close inverse relationship between recorded volume crimes per officer and police force volume crime detection rate<sup>6</sup>. *In short it indicates that non-TIC sanction detection rates tend to fall as the number of volume crimes per officer increases*, and that for every additional ten volume crimes per officer, the rate will fall by 1.54 per cent (at least within the range of values available for crimes per officer: roughly nine to 35).

<sup>6</sup> R<sup>2</sup> = 0.4465. The 'intercept' between the line of best fit and the Y axis is at 9.3147 per cent non- TIC detections. From this point the line of best fit suggests that for each additional crime per officer the detection rate can be expected to fall by 0.1543 per cent.

**Figure 3.3: Volume crimes per police officer and non-TIC sanction detections per 100 recorded volume crimes, by police force**

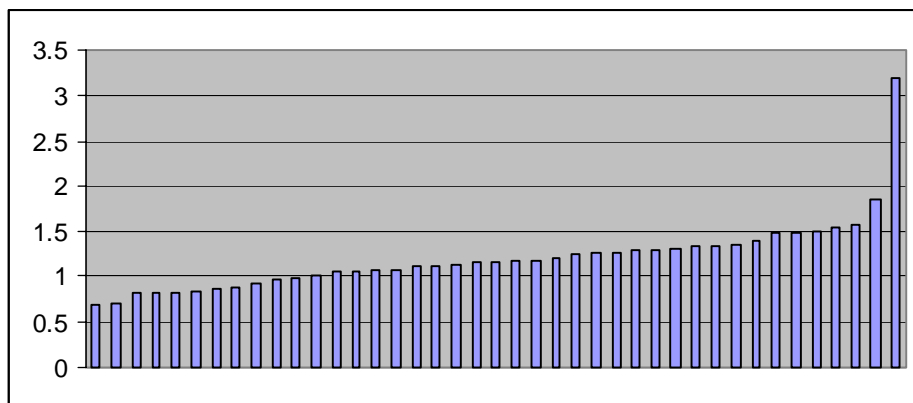


**Figure 3.4: Volume crimes per police officer and non-TIC sanction detections per 100 recorded volume crimes, by police force excluding outliers**



In view of the general association between numbers of officers in relation to the amount of volume crime, and the detection rate excluding TICs, one crude measure of efficiency in volume crime detection could be *detections per police officer* (Figure 3.5). The annual overview of detection rates (Simmons and Dodd, 2003) regularly refers to patterns in this measure and has noted how the number of total detections per officer (all crime) has risen slightly in recent years – from 9.5 detections per officer in 1995 to 10.7 in 2002/3.

**Figure 3.5: Sanction detections excluding TICs per police officer**



Some of the forces that seem to be relatively inefficient in terms of numbers of non-TIC detections per 100 recorded crimes, are relatively efficient in terms of non-TIC detections per officer. The three forces with the lowest rates of non-TIC sanction detection per 100 crimes (with 4.6 or less per 100 crimes overall) were amongst the eight with the highest number of non-TIC

sanction detections per officer (at 1.4 or more per officer). On the other side of the coin, three of the top five forces for non-TIC sanction detection rates (with 9 per 100 cases overall or more) were amongst the six with the lowest number of non-TIC sanction detections per officer (at less than 0.85 per officer – Figure 3.5). A very small number of forces did relatively well on both counts, but only one fell into the top ten for both measures.

### Detection rate variations across BCU families

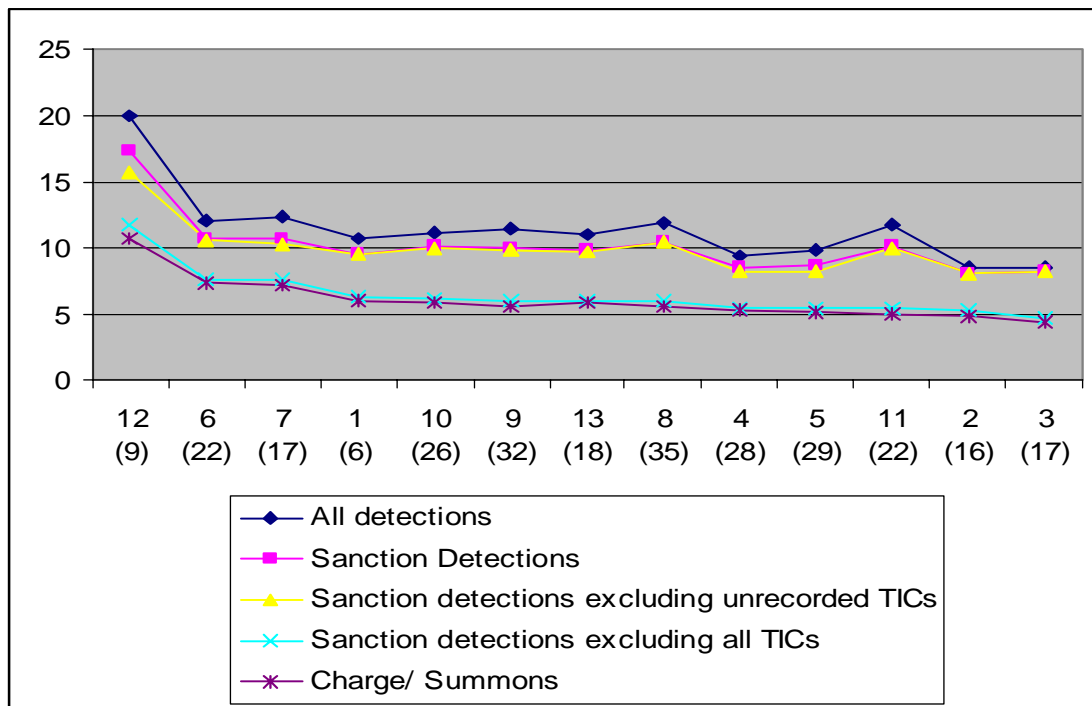
In order better to compare the performance of BCUs, the Home Office has identified families with clusters of similar attributes (Harper *et al.*, 2001; Sheldon *et al.*, 2002; Hall *et al.*, 2003a, 2003b – the Appendix lists the factors used). These attributes include some socio-demographic correlates of crime but do not include crime levels *per se*, since the performance of BCUs will be assessed in part in terms of achievements in controlling crime.

Fourteen different families emerge from the cluster analysis. One of these comprises the special case of airports, omitted from the analysis here. The families are known simply by the numbers attached to them. Moreover, they are not ranked in any way. They simply describe the 'best fit' of the constellations of attributes used to define them in order to make each group as internally similar as possible and each family as differentiated from others as possible.

Figure 3.6 shows the detection rate variations for BCU families in the same way that patterns were shown for police forces in Figure 3.1 (the labels on the horizontal axis indicate the family number, and the figure in brackets alongside gives the number of BCUs nationally in that family). The 'family' detection rates have been calculated by dividing total detections by total crime for all BCUs in each family. Again the data are ranged left to right from the family with the highest, to the family with the lowest, number of non-TIC sanction detections per 100 recorded crimes.

It is clear that families exhibited a relatively narrow range: all except one fell between 4.7 and 7.7 non-TIC sanction detections per 100 recorded crimes. Only Family 12, made up of rural areas, was substantially different from any of the other families. At 11.8 non-TIC sanction detections per 100 recorded crimes, its rate was more than half as much again as Family 6 (which had the next highest rate). The patterns of other stages in the attrition process varied a little more by family, but again Family 12 stood out most conspicuously from the rest. *This would seem to suggest that only a relatively small part of the differences in detection rates between BCUs can be accounted for by variations in BCU 'family attributes'.*

**Figure 3.6: Attrition patterns by BCU family for all volume crime (percentages)**



The issue of TICs needs to be examined in relation to families as it was in relation to forces. By family, the ratio of all sanction detections to non-TIC detections for all volume crime types did not vary greatly, as shown in Table 3.3. The mean number of all sanction detections to non-TIC detections varied only from 1.4 to 1.8. There tended to be rather more variation within the different crime types, with the greatest range for domestic burglary. Table 3.3 shows that for domestic burglary the range was 1.1 to 3.9, for burglary other 1.3 to 1.7, for TFMVs 1.5 to 2.5 and for TOMVs 1.1 to 1.5.



**Table 3.3: BCU families: ratios of all sanction detections to sanction detections, excluding TICs**

Family	All volume crime	Domestic burglary	Burglary other	TFMVs	TOMVs
11	1.8	1.9	1.6	2.3	1.5
8	1.7	1.8	1.5	2.3	1.3
3	1.7	2.1	1.7	1.7	1.1
10	1.7	1.6	1.5	2.2	1.5
13	1.6	1.7	1.5	2.0	1.4
9	1.6	1.7	1.5	1.8	1.3
5	1.6	1.6	1.5	2.0	1.3
4	1.6	1.6	1.4	2.5	1.3
1	1.5	3.9	1.4	1.7	1.1
2	1.5	1.7	1.5	1.6	1.1
12	1.4	1.1	1.5	1.9	1.3
7	1.4	1.5	1.3	1.6	1.2
6	1.4	1.4	1.3	1.5	1.3

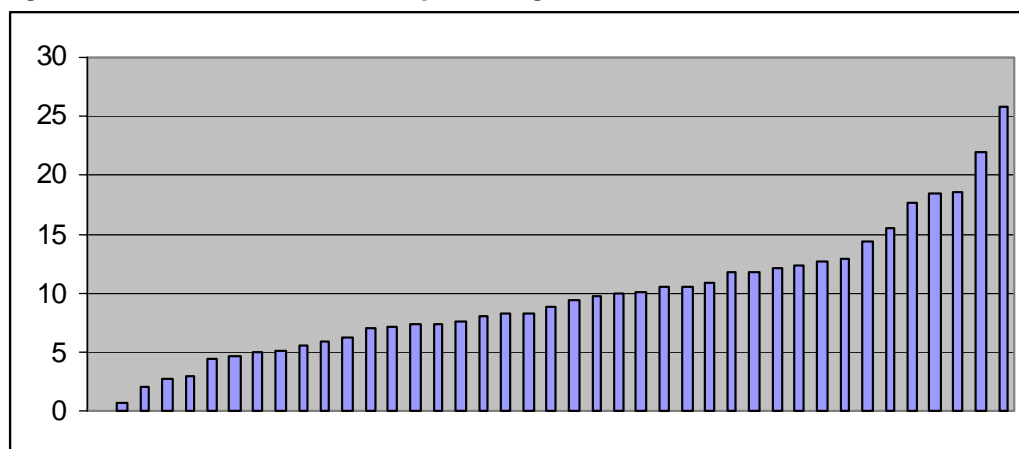
Forces seem to be more significant than families in shaping BCU variations in the rate at which TICs are acquired in relation to non-TIC detections.

### Other detections

The final element of attrition to consider relates to ‘other’, or administrative, detections. These are non-sanction detections and were not sub-divided in the data set used in this analysis. Figure 3.7 shows the percentages of all detections that were classified as ‘other’. For two forces ‘other detections’ comprised more than a fifth of all detections. At the other end of the spectrum, for eight forces, ‘other detections’ account for less than five per cent of all detections.

Variations in overall headline detection rates may, thus – in some cases and to some degree – reflect variations in the use of administrative detections.

**Figure 3.7: ‘Other’ detections as a percentage of all detections**



## 4. Exploring attrition pattern variations

The discussion turns now to possible explanations for the variations in detection rates. Most attention is paid here to non-TIC sanction detections, given the importance attached to this in the parallel case-tracking field study informed by this overview (Burrows *et al.*, 2005). Bearing in mind the limitations of the data available, it is clearly not possible to do more than highlight some general factors associated with variations in detection rate. The detailed case-tracking study substantially adds to the picture provided here.

The analysis that follows draws on data for only 262 BCUs, within 40 of the police forces in England and Wales. For these (as indicated already) in addition to information about patterns of detection and clear-up, the research team had access to the numbers of police officers attached to each BCU.

### Rates of detection for the different 'volume crimes'

At BCU level, as Table 4.1 shows, *there is quite a close association between rates of detection for the four volume crimes under review and with all four types combined. In short, BCUs do not tend to have high or low non-TIC sanction detection rates on a random basis.*

**Table 4.1: Correlations between non-TIC sanction detection rates of each volume crime types and all four volume crimes combined, 262 BCUs**

	Domestic burglary sanction detection rate excluding TICs	Burglary other sanction detection rate excluding TICs	Thefts from motor vehicles sanction detection rate excluding TICs	Thefts of motor vehicles sanction detection rate excluding TICs
Per cent of all volume crimes with sanction detections excluding TICs	.826(**)	.866(**)	.858(**)	.854(**)
Domestic burglary sanction detection rate excluding TICs		.651(**)	.764(**)	.589(**)
Burglary other sanction detection rate excluding TICs			.701(**)	.683(**)
Thefts from motor vehicles sanction detection rate excluding TICs				.578(**)

\*\* Correlation (Pearson) is significant at the 0.01 level (2-tailed).

The discussion of resource availability and its impact on detection rates focuses on all four volume crimes combined.

### The impact of resources

Two apparently competing hypotheses, relating to resources and non-TIC detection rates, can be considered, namely that:

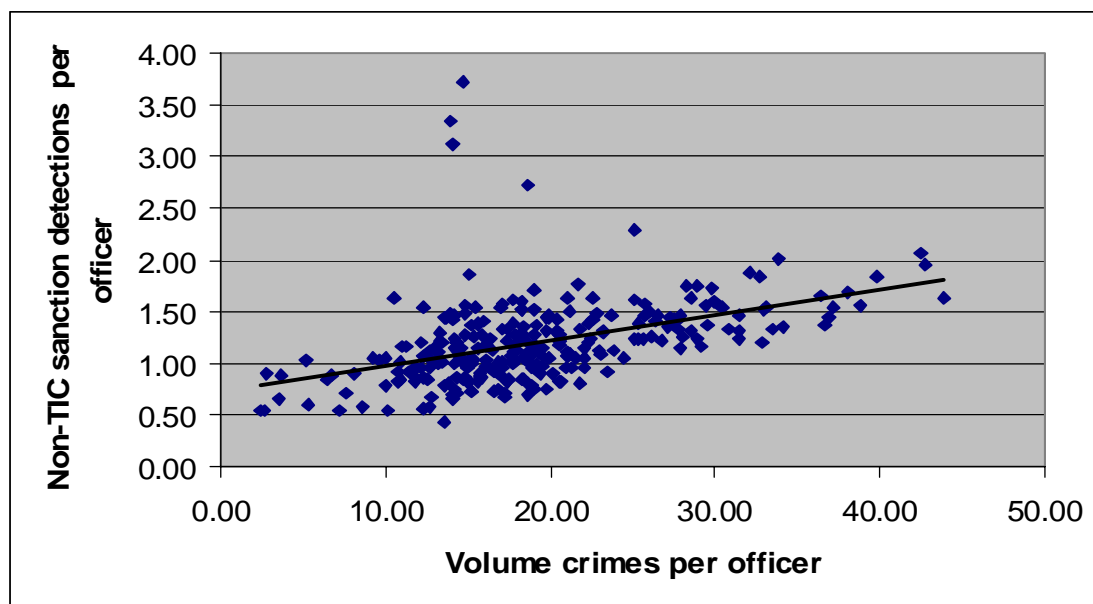
1. The more crimes there are for each officer to investigate, the more they will detect, since the greater volume of crimes provide more opportunities for detection.
2. The fewer crimes there are for officers to investigate, the more they will detect overall – since officers will have time to conduct thorough enquiries rather than engage in simple case management.

The data provides support for the first hypothesis. As shown in Figure 4.1, *the more volume crimes per police officer available for them to detect, the more they do detect*. The relationship is not perfect, of course, but it is striking, indicating that with ten additional crimes per officer an additional 0.25 detections per officer could be expected.<sup>7</sup> This relationship is also found within families and is strongest within Family 3, which comprises 17 BCUs, 14 of them in the Metropolitan Police Service.<sup>8</sup>

<sup>7</sup> R<sup>2</sup>=0.2. The intercept falls at 0.7319 detections per officer, with an increase of 0.0245 for every additional crime per officer.

<sup>8</sup> R<sup>2</sup>=0.77, which is a very strong association.

**Figure 4.1: Volume crimes per police officer and sanction detections excluding TICs per officer**



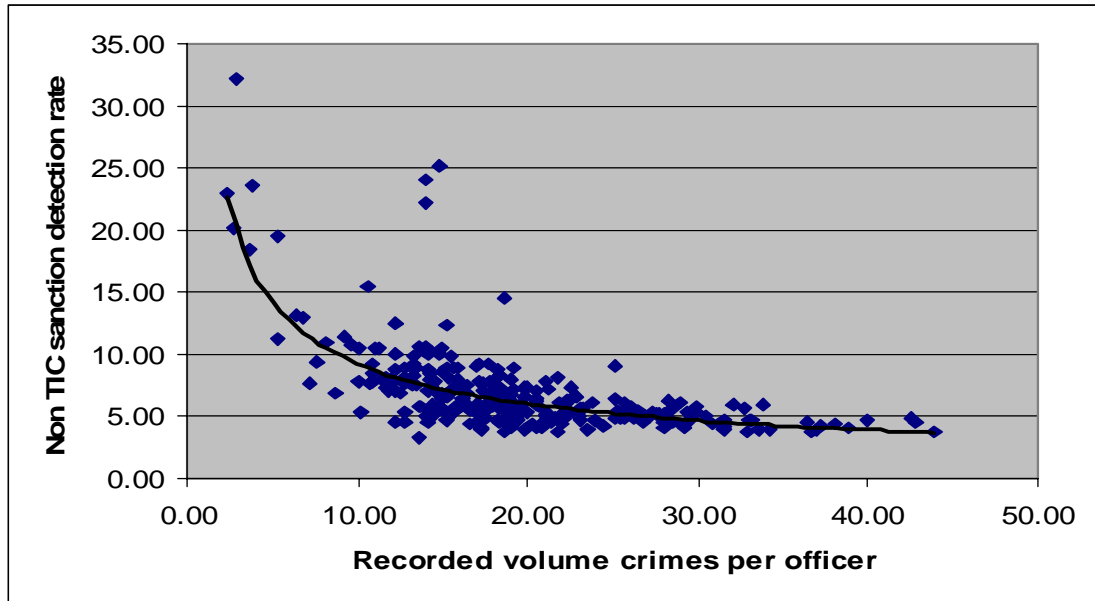
There is, however, also support for the second hypothesis: that is, the more volume crimes there are for each police officer the lower the number of non-TIC sanction detections per 100 recorded volume crimes. Figure 4.2 plots the non-TIC sanction detection rate against the number of volume crimes per police officer. The initially steep but progressively diminishing inverse relationship between crimes per police officer and the overall non-TIC sanction detection rate is quite clear.<sup>9</sup> *This shows that as the number of crimes per officer increases so the proportion of all volume crime detected, excluding TICs, falls.* The availability of officers is positively associated with rates of non-TIC detection.

Both these figures (4.1 and 4.2) plot police officer workload (expressed as the number of volume crimes per officer) against different measures of detection achievement: the numbers of detections per officer and the proportion of volume crimes ‘directly’ detected. With a small number of officers in relation to the total amount of crime it is possible to have a large number of detections per officer, but a low overall non-TIC sanction detection rate. Likewise it is possible to have a relatively large number of officers in relation to the total volume of crime, but with a low number of detections per officer and a high overall non-TIC sanction detection rate.

The broad patterns shown in Figures 4.1 and 4.2 for all of the four crime types combined, are also found for each individual volume crime type. The relationships seem to be pretty robust across all BCUs, within families and across crime types.

<sup>9</sup>  $R^2=0.52$ . The curved line of best fit meets the Y axis at 38.792 non-TIC sanction detections per 100 recorded crimes. The expected non-TIC detection rate comprises a product of this (38.792) and the number of crimes per police officer to the power of -0.6235. Thus at 20 crimes per officer the projected number from the regression equation would be  $38.792 \times 20^{-0.6235}$ , which comes to 6.

**Figure 4.2: Volume crimes per police officer and non-TIC sanction detections per 100 volume crimes**



An explanation for these general patterns may be found in the relative ease with which crimes can be detected. Some individual crimes will be much easier to detect than others. For example, all other things being equal, if the offender is caught red-handed, and restrained by the victim or witness, less investigative work will be required than will be the case if the offender is not caught at the scene and leaves no physical marks. In any large population of crime incidents some will veer towards the 'easy to detect' end of the spectrum, indeed will require negligible investigative time, whilst others will be close to the 'impossible to detect' end, where to have any real chance of detection much time and effort will need to be expended.

Suppose ten per cent of offences were to be detected independently of significant police investigation, and in one BCU (labelled here 'BCU1') there were 40 crimes per officer: each would have on average four 'easy' detections. But suppose in 'BCU2' there were only ten crimes per officer: on average each would have only one 'easy' detection.

However, with fewer crimes per officer, more time is available per crime – so that it becomes possible to devote fuller investigative effort to incidents. Here it is reasonable to expect that increasing a higher detection rate will be achieved in relation to an increasing proportion of crimes calling for a significant amount of investigative effort to achieve a detection. Assuming for the moment equal investigative skill, equal offender ingenuity and so on, more detections would be expected at a diminishing rate in proportion to the time needed to bring the investigation to a successful conclusion. In BCU1, with 40 crimes per police officer, few detections beyond the 'easy to detect' might be possible. But in BCU2, with ten crimes per officer, resources might become available for investigation. Suppose an additional two detections were achieved in BCU2: there would then be three detections per police officer.

If in both scenarios there were 1000 volume crimes, but BCU1 had 25 officers (thus the 40 crimes per officer mentioned above) and BCU2 had 100 officers (i.e. ten crimes per officer). In BCU1, the detection rate would be ten per cent, at ten detections for each of the 25 officers. In BCU2, in comparison, the detection rate would 30 per cent at three detections for each of the 100 officers. Here, as in the general pattern shown in Figures 4.1 and 4.2, *more crimes per police officer produce more detections per officer, but fewer crimes per police officers produce higher detection*

rates. Both resource availability detection rate patterns can, thus, be explained by plausible assumptions about variations in time needed for detection across a population of crime incidents.

The account given here may explain the distinctive pattern, for example, in Family 12, which had substantially the highest rate of detection. Table 4.2 shows the patterns of resource availability and detection for all families. Family 12 had, by some margin, the lowest number of recorded volume crimes per officer (6.8) and also the lowest number of detections per officer (1.2). For each individual volume crime type it had the lowest number of crimes per officer with the exception of non-domestic burglary where it had the second lowest. Except for Family 1, it had the highest detection rate for all volume crime, and by a large margin the highest rate for domestic burglary and TFMVs. Its rate of detection was second to Family 1 for detection of 'burglary other' and TOMVs, which may reflect the special attributes of members of Family 1 – inner city BCUs in large conurbations with rather distinctive crime profiles and resources. Family 12 can be compared with Family 10. As Table 4.2 shows, they had very similar numbers of police officers in relation to the populations served (201 and 203 per 100,000 respectively), but Family 10 members had twice the detections per officer (2.3 as against 1.2), with more than three times the total number of volume crimes per officer (23.4 compared to 6.8) and a least twice the numbers of offences in each volume crime type (for example 5.6 compared to 1.4 domestic burglaries per officer). The overall non-TIC sanction detection rate across all volume crime types, however, was less than half that for Family 12 (for example 9.5 per cent, compared to 21.5 per cent, of domestic burglaries resulted in a non-TIC detection).

**Table 4.2: Families, police officer resources and volume crime detection rates per 100 recorded crimes**

Family	Police officers per 100,000 population	All SDs per police officer	Vol. crimes per police officer	TOMV per police officer	TFMV per police officer	Burglary other per police officer	Domestic burglary per police officer	Domestic burglary snctn. det. rate exc. TICs	Burglary other snctn. det rate exc. TICs	Thefts from motor snctn. det. detection rate exc. TICs	Thefts of motor vehicles snctn. det. rate exc. TICs
1	4819	1.4	11.9	1.8	5.5	2.5	2.1	11.2	16.3	4.5	24.9
2	390	1.4	15.8	3.4	6.3	2.2	3.9	7.1	9.7	2.4	8.6
3	208	1.7	19.6	3.5	8.0	3.2	5.0	6.0	7.9	1.7	8.4
4	277	2.0	21.4	4.0	6.5	5.1	5.8	8.3	6.8	3.5	9.0
5	165	2.1	23.6	3.6	8.0	6.3	5.7	9.4	5.8	3.2	9.8
6	184	2.3	19.5	3.8	6.0	5.0	4.8	13.7	8.8	5.5	11.6
7	163	2.0	16.9	2.1	5.8	5.3	3.7	11.9	9.2	5.6	14.5
8	145	1.9	17.7	2.8	6.8	4.6	3.6	9.3	6.9	3.2	10.0
9	135	1.6	16.4	1.9	6.2	5.1	3.2	10.2	6.1	3.6	10.8
10	203	2.3	23.4	4.2	8.1	5.5	5.6	9.5	6.6	3.1	9.9
11	141	1.9	19.2	3.0	7.3	5.2	3.7	8.4	5.5	2.9	9.9
12	201	1.2	6.8	0.8	2.2	2.5	1.4	21.5	14.2	8.8	20.9
13	213	2.4	23.1	4.1	7.1	5.8	6.1	9.0	7.3	3.2	10.1

### Variations in efficiency and effectiveness?

This is not to say, of course, that variations in efficiency and effectiveness, too, can in part explain differences in non-TIC detection rate. Within some families (2, 4, 7 and 13, for example), there were statistically significant associations between numbers of detections per police officer and overall non-TIC detection rate for volume crime, even though there was no association between

these across all 262 BCUs. This raises questions about effectiveness and efficiency variations within these families.

An example will make the point clear. In Family 2, one BCU had 14 volume crimes per police officer, a volume crime rate of 32 per 1000 population, 0.4 non-TIC crime detections per police officer, and an overall non-TIC detection rate for volume crimes of 3.2 per cent, whilst another has a very similar number of volume crimes per police officer (15), a slightly higher volume crime rate (43 per 1000 population) but far more non-TIC detections per police officer (1.2) and a correspondingly higher non-TIC detection rate of 7.9 per cent. Of course that BCU may have had a different pattern of non-volume crime calls for police attention that may have meant that, in practice, more time for investigation per volume crime incident was available. This cannot be gauged from the available data.

## Appendix

### Attributes examined to create BCU 'families'

1. Percentage of young males (aged 16-24)
2. Percentage of minority ethnic population
3. Percentage of single adult households
4. Percentage of single parent households
5. Percentage of student households
6. Percentage of residents living at a different address one year before the 1991 census
7. Percentage of local authority housing, plus new town renters and housing associations
8. Percentage of terraced housing
9. Percentage of overcrowding
10. Population sparsity
11. Population density
12. Length of A, B and minor roads per head of population
13. Percentage of daytime population (leisure and retail employment)
14. Percentage of young male claimants (of unemployment-related benefits)
15. Percentage of long-term claimants (of unemployment-related benefits)
16. Index of homogeneity
17. Motorway junctions per 1000 population
18. Population per square kilometre



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