YES, IT WORKS, NO, IT DOESN'T: COMPARING THE EFFECTS OF OPEN-STREET CCTV IN TWO ADJACENT SCOTTISH TOWN CENTRES

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Abstract: *This paper reports the evaluation of two contrasting open-street closed circuit television (CCTV) installations in Scotland. Twelve cameras were installed in a small town called Airdrie in 1992, and 32 cameras were installed in Glasgow, a large city, in 1994. After controlling for extraneous factors, it was discovered that, overall, recorded crime fell (and detections rose) in Airdrie after camera installation, but in Glasgow recorded crime rose (and detections fell). However, in both locations, some more specific types of recorded crimes fell and some others rose. It cannot simply be concluded that CCTV "works" in small towns, but not in large cities. In part this is because the goals of open-street CCTV installations are usually developed at a somewhat slower pace than are the systems themselves, and are often incompatible. For example, proponents claim that CCTV will both reduce crime (by deterring potential offenders) and increase it (by capturing more illegal acts on camera). Accordingly, in both locations studied, CCTV has been a different sort of success.*

INTRODUCTION

There has been substantial investment in closed circuit television (CCTV) schemes in Britain since the early 1990s. Central and local

Crime *Prevention Studies, volume 10, pp. 201-223*

government investment in open-street CCTV in the U.K. between the years 1994 and 1997 has been estimated to have been in excess of £100 million (Norris and Armstrong, 1998). Before this, some small-scale research had indicated that CCTV had had an impact in various closed locations, such as: in shops (Van Straelen, 1978; Burrows, 1991; Gill and Turbin, 1997); on buses (Poyner, 1988); in car parks (Poyner, 1991; Tilley, 1993); on the London Underground (Mayhew et al., 1979); and in small businesses (Hearnden, 1996). However, in general, instances of fully independent professional evaluation of open-street CCTV schemes has been rare,[1] a gap which the research reported here hopes partly to fill.

Scotland differs slightly from England and Wales insofar as, in the main, partially government-backed schemes were not introduced until slightly later, and not substantially before the results of independent professional evaluation were available. Flying in the face of its legendary fiscal caution, Scotland has since adopted town and city centre CCTV schemes with uncharacteristic abandon. There have been two distinctly different investment phases. Prior to 1996, the 12 schemes that were in operation in January 1996 were all the result of the handiwork of sharp-eyed solitary moral entrepreneurs working in different locations and occupying different roles.[2] Since 1996, funding has become institutionalised, with the Scottish Office playing a key role in encouraging the spread of CCTV by mounting two CCTV Challenge competitions. In the 1996-97 round, 32 additional schemes were partially funded by the Scottish Office (the total capital cost of the 32 successful schemes amounted to £4.859 million, of which the Scottish Office contributed £1.851 million). In the 1997-98 round, 30 more schemes were partially funded by the Scottish Office (the total capital cost of these schemes amounted to £4.953 million, of which the Scottish Office contributed £1.861 million).

Twelve open-street CCTV cameras were installed in Airdrie's town centre in 1992, and became operational in November of that year. This was the first multi-camera CCTV installation in Scotland. Almost exactly two years later, in November 1994, 32 cameras were installed in Glasgow's city centre. Glasgow is Scotland's biggest city, and Airdrie is a small town located some 15 miles east of Glasgow. We were responsible for the independent professional evaluation of both installations. Details of the governmental and other publications stemming from this endeavor are given at the end of this paper. This is the first time the effects of CCTV in the two places have been considered. together.

THE EFFECT IN AIRDRIE

The area of the centre of Airdrie actually visible from one or more of the cameras represents parts of six separate police patrol beats. Crime and offence data were collected for the period November 1990 to October 1994. This represents exactly 24 months before installation of the cameras, and 24 months afterwards. Considerable care was taken to plot areas visible to the cameras, so as to be able to distinguish those crimes and offences recorded in areas visible to the cameras from those recorded in the remainder of the six beats.

Recorded crime and offence and detection data were also collected for six increasingly sized areas of comparison: the CCTV vision area, the rest of those six beats, the rest of the subdivision, the rest of the division, the rest of the police force area, and the rest of Scotland. These data were collected to allow both a comparison of rates of change in the commission of crimes and offences in the CCTV area and other comparable areas, and to allow a check to be made for possible displacement of criminal activity from the CCTV area to other areas, and/or for possible diffusion of benefits of CCTV to such areas.

Recorded Crime in Airdrie

The overall effect on recorded crime and offence rates of installing CCTV cameras in Airdrie can be seen in Figure 1.

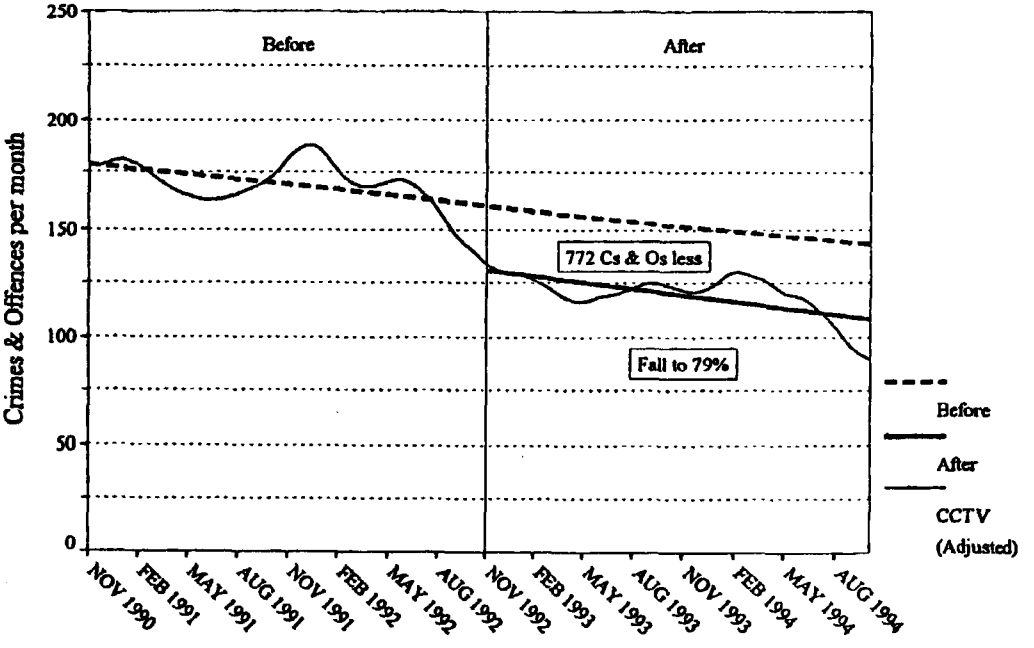
The "before" segment represents the 24 months prior to installation, and the "after" segment, the two years following. The curved line represents the total recorded crime and offence rate derived from data that have been both seasonally adjusted and controlled for underlying trends.[3]

It is hard to determine visually a periodic trend from a curved line. To calculate the trend (in effect to straighten the line), the "line of best fit" (the regression line)[4] has been calculated separately for the before and after periods. For each line, the angle of slope indicates the trend (both before and after CCTV installation, recorded crimes were decreasing); and the position of the line from the baseline indicates the magnitude of the effect. The dashed line represents the line of best fit before installation, and the solid black one, the line of best fit afterwards.

Clearly, the installation of CCTV has had a beneficial effect. This is indicated in Figure 1 by the area between the dashed and solid sloped lines of best fit after CCTV installation. One way of looking at

this area is to see it as representing 772 recorded crimes and offences that CCTV installation has prevented.

Figure 1: Recorded Crimes and Offences in Airdrie's CCTV Area, Lines of "Best Fit" Before and After Camera Installation November 1990 - October 1994

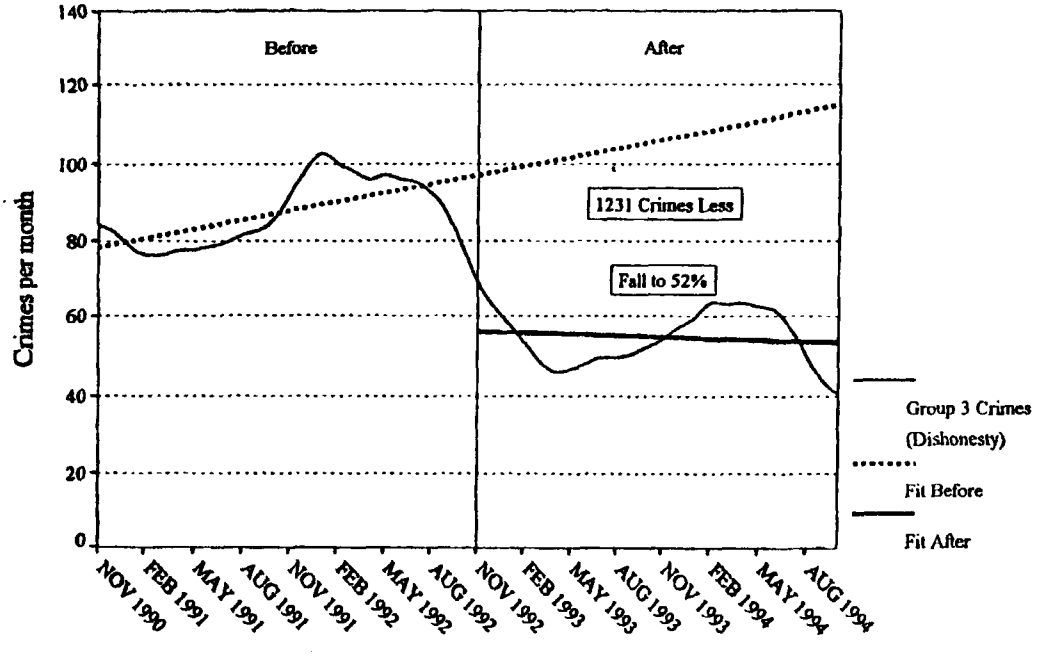


CCTV seems to have had a variable effect on the rates of different types of recorded crimes and offences. Recorded crimes and offences are divided into seven general groups by the Scottish Office, and it seems sensible to use identical aggregations. These groups vary in

direction and the degree to which they are affected by the installation of CCTV. The first five groups are crimes; the last two, offences.[5]

It is not possible to analyse changes in recorded crimes from Group 1 (violence) and Group 2 (indecency), as too few were recorded.[6] Recorded crimes of dishonesty (Group 3 crimes) fell to 48% in the 24 months after installation of CCTV. This represents 1,231 fewer recorded crimes in the area of Airdrie covered by the cameras in the 24 months following installation (see Figure 2).

Figure 2: Fully Adjusted Recorded Crimes in Airdrie's CCTV Area, Group 3 (Crimes of Dishonesty) November, 1990 - October, 1994



Group 4 crimes (fire-raising and vandalism) fell by 19% in the 24 months after installation of CCTV. This decrease is based on relatively small numbers of recorded crimes and translates into just 42 fewer crimes in the 24 months following CCTV installation. Recorded crimes in Group 5 (other) crimes rose by 1,068% (when compared to previously recorded levels) in the 24 months following installation. Again, the numbers are small in this group with this percentage representing 180 more crimes in the 24 months after CCTV was operational.

Similarly, 194 more Group 6 (miscellaneous) offences were recorded in the 24 months following CCTV installation — a rise to 133% of previously recorded levels in the 24 months. Finally, Group 7 offences (motor vehicle-related) increased by a total of 58, to 126% of previously recorded levels, in the 24 months following CCTV installation.[7]

Increases in recorded crimes in Group 5, and in recorded offences in Groups 6 and 7 are not necessarily indicative of the failure of CCTV. Within Group 5, an increase in drug offences may reflect well on the surveillance ability of CCTV to detect crimes that might otherwise have gone unnoticed. The same could be said of "breach of the peace" offences (Group 6) and minor traffic violations (Group 7).

Overall, crimes and offences fell to 79% of previously recorded levels in the two years following the installation of CCTV in Airdrie.

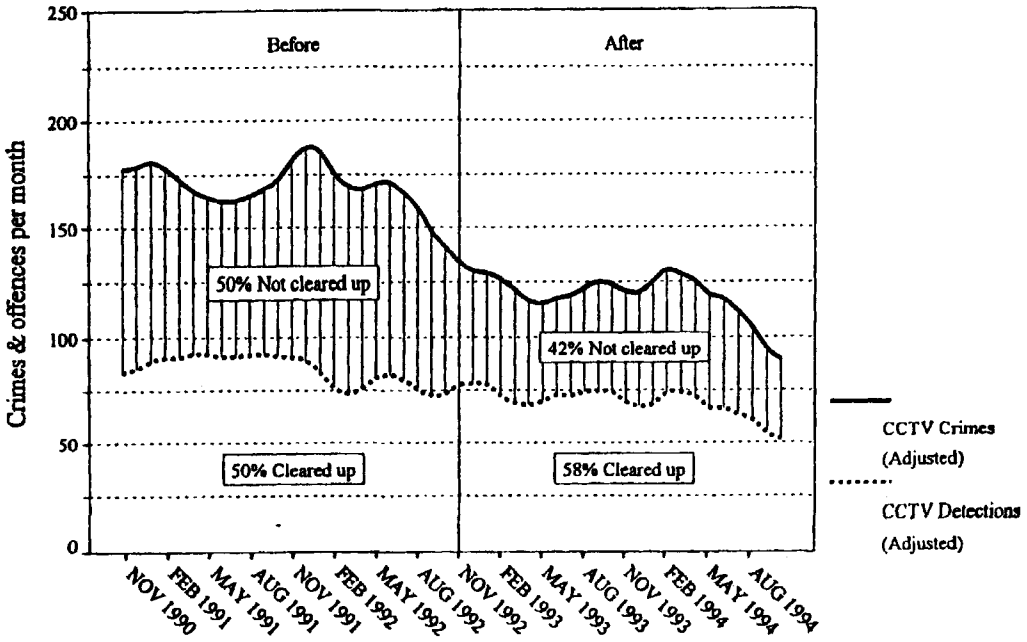
Detections in Airdrie

In the two years after CCTV installation, detections[8] improved to 116% of previously recorded levels. To put this another way, the clear-up rate improved from 50% to 58% of recorded crimes and offences. This is illustrated in Figure 3.

The improvement in detections varied by crime and offence group. Group 3 crimes of dishonesty did not play such a big role in the overall improvement in detections as they played in the reduction in recorded crimes, maintaining a 31% clearance rate both before and after CCTV installation. (Again, it is not possible to consider changes in detections for Group 1 and Group 2 crimes, as even fewer were recorded in each group than was the case for recorded crimes in these two groups.)

Most impressive were Group 4 crimes, which showed a detection improvement from a 20% to a 27% clear-up rate (itself, a 35% improvement). Detections in Group 5 crimes (from 95% to 97%), and Group 6 miscellaneous offences (from 82% to 87%) both show a slight

Figure 3: Adjusted Recorded Crimes, Offences and Detentions in Airdrie's CCTV Area, All Crimes and Offences November 1990 - October 1994



improvement. Group 7 motor vehicle offences saw a slight deterioration (from 98% to 94%). It should be recalled that Group 7 offences have a very high detection rate anyway, one that would be difficult to improve substantially.

Overall, detections improved to 116% of previously recorded levels in the two years following the installation of CCTV in Airdrie.

Displacement or Diffusion from Airdrie?

It is possible that at least some of the crimes and offences apparently prevented by the installation of CCTV were not prevented at all, but instead will have been "displaced" from that area and committed elsewhere or in other ways.

The areas surrounding the parts of Airdrie in camera vision generally saw an increase in recorded crimes. Much of this increase in criminal activity in adjacent areas was due to an increase in Group 5 (other) crimes, which include drug-related offences. These increased to 161% and 215%, respectively, of previously recorded levels in the 24 months after installation of CCTV in the rest of the CCTV visible beats and in the rest of the subdivision. This gives some sort of context to the finding that recorded Group 5 crimes also increased in the area covered by the cameras (to 145% of previously recorded levels in the 24 months after installation of CCTV).

A breakdown of Group 5 crimes in the CCTV area shows that Bail Act offences (something of a "phantom" crime)[9] and drug offences accounted for the majority of the increase. The same pattern holds in the potential displacement areas (both in the rest of the CCTV visible beats and in the rest of the subdivision). The best interpretation we can offer is that Bail Act offences and drug offences were increasing across the board and are relatively impervious to CCTV intervention.

There is no statistical evidence, therefore, to suggest that the crimes "prevented" in the CCTV area — mainly crimes of dishonesty (Group 3) — have been "geographically" displaced to either of the two immediately adjacent and larger areas. Nor is it likely that they have been displaced "functionally" to these areas, as displacement cannot explain the increase in Group 5 Bail Act and drug-related offences. Rather, as noted above, Bail Act and drug-related offences have increased in all areas.

This tentative conclusion seems to be borne out by attempting to "find" crimes apparently prevented in the CCTV area, in both the rest of the CCTV beats and the rest of the subdivision. Statistical evidence suggests that 772 crimes have been prevented in the CCTV area following installation of cameras. (This is calculated by projecting expected totals to the two years following camera installation in the CCTV area and then subtracting the actual adjusted recorded crime total). As it was not possible to trace any of these crimes to the immediately adjacent areas, it may be justifiable to treat them as having been prevented rather than merely displaced.

However, this cannot be treated as "proof that displacement did not occur. Our check of geographical displacement was confined to

adjacent areas; offenders may well be choosing to move very much further afield to continue offending. Various studies conducted in other countries have found that some burglars (Gabor, 1978) and some robbers (van Koppen and Jansen, 1998) will travel long distances and for many hours to reach their targets, while some, although not all, will be dissuaded from offending by such crime prevention measures (Bennett, 1986). Since conducting the main statistical study in Airdrie, we have piloted the idea of interviewing offenders in the area. This proved instructive, and these initial enquiries have been published as Short and Ditton,1998; and Ditton and Short, 1998a, 1998b. However, a full-scale study has not been undertaken.

THE EFFECT IN GLASGOW

Glasgow's city centre is covered by Strathclyde Police Force's "A" Division, which is itself divided into two subdivisions: "AB" and "AC." The CCTV cameras cover most, but not all of the beats in "AB" subdivision (21 of the 25), and some of the beats in "AC" subdivision (7 of the 24). Thus, the CCTV cameras cover, to some degree or other,[10] 28 separate beats in "A" Division.

Data were collected for the periods: 1st November, 1992 through 31st October, 1993; 1st November, 1993 through 31st October, 1994; and 1st November, 1994 through 31st October, 1995. This represents the first year after CCTV installation, compared with the identical calendar periods one year and two years before.

Equivalent data were also collected from: the beats in "A" Division that do not have any camera coverage (beats 1, 2, 5 and 6 from "AB" sub-division, and beats 26, 28-31, and 38-49 from "AC" subdivision, referred to henceforth as the rest of "A" Division); the surrounding police Divisions (Divisions "B," "C," "D," "E," "F," and "G"); and the rest of Strathclyde Police Force (Divisions "K," "L," "N," "P," "Q," "R," "U" and "X").

These additional data were collected, first, to establish a yardstick from which an underlying trend rate could be calculated. Then, after initial analysis ruled out alternative choices, the rest of "A" Division was chosen. In earlier work in Airdrie, a broadly similar aggregation (in that case, the rest of "N" Division) was chosen as the underlying trend yardstick.

Recorded Crime in Glasgow

The overall effect of installing CCTV cameras in Glasgow's city centre can be seen in Figure 4. The "before" segment represents the 24 months prior to installation, and the "after" segment the year following. The curved line represents the total recorded crime rate derived from data that have been both seasonally adjusted and controlled for underlying trends. A technical description of these processes is given in Annex Two of Ditton, et al. (1999). Apart from one slight but necessary modification, exactly the same analytic processes were used here as in the evaluation of the CCTV installation in Airdrie.[11]

Again, the line of best fit (the regression line) has been calculated separately for the before and after periods. For each line, the angle of slope indicates the trend (before CCTV installation, recorded crimes were decreasing); and the position of the line from the baseline indicates the magnitude of the effect. The dashed line represents the line of best fit before installation, and the solid black one, the line of best fit afterwards.

In Airdrie, it was calculated that recorded crimes and offences fell to 79% of previously recorded and adjusted totals. In Glasgow, contrarily, recorded crimes and offences rose to 109% of previously recorded and adjusted totals. CCTV seems to have had a variable effect on the rates of different types of recorded crimes and offences. The same Scottish Office groups that were used to aggregate data in Airdrie were used again in the Glasgow part of the study.

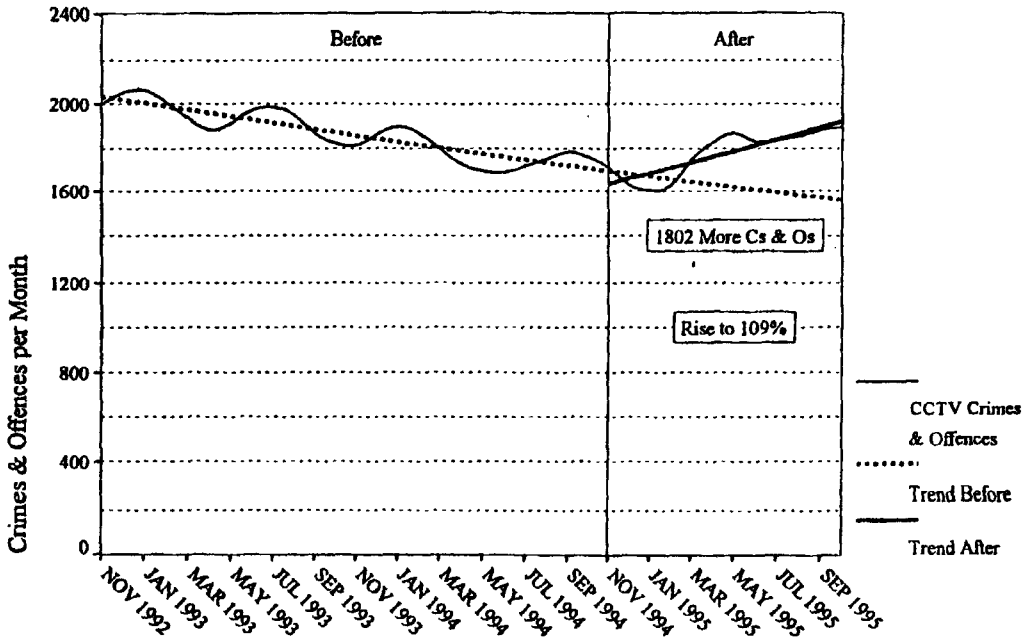
The pattern is by no means consistent, even if the overall effect is a slight rise. Recorded crimes in Groups 1 and 4, and recorded offences in Groups 6 and 7, all fell, but recorded crimes in Groups 2, 3 and 5 all rose.[12] Group 1 crimes fell to 78% of their previous amount (amounting to 230 fewer crimes); Group 2 crimes and offences rose to 117% (equivalent to 120 more crimes); Group 3 crimes rose to 123% (2,185 more crimes, as illustrated in Figure 5); Group 4 fell to 92% (57 fewer crimes); Group 5 rose to 132% (464 more crimes); Group 6 fell to 93% (272 fewer offences); and Group 7 fell to 88% (318 fewer offences).

Detections in Glasgow

Overall, the clearance rate (detections expressed as a percentage of recorded crimes and offences) fell slightly from 64% to 60% (Figure 6). In Airdrie, the clearance rate improved from 50% to 58% over all.

In Glasgow, crimes and offences in Groups 1, 4 and 6 fell, and those in Groups 2 and 3 rose. The clearance rates in Groups 5 and 7 remained virtually unchanged. Specifically, detections in Group 1 fell from 74% to 46%; in Group 2, they rose from 92% to 98%; in Group 3, they rose from 39% to 44%; in Group 4, they fell from 39% to 30%; in Group 5, they fell from 100% to 99%; in Group 6, they fell from 86% to 82%; and in Group 7, they rose from 99% to 100%.

Figure 4: Recorded Crimes and Offences in Glasgow's CCTV Area, Lines of "Best Fit" Before and After Camera Installation November 1992 - October 1995



Complacency or Confusion in Glasgow?

It is only thus at an ambitious and unrealistic level (i.e., affecting *all* recorded crimes and offences positively) that CCTV in Glasgow can be said not to have "worked." Even after the undertaking of various statistical procedures (seasonal adjustment, smoothing, controlling for underlying trends) — each of which depressed the effect of CCTV when used on data from the first part of this study in Airdrie — there have been reductions in recorded instances of violence (Group 1), vandalism, etc. (Group 4), petty personal offences such as breach of the peace and petty assault (Group 6), and offences involving vehicles (Group 7). Because there was no recorded fall in the overall number of crimes and offences reported in Glasgow's CCTV area, no search for displacement could logically be undertaken.

DISCUSSION

Put at its starkest, after the installation of open-street CCTV in Airdrie, recorded crimes and offences fell to 79% of their previously recorded levels, and detections rose from 50% to 58%. Conversely, after the installation of open-street CCTV in Glasgow, recorded crimes and offences rose to 109% of their previously recorded levels, and detections fell from 64% to 60%.[13] Rather crudely, it could be concluded that CCTV worked in Airdrie, but not in Glasgow. This interpretation should be resisted firmly.

Why? Because there are a series of interrelated problems that preclude simplistic judgements like this. These may be grouped into concerns relating to the adequacy of the *test* of effectiveness; the *type* of situation in which CCTV was "tested," and the *timing* of the introduction of CCTV in different locations.

Adequacy of Tests of Effectiveness

First, then, concerns relating to the adequacy of the *test* of CCTV's effectiveness. A major difficulty here is confusion to the point of contradiction as to what, precisely, open-street CCTV cameras are supposed to do. From one point of view, their ability to see criminal events unfolding when there are no police officers physically present should increase logically the number of crimes and offences thus recorded. From another point of view, their sheer presence should deter offenders from offending, and should decrease the number of crimes and offences thus recorded. If such cameras prove better at the first goal than the second, then the crime rate should rise, and this would

be counted as a "success." If, contrarily, they prove to be better at the second than at the first, then the crime rate should fall, and this would be counted as a "success."

We might, at this point, turn to the history of the two CCTV schemes to see what the goals of each actually were. In Airdrie, CCTV began as the imaginative response to a specific local crime problem (teenage shoplifters disappearing into the massed ranks of dancing teenagers at a local youth club). An energetic local police officer had confronted the youth club members, and at one point in these discussions, a young girl suggested to him, "you should put a camera in

Figure 5: Group 3 Recorded Crimes in Glasgow's CCTV Area, Lines of "Best Fit" Before and After Camera Installation November 1992 - October 1995

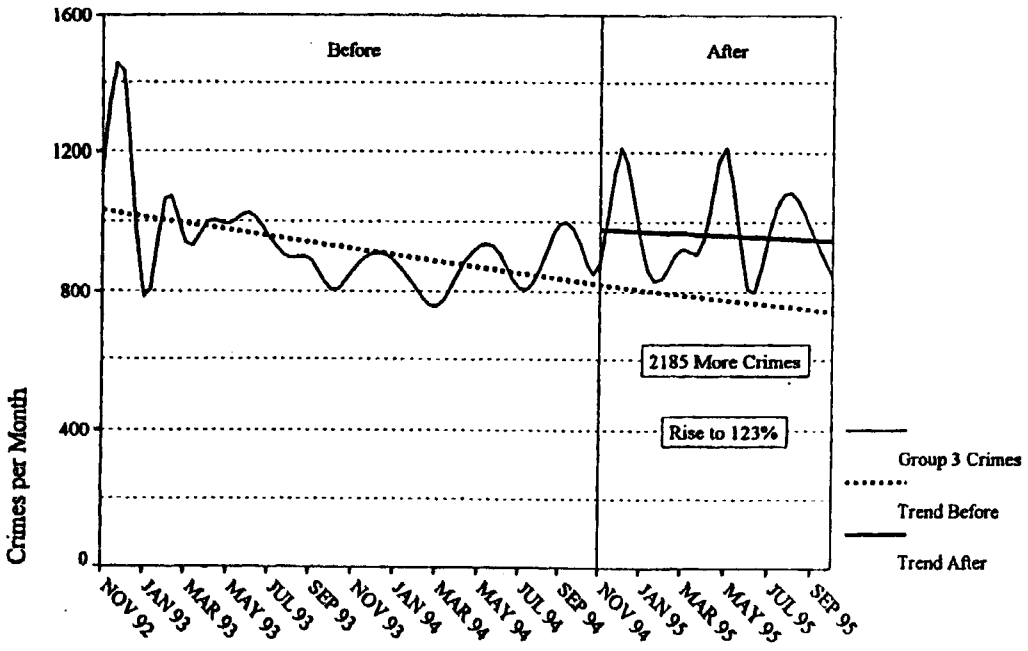
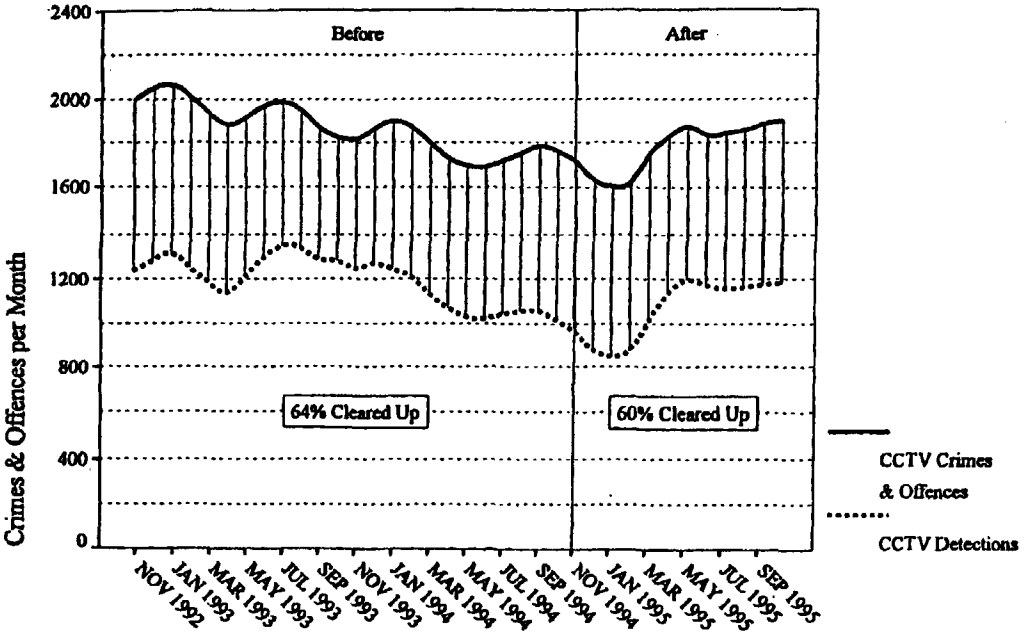


Figure 6: All Recorded Crimes, Offences and Detections in Glasgow's CCTV Area November 1992 - October 1995



the youth club." Once germinated, the idea proliferated with speed: by the end of the week, he had planned the whole town centre network (Ditton & Short, 1998b).

In Glasgow, the CCTV scheme began life as an idea designed to have a positive impact on the erroneous image of the city as a "dangerous" place in the minds of inward investors based in other countries. In the early days, CCTV was actively promoted by the local development agency in terms that indicated that it was expected to increase inward investment to the city by £43 million per year, generate 1,500 new jobs, and bring an additional 225,000 visitors to the city

every year. Within 18 months, CCTV was "about" reducing criminal victimisation to locally resident visitors to the city centre.

Indeed, there seem to have been a succession of goals, and with the benefit of hindsight, it is now clear that the original objectives have been regularly replaced to the point where, in a two-year period, current goals bear no resemblance to initial ones. However, by which goal achievement should Glasgow's cameras be judged?

In Airdrie, CCTV's "mission creep" (from policing a youth club to policing a town centre) was not self-contradictory. However, in Glasgow it was distinctly so. For example, the most famous piece of CCTV-captured offending is of two young men attacking, and finally jumping up and down on the head of, a third one. This has been widely shown on television (abroad, too), and photographic stills taken from it are frequently published in the British press.

No doubt this confirms the ability of CCTV to capture incidents on camera, and helps to justify the presence of the system, particularly in its endless search for annual running costs. It may also be good for employee morale. Indeed, the operators are justifiably proud of having noticed the incident unfold, of having alerted the police, and of having rushed medical assistance to the scene. But what has this publicity done to either calm the fears of foreign investors or reassure locally resident visitors that Glasgow is a safe place to visit?

These problems aside, a related issue is the vastly inflated expectations of the effect of open-street CCTV. It is really just some video cameras pointing either up or down a handful of city streets. Glasgow has 32 cameras, and Airdrie has 12, but each network has only two relatively untrained persons watching them at any one time. One person can really only watch one screen at a time, and our observation in the Glasgow control room indicated that there were occasions when nobody was watching anything. There were also many other occasions when operators were watching the screens, but nothing apparently was happening. Camera vision is impressive, yet occasionally obscured (by trees in leaf, by snow on the lens), and therefore ultimately limited. In addition, there is no sound.

Overall, in the first year of operation, Glasgow's CCTV system was linked to 290 arrests, although it is unclear how many of these would have been made without the cameras. Even if all 290 would not have occurred without the cameras in place, this is still a strike rate of one arrest per camera for every 967 hours of operation, or one every 40 days. Put another way, the cameras "saw" under 5% of the total number of crimes and offences that resulted in arrests in the area they surveilled during the first year of operation. Why, thus, should

CCTV there have more than a 5% effect in either reducing or increasing recorded offending?[14]

Types of Testing Situations

A second main concern relates to the *type* of situation into which open-street CCTV is being introduced. Glasgow has a "centre": so does Airdrie. There the similarity ends. Glasgow is a huge port city, and Airdrie is a sleepy little town. The people of Airdrie are very proud of their cameras. We have been told that when the control room first became operational there, thousands of local inhabitants queued for hours to get a quick glimpse of the monitors in the police station. A year or two later, when the budget was low and the survival of the whole installation under threat, these same local residents held coffee mornings to raise money to keep it going.

For Airdrionians, the middle of the town is "their" town centre. For Glaswegians, the middle of the city is "the" city centre. Only an insignificant number of people actually live in Glasgow's city centre, and most of those who visit it cannot get there on foot. More people actually live in the middle of Airdrie, and those who live in the rest of the town can easily walk to the centre. One year after camera installation in Glasgow (a year that saw frequent mentions of the cameras in the local media), only between a quarter and a third of the ambulatory population were even aware of their existence (Ditton et al., 1999). No satisfactory general population poll has been conducted in Airdrie, but when we interviewed a small group of offenders, most claimed to have first heard about the cameras from the local media.[15]

Timing of CCTV Introduction

Finally, and perhaps most crucially, the *timing* of the introduction of cameras in the two centres may well have had the biggest effect on relative success, when the latter is conceived narrowly in terms of reductions in the overall rate of recorded offending. It should be recalled — and this is unusual given the history of implementation of most crime prevention initiatives (see Campbell and Ross, 1968) — that CCTV was introduced into Glasgow's city centre at a point when recorded crime had been on the decline for at least two years. It is unclear why recorded crime rates oscillate over the long term. But, when they are on the rise, there is more inclination to experiment with ways of reversing this than when they are on the decline.

Had Glasgow's CCTV system been installed at a relative recorded crime zenith, it would have been a simple matter to predict an inde-

pendent downturn thereafter. Being, as it was, installed at a nadir, an upturn thereafter was always the most likely consequence. Equally plausibly, had Airdrie's cameras been introduced two years later, then, after a probable period of decline in recorded offending, crime rates might well have begun to rise.

CONCLUSION

It should be noted that CCTV has had an impact very different in Glasgow than in Airdrie.[16] In both, some occasional yet noteworthy success was obtained in capturing emerging incidents on camera. Yet, in Airdrie recorded crime declined as a whole, and no displacement effect could be discovered. In Glasgow, on the other hand, recorded crime as a whole rose slightly (although it fell in some categories), and thus no search for displacement could be undertaken.

However, in Glasgow, the CCTV system seems gradually to be finding a different role for itself, particularly in the relatively recently developed reviewing of tapes to retrospectively investigate major crimes.[17] Here, rather than base the evaluated utility of the system on its ability to spot contemporary offending (or even prevent it), the videotape library is used as an archive. After the notification of a major criminal incident, tapes for the day and time in question are examined minutely, frame by frame, for anything that might help the police with their enquiries. Although this may be no more than a new and cost-effective way of conducting an age-old police activity, it is one job that police officers claim that CCTV can do well.[18] Given the alleged cost of conventional major criminal enquiries, and the apparent capability of CCTV networks to succeed at conducting them at little cost, this latterly discovered benefit may well be the real use of open-street CCTV systems in the centres of major cities. The use of the tape archive has been of great use in retrospectively investigating major crimes in Glasgow; but there has been little scope for this in Airdrie, which suffers few, if any, crimes of this seriousness.

It appears, then, that open-street CCTV works differently in different situations. Airdrie is a small town: Glasgow a major city. Many of those seen on screen in Airdrie were well-known to the local police as residents. In Glasgow, this was far less likely to be the case. For this and other reasons, instead of asking blandly "does CCTV work?" we need, following the advice of Tilley (1997), to ask what works, in what circumstances, and how.

We conclude: open-street CCTV can "work" in limited ways, but is not a universal panacea. It works in different ways in different situa-

tions, and future evaluation might choose wisely to concentrate on "how" rather than "if." In both locations studied, Airdrie and Glasgow, CCTV has been a different sort of success.

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NOTES

1. Brown (1995) is something of an exception, although it is more of an attempt professionally to reanalyse locally collected data from three very different areas.

2. These schemes are detailed in Annex A of Short & Ditton (1996). This report also contains a fuller analysis of the crime and offence and detection data discussed below. The collection and analysis of this statistical data was funded by the Scottish Office, to whom we are grateful.

3. Recorded crime and offence rates exhibit mostly inexplicable, but noticeable, seasonal patterns. These were extracted, in a formal sense, from the four years of data, and then deleted, leaving a seasonally adjusted residue. The underlying trend is the direction in which the recorded crime and offence "line" could have been expected to have gone if CCTV cameras had not been introduced. This underlying trend was calculated from trends in locally comparable areas where there were no cameras. This, too, was factored into the calculations.

4. These are standard regression lines, i.e., straight lines that minimise the *sums* of the *squared* vertical distances from the observed data points to the line.

5. Crimes are, generally speaking, more serious than offences. The groups are:

Group 1: *Crimes of violence, etc.* This group contains the most serious crimes; for example, murder, attempted murder, serious assault, handling of offensive weapons and robbery. Group 1 crimes total about 1% of all crimes and offences recorded by the police in Scotland.

Group 2: *Crimes of indecency.* This group contains sex crimes of violence (rape, attempted rape and indecent assault), lewd and libidinous practices, and prostitution. Group 2 crimes total about y_2% of all crimes and offences recorded by the police in Scotland.

Group 3: Crimes of dishonesty. This is the largest group, and contains housebreaking, theft of (and from) motor vehicles, etc., shoplifting, fraud, and other crimes of dishonesty. Group 3 crimes total about 38% of all crimes and offences recorded by the police in Scotland.

Group 4: Fire-raising, malicious mischief, etc. Group 4 only includes fire-raising and vandalism. Group 4 crimes total about 9% of all crimes and offences recorded by the police in Scotland.

Group 5: Other crimes. Group 5 includes crimes against public justice, drug-related offences, and other miscellaneous crimes. Group 5

crimes total about 5% of all crimes and offences recorded by the police in Scotland.

Group 6: Miscellaneous offences. Miscellaneous offences include petty assault, breach of the peace, and drunkenness. Group 6 crimes total about 12% of all crimes and offences recorded by the police in Scotland.

Group 7: Offences relating to motor vehicles. Motor vehicle offences include reckless and careless driving, drunk driving, speeding, unlawful use of vehicles, and various vehicle defect offences. Group 7 crimes total about 34% of all crimes and offences recorded by the police in Scotland.

6. One hundred eleven Group 1 crimes of violence were recorded in the 24 months prior to CCTV installation in the area surveyed by the cameras, with 99 being recorded in 24 months following installation. Six Group 2 crimes of indecency were recorded in the 24 months prior to CCTV installation in the area surveyed by the cameras, with 4 being recorded in 24 months following installation.

7. The net reduction in recorded crimes and offences is, calculating by this method, 841 fewer crimes and offences, which seems at odds with the reduction of 772 mentioned earlier. Of this difference of 69, 43 are accounted for procedurally, i.e., by one method totalling raw data and then adjusting for seasonality and controlling for underlying trends, and by the other method adjusting for seasonality and controlling for underlying trends and then totalling. This leaves 26 unaccounted for. These are probably accounted for by not including Groups 1 and 2 in the group totalling exercise. (Although both fell slightly in raw terms, this does not mean that adjusting and controlling might not have predicted increases.)

8. A crime or offence is detected, or, more properly, cleared up, "if one or more offenders is apprehended, cited, warned or traced for it."

9. If someone commits an offence while on bail, this is also recorded as a further offence of bail abuse.

10. Data for one test month (March 1994) were examined, and all crimes arid offences recorded were classified in terms of whether or not they were in CCTV vision. There are two ways of looking at each beat: first, the degree of geographical camera coverage; and second, the percentage of recorded crime occurring in the areas in vision. Beats were classified in terms of the second into those with very low penetration (beats 3, 7, 8, 9, 11, 36 and 37), those with low penetration (beats, 4, 19, 25, 27, 32, 33, and 34), those with high penetration (beats 10, 16, 20, 22, 23, 24, and 35) and those with very high penetration (beats 12, 13, 14, 15, 17, 18 and 21). These four areas together are henceforth referred to as the

CCTV visibility area. On analysis, no relationship was found between degree of CCTV penetration and either changes in recorded crimes and offences, or detections. This offers slight confirmation of the overall finding that CCTV has not had a noticeable effect on crime in Glasgow.

11. See Short and Ditton (1996). The one exception relates to the fact that in Glasgow, only three rather than four years' data were available. This was dealt with by reverse-extrapolating data for a fictitious preliminary year, which were then used to construct a model for seasonal deconstruction before the fictitious year was dropped from all further calculations. In fact, two fictitious preliminary years were constructed (one maximising the level of recorded crime that might have occurred, the other minimising it). Both were used independently before being discarded. There was no significant difference in the results obtained whichever fictitious year was used.

12. When calculated as a single total, the trend effect for the CCTV visibility area is of 1,802 more recorded crimes and offences (a 9% increase). When calculated separately, the sum of the group changes amounts to 1,892 additional recorded crimes and offences. The difference of 90 additional recorded crimes and offences is a procedural artifact created by, in the first exercise, totalling raw data and then adjusting for seasonality and controlling for underlying trends; and in the second, adjusting for seasonality and controlling for underlying trends and then totalling.

13. To some degree, changes in recorded crimes and offences and changes in detections may not be independent measures. Given relatively fixed police manpower, a reduction in rates of offending presumably frees more time to concentrate upon detections. Conversely, an increase in rates of offending leaves less time to concentrate upon detections. This may in part explain the difference between the outcomes in Airdrie and Glasgow.

14. A separate query relating to the adequacy of the test of CCTV's effectiveness is the conventional analyst's lament:-it is simply impossible to be sure that one has ever had all the relevant data at hand, and that analysis has not missed the operation of some ignored variable. An anecdote might suffice. Camera 12 in Glasgow (which saw more than three times as many arrests as any other camera) has been the success story of the whole installation. It is positioned overseeing a popular disco, which was a known trouble spot. Prior to installation, we have been told, a police van full of uniformed officers would be parked at the exit at the end of each evening. Nearby, an informal rank of taxis waited to take revellers home. After installation, the police van parked instead around the corner, and stayed in radio contact with the CCTV control room.

Thereafter, they could be alerted not only to any trouble, but also could be given descriptions of the offenders before appearing on the scene to arrest those thus implicated. Apparently to facilitate both recognition and tracking of offenders, the taxi rank was disbanded, allegedly on police advice. So, here, two simple crime and disorder prevention measures (the visible presence of police; and taxis in which the exuberant may leave peacefully) were discontinued, effectively encouraging offending for the camera to see. Is it any wonder that crime rates rose?

15. These interviews, reported in Short and Ditton (1998), were made possible by a small grant from the Nuffield Foundation, for which we are grateful.

16. Skinns (1997) suggests an impact somewhere between the two in his preliminary analysis of the effects of CCTV on crime in Doncaster. Doncaster is bigger than Airdrie and smaller than Glasgow. This suggests that town/city size may well affect the efficacy of open-street CCTV.

17. It is understood that this emerged relatively spontaneously in Glasgow. Apparently, an officer *on* light duties was given the task of searching for those attempting robberies at automated teller machines, with the expectation that any success, if any resulted, would take weeks to materialise. Again apparently, this officer identified those responsible in a day.

18. Glasgow's police have indicated that between April 1995 and June 1996, the CCTV archive has been used effectively in resolving 10 major incidents (including five murders and one attempted murder).