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Working Paper

Camera Surveillance as a Measure of Counterterrorism?

WWZ Discussion Paper, No. 2010/05

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Suggested Citation: Stutzer, Alois; Zehnder, Michael (2010) : Camera Surveillance as a Measure of Counterterrorism?, WWZ Discussion Paper, No. 2010/05, University of Basel, Center of Business and Economics (WWZ), Basel,
https://doi.org/10.5451/unibas-ep26668

This Version is available at:
https://hdl.handle.net/10419/123403

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Wirtschaftswissenschaftliches Zentrum (WWZ) der Universität Basel

April 2010

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WWZ Discussion Paper 2010/05
(B-099)

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Eine Publikation des Wirtschaftswissenschaftlichen Zentrums (WWZ) der Universität Basel.

Diese Publikation und das in ihr dargestellte Forschungsprojekt wurden durch den Förderverein des WWZ finanziell unterstützt.

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Camera Surveillance as a Measure of Counterterrorism?

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March 15, 2010

Abstract

Camera surveillance has recently gained prominence in policy proposals on combating terrorism. We evaluate this instrument of counterterrorism as resting on the premise of a deterrence effect. Based on comparative arguments and previous evidence on crime, we expect camera surveillance to have a relatively smaller deterrent effect on terrorism than on other forms of crime. In particular, we emphasize opportunities for substitution (i.e., displacement effects), the interaction with media attention aspired to by terrorists, the limits of real-time interventions, the crowding-out of social surveillance, the risk of misguided profiling, and politico-economic concerns regarding the misuse of the technology.

Keywords: Camera surveillance, closed-circuit television (CCTV), public security, deterrence, terrorism.

JEL classification: H56, K42

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The two authors gratefully acknowledge financial support from the Swiss National Science Foundation.

I. Introduction

Terrorist attacks are a serious threat for public security and are a challenge for both the private actors and public agencies involved in its provision.[1] Recently, camera surveillance has gained prominence as a measure for counterterrorism, and public security agencies in many countries plan to invest large amounts of money in this technology.

In this short paper, we propose essential questions that should be analyzed in order to evaluate this development in security policy. We draw on an economic approach to identify the relevant issues and refer to a wide spectrum of literature to inform our assessment of camera surveillance as an instrument in the fight against terrorism. In particular, research on the effectiveness of camera surveillance as a crime prevention tool provides interesting insights.

Camera surveillance or closed-circuit television (CCTV)[2], as it is often called, has received attention in the debate on terrorism policy after the London bombings in 2005.[3] On 7 July 2005, three bombs exploded on three underground trains, and one bomb exploded on a bus in the city of London, killing 52 commuters and the four alleged perpetrators.[4] The identification of the four suicide bombers strongly relied on CCTV footage.[5]

Two weeks after the first terrorist event on 21 July 2005, there were another four attempted bomb attacks on the London public transport system (British Broadcasting Corporation 2005b, Rasmussen 2005). This time, however, only the detonators of the bombs exploded. Still, public transport in the London area came to a complete standstill (id.).

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[1] In the economic analysis of terrorism (see, e.g., Frey 2004, Enders and Sandler 2006), different approaches have been developed to estimate its economic costs (for a survey, see Frey et al. 2007). In a specific application regarding the United Kingdom and France, the life satisfaction approach is introduced to evaluate the psychic cost of terrorism or the welfare gains from security in the absence of terrorism (Frey et al. 2009).

[2] According to Goold (2004, p.12), *CCTV* is defined as "a system in which a number of video cameras are connected in a closed circuit loop, with the images produced being sent to a central television monitor or recorded." One can categorize active (with people watching the recorded images in real-time) versus passive (only recording), and overt (obviously visible) versus covert (within protective shells or domes) systems – a variety of hybrid forms being implemented as well.

[3] In the United States, CCTV as a measure for safeguarding public areas against 'terrorist' activities gained considerable publicity in the aftermath of the 'D.C.-area sniper' case in 2002 (Wolfe 2002).

[4] For the events of July 7, see, e.g., the BBC's in-depth report (British Broadcasting Corporation 2005a).

[5] Official reports relating to this London bombing were compiled by the Greater London Authority (2006), the House of Commons (2006), and the Intelligence and Security Committee (2006).

Immediately after the terrorist attempts, CCTV images of four suspects were released, which were used to help arrest the perpetrators (British Broadcasting Corporation 2005c).

As a result of these London events, agents on the demand- and the supply-side have requested and pledged investment in camera surveillance for the public transport system. For instance, a legal studies research paper from the Center for Health and Homeland Security at the University of Maryland states: "The foremost method of deterring and responding to those kind of [terrorist] attacks is the use of CCTV. The price tag is high, but worth it" (Greenberger 2006, p. 8). In the same vein, the French Interior Minister Alliot-Marie announced: "France will triple its number of video surveillance cameras by 2009 as part of its fight against terrorism and street crime" (Reuters 2007).

In the United Kingdom in 2009, large-scale advertisement campaigns encouraged the population to report suspicious objects or activities potentially related to terrorism. Subsequent to this, the CCTV installations themselves conjecturally became terrorist targets. An ad shows a quiet street scene with people and the accompanying text: "A bomb won't go off there because weeks before a shopper reported someone studying the CCTV camera" (Metropolitan Police Service 2009). In the light of this development, the simple curiosity of passers-by regarding CCTV installations is likely to be interpreted as an indicting act. This is a noticeable outcome, as actual terrorists have never been detected spying out CCTV cameras.

A series of immediate questions arises. What theory underlies the proposal in support of camera surveillance as an instrument of counterterrorism? What is the evidence for its effectiveness? What can be learned from the experience of CCTV being used as a crime prevention method? Are there differences involved in using CCTV as part of an anti-terrorism instrument and do these matter? Finally, what are the possible side effects of an counterterrorism policy based on CCTV?

In our subsequent discussion, we offer some analysis and input that should help address these questions. In Section II, the deterrence hypothesis is presented as the theoretical basis supporting the use of CCTV as a counterterrorism measure. We confront this hypothesis with a review of the empirical evidence in Section III. Potential (unintended) side effects of CCTV, such as displacement effects, are discussed in Sections IV. We conclude with an assessment of CCTV surveillance as a response to terrorism in Section V.

II. The Deterrence Hypothesis

Camera surveillance is probably the most rapidly spreading and, at the same time, one of the most controversial instruments in security policy today. This fast-developing technology basically enables a ubiquitous surveillance of public and private space, and security agents benefit from its enhanced capabilities for detecting or retracing criminal activities. Camera surveillance signifies (i) a general extension of public surveillance systems and (ii) a shift from direct, personal or print surveillance to remote, electronically transmitted, and even computer-enhanced self-monitoring, visual surveillance.[6]

By triggering perceptual mechanisms in potential offenders, CCTV aims to increase the perceived risk of being detected, captured and possibly arrested. This trigger should raise the cost of a contemplated offence in the mind of a (limitedly) rational potential offender, be the intended act of a criminal or terrorist nature. Focusing on the surveillance and deterrence function of CCTV, the economics of terrorism based on the traditional economic approach to crime implies that the dissemination of camera surveillance enhances control capacities, and leads to a partial replacement of human capital by technological investments, thereby increasing the productivity and efficiency of policing. CCTV-systems are thus expected to promote the substitution of legal and decent behavior for illegal and deviant behavior, and thus ultimately reduce terrorism in the monitored area.[7]

Recorded images are also utilizable ex post as they support terrorist scene investigations or serve as proof material. Consequently, this new electronic surveillance technique is expected to have positive first-order effects both on the efficiency and effectiveness of security production: It enables broader detection capabilities at equal costs, thereby resulting in a decline in terrorism and an increase in public security.[8]

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[6] Second generation CCTV accelerates this process by providing digitalized images that can be automatically processed by recognition software, increasing the scope of surveillance and potentially also reducing monitoring costs (see, e.g., Norris and Armstrong 1999; Surette 2005).

[7] Of course, the primary objective of CCTV is often seen in the reduction in crime and public disorder. Recently, the effects of CCTV on public fear of crime or feelings of security have also gained interest (see, e.g., Deisman 2003 as well as Gill and Spriggs 2005). The effect on civil liberties and individual privacy is another prominent issue. It is not discussed here (but see, e.g., Cavoukian 2008).

[8] Other potential benefits of CCTV, such as supporting the provision of medical assistance or facilitating place management and information gathering (e.g., for marketing purposes) are beyond the scope of this study. For a short discussion of some of these issues, see Ratcliffe (2006).

Analyses of criminal activity indicate various mechanisms by which CCTV possibly deters terrorist activity:

- Deterrence of terrorist behavior by signaling an elevated risk of apprehension; i.e., the costs of terrorism rise if CCTV is perceived as reducing the time available for committing attacks;
- Detection, identification and possible incapacitation (arrest) of offenders as well as the identification of potential witnesses (who might otherwise be reluctant to come forward) are the potential benefits of CCTV used uniquely as an evidence-gathering tool against terrorism;
- Effective deployment (and intervention) of security personnel or police to critical situations, thereby supporting the apprehension of suspects and providing back-up security for police officer safety;
- CCTV might signal the force of a concerted political offensive against terrorism, thereby encouraging the active commitment of law-abiding citizens and personal surveillance (by stimulating moral courage, community pride and cohesion).

There is also the possibility that the above-mentioned terrorism-reducing benefits of CCTV extend beyond the areas directly monitored by cameras (referred to as a 'diffusion of benefits'). This can happen if potential offenders are aware of the presence of CCTV but unaware of its capabilities or the covered range.

III. Evidence on Camera Surveillance Effectiveness

The existing evidence regarding CCTV effectiveness is focused purely on the prevention of crime. We are not aware of any study that has tried to empirically assess CCTV effectiveness in the prevention of terrorism. The evidence backing CCTV effectiveness as a situational crime prevention measure is mixed, to say the least.[9] In the following, this evidence is briefly summarized and commented on in order to outline the issues that need to be considered when evaluating CCTV in the context of terrorism.

The empirical key findings regarding the effect of CCTV on crime can be summarized as follows:

First, most of the studies that show CCTV to have a restraining effect on criminal activity (i) were carried out in the United Kingdom and (ii) concentrated on camera

[9] For surveys see Welsh and Farrington (2003, 2009) or Gill and Spriggs (2005).

surveillance as applied to car parks. Moreover, the vast majority of existing CCTV evaluations originate from the United Kingdom. Almost all studies from other geographic areas (such as the United States or Scandinavia) do not provide clear evidence of it having a moderating effect on crime.

Second, the effect of CCTV depends upon the type of crime considered: By affecting the expected costs of criminal behavior incurred by the criminal, this type of electronic visual surveillance seems to be more effective at combating planned or premeditated criminal behavior such as property offences (such as car crime and, a bit more ambiguously, burglary, simple theft, shoplifting, and arson) than at preventing emotionally driven, impulsive violence. This might explain why, in general, CCTV works better in car parks than on public squares and in broad mass transit systems.

Third, the location under CCTV surveillance is relevant to its effectiveness. While crime appears to be manageable (to some extent) by CCTV in small, enclosed or at least well-defined areas with limited and controlled access points (such as parking lots and car parks), there is hardly any significant evidence regarding highly frequented public spaces with open access (such as 'hot spots' in city centers). Interestingly, the latter areas are exactly the ones where the application of CCTV is currently spreading most rapidly. However, in most contexts in which it has been implemented so far, CCTV is, at least, unlikely to aggravate the problem of crime.

Fourth, the way CCTV systems are operated and managed influences their effectiveness (Gill and Spriggs 2005, Cavoukian 2008): Factors like the number and types of cameras (pan, tilt, zoom, multiplexing; resolution; fixed versus re-deployable), camera coverage (density) of the area, control room operations (staffing; 24-hour active versus passive monitoring; implemented software solution), system management skills, formulated objectives of the scheme, and the involvement of the police and other law enforcement agents all have an influence on CCTV effectiveness.[10] However, these insights are often based on limited evidence. It is still open to future research to help identify the features that make CCTV schemes a success or a failure (Deisman 2003). Information on these important implementation aspects should be provided by future CCTV studies, especially as these systems and their operation need not be static but are modified and upgraded from time to

[10] For example, as long as first-generation CCTV systems with relatively low-resolution standards are implemented, only very few crimes are detectable ex post. Bowcott (2008) and McSmith (2008) report only three per cent of London street robberies being solved by CCTV.

time. For instance, in a recent study, the effectiveness of CCTV in 84 Stockholm subway stations is linked to the immediate possibility of police intervention (Priks 2009). The introduction of CCTV is found to systematically reduce crime in city-center stations that are in the vicinity of police stations, but not in peripheral parts of the metro system.

Fifth, CCTV generally has an ex post investigative utility, at least as long as the recordings are stored for sufficiently long time periods and the relevant visual information is easily searchable. However, there is also evidence of an experience-based adaptation in criminal behavior patterns.[11] This undermines the suitability of CCTV as a crime-prevention and evidence-gathering tool.

A general caveat casts a shadow over the evidence on CCTV effectiveness (i.e., there are various methodological difficulties in demonstrating a *causal* relationship between CCTV and criminal behavior). Even though natural field experiments seem technically feasible, we are not aware of any institution that has chosen this approach to understanding the consequences of camera surveillance. Instead, researchers have had to deal with the challenges of evaluating non-experimental data.

Importantly, omitted variables pose a challenge. In addition to CCTV, often other situational crime prevention measures are applied or other conditions affecting illicit behavior change simultaneously with the introduction of CCTV. A relevant example is the deployment of police patrols. The intensity of area policing may change over time, and potentially systematically, where the application of CCTV serves either as a substitute or as a complement within a new security scheme. If third variables that affect the outcome variable are correlated with the use of CCTV, the estimated correlation for CCTV is biased. If the omitted variables act simultaneously, the correlation for CCTV measures a net effect of several security measures.

Another challenge is that the introduction of CCTV (i.e., the intervention) might not be independent of the phenomenon that is to be explained; e.g., the level of illicit behavior. The use of CCTV might then easily be positively correlated with crime in cross-section analyses. A similar bias may result in a time-series perspective. CCTV schemes are installed subsequent to intensified episodes of criminal activity. Depending on the evaluation framework, biases in either direction might emerge. Regression towards the mean (i.e., an

[11] Edmunds et al. (1996) provide interesting evidence on tactical displacement in Australia, where drug markets continued to operate in the presence of CCTV by adapting certain operating practices.

extreme level of crime in an area in one period is followed by a moderate level of crime in the next period) might spuriously indicate a deterrence effect after the installation of CCTV. If the exogenous effect on crime, that also provoked the adoption of CCTV, remains, CCTV schemes are spuriously associated with higher crime rates.

Finally, the use of CCTV might directly affect the dependent variable if there is a statistical recording effect. If CCTV footage is simultaneously used to counteract illicit behavior and to improve its measurement, no conclusions on the deterrent effect can be drawn.

In order to permit an evaluation of the consequences of CCTV schemes, future implementations need to be carefully considered with regard to the context in which they are implemented as well as the objectives they aim to achieve. A high-quality evaluation design must be developed ex ante. This includes the possibility of crime mapping before the introduction of CCTV as well as in long follow-up periods. Moreover, circumstances that potentially affect the effective use of CCTV should be recorded and observed over the entire evaluation period. A better understanding of the circumstances is also necessary if the insights from crime prevention are to be transferred to terrorism prevention.

IV. Displacement Effects and Other (Unintended) Side Effects

a) Diverse Displacement Effects

CCTV is expected to deter terrorism by providing potential terrorists with an incentive to adopt legitimate methods for pursuing their goals and renounce illegal ones. However, the terrorist's response to CCTV is not clearly predictable, and substitution effects might occur that are not only unintended but also unwanted. In the economic analysis of terrorism, the substitution of targets is a well-known phenomenon that has been well-documented with regard to tightened security measures at airports (see, e.g., Enders and Sandler 2006).

The introduction of metal detectors has proven successful in substantially reducing skyjacking (id.). However, aggregate terrorist activity has not decreased due to this improvement. Instead, only shifts (displacement effects) in the type of terrorist attack have taken place in response to changes in relative costs: from skyjackings to hijackings of other means of transportation as well as hostage takings.

With regard to CCTV, we are not aware of any scientifically documented substitution effect relating to terrorism. We, therefore, again refer to crime when discussing the substitution issue, where the term *displacement* is generally used.

So far, the side effect most dominantly discussed in the literature on CCTV is the possibility that territorial (or spatial) displacement might result from electronically monitoring specific locations, and, implicitly, from not monitoring others. As Norris and Armstrong (1999, p. 92) have pointed out, "anticipatory conformity may be a strictly temporal and spatial phenomenon, with those individuals with deviant intentions shifting the time and place of their activities to outside the camera's gaze."

Crime then eventually shifts to more peripheral public and private areas that are not monitored (spatial, territorial, or geographic *displacement*), where negative effects arising from associated externalities may not only alternate, but also aggravate.[12] Moreover, an adverse selection process can crowd people with an ambivalent attitude towards social order (and unwilling to exercise social control) out of monitored areas and thereby lead to smaller regroupings – a micro-regional segregation in the social composition of the public – thereby worsening the problem of surveillance gaps in camera-free places.

Temporal displacement may also occur if cameras do not operate around the clock or if there is insufficient street lighting around the cameras at night. Besides territorial and temporal displacement, Reppetto (1976) identifies the possibility of 'tactical' (change in method), 'target' (change in victim), and 'functional' (change in type of crime) displacement.

Although previous literature views displacement effects almost unequivocally as negative, they need not be unintended. Some displacement of criminal, illegitimate or 'anti-social' behavior to less centrally located areas can be a politically intended outcome. Intended and unintended displacement should therefore be differentiated in any thorough discussion of CCTV.

There is some evidence for a territorial displacement of crime due to CCTV.[13] "[B]ut – as is the case with the general crime prevention literature – the amount of crime displaced

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[12] Bulos (1995, p. 9) reported that the use of CCTV to revive a town center resulted in "young people being displaced by town centre improvement schemes to (…) environments which are unsafe for them such as alleyways and subways."

[13] Brown's (1995) evaluation of the schemes in the city centers of Birmingham and Newcastle-upon-Tyne show some displacement. Squires' (1998) study on Ilford, England, and Mazerolle et al. (2002) on the Findlay market scheme in Cincinnati, Ohio (USA), also report displacement effects in the

rarely matches the amount of crime reduced. There is usually a net gain for crime prevention" (Ratcliffe 2006, p. 15). Moreover, the identification of displacement effects is a methodological challenge. The measurement of territorial displacement (as well as of the territorial diffusion of benefits) requires that at least two control areas are examined: one adjacent and one non-adjacent (but still comparable) control area. Here, changes in crime in the adjacent area relative to the non-adjacent area are considered as being the result of substitution behavior. Changes in crime in the treatment area relative to the non-adjacent area are interpreted in terms of deterrence.

Regarding technological improvements, such as computer-enhanced or 'intelligent' surveillance, Surette (2005) supposes that these are likely to stimulate spatial displacement as computer vision systems become more effective in detecting and identifying criminals. Depending on the software installed and the visual recognition software used, various forms of *tactical* or *target* displacement, as new and non-predicted forms of behavior are likely to appear in the future. At the same time, a less error-prone 'intelligent' surveillance system is expected to enhance the diffusion of benefits.

b) An 'Arms Race'

One possible consequence of crime-shifts due to displacement is the emergence of a social dilemma triggering an *'arms race'*. Activists, neighborhood politicians, communities, cities and even countries face a difficult choice when deciding to make CCTV investments. Many interested parties might prefer not to employ CCTV and, instead, be willing to tolerate a certain level of crime and risk of terrorism. Others, again, speculate that the posture of being tough on crime and terrorism shifts part of the problem to other areas. Moreover, these parties recognize that they are affected by investment decisions made when crime and terrorism are displaced. They realize that they are obliged to invest in CCTV in order to avoid being losers. If these motivational forces are strong, they will lead to over-investment in cameras and an excessive use of electronic surveillance, which finally results in a supra-optimal level of surveillance (and, thus, in a negative-sum game). Analysts have repeatedly observed (Davies 1996, Nunn 2003) that cities were willing to install CCTV systems simply because neighboring communities did so. Of course, this is not per se evidence of an arms race as implementation might be due to mimicking behavior in the process of policy diffusion.

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context of city centers. Flight et al. (2003) find some displacement as well as some immediate diffusion of benefits into other areas. About the same number of studies measures little or no amount of displacement.

c) CCTV and the Media – A Vicious Circle

Media coverage provides another reason for the expansion of CCTV beyond any rationale based on its scientifically established effectiveness in reducing crime or terrorism. In an ever-closer relationship between CCTV and visual media (television, world wide web, newspapers), a 'feedback loop' might result and further stimulate growth in CCTV surveillance. The CCTV images shown daily on television news programs cause public anxiety, elevate public perception of risk regarding crime and terrorism, and in turn, encourage public demand for extending CCTV systems (Jermyn 2004, Surette 2005).

d) Information Overflow

The prolific growth in the number of cameras also incorporates a risk that the enormous quantities of visual date provided will exceed the evaluation capacities necessary for its analysis. An information overload can occur either if the proportion of screens that can be watched live falls far short of the scenes under surveillance (Patel 1994) or if the amount of data exceeds the storage space capacity available for the time span required. While the first problem primarily undermines the *ex ante* deterrence function, the second aspect also erodes the capability of CCTV images to provide *ex post* detection and evidence.

Specifically, there is a constraint regarding the number of monitors that can reasonably be watched by a single person: Usually, it is proposed that no more than two screens should be simultaneously watched per control room employee (Brown 1995, Surette 2005). In any case, the issue of boredom is also closely related to data swamping and can lead to insufficient processing of the available visual information.

e) Negative Incentives for Taking Private Self-Prevention Measures

CCTV might give individuals a biased and false sense of security and thereby cause potential victims to become more vulnerable. If individuals neglect or under-invest in private precautionary measures (e.g., lower subjective alertness and verbally provocative or abusive behavior) in the presence of CCTV, a moral hazard problem arises, and prevention costs are externalized. An incentive problem may arise where people wear more conspicuous, expensive jewelry or do not walk in groups when out at night (Welsh and Farrington 2003).

f) Crowding-out of Social Surveillance

Apart from undermining private (self-) prevention incentives, social control can be crowded out, diminishing moral courage, undermining social cohesion or even aggravating tendencies of individuation. Ultimately, the 'electronic eye on the street' (Fyfe and Bannister 1998) might corrode informal guardianship in public spaces, which was coined by Jacobs (1961) as 'spontaneous' or 'natural surveillance'.

Alternatively, CCTV coverage might also serve to "encourage broader based public interactions between classes, races, and ages by increasing a shared sense of safety" (Surette 2005, p.165) and thereby stimulate social guardianship. So far, very little advance has been made in the empirical analysis of the social consequences of electronic surveillance techniques, and, therefore, no reliable conclusions have yet been drawn. Surette's (2006) study suggests that the installation of CCTV does not diminish informal citizen guardianship.

g) Profiling and Discrimination

Security camera footage examination necessarily has a selective nature. Accordingly, control room operators and judges possess a certain degree of discretionary authority with regard to the outcomes of comprehensive monitoring. In particular, there is a higher likelihood of profiling, stereotyping and discrimination occurring in the absence of formalized imperatives and specific guidelines. The question of who is authorized to control CCTV-generated content is, therefore, also a central issue determining the system's public acceptance (Surette 2005).

Williams and Johnstone (2000) observe instances of systematic, selective racial and socio-economic profiling by CCTV system operators who aim their cameras at social groups that they subjectively judge as being high-risk or more likely to behave defiantly, especially young black males. Discriminatory CCTV monitoring and a tendency towards racial and ethnic profiling in evidence gathering and law enforcement were also observed by Ditton and Short (1999), Norris and Armstrong (1999), and Norris (2001).

A tacit use of markers based on some sort of profiling potentially leads to a self-fulfilling prophecy. By keeping some people with specific characteristics under close surveillance, these people are more likely to be observed with deviant behavior (independently of whether they have a higher base rate for some norm violation). This process reinforces biases against people who share the specific characteristics; this might be particularly relevant for minor offenses that can be observed with CCTV.

In contrast, profiling might be largely ineffective if applied to terrorism suspects. Particular shortcuts to identify suspicious individuals are only available ex post or recognized with hindsight. Moreover, targeted people or terrorist organizations are expected to be conscious of and react to the risk of intensive scrutiny; for instance, terrorist leaders now recruit more women instead of men for possible future suicide bomber attacks.

V. Assessment of CCTV Surveillance as a Response to Terrorist Threats

Camera surveillance as an instrument of counterterrorism rests on the premise of a deterrent effect that motivates potential terrorists to abstain from illegal activities when pursuing their political and religious goals. Again, this may happen through ex ante identification of suspicious persons of packages or by aiding ex post identification and apprehension of perpetrators. While CCTV footage played a prominent role in the identification of the men alleged to be responsible for the first London bombing in July 2005 and in the arrest of the men involved in the attempted attacks two weeks later[14], no systematic evidence exists on whether terrorist activity is actually deterred by CCTV.[15] The review of the evidence on camera surveillance as a crime prevention tool suggests that CCTV effectiveness is rather situation-specific. However, the conditions for its successful application have not yet been systematically explored.

Based on the economic analysis of illegal behavior, we expect CCTV to have less of a deterrence effect in the case of terrorism than in the case of street crime. Surveillance appears less effective where the substitution possibilities for terrorist attack targets seem almost unlimited. Property crime targeting lucrative gains becomes relatively less attractive under surveillance. In the case of suicide bombers, any increased risk of apprehension due to CCTV only acts as a deterrent where a potential failure of the attack is considered. Otherwise, the perpetrators are "dead anyway" and potential ex post identification is irrelevant to crime prevention.

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[14] CCTV started to play an initiating role as a measure of counterterrorism already in the aftermath of the Irish Republican Army's attack on Bishopgate (in the City of London). This lead to the introduction of a vast traffic CCTV network, the so-called 'Ring of Steel', recording licence plates on nearly every vehicle entering central London (Norris and McCahill 2006).

[15] However, the recorded images and the subsequent identification allowed police to trace their movements on the day of the attack and, ultimately, to identify their point of origin and bomb-making equipment in Leeds (UK). Interestingly, this reconstruction of the terrorists' behavioural patterns required the inspection of even more CCTV footage from other areas far away from the ones targets (Steel 2005).

In contrast, camera footage increases public attention to the terrorists' activities and might facilitate the attribution of attacks to specific terrorist networks. Terrorists paradoxically often actively exploit both of these aspects: They choose locations and targets as well as the timing of attacks in order to generate as much media attention as possible (for the relationship between the media and terrorists, see, e.g., Hoffman 1998 and Wilkinson 2000). Accordingly, targets under camera surveillance might become more and not less attractive.

A further argument regards the capacity of CCTV to enable real-time intervention prior to an attack. This argument depends on an assumption that terrorist behavior is about as self-evident as the technical problems arising in production processes monitored by CCTV. However, terrorists are careful to avoid suspicion by means of covert behavior; here, an interpretation of non-routine behavior is highly ambiguous and complex. Behavior is often only declared to be clearly suspicious in the light of hindsight.

Moreover, the possible side effects of an anti-terrorism policy based on CCTV have to be considered. First, if a strong positive link is evident between CCTV and public perceptions of the terrorist threat, this will imply that CCTV exacerbates rather assuages public fear. According to Viscusi and Zeckhauser (2003), people are inclined to predict worst-case scenarios and are susceptible to anxiety owing to reports of anomalous events in other risk perception contexts. The hindsight bias and embeddedness effects are particularly evident for terrorism-risk perception. Downes-Le Guin and Hoffman (1993) contend that the probabilities accorded to expectations of terrorism are significantly higher than those accorded to other life-threatening acts. If the likelihood of a terrorist attack is presented as an immediate threat (as in the UK ad campaign described in the introduction) and even linked to people critically studying CCTV, this is likely to increase general suspicion and undermine communal trust in fellow citizens.

Second, the expanded application of CCTV to the field for terrorism prevention can probably partly be explained by its limited success in the field of crime prevention. This expansion of CCTV demands that the potential (mis-)uses that are beyond its designated function are carefully considered. In particular, there is the temptation to use the technology to deal with less serious offences,[16] even though the use of CCTV on public ground for investigatory purposes is restricted to the specific function of crime and terrorism prevention

[16] Some cases have been reported, e.g., in the BBC News (British Broadcasting Corporation 2008) in an article entitled "Spy law 'used in dog fouling war'".

in many countries (e.g., the 2000 Regulation of Investigatory Power Act in the United Kingdom).

The latter arguments highlight the politico-economic considerations that have to be taken into account when evaluating CCTV. It is difficult to explain the prolific diffusion of CCTV as being the result of demand-side, evidence based optimal policy implementation. This development has rather been a consequence of the strong supply-side influence of the private security technology industry. After September 11, the security industry was given the opportunity to sell its products to the police and other state security units that had benefited from massively increased budgets.[17] This entailed that CCTV systems had to be standardized and modernized so that they could be integrated and centrally controlled (Webster 2009). On the demand side, the bureaucracy responsible for security was committed to expanding the scope of CCTV surveillance. Actual or potential terrorist incidences justified calls for increased monitoring. The sale of surveillance systems became subject to a ratchet effect, owing to the innumerable possible targets for terrorist attacks, and the associated security gaps.

There is another – more fundamental – public choice aspect challenging previous assessments of CCTV policies. This is the implicit assumption of a benevolent 'CCTV operator'. While political actors who are held accountable in a democratic process have incentives to use surveillance for the benefit of their constituency, this is less clear in a corrupt system with weak democratic institutions. The elite in power can exploit CCTV footage to fight their political opponents or critics of the regime who are branded subversives or even terrorists. This aspect must also be taken into account when CCTV technology is delivered to regimes in the fight against terrorism; regimes that are willing to use any available means to maintain their political power.

In our view, in order to achieve a successful implementation of CCTV, it is essential that all the aspects specifically influencing its efficacy as an anti-terrorism device should first be carefully analyzed and compared with alternative measures of anti-terrorism policy (see, e.g., Frey and Luechinger 2003 and Enders and Sandler 2006). The various measures should be compared both in terms of their effectiveness and the costs that they incur in providing public security.

[17] According to Haggerty and Gazso (2005, p. 169), "September 11th provided a convenient opportunity for the security establishment to lobby for increased surveillance, despite lingering questions about whether such devices can achieve their professed goals."

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