Cars and robbers
Has car theft crime prevention worked too well?

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ISS Paper 124 • March 2006
Price: R15.00

Introduction

In the late 1990s, anyone who looked at the state of crime in South Africa would have been forgiven for thinking that mere anarchy had been loosed upon the world: murder rates, though off their peaks, were still nudging 60 per 100,000; aggravated robbery was rising steeply after a low in 1996/97; and recorded carjackings rose by more than 20% between 1996/97 and 1998/99. Today things look different. Murder rates have fallen by nearly 50%, car theft and carjacking numbers are down 22% in absolute terms, and most other crimes are no worse than they were, and are frequently much better.

The one exception to this rule, however, is the rate of recorded robbery (both aggravated and common robbery) which, although coming down at last, rose faster and longer after 1994/95 than any other form of criminality. This paper offers some thoughts on why this was the case, arguing, in effect, that one of the reasons why robbery rates continued to climb until at least 2003/04 was that it became increasingly difficult for criminals to make a living by stealing cars.[1]

Some might think this argument implausible, suggesting instead that criminals specialise in certain crimes: car thieves steal cars, burglars burgle, muggers mug. The case for this, however, seems much weaker after a little thought. It may be true that it is harder to steal cars or burgle houses than to mug and that, for that reason, not all muggers can steal cars, but the reverse is not necessarily true. It follows, then, that if burglary or housebreaking becomes more risky or less lucrative, some who commit these crimes might turn to other forms of criminality. An examination of the evidence suggests that this might well have happened.

This paper argues that improvements in car security and policing, the spread of tracking technology, as well as improvements in the management of systems for the registration and re-registration of the ownership of the country's cars have, in effect, led to a form of displacement, with would-be car thieves turning their energies to other crimes.

It must be noted immediately that this paper does not claim that this form of displacement is the sole or even dominant reason why robbery rates continued to grow even as rates for other forms of property crime fell. There may be many other reasons why robbery rates rose. Statistical analysis presented below, however, suggests that the greater the decline in car theft in a station area, the greater the increase in aggravated robberies.

> Statistical analysis suggests that the greater the decline in car theft, the greater the increase in robberies

This paper consists of five principal sections after this introduction. The first looks at property crime trends and describes how dissimilar they are, with burglary, car theft and robbery moving in quite distinct directions. It is this fact that requires explanation: why did the trends for three crimes all committed for money, not change in more similar ways?

The next section confronts one potential challenge to this analysis which is that the increased number of recorded robberies is merely a reporting phenomenon. It argues that this is unlikely given the duration and pace of the increase, as well as the fact that much of it is concentrated in geographic areas where increased reporting due to improvements in policing is unlikely. Besides, there is also some evidence that reporting rates for robbery have actually fallen.

The next section looks at trends in car theft and car hijacking, describing how they have both fallen since 1998 and arguing that this is the result of improved policing, better systems and, especially, the introduction of tracking technology which has been linked to significant declines in car theft in other countries like the United States.

A fourth section looks at the relationship between the rise in robbery and the fall in car theft by testing whether there is a statistically significant relationship between the decline in the number of car thefts recorded in a police station area and the rise in robberies in that area. It finds that there is such a relationship.

Finally, the last section considers the implications of this analysis for public policy.

The limits of this paper

This paper has quite modest objectives. It does not seek to conduct a comprehensive review of the efforts of government and civil society to combat robbery or car theft. It does not seek to document everything we know or think we know about either of these two forms of criminality. It does not pretend to be a full account of the reasons these crimes have risen or fallen. It is, instead, a 'think piece' – a paper designed to stimulate thinking and debate about the nature of crime prevention in South Africa, its limits and its potential unintended consequences. It is hoped that readers will take from it a sense of the irreducible difficulty of planning, implementing and assessing crime prevention programmes in a complex world in which the effects of actions often cannot be predicted with any assurance.

Readers who seek here a comprehensive account of what works or fails to work will be disappointed. What they will find, however, is a potentially controversial discussion of a relatively sensitive topic. Hopefully, readers will accept the good faith of both the writer and the Institute for Security Studies when we offer the assurance that the analysis presented here is not intended to diminish or undermine the efforts and successes of government, the private sector and security companies to combat car theft. We hope, instead, to raise important policy questions in the expectation that these will be debated and discussed.

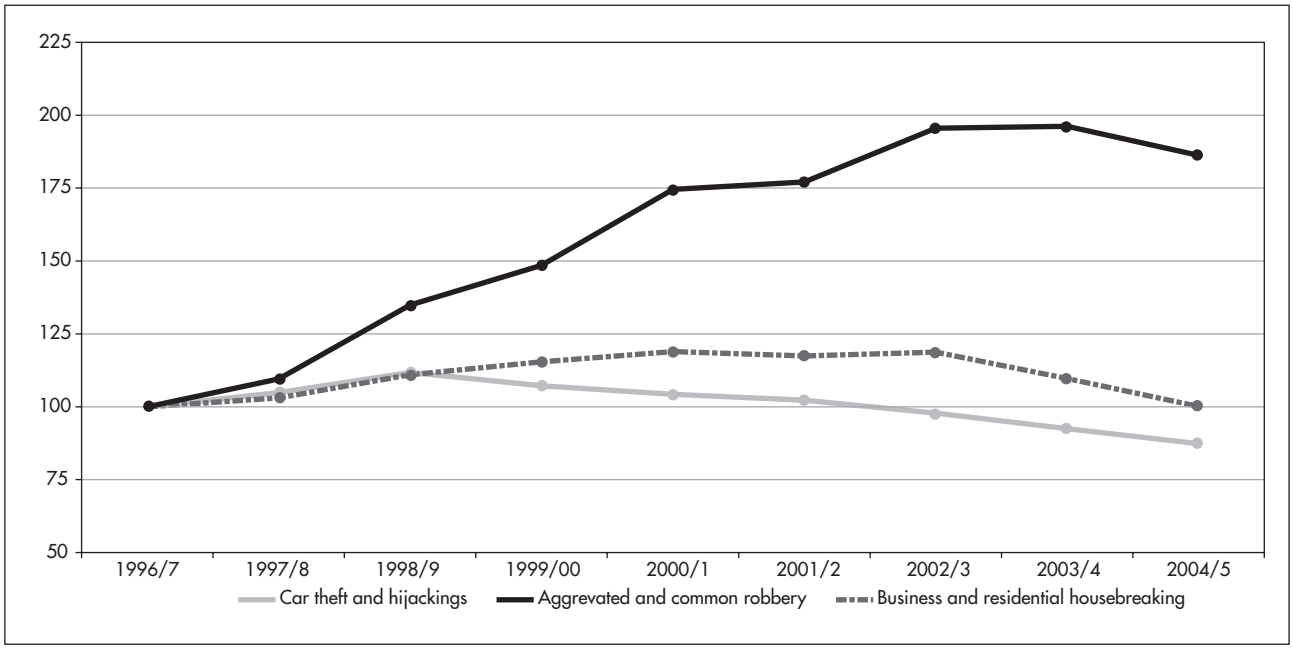
With that caveat in mind, it is now time to turn to the substance of the paper. The first matter with which we must deal is whether the observed rise in recorded robberies reflects only increased reporting or a real increase in the incidence of that crime.

Understanding property crime trends

There is something decidedly odd about the shapes of the trend lines of the key property crimes recorded by the South African Police Service. On the one hand, car theft and car hijacking have declined continuously since 1998 (having risen by nearly 12% over the previous two years). Robbery (here defined to include both aggravated robbery and common robbery), on the other, has risen quickly in all years except 2001/02 and 2003/04 (in each of which the total was similar to the year before) and 2004/05 (in which it fell by 8% relative to the previous year). Burglary (residential and business housebreaking), by contrast to both, rose slowly from 1996/97 to 1999/00, after which it was relatively static for three years before falling by 16% over the next two. Graphed (as in Figure 1), the trends look strangely incompatible.[2]

What explains these different patterns? Why is it that the trend-lines differ so markedly?

Figure 1: Stolen cars, burglaries and robberies in SA (1996/7 = 100)



Source: SAPS Annual Reports, various years

One possibility is that the trends differ in appearance only. This, at root, is the argument of those who contend that the rise in robbery between 1996/97 and 2004/05, has more to do with increased reporting than it does with any increase in underlying levels of criminality. This argument will be dealt with in a moment. Before doing so, however, we need to at least note the alterative: that the differing patterns of recorded crime reflect different trends in actuality; that robbery really did rise over a period in which burglary levels stagnated and car thefts actually fell.

To make such a case, however, requires confronting a serious obstacle: how does one explain that the trends for different kinds of property crime have moved in different directions?

This is not an easy question to answer because it is difficult to explain how the underlying causes of one crime are changing in ways that do not apply to the underlying causes of other crimes. What social or economic changes affect one crime, but don't affect others? The trouble here is with the way the notion of 'underlying causes' is usually understood, an understanding which makes it difficult to conceive of different crimes moving in different directions because of changes to these causes.

If property crime is 'caused' by socio-economic factors, how is it that some property crimes go up while others go down? The basic socio-economic causes of each type of property crime, after all, are similar. So too are the offender profiles.

If the notion of 'underlying cause' is conceived of somewhat differently, however, it might become possible to think about why some crimes increase and others decline – even if they are, in some respects at least, quite similar forms of criminality. In particular, if some measure of the reward that a prospective criminal might anticipate when contemplating the commission of a crime is included in the notion of 'underlying cause', ways to distinguish between the 'causes' of one form of property crime and the 'causes' of another may be found.

For example, imagine yourself to be a criminal seeking to obtain income by stealing from others. Imagine also that you can choose between mugging pedestrians (i.e. committing robberies) and stealing cars. What factors would influence your decision?

The most obvious is how much value you expect to realise from the crime.[3] Typically, a car is far more valuable than the contents of the pockets of even the richest potential mugging victim. If the value of the personal property carried by the typical mugging victim rises, this may lead to an increase in the number of muggings relative to the number of car thefts. It may be, therefore, that the rapid penetration of cell phones into the market after 1996/97 was itself an important factor in explaining the rise of robbery incidents in the last decade.

There are also other ways in which the relative value of car thefts and muggings can change, however. This is so because – except in the case of cash stolen in a mugging – the value of the haul to the criminal depends entirely on how much he can sell the items he steals for. This will depend both on who the criminal knows, as well as conditions in the market for stolen cars, cell phones, watches and jewellery. Thus strategies which affect these discrete markets differently may affect the relative desirability of stealing cars or mugging pedestrians.

If, for instance, the price of stolen cars is driven down while the price of stolen cell phones, watches and jewellery is not, criminals might be more likely to engage in muggings than they would have been had the price of stolen cars not fallen. Similarly, if the chances of being caught with a stolen car increase while chances of being caught with the goods typically stolen in burglaries and muggings do not, some car thieves may choose these other criminal strategies.[4]

If this is true then it is possible to conceive of reasons why some forms of property crime might have different trends to others. It may be, therefore, that the data for various forms of property crime tell us something about real trends rather than being simply a reflection of changes to reporting rates.

The increase in recorded robbery was not merely a reporting phenomenon

It is this view that the paper adopts. It is premised, in other words, on the conviction that the recorded increase in robberies between 1996/97 and 2003/04 is a reflection of what really happened even if it is not necessarily an accurate count of the changes in the annual number of robberies that occurred. It does not mean that changes to reporting rates did not occur. But it does mean that the increase in recorded robbery was not merely a reporting phenomenon. The case for this view is made more strongly in the next section.

This, however, is not the only objective of this paper. In addition to showing why it is plausible that robbery rates did rise, the paper will also seek to show that part of this rise is a result of the disruption of the market for stolen cars. It will argue, in other words, that some of the increase in robbery is a result of the displacement of criminal energy from the stealing of cars, which – for a variety of reasons including the advent and growth

of tracking technology – seems to have become somewhat less profitable for prospective car thieves than it once might have been. This tendency may have been accentuated by the rise in the expected returns to muggings attendant on the increased carrying of cell phones.

Explaining the rise in recorded robbery

An argument sometimes made about the increase in recorded crime levels in South Africa since 1994 is that much of it is explained by increased reporting rates rather than by any increase in the actual number of incidents. In effect, this argument implies that much of the perceived rise in crime is nothing more than a statistical illusion arising from the increased accessibility, legitimacy and service-orientation of the police. These factors, so the argument goes, have meant that crimes that previously went unrecorded are now reflected in official statistics.[5]

There is, of course, plenty of merit in this argument. We know, for instance, that during the 1980s and early 1990s, when the police were co-belligerents in a low-intensity conflict and were feared and hated by many, the reporting of crime suffered greatly. With the end of that conflict, there may well have been a reporting-dividend which was then reflected in the statistics, and which created the perception of a post-liberation crime wave.

We know also that, prior to 1994, the collection and reporting of crime statistics in the former Bantustans was undermined by the inaccessibility of police stations, the lack of training, poor record-keeping and inadequate information technology. Under those circumstances, even a crime that was reported might not have been properly aggregated into the official statistics (when these were collected at all). Recording lapses such as this may have undermined the accuracy of recorded crime figures, and the roll out of better systems and infrastructure, then, might also have led to an increase in criminality that was apparent rather than real.

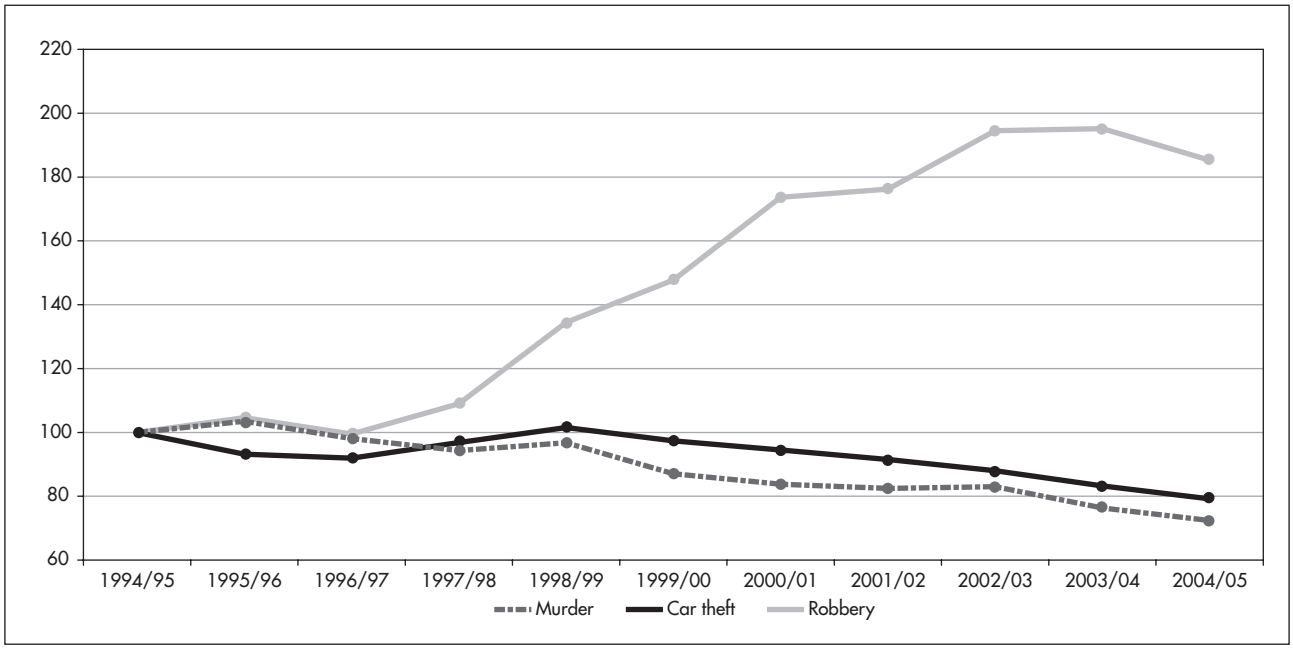
Given these factors, it is unsurprising that the decline in murders and car thefts (two very well-reported and -recorded crimes)[6] since the late 1990s has sometimes been taken as an indication that all crime (including robbery) was probably falling, the upward trend in the official statistics notwithstanding. Thus, as Figure 2 shows, the trend in robbery was, by fiat almost, deemed more or less illusory.

The trouble with the 'increase reporting did it' argument, at least as it relates to the rise in robberies, however, is that it seems to imply a rise in reporting rates that is very steep, very prolonged and, at the same time, very concentrated.

Can increased reporting explain the rise in aggravated robbery?

Between 1996/97 and 2003/04, recorded robberies rose by more than 10% a year, every year, for seven years. If this was solely a reporting phenomenon, it implies that reporting rates doubled over the period. That seems implausible, not least because if increased police legitimacy were an important variable in explaining increased reporting, one might expect the increase to have taken place over a relatively short period of time after 1994. Besides, the reporting

Figure 2: Robbery, murder and car theft trends (1994/95 = 100)



Source: SAPS Annual Reports, various years

Table 1: The 50 police stations in which aggravated robbery rose most between 1996/97 and 2003/04

Rank	STATION	Prop of agg. rob. in 96/97	Prop of agg. robb. in 03/04	Incr. in number of agg. robb. (96/7-03/4)	Prop of increased incidents	Cumulative increase in incidents
1	HILLBROW	2.0%	3.1%	2,791	4.2%	4.2%
2	DBN CENTRAL	1.4%	1.8%	1,488	2.2%	6.4%
3	PTA CENTRL	0.3%	1.2%	1,303	2.0%	8.4%
4	MAMELODI	0.5%	1.2%	1,229	1.8%	10.2%
5	SUNNYSIDE	0.1%	1.0%	1,183	1.8%	12.0%
6	KHAYELITSHA	0.6%	1.1%	1,075	1.6%	13.6%
7	WITBANK	0.8%	1.2%	1,067	1.6%	15.2%
8	BOOYSENS	0.9%	1.2%	1,023	1.5%	16.8%
9	NYANGA	0.4%	1.0%	1,021	1.5%	18.3%
10	POINT	0.3%	0.9%	951	1.4%	19.7%
11	KWAMASHU	1.1%	1.2%	893	1.3%	21.1%
12	MITCH. PLAIN	0.8%	1.0%	825	1.2%	22.3%
13	TEMBISA	1.3%	1.3%	786	1.2%	23.5%
14	RANDBURG	0.7%	0.9%	786	1.2%	24.7%
15	IVORY PARK	0.3%	0.7%	664	1.0%	25.7%
16	RIETGAT	0.2%	0.6%	649	1.0%	26.6%
17	JHB CENTRAL	2.6%	1.8%	639	1.0%	27.6%
18	YEOVILLE	0.5%	0.7%	614	0.9%	28.5%
19	EMPANGENI	0.6%	0.8%	581	0.9%	29.4%
20	MOROKA	1.0%	0.9%	574	0.9%	30.3%
21	TEMBA	0.3%	0.5%	550	0.8%	31.1%
22	RUSTENBURG	0.4%	0.6%	539	0.8%	31.9%
23	VANDERBIJLPARK	0.4%	0.6%	535	0.8%	32.7%
24	PARKWEG	0.4%	0.6%	533	0.8%	33.5%
25	JEPPE	1.1%	0.9%	528	0.8%	34.3%
26	HONEYDEW	0.3%	0.5%	519	0.8%	35.1%
27	INANDA	0.7%	0.7%	507	0.8%	35.8%
28	GUGULETU	0.3%	0.5%	497	0.7%	36.6%
29	ESIKHAWINI	0.4%	0.5%	495	0.7%	37.3%
30	VEREENIGING	0.4%	0.6%	494	0.7%	38.1%
31	KUILSRIVIER	0.3%	0.5%	490	0.7%	38.8%
32	BENONI	0.5%	0.6%	460	0.7%	39.5%
33	AKASIA	0.2%	0.4%	448	0.7%	40.2%
34	ATTERIDGEVILLE	0.3%	0.5%	447	0.7%	40.8%
35	LINDEN	0.3%	0.5%	443	0.7%	41.5%
36	MIDRAND	0.4%	0.5%	424	0.6%	42.2%
37	SANDTON	0.9%	0.8%	419	0.6%	42.8%
38	LOATE	0.3%	0.4%	412	0.6%	43.4%
39	KEMPTON PARK	0.6%	0.6%	411	0.6%	44.0%
40	SEBOKENG	0.5%	0.6%	409	0.6%	44.6%
41	UMLAZI	1.2%	0.9%	407	0.6%	45.2%
42	BOKSBG NORTH	0.4%	0.5%	402	0.6%	45.8%
43	PRETORIA WEST	0.2%	0.4%	400	0.6%	46.4%
44	NORKEMPARK	0.3%	0.4%	394	0.6%	47.0%
45	NEW BRIGHTON	0.3%	0.5%	392	0.6%	47.6%
46	MABOPANE	0.2%	0.4%	388	0.6%	48.2%
47	KANYAMAZANE	0.4%	0.5%	385	0.6%	48.8%
48	TOKOZA	0.2%	0.4%	379	0.6%	49.4%
49	MEADOWLANDS	0.4%	0.5%	379	0.6%	49.9%
50	ROODEPOORT	0.4%	0.5%	375	0.6%	50.5%
TOTAL		28.9%	39.8%	33,603	50.5%	

rate for robbery, as measured by the response to a question on whether the incident was reported to the police in two national victimisation surveys, fell from 41% in 1998 and only 29% in 2003.[7]

In any event, if reporting rates explained the entire increase in recorded robberies, we would expect the increase either to be felt generally across the country as a whole (since police legitimacy improved in all areas) or, if it were geographically concentrated, for it to be concentrated in those police precincts that were previously under-serviced (such as in the old Bantustans and townships) or, at worst, in precincts in which service delivery was perceived to have improved markedly. In fact, none of these possibilities explains the geographic footprint of the increased number of reported robberies which is highly concentrated, but not primarily in previously under-serviced areas or in former Bantustans.

Between 1996/97 and 2003/04, the reported number of aggravated robberies rose by a little less than 67,600.[8] As few as four stations (out of the more than 1,100 that operate) account for more than 10% of the increase, some 25% of the increase is accounted for by 15 stations, while 50% of the total increase was recorded in only 50 police stations, as reflected in Table 1 above.[9] The result is that the proportion of all robberies accounted for by these 50 stations rises from about 29% in 1996/97 to 40% in 2003/04.

These 50 stations are a fairly broad mix, though they include only a handful which fell within the borders of the former Bantustans. Suburban and inner city station areas are well represented on the list, and many of the stations, far from having a reputation for improved service delivery, are believed by many to have seen service standards drop. These are not, in other words, the stations we might have expected to see dominating this list if increased reporting rates alone were responsible for the increase in recorded robberies. Instead, what is common to many of the stations here is rapid population growth and/or diminishing economic welfare among the local community. They are, therefore, precisely the stations which one might have expected to see a real, as opposed to a merely reported, increase in aggravated robberies.[10]

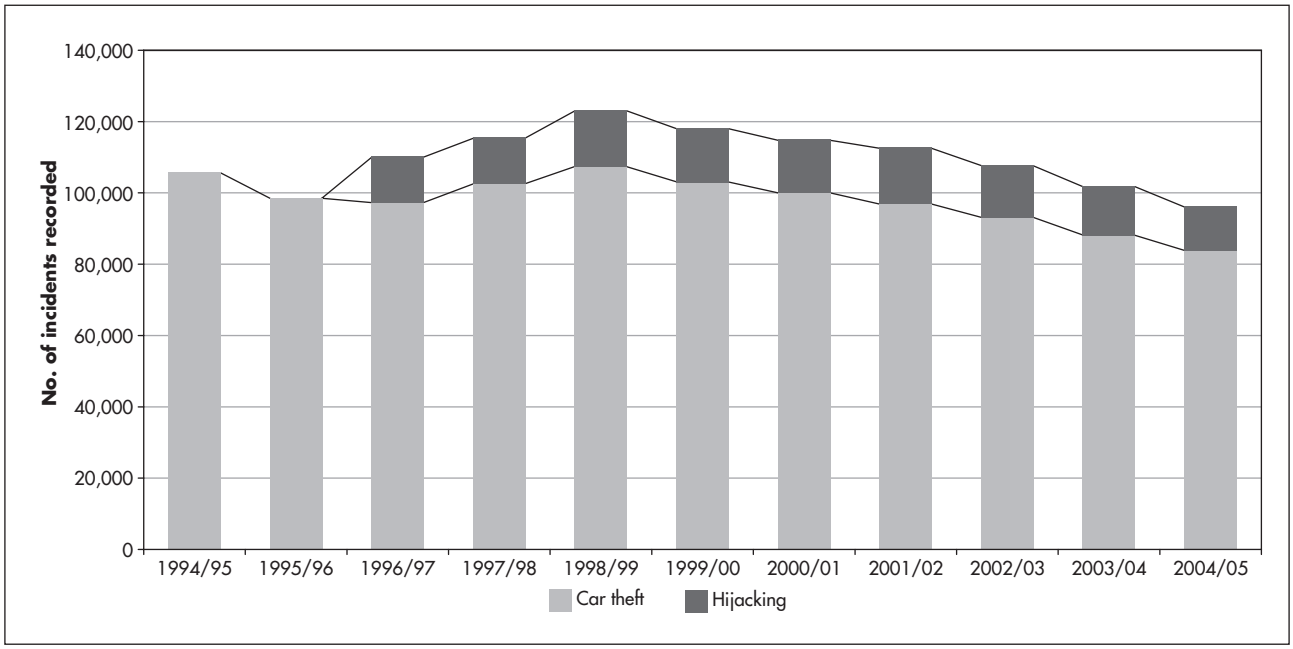
Given this, it seems very unlikely that reporting rates alone account for the increase in the number of cases recorded by the SAPS between 1996/97 and 2003/04. It is much more likely that there really was an increase in this kind of criminality, even if that increase was highly concentrated geographically.

The remainder of this paper seeks to establish whether or not the fall in car theft might explain all or some of the rise in robbery and, in particular, the rise in aggravated robbery. It will argue that there does appear to be a relationship of this sort. In order to make this case, however, it is first necessary to show that car theft rates might be driven down through factors that are unique to that form of crime. If that case cannot be made, it would be far harder to argue that the observed decline displaced some criminality towards other forms of crime.

Understanding car theft trends

Figure 3 tracks car theft and car hijacking from 1994/95 to 2004/05. Unfortunately, hijacking statistics were

Figure 3: Car theft and hijacking in SA



Source: SAPS Annual Reports, various years

kept only from 1996/97, so before that date we have no information about the extent of that particular crime.

As can be seen, despite a modest drop in the number of reported car thefts between 1994/95 and 1996/97, the number of incidents of theft and hijacking rose by 12% between 1996/97 and 1998/99. Over the next six years, however, both fell by more than 21%. What explains this?

Two answers are usually proffered to this question. The first emphasises the strengthening of the criminal justice response to car theft and hijacking, the elements of which include:

- improvements in the performance of detectives in tracing car thieves and hijackers, itself a function of some restructuring in the police service and assistance from Business Against Crime (BAC);
- improvements in the efficiency of courts, where specialisation has helped to raise conviction rates and in which a change in bail laws has led to far fewer captured car thieves and hijackers being released and skipping bail; and
- mandatory minimum sentences which have dramatically increased the severity of sentences handed down in hijacking cases; this, so the argument might go, both incapacitates those criminals who are caught and, more importantly, deters those who might be contemplating committing a crime of this sort.

The second answer relates to the improvements in the vehicle licensing systems managed by the Department of Transport which, with assistance from BAC, have been reengineered in order to make it far more difficult to re-licence stolen vehicles. This, in turn, is said to have disrupted the market for stolen cars and reduced their price.[11]

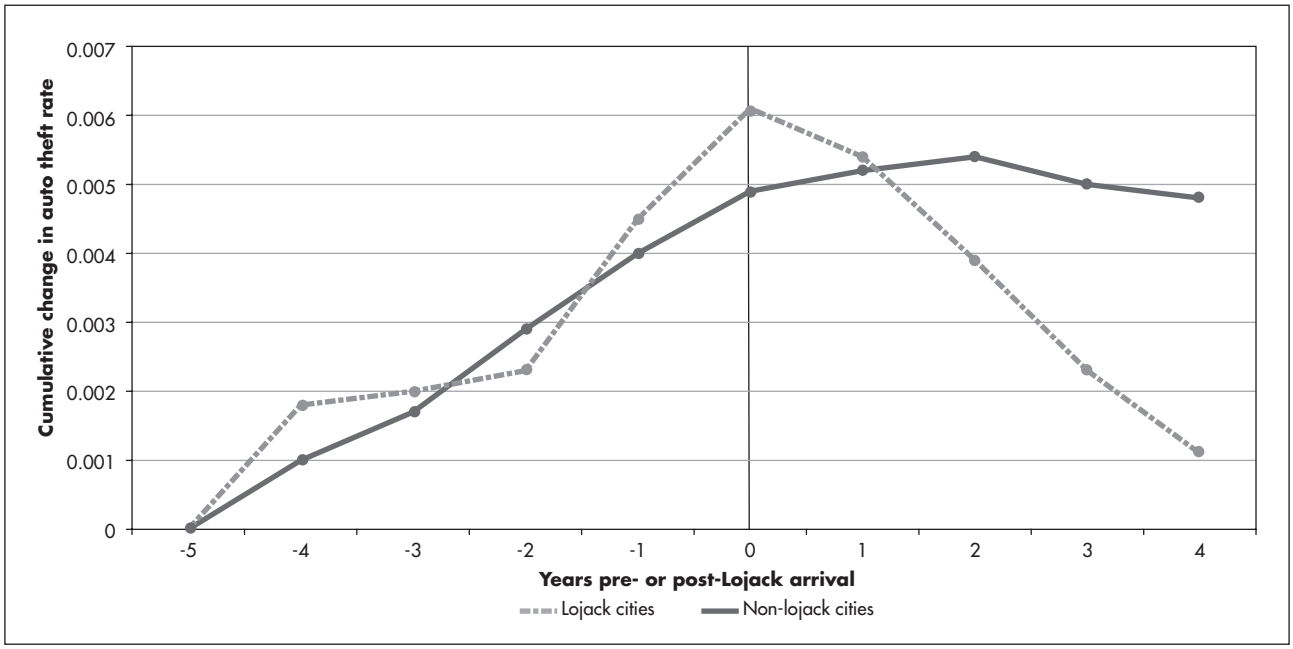
There is, no doubt, something to all of this. But, there is also another factor which may well have had an important impact in the level of car crime in South Africa: the penetration of vehicle tracking technology into the market since 1999.

How vehicle tracking can reduce car crime

In 1997, two economists looked at the impact of vehicle tracking technology in American cities in order to establish whether and to what extent it may impact on levels of car theft.[12] They knew that the technology – called Lojack in the USA – was not widely available and that its penetration of those markets into which it had been introduced, was limited. Nevertheless, because the US regulates this kind of technology at the county level, the fact that some counties had allowed the introduction of Lojack and others had not, meant that it was possible to track whether trends in car theft differed on that basis.[13] The results were remarkable and are summarised in Figure 4.[14]

The graph maps what happened to the per capita car theft rate in the five years preceding the introduction of Lojack into the six cities[15] in which it was used at the time, and compares that to the average changes in 44 other large American cities in those same years. As is apparent, the impact of Lojack was found to be dramatic and immediate. The analysts concluded that "four years after the introduction of Lojack, auto thefts per capita decline by 17.4%."[16] If this finding is translated into absolute terms, it appears that Lojack

Figure 4: Auto Theft and Lojack Availability (Lojack cities vs. non-Lojack cities)



Source: Ayers and Levitt, 1997

might have accounted for a decline in the number of car thefts of a good deal more than 20% over the first four years of its introduction depending on the rate of population growth in the cities in which Lojack was initiated.

Knowing how limited the penetration of Lojack into these vehicle markets was (it seldom covers more than 2% of vehicles on the road), the authors ask how such a large impact can be explained. The essence of their answer is that tracking technology changes the economics of car theft profoundly. This is because once tracking technology is in place, the odds are very high that law enforcement will track down a vehicle with one of these devices on board. That means that professionals involved in stealing cars – those who steal a large number of vehicles per year and, as importantly, the people who run chop shops – suddenly face an increased risk of arrest. As a result, they must either devote much greater energies to ensuring that they steal cars without the technology or find other ways in which to make a living.

In effect, this means that tracking technology changes the balance of risk and reward for a prospective car thief. On the one hand, if he is unlucky enough to steal a vehicle with the technology on board, he stands a greater risk of being caught. On the other, chop shop owners, nervous of being caught with a tracked stolen car, may either close down or insist on paying less for stolen cars. It is a lose-lose situation: more risk and smaller rewards.

In the case of US cities, Ayers and Levitt believe that Lojack has tended to lead these people to find other, legitimate sources of income, although there was also a small but observable tendency for older-model cars to be stolen; presumably because these were somewhat less likely to have a Lojack transmitter. This effect – that car thieves and chop-shop operators leave the 'industry' – may well have applied in South Africa. The difference is that, while in the USA it seems that the Lojack-induced decline in car theft did not result in a significant increase in other kinds of crime, that does not appear to be the case here.

Before getting to that, however, we need to look at the available data on car theft and, in particular, at the 'geographics' of this crime. This is necessary to show (a) that car theft declined fastest in areas in which tracking technology was most likely to be in place and (b) that the decline in car theft was often mirrored by an increase in aggravated robbery.

Having said that, it is not, strictly speaking, essential to show that car theft declined fastest in those places most likely to have seen the penetration of tracking technology. The simple fact is that, whatever the precise reason, car theft numbers have fallen quickly in South Africa over the past six years. Whether or not tracking technology alone or a combination of improved systems, better policing and more effective target-hardening is responsible for this is, on one level, irrelevant. What matters is whether the decline in that form of criminality appears to have precipitated, at least in part, a rise in another form of crime.

Where did car theft numbers fall?

Perhaps the most surprising thing about the decline in car theft is how concentrated it is in South Africa's major cities. The top ten police stations (as measured by the decline in the number of car thefts recorded between 1998/99 and 2003/04) are included in Table 2 along with the bottom ten stations which saw the largest absolute increases in recorded aggravated robberies.[17]

Table 2: The ten police stations with the biggest declines in car theft and the ten stations with the biggest increases in aggravated robbery

Top 10: stations with greatest declines in car theft	Absolute decline in cases	% of total decline	Bottom 10: stations with greatest increases in aggravated robbery	Absolute increase in cases	% of total increase
Sandton	-1,077	5.8%	Hillbrow	2,183	5.4%
Hillbrow	-1,018	5.5%	Durban Central	1,106	2.7%
PTA Central	-853	4.6%	Sunnyside	1,092	2.7%
JHB Central	-629	3.4%	Mamelodi	1,007	2.5%
Bedfordview	-613	3.3%	PTA Central	966	2.4%
Booysens	-602	3.2%	Nyanga	902	2.2%
Jeppe	-552	3.0%	Point	877	2.2%
Polokwane	-503	2.7%	Khayalitsha	803	2.0%
Sunnyside	-493	2.7%	Tembisa	748	1.9%
Mondeor	-455	2.5%	Mitchell's Plain	652	1.6%
Total	-6,795	37.0%	Total	10,336	26.0%

This table raises a couple of points. The first is that three stations – Hillbrow, Pretoria Central and Sunnyside – appear on both lists. Each is, in other words, among the very best performing stations in relation to the decline in the annual number of car theft cases, and, at the same time, among the very worst performing in relation to aggravated robbery. This is interesting since it suggests one of two possibilities: either there are differences in the causes of these two types of crime or that there is some element of displacement in operation. These two possibilities are not mutually exclusive. Indeed, one precondition for displacement to have occurred is that something affecting the level of one crime has changed without an offsetting change in the factors affecting the other kind of crime.

The second point is that the decline in car theft is concentrated in formerly white areas and the CBDs of our major cities, while the rise in aggravated robberies is concentrated in CBDs and urban townships. Indeed, both of these trends continue to be visible if the table is extended to include the top 20, top 30 or even top 50 stations in each case.

At first glance, the difference between the type of station that recorded an increase in aggravated robberies and the type that saw a decline in car thefts seems to contradict the possibility that displacement plays a large role in explaining the rise in robbery. If it did, wouldn't there be an increase in robberies in the same stations that record a decline in car theft? In addition, as has already been noted, the rise in aggravated robberies seems to be concentrated precisely in the places we would expect it to be concentrated: poor neighbourhoods that are undergoing profound changes to their socio-economic profile.

Having said that, it should also be noted that in most of the seven stations where robbery rose markedly and which did not appear on the list of top ten performing stations in the case of car theft, car theft numbers either improved or, at least, failed to get significantly worse. Indeed, in three (Durban Central, Tembisa and Mitchell's Plain), car theft numbers fell between 1998/99 and 2003/04, while another (Mamelodi) saw an increase of only 17 car theft cases when the two years are compared. Over the same period the number of aggravated robberies recorded in Mamelodi rose by over 1,000.

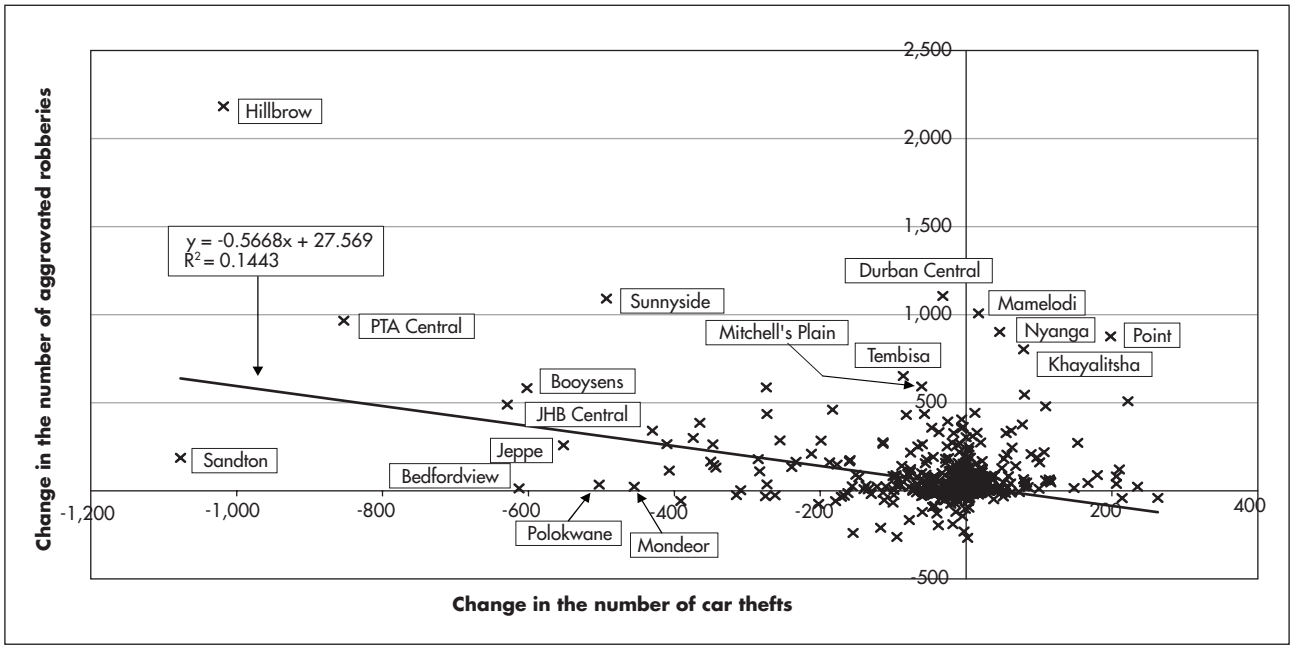
It seems, therefore, that in seven of the ten stations which saw the largest increases in the number of aggravated robberies between 1998/99 and 2003/04, the number of car thefts fell (in some cases, precipitously) or was basically unchanged. In each of these precincts, therefore, two different kinds of property crime moved in completely different directions.

Recognising all of this, it seems clear that the underlying trends driving car theft and robbery are different. The question now is whether the decline in one is the cause of the rise in the other. In other words, is the decline in car thefts – whether it is because of improved policing, better systems in the licensing departments or the rolling out of tracking technology – one of the reasons for the increase in robbery?

Is there a relationship between declining car crime and rising robbery?

Looking at the stations with the biggest increases in robbery and the biggest declines in car theft does not constitute a scientific test of whether the rise in robbery is correlated with the decline in car theft.

Figure 5: Absolute change in car theft v absolute change in agg. robbery (1998/9 v 2003/4)



That requires data on far more stations. When those data are examined and analysed, however, they reveal something interesting.

Figure 5 plots changes in the number of robberies committed in any given police station area against changes in the number of car thefts between 1998/99 (the peak of reported car thefts and hijackings) and 2003/04. Each point represents a police station. The further a point is to the left, the greater the fall in the number of car thefts in that station. The higher the point on the graph, the greater the increase in the number of aggravated robberies.

Thus, Hillbrow (with many fewer car thefts and many more robberies) is in the extreme north-west corner of the graph, while Sandton (which saw a big decline in car theft and a small increase in the number of robberies) is in the south-west corner. The nearly 380 stations that recorded an increase in car thefts lie to the east of the vertical axis. Very few of these saw no increase in the number of robberies committed, though the absolute increase varied a great deal, with Mamelodi experiencing the largest increase.

The equation of the trend line ($y = 27.6 – 0.57x$) can be translated to mean that between 1998/99 and 2003/04 every police station saw an increase of 27.6 robberies PLUS 0.6 robberies for every car theft that did not occur in 2003/04 relative to 1998/99. It appears, therefore that nearly two aggravated robberies occurred for every three car thefts 'prevented'. This means, in effect, that the equation predicts that if a station experienced a decline of 100 car thefts per year, it could expect an increase of about 85 (27.6 plus 0.57x100) aggravated robberies per year.[18]

Nearly two aggravated robberies occurred for every three car thefts 'prevented'

By contrast, in stations where car theft rose, the equation predicts that the number of robberies would have risen by less than would have been the case if car theft had not increased. Thus, if there were no change in the number of car thefts, there would have been about 28 more robberies. Finally, if there were 100 more car thefts in 2003/04 compared to 1998/99, the equation predicts that there would have been about 30 fewer aggravated robberies than if car thefts had not increased (27.6 more robberies less 0.57x100). As we shall see, however, the analysis of the data also shows the limits of the change in car theft as a predictor of the change in aggravated robberies. It is by no means certain, therefore, that these calculations will predict, with a high level of accuracy, precisely what actually happened.

The crucial question which any analysis of this nature must answer is whether the slope of the line (in this case -0.57) is statistically significant. In this regard, the term 'statistically significant' means something very precise: that the observed relationship between the variables plotted on the x- and y-axes is very unlikely to have emerged from the data unless there really is a relationship between them. In practice, the way this is tested is to ask what the chances are that the relationship depicted by the line could have emerged as a matter of pure chance. This is tested by looking at the number of data points (because of the law of large numbers, the more data you have, the less likely it is that you will find any clear relationship between two variables if, in fact, there is none) as well as the strength of the relationship (as measured by the dispersal of data points around the trend-line).

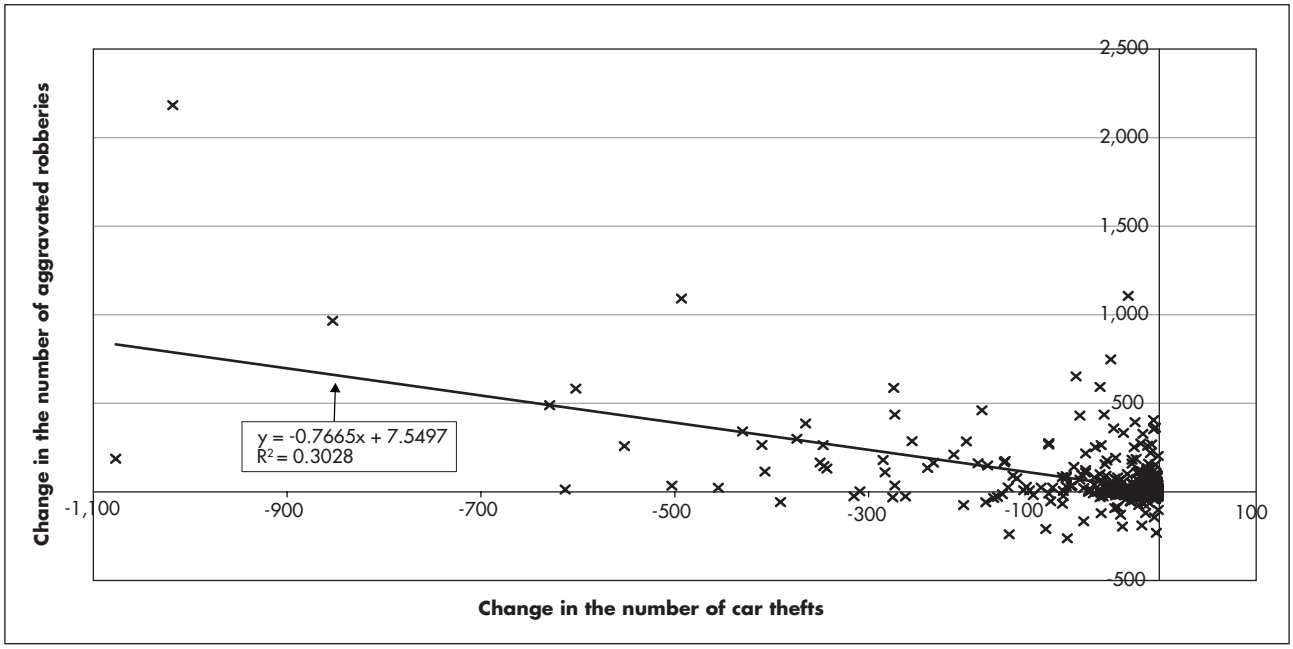
Statistical significance, then, does not mean that a relationship is overwhelming or even that it is strong. It is also no guarantee that the precise measure of the gradient of the slope (ie -0.57) is accurate. It simply means that there really is a negative relationship between the two variables.

In the present case, it turns out that the slope of the line is, statistically speaking, highly significant. This is borne out by the value of the t statistic, which, at -13.5 with 1,080 degrees of freedom, means that the probability that, despite the observed relationship between these two variables, there really is no relationship between them, is very, very much lower than 1%. Indeed, the analysis tells us that there is no chance that a negative relationship of this nature would have been found if there was, in fact, no relationship (or, indeed, a positive relationship) between the decline in the number of robberies and the rise of car thefts in a station area.

Since in the social sciences a 5% level of significance is regarded as adequate, this suggests that we are dealing with a real relationship between the decline in car theft and the rise in aggregate robbery at a police station level. From a statistical point of view, there is next to no possibility that the observed negative relationship between the decline in car theft and the rise in robbery is the result of pure chance.

Having said this, it must be readily admitted, that, with an R^2 of only 0.144, the observed variation in the change in the number of robberies at any given station is only partially (14.4%) explained by the observed variation in the change in the number of car thefts. Other factors – urbanisation, policing, etc. – will have to explain the rest.[19] At the same time, the conclusion that there is some displacement effect is greatly strengthened if we confine ourselves to looking at the 581 stations which

Figure 6: Absolute change in car theft v Absolute change in agg. robbery (1998/9 v 2003/4; 581 stations in which car theft numbers fell)



recorded a decline in car thefts between 1998/99 and 2003/04, as reflected in the following graph.

While it is generally not desirable to look only at subsets of data which support one's argument, looking at this particular subset of stations is legitimate because it goes to the heart of the question this paper seeks to answer: in areas in which fewer cars have been stolen, what has happened to the number of robberies that has been committed? Thus, while looking at the 1,080+ stations gives us general answers to this question, asking it about this, more limited, set of stations gives a more direct answer. If, on the other hand, we look at stations in which car thefts really did fall, we will get a better picture of what happens to other kinds of crime, as we do in Figure 6 which, in effect, considers only those stations lying to the west of the vertical axis in Figure 5.

Among this subset of stations, every car theft that didn't happen in 2003/04 relative to those that did in 1998/99, caused 0.8 additional aggravated robberies. In other words, five fewer car thefts meant four more robberies. Once again the correlation is statistically highly significant. This time, however, more than 30% of the observed variation in the rise or fall of robbery is explained by the fall in car theft. The decline in car theft, in other words, is a stronger predictor of the rise in robberies in this subset of stations than it is in all stations taken as a whole. Once again, statistical analysis tells us that the probability that, despite what appears here, there is no relationship between the decline in car theft and the rise in robberies is miniscule and can, therefore, be discounted.

One objection that is often made to this kind of analysis is that it can only identify a correlation between the movements of two variables, and that it cannot show that movement in one caused the movement of the other. It may be, therefore, that causation actually runs in the direction opposite to that postulated by the report or that the movement of both variables is determined by some other factor that is not included in the analysis. In this case, however, these objections lose much of their sting.

The idea, for instance, that the rise in robberies caused the decline in car theft (i.e. that causality runs from robbery to car theft), seems far more implausible than does its opposite. It may be true that the average value of a robbery has risen (perhaps because of the prevalence of cell phones). Still, it seems unlikely that this would have drawn car thieves and hijackers away from their original vocations because it is hard to see how, in the absence of either an increased risk or a reduced reward associated with stealing cars, the spread of cell phones would have altered the relative expected reward for stealing cars compared to robberies by a factor large enough to explain the observed effects. It seems much more likely that if the carrying of cell phones does explain the rise it robberies, it does so by its having drawn people into the crime of robbery who might otherwise have not committed that kind of crime at all.

Besides, hijackings, a crime in which cell phones and other property are also usually stolen, have fallen as quickly as have car thefts generally. Even if the rise in the value of muggings had driven the decline in car thefts, it could not explain the decline in hijackings.

The alternative idea – that some third, unspecified factor is responsible for both the rise in robbery and the decline in car theft – is even harder to accept.

What, precisely, would such a factor be if it were not, as we have suggested here, the change in the relative expected returns on the two kinds of crime? If this factor is correct, then the decline in car theft did 'cause' the rise in robbery. No third factor appears as an alternative.

The upshot of all of this is that it does, indeed, appear that the increase in robberies recorded in South Africa *is* partly explained by the decline in the number of car thefts. It appears, in other words, that the efforts that have been taken to reduce car crime by government, private security companies and the general public may very well have had the unintended consequence of raising the number of robberies committed.

There are a number of implications of this analysis. Before getting to them, however, we need to wrap up a few loose ends: how to interpret the fact that the car theft to robbery displacement rate is less than one-to-one and why there is as much variation in the pattern as there appears to be.

As described above, if one looks at overall displacement it appears that a three-theft decline in car thefts seems to lead to a two-robbery increase in aggravated robberies. Or, if we look only at the 580 stations in which car thefts actually fell, then there were four more aggravated robberies for every five fewer car thefts.

On the face of it, this is somewhat surprising since it seems reasonable to believe that the average robbery – most of which are muggings – generates far less income for the robber than does the theft of a car (which nets the car itself and its contents). This is particularly so in relation to hijackings, since hijack victims might also be robbed of wallets and cellphones.

It might be expected, therefore, that a would-be car thief needing to replace lost income would commit *more* robberies than car thefts. If that is not happening, as our data suggest, does it mean that the displacement effect is not really present or that the displacement – by being less than one-to-one – reflects a net improvement in the total number of crimes committed, even while it changes the balance between car thefts and robberies?

Sadly, the short answer to this question is no. Indeed, there are four factors, none of which is exclusive of the others, which together go a long way in explaining the disparity (and which suggest that the displacement effect measured here is, if anything, understated).

- One factor is that this analysis has focussed on aggravated robberies. Over the same period, however, common robberies also increased rapidly (from 65,000 to 91,000 per year). It may be, therefore, that the absolute level of displacement towards robbery, as measured here, understates the true extent of displacement from car theft to robbery.
- The second factor is that robbery (aggravated and common) is significantly under-reported while car theft is not. Since police statistics are used here, the fact that we are seeing displacement from a highly-reported crime to one that is less well-reported would suggest that some of the displacement effect is simply not being picked up.
- A third factor is that there is no reason to assume that every criminal who decides against stealing a car will necessarily choose to commit other crimes. There may, in other words, be a net decline in total criminality when some forms are prevented. Conversely, those who do choose to continue making a living through criminality, may do so in ways other than through robbery. This would imply that total displacement towards robbery is less than the full extent of displacement. Perhaps that is why burglary levels have come down more slowly than car theft levels.
- Finally, it may be that in the age of cell-phones, the average haul associated with a robbery is large enough to mean that robbers need to commit fewer crimes than they might otherwise have had to. Had they been forced to steal only wallets, there may have been even more displacement than is picked up here.

The second piece of house-keeping relates to the degree of variation observed between stations. In many police station areas car theft fell, but in others it rose. Some stations which saw declines in car theft also saw declines in aggravated robbery; others recorded modest rises and a few saw very dramatic rises. A final category of stations saw both increased car theft and increased aggravated robbery. What does this mean for the claim that the displacement of car thefts accounts for the growth of robbery?

Identifying and establishing the existence of a statistical relationship does not mean that one factor (the decline in car theft) explains another (the rise in aggravated robbery) absolutely and completely. All that it means is that, out of the existing data, it appears that there is a relationship, and that it is statistically significant (i.e. that there is very little chance that the pattern observed was the result of pure chance; instead something real was happening).

However, as described above, the pattern of variation in the rise of robbery is only *partly* explained by the pattern of the decline in car theft. This is reflected in the fact that the R^2 for the two calculations are 0.144 and 0.303. This means that 14.4% of the observed pattern of increased robbery is explained by the observed pattern of decreased car theft if we use all police stations. This rises to 30.3% if we look at those stations in which car theft actually fell.

This confirms what we already know: that there are other reasons for the rise in recorded robbery. These could include anything from changes in reporting rates that differ among police stations, changes to socio-economic and demographic variables in ways which differ across police stations, changes to the average value of goods stolen in muggings and other robberies, and/or changes in policing which vary across police stations.

To repeat, displacement does NOT explain the entire increase in aggravated robbery. Having made that clear, it is appropriate to turn to the key policy question that arises: what does the fact of displacement mean for policy-makers and police strategists? In order to deal with that question we need to ask whether the use of tracking technology creates positive externalities and, if it does, whether it should be actively encouraged – even subsidised – by government?

Conclusion and policy implications

One implication of the analysis of these data is that Ayers and Levitt's recommendation on the impact of Lojack on car theft rates – that government should subsidise the installation of Lojack in vehicles on America's streets – cannot be endorsed as an appropriate policy for South Africa.[20] The logic of this suggestion relies on the economists' conviction that Lojack installation results in 'positive externalities'.

In economics, an externality is something which results from an activity but which the participants in that activity do not pay for or do not, themselves, benefit from. Thus the pollution caused by a factory is a negative externality: it imposes costs on people who do not benefit from the work of the factory, costs which are an inevitable by-product of the factory's work but which its owners and/or clients do not pay for. This is a 'negative externality' and one implication of its existence is that the activity which gives rise to it will be conducted at a higher level than would be the case if all costs were paid for by those involved. When these externalities exist, so the logic goes, it is government's duty to intervene in the market – by taxing the factory or requiring it to upgrade its pollution management – in order to internalise the externality.

By contrast, a positive externality exists when participants in a transaction do not accrue all the benefits of that transaction. Because not all the benefits are accrued by those engaged in the transaction (i.e. those who pay for it), activities where there are significant positive externalities are under-provided in the market. The classic example of a positive externality is a defence force: if my neighbour pays for national defence, I get the benefits of his expenditure (i.e. a positive externality) whether I pay my share or not. My neighbour knows this and so he will also refuse to pay unless I pay my share too. As a result, no-one will cough up and the services will be under-provided unless government intervenes.

According to Ayers and Levitt, Lojack is a little like military defence. Since all car drivers – whether or not they install Lojack – benefit from the fact that those who are willing to pay for Lojack drive professional thieves out of the industry, the act of installing Lojack creates a positive externality. Since positive externalities are under-provided by the free market, they conclude that it is appropriate for government to step in with subsidies so that more people install the equipment. This would result in more cars being fitted with Lojack and, therefore, less car crime overall.

The trouble with trying to apply this argument in South Africa is that it rests fundamentally on Ayers and Levitt's finding that there is no displacement from car theft to other forms of criminality, which would be a negative externality. If they had found that there was displacement of this sort – as appears to have happened in South Africa – the case for government subsidy falls away. Indeed, if displacement were very acute, there may even be legitimate calls to ensure the *reduced* use of tracking technology. In this regard, the evidence of displacement in the South African context would need to be very much stronger – and observed the displacement effect would have to be very much larger – before any possible calls to restrict the use of tracking technology could be endorsed. Indeed, displacement is a fact of life in crime prevention, and should even be treated as an indication of success.

Displacement does NOT explain the entire increase in aggravated robbery

Successful crime prevention and displacement

This paper has explored the question of why the trend-lines for car theft (and hijacking) look so different from those of robbery. The argument has been made that the decline in car theft is likely to be real – since this is a crime that is very well reported. In addition, it has argued that the notion that the rise in robberies reflects increased reporting rather than increased incidents is flawed. Instead, we believe that post-94, South Africa did see a sharp rise in the number of robberies committed every year.

Having established this, the question is whether the decline in car theft – driven by changes in administrative and policing systems, as well as by changes in vehicle security – has led to the displacement of some crime

from car crime towards robbery. An examination of the data found that this may very well be the case: the increased risk and reduced rewards for car theft seem to have resulted in some car thieves turning to robbery to secure their income. There was, in other words, a degree of displacement.

Usually, when people talk about the displacement of crime, they have in mind the notion that some forms of private security tend to displace crimes that would have occurred in one place to another place. Gated communities, it is often said, do this: if it is harder and more risky to steal from houses in a boomed-off neighbourhood, than burglars will go elsewhere. But displacement need not always work this way: preventing one form of crime might lead to the commission of others.

One example frequently cited in this regard is that the rise in hijackings in South Africa was due to the improvements made to the security of cars after they were parked. Similarly, there is a possibility that the recent spate of mall robberies is partly a result of increased security making cash-in-transit heists that much more risky. In their turn, those heists may have emerged as banks' security improved.

Casting the issue of displacement in these terms suggests that, to the extent that a crime prevention strategy leads to displacement, it is also a failure. The fact (indeed, the possibility) of displacement becomes a criticism of the crime prevention strategy itself. But to treat the matter in this manner is somewhat simplistic. After all, displacement can only be said to occur if the crime prevention strategy works. If that were not true, there would be no (prevented) crime to displace. Displacement, then, is evidence of success rather than failure. What it does imply, however, is that the success may be only partial and that it may have some unintended effects.

The difficulty is that partial success is all that can be hoped for: the nature of crime prevention is that it is a never-ending game of cat-and-mouse. It is simply inconceivable that security measures and target-hardening will work without creating some unintended effects. Nor is it reasonable to demand that crime prevention programmes, projects and products be developed 'holistically'; that their backers think through all possible displacement effects and refrain from acting unless and until these can be addressed. To demand this is to allow the perfect to become enemy to the good.

The upshot, then, is that attempts to prevent car crime – by law enforcement and the Department of Transport, by BAC and the private security industry – have had their intended effects. It appears, however, that they have also had unintended effects, in this case, an increase in levels of robbery. Fortunately, with the South African Police Service's current focus on 'contact crimes', problems such as robbery should now be getting more attention.

Endnotes

1 While the evidence in this regard has not been examined, it is plausible that the same might be true of burglary: increased and improved security in homes and businesses, may have had the unintended effect of pushing would-be burglars into the streets where they became robbers.

2 In general, it is regarded as appropriate to use per capita crime rates in analyses of crime trends. In this paper, however, absolute figures on the number of incidents are used. The reason for this is that the question of criminality is being approached from the point of view of the choice a prospective criminal faces between different forms of criminality. In essence, we are looking at the extent to which criminals have, in recent years, chosen to commit robberies rather than to steal cars. Since we are testing the extent to which this might be the case, we need to look at the number of crimes that are committed by offenders, not at the level of victimisation in our society.

3 Another factor, of course, is skills: it takes a certain level of skill to steal a car, especially if the keys are not available. It may be, then, that many people cannot steal cars. Car thieves, however, can choose between committing different kinds of crime based on the risks and rewards of each.

4 Note that this argument does not require that the price obtained for a stolen car must fall below that of the goods stolen in a mugging or that the odds of being caught in a stolen car are, in absolute terms, greater than the odds of being caught with other kinds of stolen property. All that is necessary for the argument to hold is that there is a change in the **relative** price of a stolen car in comparison to other stolen merchandise or that the **relative** risk associated with car theft increases. If either of these things happen, we can expect some adjustment in the balance of approaches used by criminals to obtain an income. It may be, therefore, that stolen cars are still more valuable than the contents of a mugging victim's pockets. If, however, the differential changes markedly, so too will decisions of criminals about which forms of criminality in which to engage.

5 See for instance T, Leggett, Improved crime reporting: Is South Africa's crime wave a statistical illusion?, *SA Crime Quarterly* 1, 2002, ISS, who argues: "It was not unexpected that the arrival, in 1994, of a democratic government should lead to a dramatic increase in crime reporting. Police statistics show that commonly underreported crimes have been going up, while those most likely to be reported (murder, car theft, and business burglary) are in decline. This suggests that improved performance by the police (which encourages reporting by the public) may be responsible for the 'increase' in crime in recent years."

6 A United Nations Interregional Crime and Justice Research Institute report suggests, on the basis of a review of responses to victimisation surveys around the world that the international reporting rate for car theft is over 90%, while it is less than 70% for burglary, less than 50% for theft from cars, less than 40% for assault and robbery, and less than 30% for theft of personal property and sexual assault. A Alvazzi del Frate, *Victims of Crime in the Developing World*, UNICRI, Rome, 1998, p 88.

7 P Burton, A du Plessis, T Leggett, A Louw, D Mistry and H van Vuuren, *National Victims of Crime Survey: South Africa 2003*, ISS, Pretoria, 2004, p 107. It is hard to know how much to make of this, however, because the same survey that found the fall in reporting rates also found that there'd been a decline in the per capita victimisation rate for robbery from about 2,400 per 100,000 to about 2,000 per 100,000. These figures might make sense if police records also indicated a fall in robbery over the period. In fact, they record an increase from 221 to 288 per 100,000 for aggravated robbery and from 154 to 206 per 100,000 for common robbery. It is simply not possible to square all of these facts without assuming that respondents' definition of what constitutes a robbery changed. In fact there may be a case for this since the survey reports that for some reason the 2003 Victimisation Survey captured fewer common robberies than the 1998 survey had (op cit, p 134).

8 Although both aggravated robbery and common robbery have both risen precipitously in South Africa in the past decade, the bulk of this paper focuses on aggravated robbery. The essential reason for this is that we belive that the reporting and recording rates for aggravated robbery are likely to be significantly higher than those for robbery. It is likely, therefore, that the increase in aggravated robbery is driven less by any changes in reporting rates. Given the fact that common robbery has actually risen faster than aggravated robbery (except in the most recent years), any analysis that included these data would likely find an even stronger relationship between the decline in car theft and the rise in aggravated robbery.

9 For the most part, this paper uses the time-frame 1998/99 to 2003/04 for its analysis. It is worth explaining the choice of these dates, as well as the reason why Table 1 uses the period 1996/97 to 2003/04. The choice of the period 1998/99 to 2003/04 is partly due to the nature of the analysis presented here, and partly made for pragmatic reasons. 1998/99 was the year in which the number of car thefts and hijackings peaked. As such, it is the logical point from which to begin an analysis of the impact of the decline in car theft/hijacking on other forms of criminality. The choice of 2003/04, rather than 2004/05, reflects simply the fact that, at time of writing, we have not completed the laborious task of uploading station-level data onto out database. In the case of the present section, the period chosen is 1996/97 to 2003/04. While the same consideration governing the choice of 2003/04 applies in this case too, the choice of an earlier starting point is justified on the basis of the purpose of this section. We are arguing here that the increase in aggravated robbery was not a mere statistical illusion. To do so, we have used the starting date at which aggravated robbery numbers were the lowest on record.

10 There is one caveat to this argument. This is that it is at least possible that some stations saw an influx of people who had lived in areas in which they had too little confidence in the police to bother reporting robberies and who, in their new neighbourhoods, were now willing to report their victimisation. This, it must be acknowledged, may be possible. But it does seem somewhat fanciful. It seems very unlikely, for instance, that people moving to townships from rural areas were as at much risk of victimisation in both places. If that is the case, urbanisation must increase victimisation rates and, therefore, crime levels.

11 An unreferenced circular put out by BAC modestly put it thus: "One possible explanation for the decline in vehicle theft and hijackings over the years may be ascribed to the fact that a coordinated approach to these crimes began in 1997 through the National Vehicle Crime Project. This project was responsible for the creation of a holistic strategy aimed at combating and preventing these crimes, as well as a comprehensive set of projects aimed at rectifying and improving many of the deficiencies in legislation, law enforcement, business systems and processes, etc. This project has been consistently and fully supported by all of the Public and Private sector partners over the years and has been project managed by Business Against Crime South Africa."

12 I Ayers & S Levitt, *Measuring positive externalities from unobservable victim precaution: An empirical analysis of Lojack*, 1997, National Bureau of Economic Research. Available at <www.nber.org>.

13 Naturally, the two academics considered other possible variations – from socio-economic to changes in levels of law enforcement – as reasons for any observable differences in trends. For this purpose they included a range of factors in their regressions. This they did in order to isolate the effect of Lojack.

14 The following graph is reproduced from Ayers & Levitt, op cit, p 38. Despite e-mailed requests for the original data, these have not been forthcoming. As a result, it has been necessary to estimate the values of the data reflected in the original graph.

15 The cities were Boston (introduced in 1985), Los Angeles, Miami and Newark (all 1988), and Chicago (1991).

16 Ayers & Levitt, op cit, p 15.

17 Note that this table relates to the period 1998/99 to 2003/04. The previous table dealt with the increase in robberies over the period 1996/97 to 2003/04. The two tables are not, therefore, entirely comparable.

18 A word on how the trend line is calculated. Essentially, the formula of the line is calculated by fitting a line which minimises the aggregate of the square of the

distance between each point and any hypothetical line drawn through the data. This means that any other formula would result in there being a larger number of points being further away from this line. By producing a 'best fit', this method – called ordinary least squares – creates an average relationship out of all the diverse bits of data.

19 R^2 is a measure of the extent to which independent variables specified in an equation (in this case, the decline in car theft) explain the dependent variable (the rise in aggravated robbery). A high R^2 (the maximum is 1) implies that variation in the independent variables accounts for a great deal of the variation in the dependent variable and that the equation has a great deal of explanatory power, while a low R^2 (the minimum is 0) implies that the equation has very little explanatory power.

20 Ayers & Levitt, op cit, p 6.

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About this paper

This paper addresses a central puzzle that confronts anyone who seeks to understand how the level of property crime has changed in South Africa over the past decade. The issue is that although important forms of property crime – most notably car theft and car hijacking – have fallen quickly, the overall level of robbery has risen quickly. What accounts for this disparity?

The essence of the argument is that the increase in robbery is not a mere reporting phenomenon. Instead it reflects two underlying phenomena. The first, and quantitatively more important, is that the average value of a robbery (most of which, in this country, are muggings) have risen as a result of the increasing prevalence of cell phones. This is uncontroversial. The second is that as vehicle security has improved and tracking technology has taken root, there has been some degree of displacement from car theft to robbery. This has implications for how we should think about crime prevention and its consequences.

About the author

ANTONY ALTBEKER joined the ISS's Crime and Justice Programme as a senior researcher in January 2005. Antony works principally on policing issues. He has previously worked at the Centre for the Study of Violence and Reconciliation, the Graduate School of Public and Development Management at Wits University, the National Treasury and the Secretariat for Safety and Security. He has a Masters in Economics from the University of the Witwatersrand. His first book, *The Dirty Work of Democracy: A year on the streets with the SAPS*, was published by Jonathan Ball Publishers last year.

Funder

This paper is part of the ISS's Criminal Justice Monitor which is supported by USAID and the Royal Danish Embassy. The Criminal Justice Monitor is an on-going research programme at the ISS. It provides a regular, up-to-date, objective and accessible information and analytic service to policy makers, criminal justice departments, civil society, the donor community, the media, and the public for:

- analysing crime trends and developing likely scenarios;
- assessing and evaluating policy and strategy in the criminal justice system;
- assessing levels of public confidence and feelings of safety;
- evaluating strengths and weaknesses in the criminal justice system;
- determining lessons and good practice for improving service delivery;
- communicating, in a constructive manner, feasible interventions to improve the services of the criminal justice system and to reduce crime in South Africa.

ISSN: 1026-0404

9 771026 040004

Published by the Institute for Security Studies
Head Office • P O Box 1787 • Brooklyn Square • 0075 • Tshwane (Pretoria) • SOUTH AFRICA
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