Running Title: Optimal Penalties for Concealment of Crime

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ABSTRACT

Society should give criminals incentives not to conceal their criminal activity. The concealment costs themselves are a social waste, as are other costs the concealment may impose on society, such as additional harm or increased law enforcement expenditures. I show that for any set of sanctions that lead to positive concealment on behalf of the criminal, that society can modify the sanctions to give the criminal an incentive not to conceal and unambiguously improve social welfare. A similar conclusion will apply to increasing the costs of concealment devices to improve social welfare.

Society can deter concealment of crime by raising the sanction or raising the cost of concealing the crime. Which policy is chosen should depend upon the concealment device involved. If it is easy to detect the use of a concealment device when a person is caught, then penalties should be imposed on the criminal for using such a concealment device. If the device is of the type that has no legitimate purpose other than being used for concealment, then the device should be heavily taxed or be outlawed. For situations where we are unable to determine whether the device has been used to conceal and the device has legitimate purpose, society should set one penalty for the crime, and possibly a generalized additional sanction for any concealment of the crime that can be determined.

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I. Introduction

Concealment is a common attribute of criminal acts. For example many robberies take place at night because there will be fewer witnesses, thus lowering the probability of apprehension. Drivers buy radar detectors that warn them to avoid speeding when a law enforcement radar gun is nearby. Some manufacturers have even developed radar jammers that allow a car to be "cloaked" from law enforcement radar.[1]

The criminal's concealment costs themselves are a social waste.[2] Concealment may also exert other costs on society. Concealment may decrease a crime's expected sanction, and thus decrease the incentives not to cause harm to others. In addition, concealment may lead to higher law enforcement expenses, as for any probabilistic level of criminal detection and prosecution that is sought by law enforcement, concealing activities on the part of criminals raise the law enforcement costs that must be spent to reach this probabilistic level.[3]

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1 Radar jammers interfere with the radar and lasers used by law enforcement to detect speeding motorists by sending a confused signal back to the radar gun. While radar jammers are illegal under federal law because they interfere with licensed radio signals, some states have recently passed additional state laws making jammers illegal. For example, Minnesota recently passed a law that as of August 1, 1995, it will be illegal to sell, use or possess radar jammers. 1995 Minn. ALS 118, 1995 Minn. Chapter Law 118. Minnesota passed the law because the state had problems getting the U.S. attorney's office to prosecute radar jamming cases in federal court.

The current price of such radar jammers is $300 to $500 for those who are interested. See the classified ads section of Motor Trend or Road & Track.

2 That the costs of committing crimes are social wastes was noted by Tullock (1967).

3 That there is an optimal probabilistic detection and prosecution of criminals was shown by Becker (1968). His analysis recommends high fines and a low probabilistic detection rate to save enforcement resources. There are reasons against such maximum feasible fines such as marginal deterrence (Stigler, 1970), risk averseness (Polinsky and Shavell, 1979), concealment costs (Malik

I present a model where criminals choose the amount of concealment they engage in. It is shown that if concealment can be easily (cheaply) determined then optimal penalties should be partially based on the amount of concealment.[4] Sanctions should be designed such that crimes involving a high amount of concealment have higher total costs, that is the expected sanction plus the criminal's cost of concealment, than crimes involving little or no concealment. Thus criminals will have an incentive not to conceal.[5]

Malik (1990) examined concealment of crime, showing that the maximum feasible fine might not be optimal because higher fines encourage the criminal to engage in concealing behavior. Although Malik differentiated his argument from Stigler's (1970) marginal deterrence argument, the underlying reasoning is similar if one considers the total costs – the criminal's concealment costs as well as the costs imposed on others – of concealment as harm imposed on society by the criminal.[6]

Malik (1993) and Kaplow and Shavell (1994) showed that fines for those who self report their behavior should be lower than those who do not.[7] Their analysis focused on the savings in enforcement costs that self-reporting allowed. Malik (1993) also examined penalties for untruthful reporting, which were to be high to deter such actions.[8]

1990) and wealth variations among individuals (Polinsky and Shavell, 1991). This paper relates the concealment cost argument to the marginal deterrence argument.

4 That is when a criminal is caught we can easily determine that he was attempting to conceal his crime. For example when a driver using a radar detector is caught speeding, it may be easy to tell that the driver was using a concealment device if the radar detector is mounted on the dash board of the car.

5 It is important to note that in order to deter concealment the expected sanction need not increase as the criminal expends more effort to conceal his crime. It is only necessary that the expected sanction plus the criminal's cost of concealment increase as the criminal increases his concealment effort.

6 In Malik's (1990) model, the sanction is only based on the harm to others. The criminal's concealing cost is not included in determining the optimal sanction, although it enters into the social welfare function as more harm. When the sanctions are only based on the amount of harm caused to others, the criminal may have an incentive to conceal his activity to lower his expected sanction.

7 If administrative processing costs are high, there may be some situations where self-reporting will not be desirable. Malik (1993), Kaplow and Shavell (1994).

8 Malik (1993) did not have a cost of criminal concealment of untruthful reporting in his model, thus assuming that there is no cost of the act of deception itself. The fines must to be quite

This paper will extend the analysis of these articles by determining optimal penalties for crimes that are concealed. By giving a criminal an incentive not to conceal his behavior, social welfare will be increased because there will be less socially wasteful concealment activities, law enforcement expenditures may be saved and some harm to others may not occur that could have occurred had concealment not been deterred.

This paper examines marginal deterrence issues, where the "choice" in the crime committed is the "choice" in the amount of resources spent on criminal concealing. Stigler's (1970) general marginal deterrence arguments against raising the fine as high as feasible in some situations is also applicable here.[9] Specifically the fine should only be as high as possible in situations where the criminal is expending substantial resources on concealing. In many situations, we will want to use a reduction in the fine from the maximum feasible fine in order to give the criminal an incentive not to conceal his crime.

A model is presented that shows that if concealment can be easily determined and sanctions are partially based on concealment, then it will never be optimal to have a set of sanctions that lead to positive concealment costs. For any set of sanctions that lead to positive concealment costs, the sanctions can be modified in such a way that leads the criminal not to conceal his activity, while unambiguously improving social welfare. Other ways to give a criminal incentives not to conceal his crime, such as directly raising the cost of concealment are also discussed.

Which method, sanctions or increasing the cost of concealment, should be used to decrease concealment will often depend upon the criminal's scheme being used for concealment and the ability of law enforcement to detect it. Items whose primary purpose is the concealment of crime

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high in order to deter this type of cheap concealment. In most cases his assumption that the cost of physically lying to authorities is close to 0 may be true. One can imagine, however, higher concealment costs of misleading authorities, such as fake documentation and paper work to match up with any false statements.

My model includes the cost of concealment, which is why to deter concealment expected sanctions may not have to increase as concealment increases; only expected sanctions plus the cost of the concealment activity need increase to deter concealment. Of course if the cost of concealment is 0, then expected sanctions will have to increase as in Malik's (1993) analysis.

[9] Stigler (1970). Also see Malik (1990)

(radar detectors) should have their prices raised, either through taxes or by direct outlawing. Increasing the price of these items will deter their use in the concealment of crime. In addition, when these items are used for crimes there should be higher fines. For those concealment items that may have legitimate purposes, such as PGP,[10] it might be best not to raise the cost of such items. Instead we should raise the fine when the item is used for criminal concealment to discourage such uses. For items that are hard to detect and have no legitimate use, their costs should be raised even if we do not raise the sanction when they are used. For example the making of fake documentation of passports and driver's licenses is illegal, effectively raising the costs of these items that are often used for fraud.[11]

This paper proceeds as follows: Section II introduces concealment costs as harms to society; Section III presents a model of criminal concealment; Section IV explores extensions of the model and policy recommendations; Section V provides a conclusion.

II. Concealment Costs as Harms to Society

Concealment of crime leads to increased costs to victims and society as well as the direct costs incurred by the criminal. These costs lower social welfare. The costs to non-criminals includes harm caused by acts take place with concealment that would not take place without concealment. It also includes increased law enforcement expenditures needed to detect concealers. There is also the social waste of the criminal's concealment effort itself. The criminal's cost of concealment is a special kind of harm in that it is faced by the criminal himself, and thus enters into his decision making process.

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10 PGP stands for Pretty Good Privacy. It is a free-ware strong encryption program developed by Paul Zimmerman. See section IV.C. below for a discussion of PGP.

11 Society is also working to make some fake items more detectable and costly. For example the California Department of Motor Vehicles incorporates holograms of the state seal into the driver's license. This makes it more difficult and expensive to forge, and makes cheaper copies easier to detect.

Many crimes are defined in such a way that the criminal's concealment is not taken into account in setting the penalty or fine.[12] For example the sanctions for theft do not depend upon the concealment activities of the criminal. A criminal who uses gloves to prevent leaving his finger prints at a crime scene receives the same sanction as a criminal who does not use gloves and leaves his finger prints all over, even though the former is less likely to be caught.[13]

For other crimes, such as speeding, whether concealment effort effects the fine is likely to depend upon the state where the crime is committed. Most some states do not impose additional fines on those speeders who use radar detectors.[14] Some states do increase fines for the use of radar detectors.[15]

The criminal is likely to base how much he chooses to spend on concealment on the sanction. How sanctions affect the a criminal's choice of concealment expenditures was modeled

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12 This is not to say that all crimes that are concealed are not punished more than crimes that are not concealed. They are in many instances. For example hit and run motor vehicle accidents are punished while hit and stay motor vehicle accidents are not punished. The later being non-concealing behavior.

13 A well known bar exam question/answer is that burglary can only occur at night (at least during the exam). This is often seen as an archaic common law relic of the past. But if one believes that criminals commit the act at night in order to conceal their activity, then having a higher penalty for nighttime crimes will make sense.

While the bar question focuses on the common law definition, whether we call burglary during the day a different crime from burglary at night is not important. What is important is having a higher sanction for a crime committed at night because of the nighttime concealment element, even if we now use the term burglary to apply to both day and night time activities. It is removing the incentive to conceal the crime at night which is desired.

14 Most states allow radar detectors for cars. On the WWW, visit the Radio Association Defending Airwave Rights, Inc. (RADAR) site at http://www.nashville.net/speedtrap/radar.html for RADAR's Travel Chart: "A state by state breakdown of where radar detectors and scanners are legal, what special types of radar are used (in addition to standard X, K & Ka bands), and whether photo radar, aircraft, laser or VASCAR are utilized". The web site also has additional useful information such as how to beat a radar based speeding ticket in court and locations of law enforcement speed traps throughout the United States.

15 For example the use of a radar detector is illegal in Virginia. In Britain it is legal to have a radar detector in one's car, but it is illegal to turn the radar detector on. Some European countries have outlawed even the possession of radar detectors.

On December 14, 1993, the Federal Highway Administration issued a final rule amending 49 C.F.R. Parts 390 and 392 to ban the use of radar detectors in commercial vehicles. The United States Court of Appeals for the Sixth Circuit recently ruled the restriction was constitutional. The case has recently been appealed to the Supreme Court of the United States. Radio Association Defending Airwave Rights Inc. v. U.S. Dept. of Transportation, 47 F.3d 794 (6th Cir. 1995), *appeal docketed,* No. 94-1904 (U.S. May 17, 1995).

by Malik (1990). He showed that where a fine is based only on the harm to others, but not on the concealment costs to the criminal himself, then it might not be optimal to raise the fine as high as possible. The reasoning is that raising the sanction will give the criminal an incentive to increase his expenditures on concealment, and thus make society worse off.

In another paper I showed that raising the sanction will always make the criminal worse off, but might lead to a reduced expected sanction. I also showed that if the criminal has both fixed and variable costs of concealing, then raising the sanction may actually lead to increased crime.[16]

If we consider these socially wasteful costs of concealment as leading to another defined "crime" with different penalties, then we can see that Malik's analysis is a special case of Stigler's general marginal deterrence argument. In Malik's model the concealment costs of crime enter into the social welfare function as though it is simply more harm.

Malik showed that when the fine is not based on the concealment costs, the criminal's incentive to cause more social harm by increasing concealment might not be optimal.[17] Even though the criminal is causing the harm to himself, by way of increased criminal concealment costs, it may be that the reduction in the expected sanction exceeds his concealment costs. This is similar to the Stigler marginal deterrence argument against having as high of a fine as feasible. Under Stigler's analysis, the criminal is judgment proof and thus commits more harm in order to reduce his expected sanction. In both cases the criminal will cause more harm to reduce his expected sanction and thus a reduction in the sanction from the highest feasible amount may be

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16 See Stanley (1995b). The reasoning behind the possible increase in crime when the sanction is increased is relatively simple. As the sanction is increased, the criminal may increase his expenditures on fixed costs. The increased fixed costs may lead to decreased variable costs of committing the crime. The key is that once the criminal pays his fixed costs, they will be sunk costs, and thus they will no longer enter into the criminal's decision process of committing criminal acts. The variable cost of crime, however, will enter into the criminal's decision process. Decreasing the variable cost of crime can actually lead to more crime. If increased sanctions ultimately lead to decreased variable costs, then increased sanctions may lead to more crime.

17 It is important to remember what is optimal for the criminal may not be optimal for the society, even where the criminal faces the costs of purchasing a concealment device. For a glaring example of this see Stanley (1995b), where raising the fine leads the criminal to invest in a concealment device and commit more crime. From a societal point of view this is obviously not optimal.

necessary to give the criminal an incentive not to cause more harm. Under the marginal deterrence analysis the criminal's judgment proofness gives the criminal improper incentives. Under Malik's concealment of crime analysis, that we choose not to include the criminal's concealment cost in the sanction may also give the criminal improper incentives.

This article will show that to improve social welfare fines should be based partially on the concealment by a criminal.[18] Where concealment can be determined cheaply, it will never be optimal to have sanctions that lead the criminal to have positive concealment costs. That is we can always increase social welfare by designing sanctions that give the criminal an incentive not to conceal his activity. The concealment of the activity is definitely socially wasteful and thus should be deterred.[19]

III. Monitoring Model

I will use a model similar to Malik's (1990) monitoring model of criminal behavior to show how the optimal sanctions should depend on criminal concealing.[20] The model will assume risk neutral actors who choose whether or not to commit an act that causes harm *h*. The actor receives a benefit *b*, not including any concealment costs he may incur. This benefit differs among individuals and has a positive continuous density function $f(\cdot)$ with cumulative distribution function $F(\cdot)$. The size of the population is normalized to one. The actor can spend resources *c* on

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18 Fines should also be based on the harm caused to others and law enforcement resources used to detect crime. See Becker (1968).

19 It is important to distinguish between the activity and the concealment of the activity. I am not saying that we always want to deter an activity that may not be socially wasteful, only that we want to deter the concealment of the activity. Thus we may want some speeders although we will never want speeders who avoid detection by the use of radar detectors.

20 Kaplow and Shavell (1994) use an investigative model, where individuals are randomly selected and then investigated. The same conclusions will hold for their model, although the analysis would be different.

Malik (1993) used a signaling model, where firms self report their emissions, fines are levied for pollution, and large penalties are levied for misleading authorities. Failure to file an emissions report is equivalent to reporting the worse outcome of high pollution in the model.

As misleading authorities is the equivalent of concealment, Malik's analysis that concealment should be penalized is the similar to this paper, although he assumes that the cost of concealment is 0, which leads to the large fines for concealment in his conclusions.

concealment of the activity. Society has monitoring costs *k*. It is assumed that society can observe the concealment costs *c* if the criminal is detected.[21] Society imposes a sanction $s(c)$ on the criminal for the activity that will partially depend upon the concealment cost.[22] Criminals are detected randomly with probability $p(c,k)$, with *p* non-increasing in *c* and non-decreasing in *k*. A summary of the notation of the model follows:

b	criminal's benefit from the criminal act, $b \in [0,\infty)$
$f(\cdot)$	density function of the benefit
$F(\cdot)$	cumulative density function of the benefit
c	criminal's concealment cost
h	harm caused by act
k	monitoring enforcement costs
$p(c,k)$	probability of detection
$s(c)$	sanction

In the model, we can examine the criminal's choice of action and concealment expenditure. The criminal will only commit an act if his private benefits are greater than his private costs. Thus the actor will only commit a criminal act if his benefit less his chosen concealment costs less the expected sanction is greater than the 0 utility he can receive by opting out of committing the act. The following is necessary for the actor to enter into a criminal act: $b - c - p(c,k)s(c) > 0$ for some

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21 When we cannot accurately determine the amount of concealment, we will still want to decrease concealment if possible but may have to do it in ways other than sanctions. If a certain item is used for concealment of a crime, but is hard to detect, then we may want to raise the cost of that item. For example it is illegal in the state of California to make fake drivers licenses that look like the ones put out by the Department of Motor Vehicles. This effectively raises the costs of this concealment device.

22 The sanction will also depend upon the harm caused and law enforcement expenditures. But these items will be held constant in the proof below and thus have been removed from the sanction function for increased readability.

c. Should the actor choose to commit the act then he will chose concealment costs c^* that maximizes his net utility of $b - c - p(c,k)s(c)$.

Society will include in its welfare function the harm caused by the act, law enforcement expenditures and both the criminal's benefits and costs of the crime.[23] Society will maximize the welfare function: $W = \int_{c+p(c,k)s(c)}^{\infty} (b - c - h) f(b) db - k$. That is the criminals benefit less concealment costs less harm caused by the act when it occurs, less enforcement costs.

I will now show that society is better off setting sanctions in such a way that the criminal is given incentives to choose not to expend resources on concealing his activity. To do this we will compare the social welfare under a set of sanctions that lead the criminal to conceal with the social welfare under a slightly modified set of sanctions that lead the criminal not to conceal.

First suppose we have a law enforcement regime, such that for a set of sanctions $\hat{s}(c)$ and monitoring resources $\hat{k}$, the criminal chooses concealment costs $\hat{c} > 0$. That is $b - \hat{c} - p(\hat{c},\hat{k})\hat{s}(\hat{c}) > b - c - p(c,\hat{k})\hat{s}(c)$ for all c.

The question is: will society be made better off if the sanctions are changed in such a way that the criminal has an incentive not to conceal the criminal act? I will show that society will be better off structuring sanctions in this way.

To do this, let us devise another set of sanctions that gives the criminal an incentive not to conceal his activity. Suppose society chooses a set of sanctions $\tilde{s}(c)$ with the same monitoring resources $\hat{k}$, such that the criminal chooses concealment costs $\tilde{c} = 0$. Again we know the criminal will maximize $b - c - p(c,k)s(c)$, by choosing the c that maximizes his utility.

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23 I will be assuming a regulatory type of crime, where the benefit received is socially valued. Thus I include the criminal's benefit as well as concealment costs in society's utility function.

Let us set up a new sanction set $\tilde{s}(c)$ such that: $\tilde{s}(c)=\hat{s}(c)\forall c\neq 0$. Thus under this new sanction system the criminal will prefer to spend $\hat{c}>0$ to all choices of $c\neq 0$. That is $b-\hat{c}-p(\hat{c},\hat{k})\tilde{s}(\hat{c})>b-c-p(c,\hat{k})\tilde{s}(c)$ for all $c\neq 0$.[24]

Now I will set the sanction $\tilde{s}(0)$ such that the criminal has an incentive not to conceal. Because I know that the criminal prefers to spend $\hat{c}>0$ to all choices of $c\neq 0$, I need to set the sanction $\tilde{s}(0)$ such that the criminal prefers spending 0 on concealment to $\hat{c}$. To do this we must have the following:

$$b-\hat{c}-p(\hat{c},\hat{k})\tilde{s}(\hat{c})<b-0-p(0,\hat{k})\tilde{s}(0)$$

$$\hat{c}+p(\hat{c},\hat{k})\tilde{s}(\hat{c})>0+p(0,\hat{k})\tilde{s}(0)$$

$$\frac{\hat{c}}{p(0,\hat{k})}+\frac{p(\hat{c},\hat{k})\tilde{s}(\hat{c})}{p(0,\hat{k})}>\tilde{s}(0)$$

Since the sanction $\hat{s}(0)$ is reachable, the sanction $\tilde{s}(0)$ is reachable, as $\hat{s}(0)>\tilde{s}(0)$.[25] Also note that the sanction $\tilde{s}(0)$ is not the maximum sanction possible, as it is less than $\hat{s}(0)$. This is

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24 Since $\hat{c}>0$ implies that $\hat{c}\neq 0$, it should be noted that $\tilde{s}(\hat{c})=\hat{s}(\hat{c})$.

25 Recall that the criminal chose $\hat{c}>0$ under the sanction regime $\hat{s}(c)$. Thus the following is true:

$$b-\hat{c}-p(\hat{c},\hat{k})\hat{s}(\hat{c})>b-0-p(0,\hat{k})\hat{s}(0)$$

$$\hat{c}+p(\hat{c},\hat{k})\hat{s}(\hat{c})<0+p(0,\hat{k})\hat{s}(0)$$

$$\frac{\hat{c}}{p(0,\hat{k})}+\frac{p(\hat{c},\hat{k})\hat{s}(\hat{c})}{p(0,\hat{k})}<\hat{s}(0)$$

But then we have:

$$\hat{s}(0)>\frac{\hat{c}}{p(0,\hat{k})}+\frac{p(\hat{c},\hat{k})\hat{s}(\hat{c})}{p(0,\hat{k})}=\frac{\hat{c}}{p(0,\hat{k})}+\frac{p(\hat{c},\hat{k})\tilde{s}(\hat{c})}{p(0,\hat{k})}>\tilde{s}(0).$$

Thus if $\hat{s}(0)$ is feasible then $\tilde{s}(0)$ is feasible.

because we need to give the criminal an incentive not to conceal his activity (which will improve social welfare, as shown below).[26]

Let society chooses a sanction $\tilde{s}(0)$ such that $\frac{\hat{c}}{p(0,\hat{k})}+\frac{p(\hat{c},\hat{k})\tilde{s}(\hat{c})}{p(0,\hat{k})}=\tilde{s}(0)+\varepsilon$, where $1>>\varepsilon>0$. The actor will then prefer the expected outcome where it spends 0 on concealment to $\hat{c}>0$. Thus we have set up this new sanction scheme $\tilde{s}(c)$ where we have $\frac{\hat{c}}{p(0,\hat{k})}+\frac{p(\hat{c},\hat{k})\tilde{s}(\hat{c})}{p(0,\hat{k})}>\tilde{s}(0)$, and the criminal will choose not to conceal the act.

I will now show that society is better off under this new sanction scheme $\tilde{s}(c)$ that leads to 0 concealment costs than under the sanction regime $\hat{s}(c)$ which lead to $\hat{c}>0$.

Society has the following welfare function: $W=\int_{c+ps(c)}^{\infty}(b-c-h)f(b)db-k$. The welfare under each sanction regime will be as follows:[27]

$$\hat{W}=\int_{\hat{c}+p(0,\hat{k})\hat{s}(\hat{c})}^{\infty}(b-\hat{c}-h)f(b)db-\hat{k}$$

$$\tilde{W}=\int_{0+p(0,\hat{k})\tilde{s}(0)}^{\infty}(b-0-h)f(b)db-\hat{k}$$

For society to be better off when the criminal does not conceal his activity I need to show $\tilde{W}>\hat{W}$.

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26 This is the same conclusion as Malik (1990). Although shown in a somewhat different way, the underlying reasoning is the same. In Malik's analysis raising the fine has a cost in that it increases the criminal's incentive to conceal, and thus will increase concealment costs. The reason for this is quite simple, the higher the fine the more any reduction in the probability of detection is worth to the criminal. Thus raising the fine will lead to higher concealment costs and more harm to society.

27 Notice I am holding the resources spent on law enforcement $\hat{k}$ constant under both regimes. I have only changed the sanctions.

As part of our new set of sanction to get the criminal to spend 0 on enforcement costs we have the following:

$$\frac{\hat{c}}{p\left(0,\hat{k}\right)}+\frac{p\left(\hat{c},\hat{k}\right)\tilde{s}\left(\hat{c}\right)}{p\left(0,\hat{k}\right)}=\tilde{s}(0)+\varepsilon$$

$$\hat{c}+p\left(\hat{c},\hat{k}\right)\tilde{s}\left(\hat{c}\right)=0+p\left(0,\hat{k}\right)\tilde{s}(0)+p\left(0,\hat{k}\right)\varepsilon$$

$$\hat{c}+p\left(\hat{c},\hat{k}\right)\tilde{s}\left(\hat{c}\right)\cong 0+p\left(0,\hat{k}\right)\tilde{s}(0)$$

Since $\hat{c}>0$ implies that $\hat{c}\neq 0$, we have $\tilde{s}\left(\hat{c}\right)=\hat{s}\left(\hat{c}\right)$. Thus we have:

$$\hat{c}+p\left(\hat{c},\hat{k}\right)\hat{s}\left(\hat{c}\right)\cong 0+p\left(0,\hat{k}\right)\tilde{s}(0)$$

As $\hat{c}+p\left(\hat{c},\hat{k}\right)\hat{s}\left(\hat{c}\right)\cong 0+p\left(0,\hat{k}\right)\tilde{s}(0)$, we are integrating over approximently the same integral range for social welfare under both sets of sanctions.[28] And because $\hat{c}>0$, we have:

$$\int_{0+p\tilde{s}(0)}^{\infty}(b-0-h)f(b)db>\int_{\hat{c}+p\hat{s}(\hat{c})}^{\infty}(b-\hat{c}-h)f(b)db.$$

Adding $\hat{k}$ to both sides we have:

$$\int_{0+p\left(0,\hat{k}\right)\tilde{s}(0)}^{\infty}(b-0-h)f(b)db-\hat{k}>\int_{\hat{c}+p\left(0,\hat{k}\right)\hat{s}(\hat{c})}^{\infty}(b-\hat{c}-h)f(b)db-\hat{k}$$

and thus $\tilde{W}>\hat{W}$.

28 Assuming no spikes in the density function, we can make ε arbitrarily small so that the integration sum is not effected by the exclusion of ε in the lower integral limit.

Since the set of sanctions $\hat{s}(c)$ that lead to $\hat{c} > 0$ is arbitrary, I have shown that for any set of sanctions that leads to positive concealing costs that a new set of sanctions that lead to no concealing exists and will unambiguously improve social welfare.[29]

IV. Extensions

A. Increasing the criminal's cost of concealment

Increasing the criminal's cost of concealment is an additional way to deter concealment. This can be done by either taxing or outlawing concealment devices. In the model this can show up as either a flat or percentage tax on concealment devices. Thus we can replace the concealment cost c with $\gamma c + \alpha$, where society will control γ and α. Increasing the cost of concealment devices such that the criminal chooses not to conceal his act will improve social welfare. If the device is taxed, then any amount paid in taxes for the device is simply a transfer from the criminal to the government and not socially wasteful.

In cases where it is difficult to determine if concealment has taken place, but easy to increase the price of concealment devices, then increasing the costs of concealment devices will be a good policy. For example it may be hard to determine if an identification document such as a driver's license is forged or not. Because of this we outlaw the making of these forged documents, even if they are going to be used for a legitimate purpose (possibly entertainment?).

Of course some items that are used for illegitimate purposes also have entirely legitimate uses. For example PGP is used to encrypt documents to protect the privacy of e-mail sent over the internet. There are many reasons that one might want to protect one's privacy for legitimate reasons. However, PGP can also be used for illegitimate purposes, such as the sending back and

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29 It should be noted that I have not maximized social welfare for the case where the sanction regime leads to 0 concealment costs. But I have shown that for any enforcement regime that leads to positive concealment costs, that we can modify the sanctions to give the criminal an incentive to spend 0 on concealment and unambiguously improve social welfare. It is likely society would further modify the sanction regime to save enforcement costs.

I have focused on the reduction of concealment costs to make the analysis simpler. For an analysis that non-concealment can increase social welfare by saving enforcement costs, see Kaplow and Shavell (1994).

forth of messages by organized crime. When an item has many legitimate purposes, we may not want to increase its costs, but instead will simply want to impose higher sanctions for the illegitimate use of the device.

B. Good Concealment Costs: Safe Tankers Trucks and the Illegal Movement of Toxic Waste

Some concealment costs might actually be worthwhile.[30] For example those who illegally move toxic waste will be less likely to be detected if they use seal proof containers. It seems unlikely that we will want them to use leakier containers in order to increase our probability of detecting their behavior. A policy solution to this is to have additional penalties for actual harm caused, above and beyond those for any regulatory violations. Thus we can still give the actors incentives to take care in ways that may conceal but increase social welfare.

C. Revealment with effort

Malik (1993) and Kaplow-Shavell (1994) analyzed self-reporting behavior.[31] Their models assumed that the criminal had no revealment costs of self-reporting. For most cases this will likely be close to reality, since all one needs to do to self report is call the police and sign a confession. In their models, those who reveal their criminal behavior are rewarded with lower penalties. This is socially optimal as it lead to a savings in enforcement costs.

If revealment requires more effort then one can change the model above to include revealment costs instead of concealment costs while having the probability of detection increase with these revealment costs. Whether society will want criminals to exert effort revealing their activity will depend upon the relative efficiency of revealing effort with the costs of law

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30 The idea that some costs that reduce detection might be worthwhile while others will be purely wasteful was related to me by Louis Kaplow in comments on previous paper I wrote. It is important that when giving criminals disincentives to avoid detection we do not also give them incentives to cause more harm.

31 They also note that if administrative costs are positive, then it might not be worthwhile to have self-reporting. See Malik (1993) and Kaplow and Shavell, (1994) at 600-601.

enforcement itself. It is likely that the costs of revealing are very low relative to law enforcement costs, and thus approximating revealing costs by 0 will lead to the correct analysis. As Malik (1993) and Kaplow and Shavell (1994) have already done this analysis for revealment costs of 0, I will not repeat it here.

V. Policy Considerations

The policy I recommend depends somewhat upon the device used for concealment. In the table below I have categorized the devices by two characteristics into four types. The characteristics of the device include whether: (1) the concealment device has legitimate uses, and (2) the use of a concealment device is easy to determine when an actor has been detected. I summarize my recommendations for each of the four types in the table below. I will then discuss the four types of concealment devices.

	Easy to detect concealment device	Not easy to detect concealment device
No legitimate uses for concealment device	Type 1: Make item expensive or illegal. High sanctions for illegal use of item. Example: Radar Detectors	Type 2: Make item expensive or illegal. Example: Counterfeit Identification Documents
Legitimate uses for concealment device	Type 3: High sanctions for illegal use of item. Example: PGP	Type 4: Standard sanctions for all levels of concealment. Example: Tennis Shoes

1. Easy to detect concealment devices, no legitimate uses: Radar Detectors

Those devices such as the radar detector are the easiest to address from a policy view point. Because radar detectors serve no other purpose than to avoid the detection by the law, the policy

solution is to make the ownership and use of radar detectors illegal. It is likely that we will need to do both to deter the speeder from using these concealment devices, as so many radar detectors are already in use that simply outlawing radar detectors is unlikely to be enough. Assuming we want speeding to be easily detected (which is different than desiring no speeding) we should outlaw radar detectors and raise the fine when they are used.

2. Hard to detect concealment devices, no legitimate uses: Counterfeit documents

Counterfeit identification documents make it less likely that certain types of fraud will be detected. Suppose we lived in a world where we freely allowed the counterfeiting of driver's licenses or other official government sanctioned identification documents (e.g. passports), but punished anyone who used them for an illegitimate purpose. In such a world it would likely be very difficult (or expensive) to determine when the identification documents were counterfeit. But if we allowed others to freely counterfeit these identification documents, they would be used more often. Thus society has chosen to make counterfeiting identification documents illegal. Society is raising the cost of the concealment of the crime even though the fake documents are in themselves just paper, and if not used improperly cause no harm. Since there appears to be no legitimate uses for fake identification documents other than cheating others we have made them illegal.

3. Easy to detect concealment devices, legitimate uses: PGP

PGP stands for Pretty Good Privacy. It is a free-ware strong encryption program developed by Paul Zimmerman that is used by many individuals on the internet to insure the privacy of their e-mail messages. PGP has many practical legal uses, especially for corporations who wish to use the internet for communications of confidential information.[32] Unfortunately PGP can also be used by criminals or organized crime seeking to conceal their communications from law enforcement.

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[32] PGP also has other legitimate uses, such as allowing users to verify who is sending a message.

It is relatively easy to tell when a document has been encrypted, as it will appear to have random letters that make no sense. Thus law enforcement should not have a problem detecting that encryption is being used in those instances where they have the proper authority to intercept the electronic communications.[33] Because of the numerous legitimate uses of PGP, the government should move to increase sanctions when it is used for illegal purposes, but not outlaw PGP or increase its price.[34]

4. **Hard to detect concealment devices, legitimate uses: Tennis Shoes**

A more difficult case from a policy viewpoint is an item that can be used for concealment, that has legitimate uses and is also hard to detect when used to conceal. An example is soft soled shoes that do not make noise, such as tennis shoes. Suppose we caught the criminal with stolen property a few days after the crime was committed. It would be hard to determine if a crime was executed with tennis shoes or not. Certainly the lack of witnesses hearing walking noises might be an indication that tennis shoes were warn, but not necessarily. The inability to determine whether a crime was committed with tennis shoes or not may lead to situations where one penalty is set for the crime regardless of the concealment by wearing tennis shoes. This is because it is too costly for society to determine whether the concealment device is being used.[35] In addition, because of the

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33 See Rose (1995). For a short summary of the Electronic Communications Privacy Act and what steps you can take to protect your electronic privacy, see Stanley (1995a).

34 Currently PGP is perfectly legal in the United States, although recently there was some debate as to whether we should outlaw private strong encryption and require the use of a government sponsored system known as the clipper chip in order to allow law enforcement to more easily decode encrypted messages.

PGP has been declared a munitions by the National Security Agency, and export of it outside of the United States is illegal. PGP is available at a FTP site at MIT. On the WWW point your browser to: http://bs.mit.edu:8001/pgp-form.html. PGP is also available at numerous anonymous FTP sites outside of the United States.

35 Of course if we can easily tell whether tennis shoes were used to conceal the crime we will want to increase the fine for the concealment. But this might be better handled under guidelines that included increased penalties for concealment in general, rather than legislation aimed at tennis shoes in particular.

This differs from the radar detectors and encryption examples above, where legislation particular to the concealment item being used may be desirable.

many legitimate uses of tennis shoes we are unlikely to want to increase the cost of the item just because they are sometimes used in criminal acts.

VI. Conclusion

Society should give criminals incentives not to conceal their activity. The concealment costs themselves are a social waste, as are the other costs the concealment may impose on society, such as additional harm or increased law enforcement expenditures. I showed that for any set of sanctions that lead to positive concealment on behalf of the criminal, that society can modify the sanctions to give the criminal an incentive not to conceal and unambiguously improve social welfare. The same will apply to increasing the costs of concealment devices.

Society can deter concealment of crime by raising the sanction or raising the cost of committing the crime. Which policy is chosen will often depend upon the concealment device involved. If it is easy to detect the use of such a concealment device when a person is caught (e.g. radar detector, PGP), then penalties should be imposed on the criminal for using such a concealment device. If the device is of the type that has no legitimate purpose other than being used for concealment (e.g. radar detectors, false identification documents), then the device should be heavily taxed or outlawed. For situations where we are unable to determine whether the device has been used to conceal and the device has a legitimate purpose (e.g. tennis shoes) society should set one penalty for the crime, and possibly a generalized additional sanction for any concealment of the crime for those cases where we can prove concealment. If at all possible, society should discourage the concealment of crime because of the increased social costs.

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