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Focusing law enforcement when offenders can choose location

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ABSTRACT

This paper explores the advantages of focusing law enforcement on some locations when offenders can choose locations. The substitutability of different crimes from the offender's perspective is established as the key variable determining whether asymmetric enforcement is socially desirable. When it is easy for offenders to substitute crimes, focused law enforcement can be preferable only when the act imposes more harm in one location than in another (e.g., speeding in a residential or industrial area).

1. Introduction

Policing in practice is often asymmetric across space and target groups. For example, law enforcement authorities sometimes subscribe to so-called "hot spot" policing strategies that concentrate enforcement resources in few well-defined areas (Kleiman, 2010). In such cases, it is usually assumed that the areas differ in their likelihood of crime occurring. Targeting of areas that are similar in their characteristics also occurs (e.g., when the police determine which highway to patrol).[1] For optimal law enforcement, it is key to understand the scenarios in which focused law enforcement is socially optimal. In a related vein, private agents sometimes inform other individuals that enforcement is focused on some location. For example, some radio stations provide information about the location of speed cameras. An important question is to know in what contexts it is detrimental for society that potential offenders are informed about any asymmetry in law enforcement at different locations.

In a recent paper, Lando and Shavell (2004) (LS hereafter) examined how society should optimally allocate a fixed amount of enforcement resources across the set of potential offenders. Specifically, they asked whether it is ever desirable to focus all resources on a particular subgroup of offenders, for example, those residing in a particular region or possessing some discernible characteristic (e.g., drivers of red cars), rather than to spread the resources out uniformly. Their conclusion was that if resources are sufficiently constrained (i.e., below a critical threshold), then focusing all enforcement efforts on one subgroup is optimal. The intuition is that focusing enforcement allows achievement of the highest gain per unit of enforcement (e.g., per police officer) over some subset of offenders (the largest possible subset), thereby yielding a greater overall gain than settling for a lesser return per officer over the entire set.

This paper builds on the results established by LS by elaborating on the circumstances under which focused law enforcement may be optimal. A crucial assumption by LS is that offenders cannot respond to focused enforcement by changing their group membership. In some cases, this assumption makes perfect sense, for example, if membership in the targeted group depends on some inherent characteristic of potential offenders (e.g., male versus

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[1] Police sting operations are a related strategy. See, for example, Hay (2005) and Miceli (2007).

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female). In other cases, however, individuals may have the ability to react to the announced policy; for example, if it involves only patrolling a certain highway, people could alter their routes.[2] We analyze a setting in which potential offenders can respond to focused law enforcement by undertaking their offense somewhere else (albeit at a cost), and show that this possibility mitigates the advantages of focusing enforcement at one location.[3]

The remainder of our paper is organized as follows. Section 2 describes the model used for our analysis. Section 3 presents our analysis and relates it to the one by LS. Finally, Section 4 concludes.

2. The model

Suppose that on a line of unit length, location A is set at 0 while location B is set at 1. Individuals are located uniformly on the line between 0 and 1. Individuals choose, first, between a legal activity and an illegal activity, and, second, between conducting their activity at location A or location B.[4] For example, the choice may be between, first, driving while obeying the speed limit and speeding, and, second, between itinerary A and B. The legal activity generates utility v. The gross benefit from undertaking the illegal activity is b, where $b \in [0, G]$ according to the cumulative distribution function $F(b)$ with $G > v$ such that gross benefits from crime make offending profitable for some individuals when there is no effective law enforcement. Maintaining the assumption by LS, the distribution of benefits $F(b)$ applies irrespective of the individuals' location. There is a transportation cost tx for somebody located at x on the interval choosing to act at location A, where $t/2 < v$ such that somebody located at $x = 1/2$ finds tolerating the travel costs worthwhile given the benefit v.[5] The same logic applies to location B, for which the transportation cost is $t(1-x)$. The transportation costs can be interpreted in many ways. They may be literal transportation costs, but they could also reflect differences in local characteristics or the familiarity with locations. In the traffic example, for instance, location of the individual's residence and place of work may make itinerary A more convenient, when all else is held equal. Curran et al. (2005) argue that criminals prefer to offend in places with which they are somewhat familiar. Transportation costs can thus be interpreted in the sense that there are factors specific to the individual considered that make offending at one location more appealing than offending elsewhere.

Any offense at location A and B creates social harm, $h_A \geq h_B > 0$. For example, speeding may be more harmful in a residential area than in an industrial one. Alternatively, crimes like drug trafficking and prostitution presumably impose higher social costs in more densely located areas because they may introduce related crimes like robbery into the area. In addition, people dislike seeing addicts and prostitutes in the streets and are fearful of them. In all likelihood, the social harm of many acts is weakly higher when it is perpetrated in a more densely populated area.

In order to deter offending, law enforcement authorities commit to detection probabilities p_A and p_B at locations A and B, respectively, and the fine s imposed upon detection before potential offenders determine whether or not and where to offend.[6] As is commonly assumed, the level of the detection probability is independent of the crime rate (see, e.g., Polinsky and Shavell, 2007).[7] Like LS, we focus on the potential asymmetry in law enforcement and therefore consider s to be exogenous. Law enforcement authorities at locations A and B coordinate their efforts, choosing the (potentially asymmetric) detection probabilities p_A and p_B that fulfill the budget constraint $P = p_A + p_B$.[8] That is, we assume that the level of resources used is proportional to the detection probability induced. For example, the number of people that can be checked by two policemen is twice the number of individuals that can be checked by one policeman. A uniform enforcement scheme would imply that the detection probability is $P/2$ in location A and location B.

We also assume that $p_A \geq P/2$, or that in a non-uniform enforcement scheme, resources are focused at location A. For uniform levels of social harm, this is simply a convention without loss of generality, because focusing of enforcement resources will have to occur at one location which we happen to label by A. When harm levels are characterized by $h_A \geq h_B$ and there is any focusing of law enforcement, the ranking of probabilities $p_A \geq p_B$ is the only sensible one. Importantly, the marginal costs of detection probability at location A and location B is always one (i.e., the reduction of the resources available for enforcement at the other location). Focusing all enforcement resources at location A would imply $p_A = P$, such that we impose $P \leq 1$. The level of enforcement resources P is fixed in our paper (as it is in LS 2004). Given that our interest is with the allocation of resources, this is not restrictive because the problems of determining the overall level of the budget and the allocation of that spending into various uses should be separable.

We purport to highlight the implications of mobile potential offenders for the optimality of focusing law enforcement. For this, we extend the benchmark setup provided by LS by this aspect. Other assumptions are maintained. For example, we do not consider the possibility of potential offenders being able to choose between different criminal acts. For that scenario, we would have to distinguish between the cases of general and specific enforcement and consider marginal deterrence (Shavell, 1991, 1992). Moreover, LS focus on perfectly symmetric locations, supposedly because that setting is the most hostile to the optimality of concentrating law enforcement

[2] LS recognize the relevance of this possibility in their discussion.

[3] To analyze this question, we make use of a transportation cost model that is similar to models that have been used to analyze competition in law enforcement between jurisdictions (see, e.g., Marceau, 1997; Marceau and Mongrain, 2011).

[4] There is no loss in generality in assuming only two locations since LS show that it is never desirable to divide the population of offenders into more than two subgroups. For three different levels of law enforcement, implementing the intermediate level of enforcement in an area may yield either a higher level of welfare or a lower one than implementing the higher level of enforcement in one part of the region and the lower level of enforcement in the remainder. Due to the symmetry of locations, it is then always welfare-increasing when the region with intermediate enforcement is either expanded at the cost of the other two regions or contracted and the others expanded. This conclusion, however, does not generally transfer to a setting with asymmetric locations.

[5] We assume that transportation costs are independent of the activity chosen. Transportation costs are linear in our framework. This is also the standard assumption in other spatial models (e.g., Marceau, 1997). The assumption of quadratic transportation costs is also sometimes used in the literature. For example, in the context of the Hotelling model addressing product differentiation and imperfect competition, a subgame perfect equilibrium always exists in a two-stage competition when transportation costs are quadratic but not necessarily when they are linear (see, e.g., Belleflamme and Peitz, 2010). In our setting, quadratic transportation costs would further reduce the willingness of potential offenders to travel long distances in order to offend elsewhere, but it seems that this basic intuition can be captured by variations of the level of the transportation cost parameter. On a different note, one may consider transportation costs as a policy instrument in the sense of preventive law enforcement (Friehe and Tabbach, 2013). However, in the current paper, we are interested in the structure of detection probabilities in different locations.

[6] The sequential structure of the policy maker moving first and potential offenders moving second is standard in the literature on optimal law enforcement (e.g., Polinsky and Shavell, 2007). Some contributions take credibility explicitly into account (Baker and Miceli, 2005). In other contributions, the possibility of enforcement agents and potential offenders moving simultaneously is considered (Friehe, 2008; Leshem and Tabbach, 2012).

[7] The alternative assumption is considered in Ferrer (2010), for example, and would introduce additional complications such as the possibility of multiple equilibria.

[8] For simplicity, we assume that the constraint will be binding for the optimal allocation of funds, which will be true for sufficiently high levels of harm.