Deterrence, Criminal Opportunities, and Police
(Criminology, 2015)

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Aims

Join three distinct literatures on

- Deterrence
- Policing
- Environmental criminology/Opportunities theory

Pose a mathematical model of the distribution of criminal opportunities and offender decision making to victimize them

Explore the implications of the model for effective and efficient deployment of the police

Key Conclusions from the Deterrence Policing, and Opportunities Literatures

Deterrence Literature: Certainty of apprehension not the severity of the ensuing consequence is the key deterrent

Policing Literature:

- Police presence matters
- How police are deployed matters
- Sentinel and apprehension agent roles of police

Opportunities/Environmental Criminology Literature

- Target characteristics matter a lot in whether it is victimized or not

Some Important Target Characteristics

Value of the loot (crimes with a money motive)

Risk of victim retaliation

Risk of Apprehension

- **Physical Target protection**
- **Guardianship**
  - **Citizens**
  - **Police in their sentinel role**

Some Observations about Apprehension Risk (P(A))

Police numbers and how they are used are key are determinants of apprehension risk

Willingness of community members to report crimes and identify perpetrators is another key ingredient

P(A) for any particular criminal opportunity is highly dependent the physical environment and target protection

P(A) ranges over its entire theoretical domain—0 to 1

Some Possible Forms of the Distribution of Criminal Opportunities

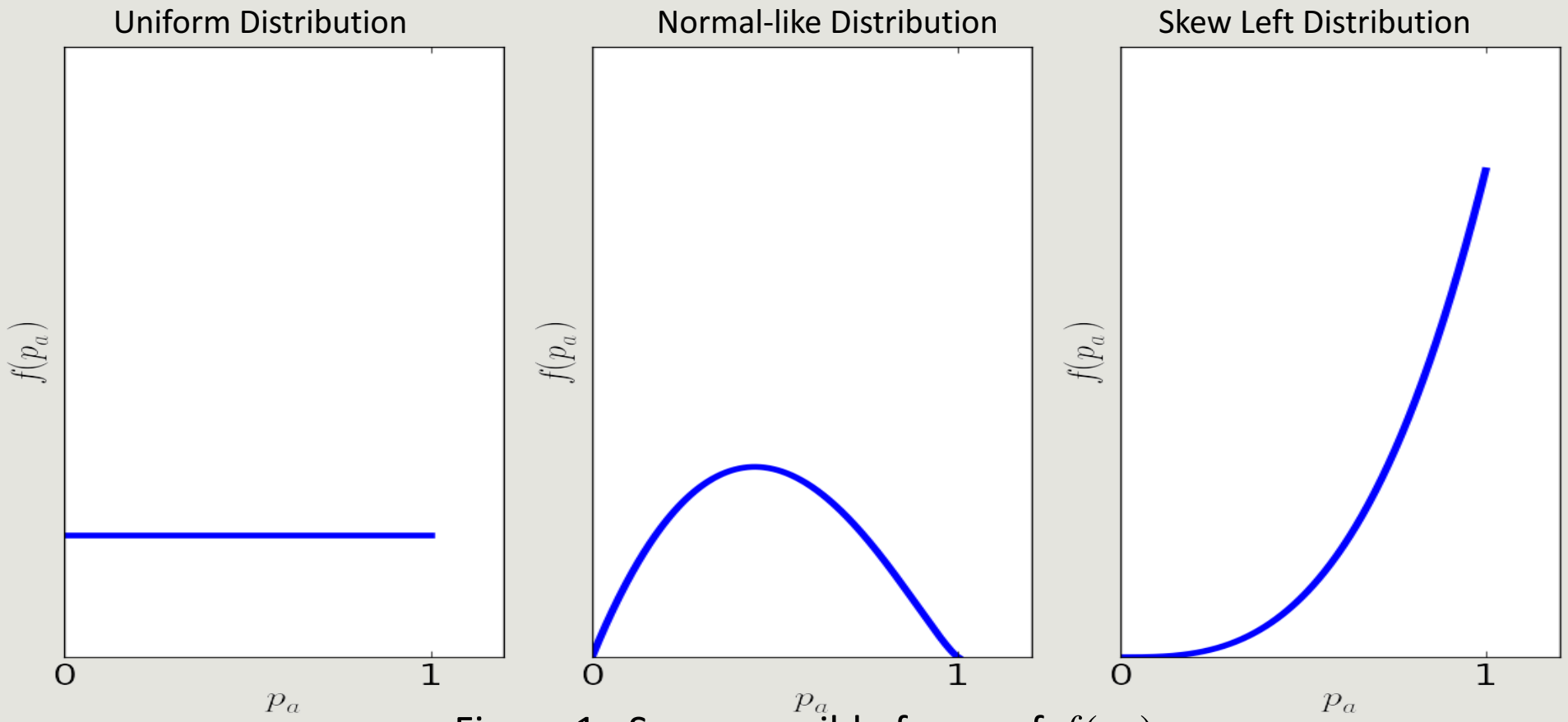

Figure 1 : Some possible forms of $f(p_a)$

Our Chosen Form of $f(p_a)$

$$f(p_a) = (\alpha + 1) p_a^{\alpha}$$

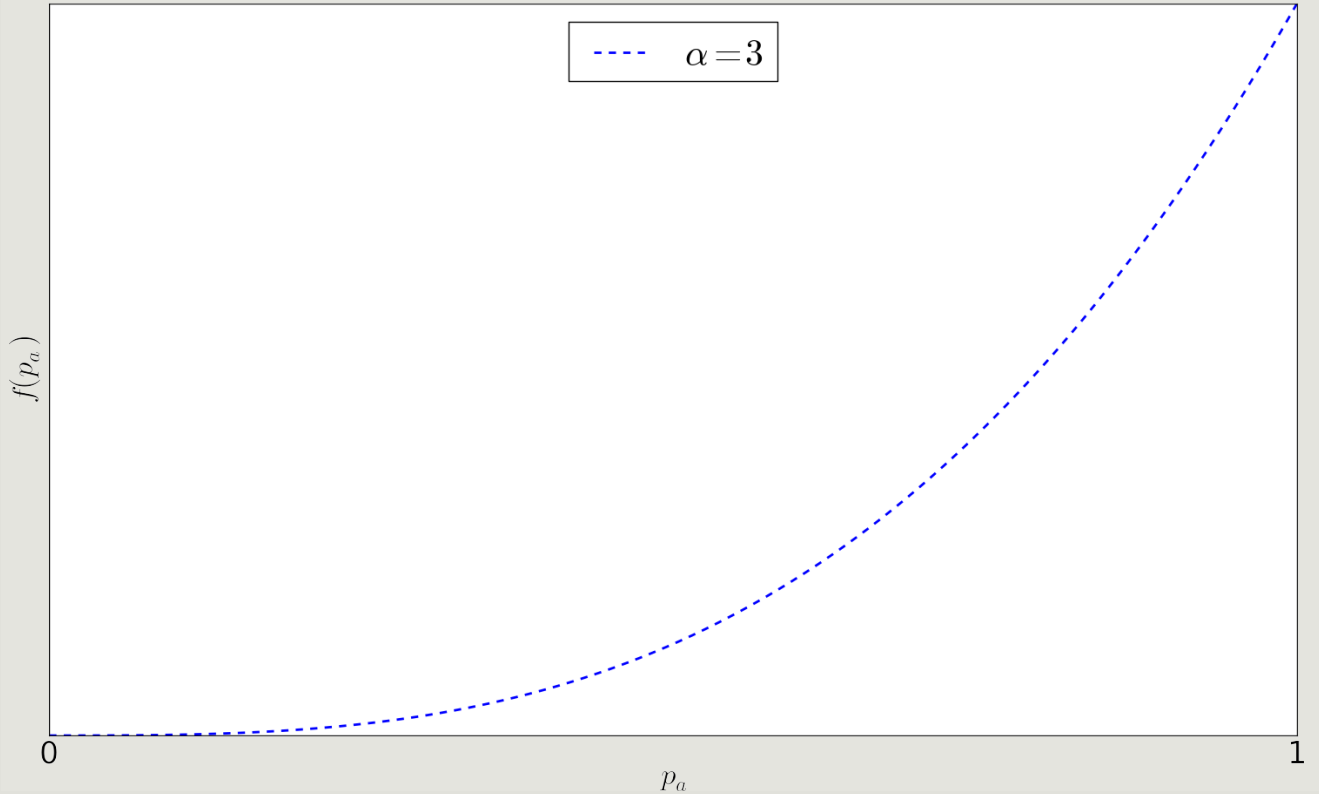

Figure 2: $f(p_a)$ for α = 3

The Influence of α on the shape of $f(p_a)$

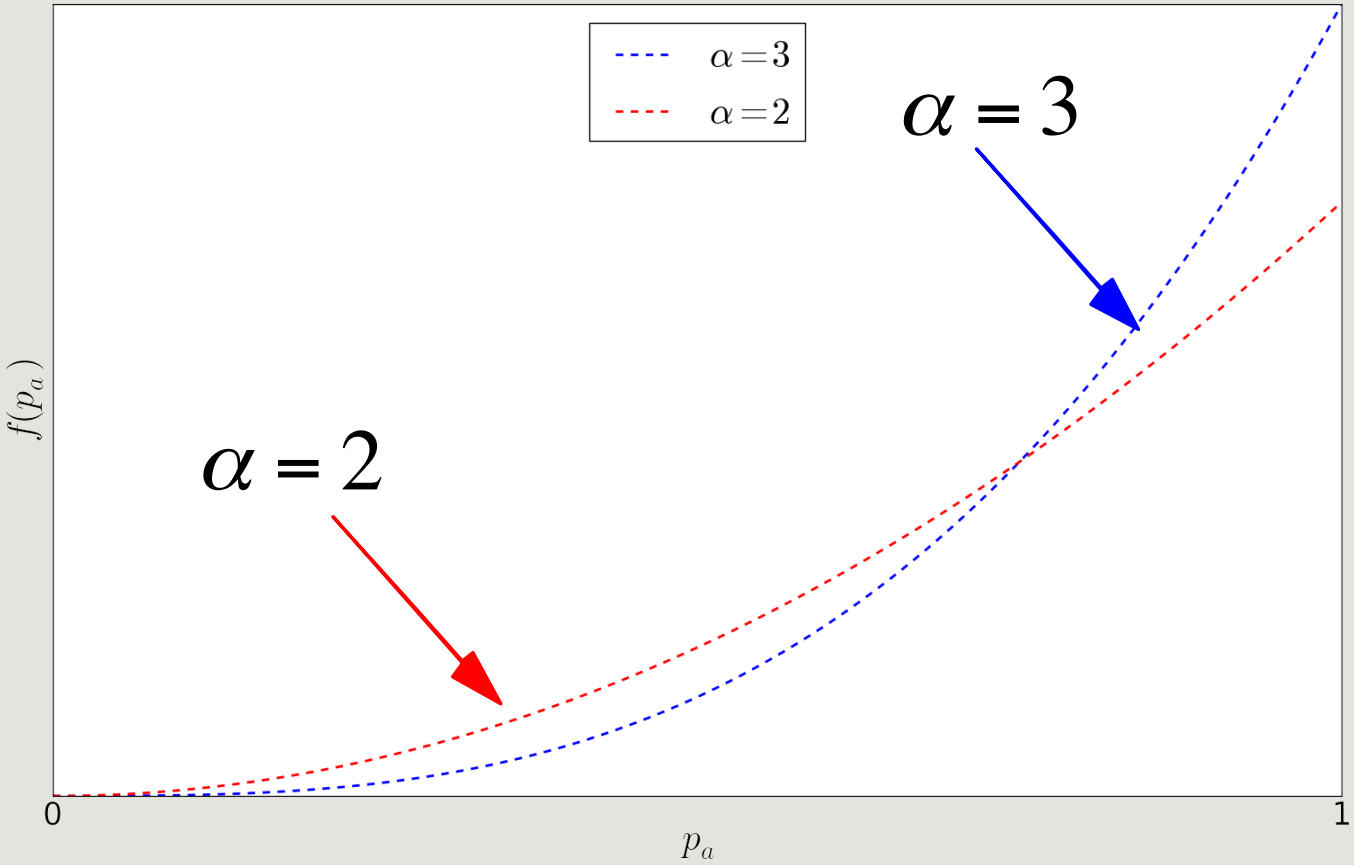

Figure 3 : $f(p_a)$ for α = 3 and α = 2

A Simple Model of Offender Decision to Hit a Target

Key assumption: Would-be offenders don't want to get caught

Decision rule: Conditional on other target characteristics would-be offenders victimize targets in which $p_a \leq p_a^*$

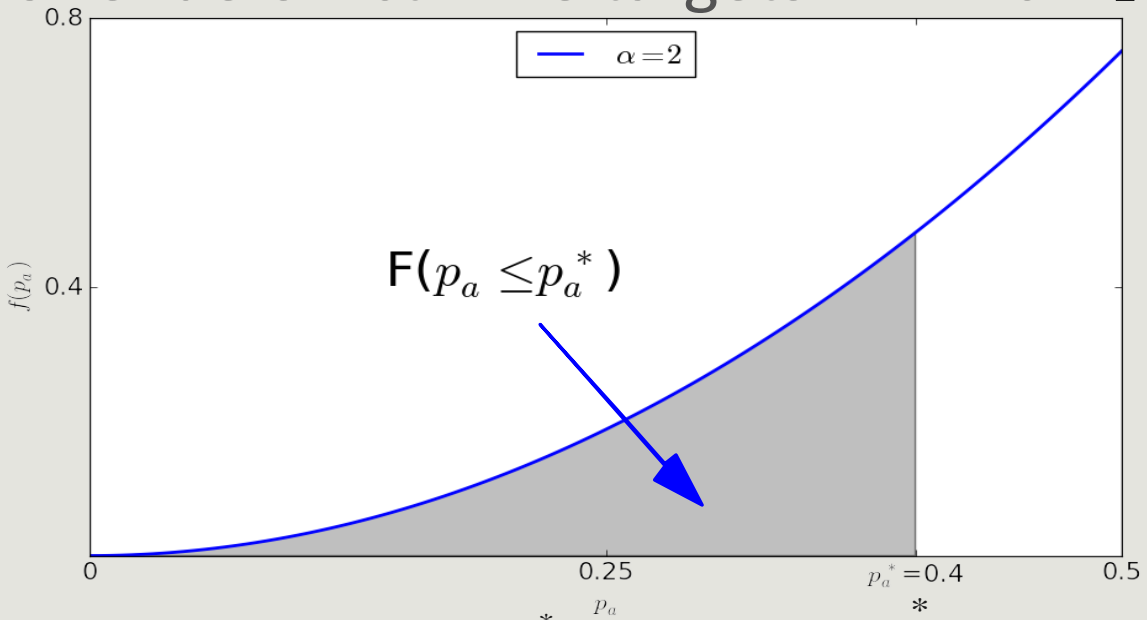

Figure 4: $F(p_a \leq p_a^*)$ for α = 2 and p_a^* = 0.4

$$F(p_a \leq p_a^*) = \text{“Crime Rate”}$$

$$= p_a^{*(\alpha+1)}$$

Implications for Policing

Model has implications for crime prevention well beyond policing

Policing Implications

- Effectiveness of targeted v. non-targeted deployment of police
- Measuring effectiveness based on arrest versus crime prevention
- Police dependence on community goodwill

Non-Targeted Police Deployment Strategies

Examples—Increased random patrol activity or hiring more police and deploying them in proportion to the current distribution across precincts

Equivalent to increasing α

Non-Targeted Police Deployment Strategies

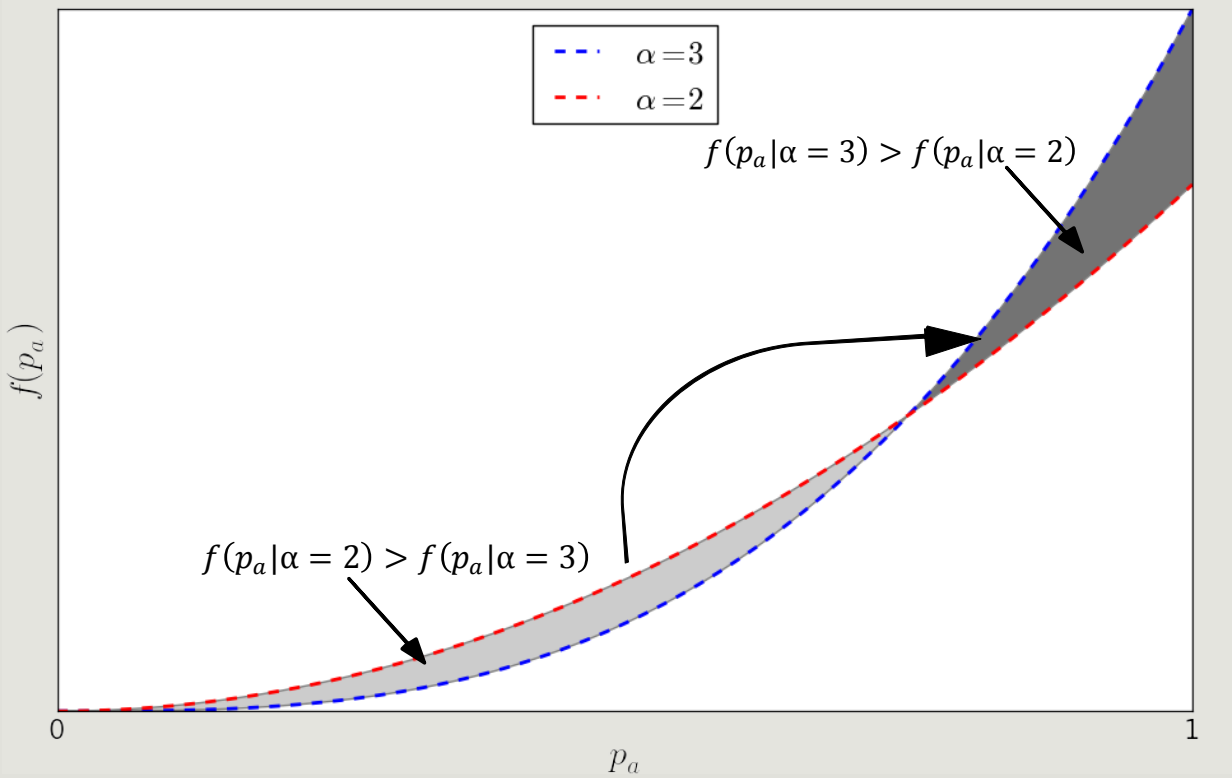

Figure 5: Increasing P(A) for all criminal opportunities by increasing α from 2 to 3

Crime Reduced But Inefficiently

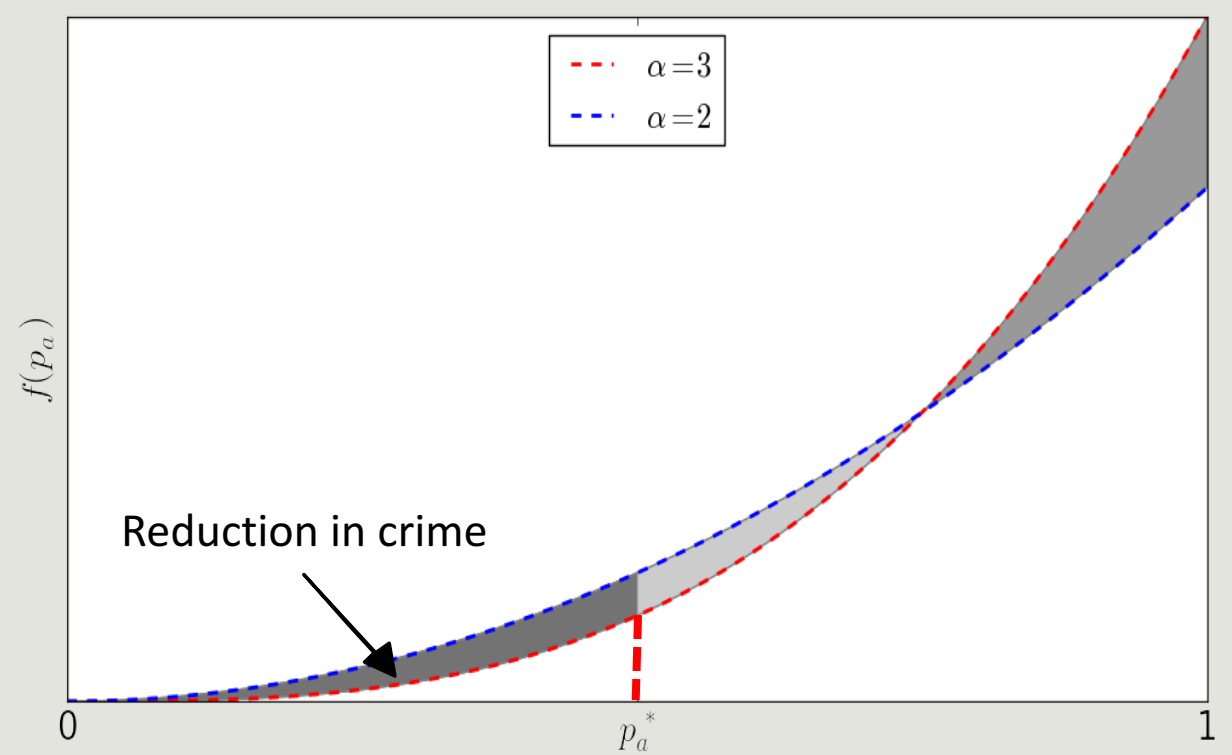

Figure 6: Measuring the shift in criminal opportunities by increasing α from 2 to 3

Crime Reduced But Inefficiently

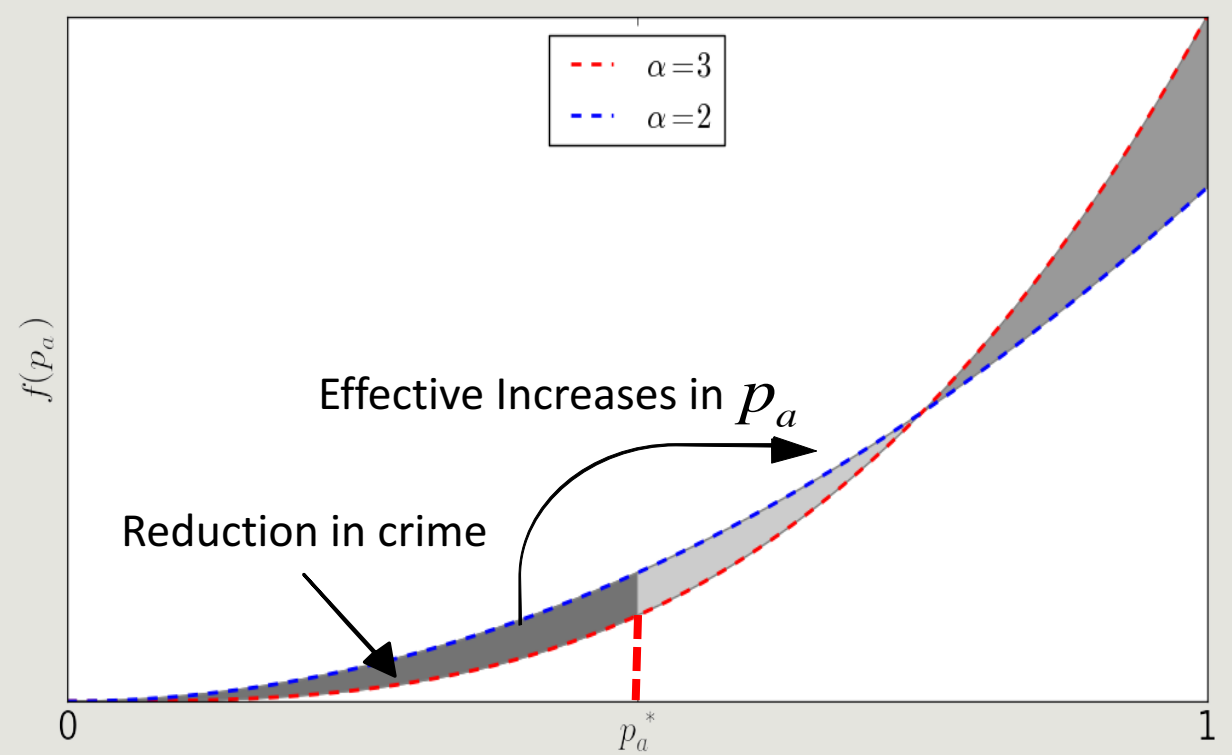

Figure 6: Measuring the shift in criminal opportunities by increasing α from 2 to 3

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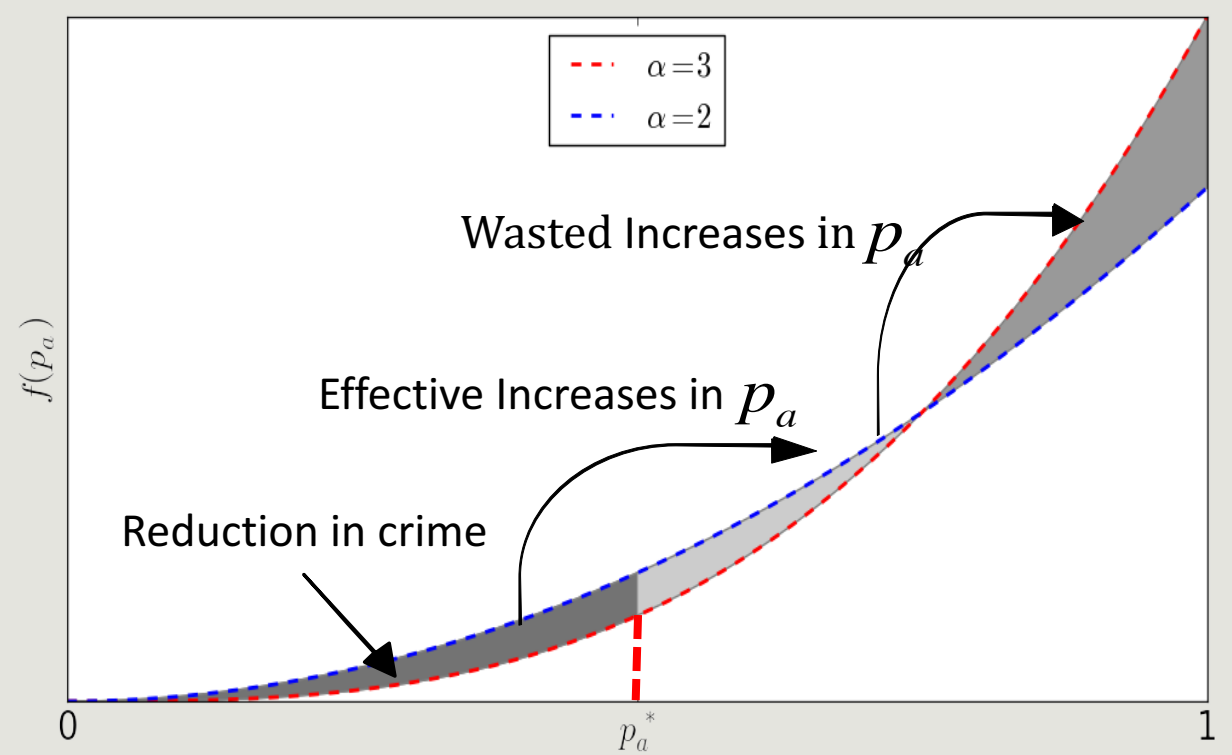

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Targeting Is More Effective and Efficient

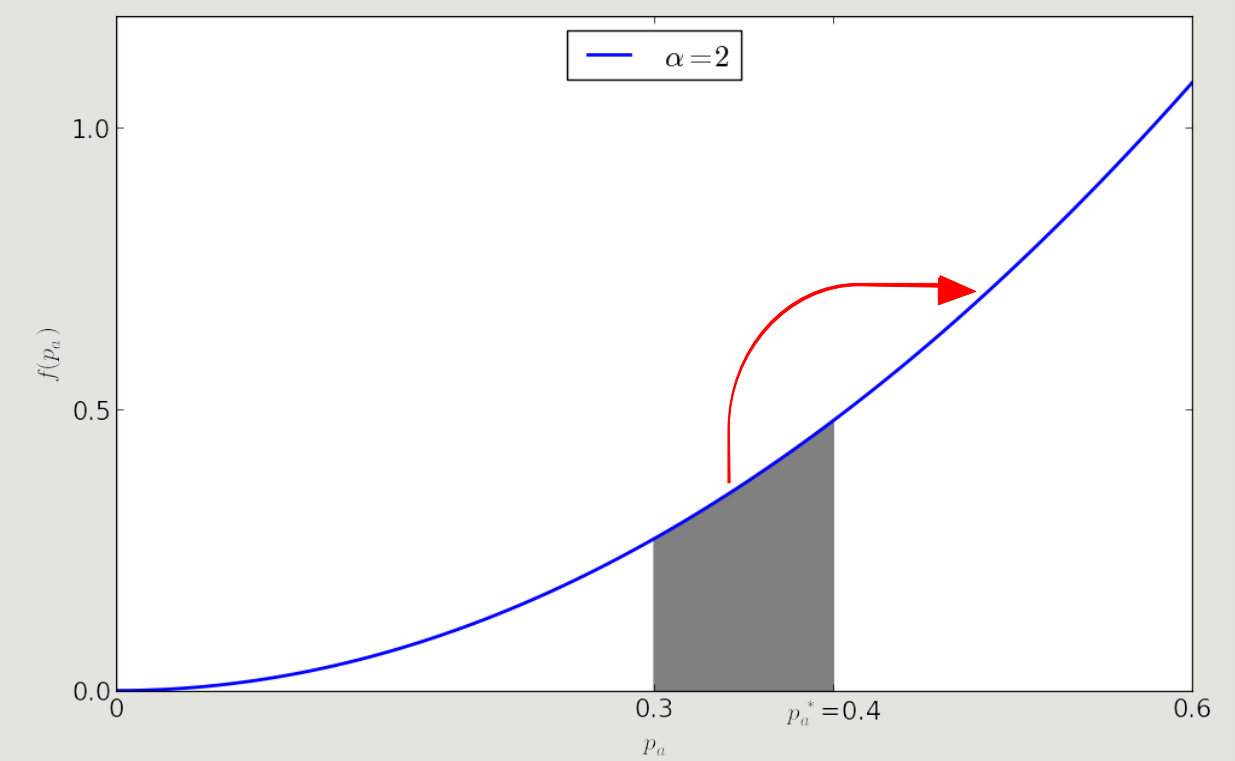
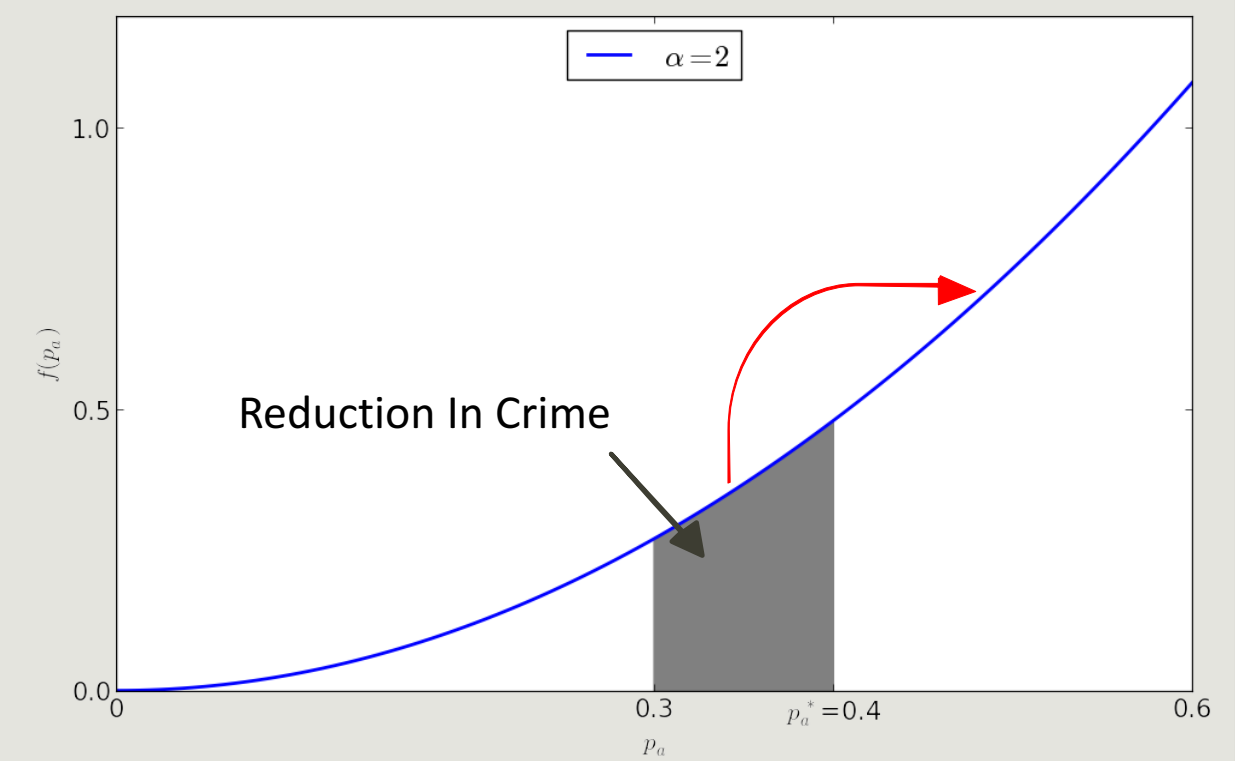


Figure 7: Targeting opportunities where $0.3 \leq p_a \leq 0.4$ ($\alpha = 2$)

Targeting Is More Effective and Efficient



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Examples of Targeting and Sentinel Policing

Hot spots policing

Third-party, problem oriented policing that increases P(A) through improved guardianship

Police Should Be Evaluated by their Effectiveness in Preventing Crime not in their Apprehension Agent Role of Making Arrests

Clearance rate measures the percentage of crimes committed that are resolved by arresting the perpetrator

In our model **Clearance rate =** $\frac{\alpha+1}{\alpha+2} p_a^*$

Clearance Rate only measures police effectiveness in apprehending perpetrators not their effectiveness in preventing crime

An Example of Why the Clearance Rate is a Perverse Measure of Police Effectiveness

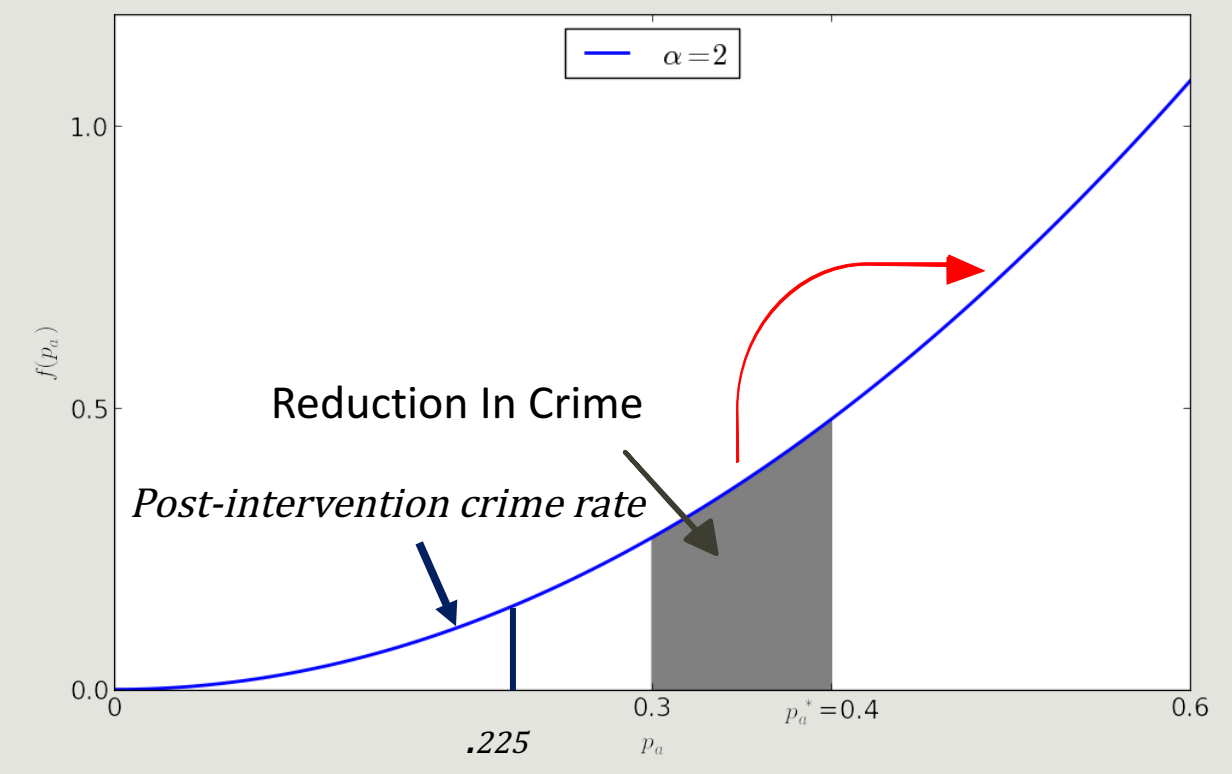


Figure 7: Targeting opportunities where $0.3 \leq p_a \leq 0.4$ ($\alpha = 2$)

Pre-intervention:
Crime Rate=.064
Clearance Rate=.3

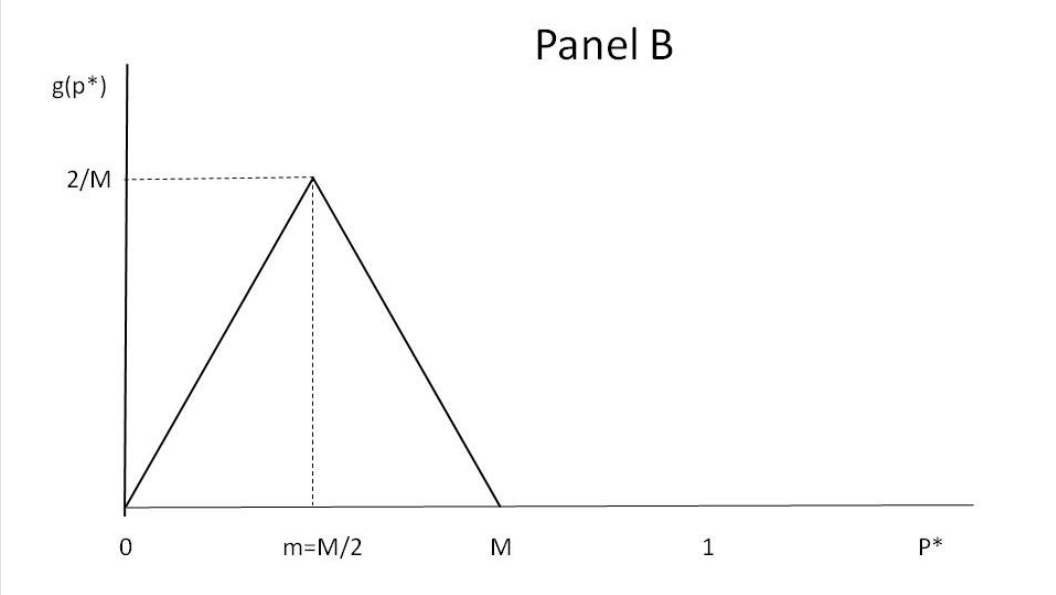
Pre-intervention:
Crime Rate=.027
Clearance Rate=.225

Allowing for Heterogeneity in p_a^*

$$F = \int_0^1 {p^*}^{\beta+1} \, g(p_a^*) dp_a^*$$

$$A = \frac{\beta + 1}{\beta + 2} \int_0^1 p^* \, g(p_a^*) dp_a^*$$

For a Triangular Distribution of p^*



Homogeneous p_a^*

$$F = \left(\frac{M}{2}\right)^{\beta+1} \quad (11a)$$

$$A = \frac{\beta+1}{\beta+2} M/2 \quad (11b)$$

Heterogeneous p_a^*

$$F = \left[\frac{4M^{\beta+1}}{(\beta+2)(\beta+3)}\right]\left[1 - .5^{\beta+1}\right] \quad (12a)$$

$$A = \frac{\beta+1}{\beta+2} M/2 \quad (12b)$$

Next Steps

Quantitative models relating target features and environment of apprehension risk

Quantitative models of offenders perceptions of apprehension risk

Evaluations of the effectiveness of police crime control tactics should measure community reactions and arrests not just reported crimes and measures of disorder