Questions for Lecture Notes V

- How does economics help us to understand crime?
- How to understand crime help us to deal with it?
- What is special about housing decisions?
Crime - Facts

- FBI collects data from local police departments on seven index crimes.
  - Personal crimes: Murder, Rape, Aggravated assault, Robbery
  - Property crimes: Burglary (illegal entry of a building), Larceny (purse snatching, pocket picking, bicycle theft, etc) and Auto Theft.

- Only crimes reported to the police (around 38% of all property crimes and 48% of all personal crimes).

- Department of Justice makes surveys of victimization rates.
# Crime - Facts

**TABLE 12-1 FBI Index Crimes, 1960–2003**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal Crime</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murder</td>
<td>5.0</td>
<td>7.8</td>
<td>10.2</td>
<td>9.4</td>
<td>8.2</td>
<td>5.7</td>
</tr>
<tr>
<td>Rape</td>
<td>9.5</td>
<td>18.6</td>
<td>36.8</td>
<td>41.2</td>
<td>37.1</td>
<td>32.1</td>
</tr>
<tr>
<td>Aggravated assault</td>
<td>85</td>
<td>177</td>
<td>299</td>
<td>424</td>
<td>418</td>
<td>295</td>
</tr>
<tr>
<td>Robbery</td>
<td>60</td>
<td>187</td>
<td>251</td>
<td>257</td>
<td>221</td>
<td>142</td>
</tr>
<tr>
<td><strong>Property Crime</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto theft</td>
<td>182</td>
<td>457</td>
<td>502</td>
<td>658</td>
<td>561</td>
<td>433</td>
</tr>
<tr>
<td>Larceny</td>
<td>1,024</td>
<td>2,124</td>
<td>3,167</td>
<td>3,184</td>
<td>3,045</td>
<td>2,415</td>
</tr>
<tr>
<td>Burglary</td>
<td>504</td>
<td>1,152</td>
<td>1,684</td>
<td>1,236</td>
<td>988</td>
<td>741</td>
</tr>
<tr>
<td><strong>Total Index Crimes</strong></td>
<td>1,870</td>
<td>3,949</td>
<td>5,950</td>
<td>5,820</td>
<td>5,278</td>
<td>4,064</td>
</tr>
</tbody>
</table>

# Crime - Facts

## TABLE 12-2 Criminal Victimization Rates, 2003

<table>
<thead>
<tr>
<th>Household Income</th>
<th>Violent (per 1,000 people)</th>
<th>Property (per 1,000 households)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Population (million)</td>
<td>Total</td>
<td>Robbery</td>
</tr>
<tr>
<td>Less than $7,500</td>
<td>8</td>
<td>49.9</td>
<td>9</td>
</tr>
<tr>
<td>$7,500–$14,999</td>
<td>16</td>
<td>30.8</td>
<td>4</td>
</tr>
<tr>
<td>$15,000–$24,999</td>
<td>25</td>
<td>26.3</td>
<td>4</td>
</tr>
<tr>
<td>$25,000–$34,999</td>
<td>24</td>
<td>24.9</td>
<td>2.2</td>
</tr>
<tr>
<td>$35,000–$49,999</td>
<td>32</td>
<td>21.4</td>
<td>2.1</td>
</tr>
<tr>
<td>$50,000–$74,999</td>
<td>35</td>
<td>22.9</td>
<td>2</td>
</tr>
<tr>
<td>$75,000 or more</td>
<td>48</td>
<td>17.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Region</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>45</td>
<td>21</td>
<td>2.7</td>
</tr>
<tr>
<td>Midwest</td>
<td>56</td>
<td>23.6</td>
<td>2.7</td>
</tr>
<tr>
<td>South</td>
<td>86</td>
<td>21.1</td>
<td>2.5</td>
</tr>
<tr>
<td>West</td>
<td>52</td>
<td>25.2</td>
<td>2.1</td>
</tr>
<tr>
<td>Residence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central city</td>
<td>66</td>
<td>28.2</td>
<td>3.7</td>
</tr>
<tr>
<td>Suburban</td>
<td>116</td>
<td>21.3</td>
<td>2.3</td>
</tr>
<tr>
<td>Rural</td>
<td>57</td>
<td>18.6</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Crime – Cost to society

Total Cost (in 1992)

U$S 250 billion per year
3.8% of GDP !!!

Economics of Crime

- Criminals are rational, as everybody.
- They are in a risky “business”
- Criminals commit the crime when the expected benefits are greater than the expected costs.

- A criminal. To be, or not to be. That is the question
Economics of Crime - Risk Aversion

- Assume a utility function (and consumption=income)
  \[ U = u(c) = u(y) \]

- Absolute coefficient of risk aversion
  \[ ARA = -\frac{u''(y)}{u'(y)} \]

- Relative coefficient of risk aversion
  \[ RRA = -\frac{u''(y)}{u'(y)} y \]

- For example, assume \( U = y^{1/2} \) hence \( ARA = \frac{1}{2y} \) and \( RRA = \frac{1}{2} \)
  \[ U = \frac{y^{1-\rho}}{1-\rho} \quad (\text{for } \rho \in [0,1]), \quad ARA = \frac{\rho}{y}, \quad RRA = \rho \]

  For \( \rho = 1 \), \( U = \ln(y) \), \( ARA = \frac{1}{y} \), \( RRA = 1 \)
Economics of Crime - Risk Aversion

Drop in utility from a drop $x$ in income

Rise in utility from an increase $x$ in income

Utility

$y-x$ $y$ $y+x$

Income
Economics of Crime - Risk Aversion

Utility

Rise in utility from an increase \( x \) in income

Drop in utility from a drop \( x \) in income

More risk aversion

\[ y - x \quad y \quad y + x \]

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Economics of Crime

Utility Function: \( \sqrt{\text{Income}} \)

Indifference between being or not a criminal

Expected Utility = 8*0.5 + 12*0.5

Probability of being caught = 50%

Expected Income = 64*0.5 + 144*0.5
Economics of Crime - Changing incentives

Utility Function = $\sqrt{\text{Income}}$

- Lawful Job: Income = 88
- Free if crime: Income = 144
- Expected Utility (Caught): Utility of 8 with probability 0.7 and Utility of 12 with probability 0.3
- Expected Utility (Free): Utility of 64 with probability 0.7 and Utility of 144 with probability 0.3

Increasing the probabilities of catching criminals (more policemen)

These individuals would decide not to commit crimes.

Probability of being caught increases to 70%.
Economics of Crime—Changing incentives

Increasing the penalties to criminals

Utility Function = $\sqrt{\text{Income}}$

These individuals would decide not to commit crimes.

The same is true by reducing loots.

Expected Utility = $7 \times 0.5 + 12 \times 0.5$

Expected Utility = $49 \times 0.5 + 144 \times 0.5$

Penalties increase by $15$
### Economics of Crime-Changing Incentives

**Utility Function:** \( \ln(\text{Income}) \)

<table>
<thead>
<tr>
<th>Decision</th>
<th>Income</th>
<th>Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caught if crime</td>
<td>104</td>
<td>4.16</td>
</tr>
<tr>
<td>Lawful Job</td>
<td>100</td>
<td>4.61</td>
</tr>
<tr>
<td>Free if crime</td>
<td>64</td>
<td>4.97</td>
</tr>
</tbody>
</table>

**Expected Utility:**
- Caught if crime: \( 4.16 \times 0.5 + 4.97 \times 0.5 \)
- Lawful Job: \( 4.61 \times 0.5 \)
- Free if crime: \( 4.97 \times 0.5 \)

More risk aversion in these individuals would decide not to commit crimes.
Economics of Crime-Changing incentives

Increasing the value of lawful activities

Utility Function: $\sqrt{\text{Income}}$

Expected Utility $= 8 \times 0.5 + 12 \times 0.5$

Probability of being caught = 50%

Expected Utility $= 64 \times 0.5 + 144 \times 0.5$

These individuals would decide not to commit crimes

Caught if crime
Lawful Job
Free if crime

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Economics of Crime

Number of crimes

Price of crime (Loot in $)

Determined by our previous discussion

Marginal Cost or “Supply” of Crime
Loot=200+3*Crime

Marginal Benefit or “Demand” of Crime
Loot=1000-5*Crime

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Economics of Crime

Price of crime (Loot in $)

- Increase in probabilities of punishment
- Increase in penalties
- Increase in anguish or risk aversion
- Increase in the value of lawful activities

Number of crimes

Initial supply

New supply

Marginal Benefit

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Economics of crime

- Some elasticities, (of crime with respect to)
  - Probability of imprisonment: - 0.3
  - Arrest ratio: - 0.3
  - Number of police officers: - 0.45
  - Length of prison: Almost 0.

- The worst punishment is the lose of freedom, not so much how many years criminals spend in prison after they lose freedom.
- Hardening the criminal (reduction in anguish).
- Prison schooling (by other prisoners).

- Wages of low skilled workers: Between -1 and -2
Economics of crime

- Education as a Crime Fighting Policy
  - Additional year of high school: Decreases the crime participation rate by about 0.1 percentage points for white males and 0.4 percentage points for black males.
  - Graduation from high school: Decreases the crime participation rate by 10% for violent and property crimes.
Optimal crime level

How does the optimal level of crime changes?

Marginal prevention cost

Marginal victim cost

$\text{Optimal crime}$

$\text{Number of crimes}$

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Optimal penalties (General Equilibrium)

Is this increase in penalties a good idea if the cost of one robbery to society is equivalent to four burglaries?

What if one robbery is like two burglaries?
Crime in cities – Two big facts

- Crime rates are higher in big cities than in small ones.

- Crime rates decreased in the US during the nineties (by around a third)
Crime in cities – Two big facts

- Crime rates are higher in big cities than in small ones.
  - Large cities (population more than 250,000) have **twice** as much violent crime and 30% more property crimes than small cities (population less than 10,000)
  - Elasticity of crime with respect to city size: **0.15**

- Why? (Glaeser and Sacerdote, 1996)
  - More female-headed houses: (explains 50% of the difference). Children less skilled and less ethical ?????
  - More loot: (explains 25% of the difference) Average value per crime $900 against $550
  - Lower probability of arrest: (explains 15% of the difference) Larger pool of criminals and less helpful “neighbors”
Crime in cities – Two big facts

Price of crime
(Loot in $)

Supply
Small city

Supply
Large city

Marginal Benefit
Large city

Marginal Benefit
Small city

Crimes in small city

Crimes in large city

Number of crimes

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Crime in cities – Two big facts

- Crime rates decreased in the US during the nineties (by around a third)
- Why? (Levitt, 2004)

*Figure 12–7 Why Did Crime Drop in the 1990s?*

Crime is a risky business because there is a chance of being caught and paying a large penalty. A potential criminal compares the certain utility of lawful jobs to the expected utility of criminal activities.

An increase in the probability of punishment has a larger deterrent effect than an increase in the severity of punishment.

The optimum amount of crime is the level at which the marginal victim cost equals the marginal prevention cost.

Education reduces crime by increasing the opportunity and payments of lawful jobs.

Increase in penalties to some specific crimes not necessarily increases welfare to society.
Housing

- Three unique characteristics of housing
  - Heterogeneity and hedonics
  - Durability
  - High moving costs
Housing - Heterogeneity

- A house is a bundle of characteristics or housing services, each with an implicit price.

- Size, layout, style, utilities, quality of the interior and exterior, neighborhood, access to schools and services, etc.

- Under the hedonic approach the price of a house is determined by each part of the housing bundle.
Housing - Heterogeneity

**FIGURE 13–1** Results of Hedonic Study

<table>
<thead>
<tr>
<th>Feature</th>
<th>Rental</th>
<th>Owner-Occupied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interior quality</td>
<td>2.1</td>
<td>5.6</td>
</tr>
<tr>
<td>Age</td>
<td>-0.5</td>
<td>-0.7</td>
</tr>
<tr>
<td>Number of rooms</td>
<td>10</td>
<td>36.8</td>
</tr>
<tr>
<td>Number of baths</td>
<td>5.3</td>
<td>14.8</td>
</tr>
<tr>
<td>Exterior quality of adjacent buildings</td>
<td>3</td>
<td>5.3</td>
</tr>
<tr>
<td>Exterior quality of dwellings on block</td>
<td>6</td>
<td>2.9</td>
</tr>
</tbody>
</table>

Housing - Durability

- A house can last more than a century.
- Naturally, quality (one of the main determinants of prices and rents) deteriorates along time.
- The owner of the house should decide the degree of maintenance to equalize the benefits from a better rent or price and the costs of repair.
- Basically the owner’s objective is to maximize profits deciding the quality of the dwelling.
- If maintenance is not profitable, the owner may decide between boarding, conversion or abandonment.
- Abandonment generates negative externalities.
Housing – Reduction in quality

The individual will move back to $q^*$ when $(U_0 - U_1)$ justifies the high moving cost.

**Diagram:**

- **Axes:**
  - **Horizontal Axis:** Housing quality
  - **Vertical Axis:** Other goods ($)

- **Graphs:**
  - $U_0$
  - $U_1$

- **Points:**
  - $q$
  - $q^*$
  - $A$
  - $A^*$

- **Notation:**
  - $q$
  - $q^*$
  - $A$
  - $A^*$

**Explanation:**

- Reduction in quality (because of time).

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The individual will move to $q^{**}$ when $(U_2 - U_1)$ justifies the high moving cost.
Summary Ch. 13 O’Sullivan

- The hedonic approach is based on the notion that a dwelling is composed of a bundle of housing services, each with an implicit price.

- Housing is durable and the owner controls its position on the quality ladder by spending on maintenance, repair, renovation and remodeling.

- The cost of moving is relatively large, so households change their housing consumption infrequently and make large changes when they move.
Questions for Lecture Notes V

- How does economics help us to understand crime?
- How to understand crime help us to deal with it?
- What is special about housing decisions?
Practice Exercises - Lecture Notes V

- O’Sullivan
  - Chapter 12: Exercises 2, 3 and 4.
  - Chapter 13: Exercises 1 and 2.