Crime and Punishment in the “American Dream”*

Rafael Di Tella                Juan Dubra
Harvard Business School        Universidad de Montevideo
Universidad Torcuato Di Tella

First Draft. Please do not Circulate. August 18, 2006

Abstract

We observe that countries where belief in the “American dream” (i.e., whether effort pays) prevails also have harsher punishment to criminals. We know from previous work that beliefs are also correlated with several features of the economic system (taxation, social insurance, etc). We ask if the three features (beliefs, punitiveness and economic system) arise simultaneously in a way that replicate the observed empirical patterns. We present a model where beliefs determine the types of contracts that firms offer and whether workers exert effort or choose to become criminals. The latter choice depends on labor market performance and an individual shock that we call “meanness”. It is this meanness level that a penal system based on “retribution” tries to determine when establishing the severity of the punishment. We find that when initial beliefs differ, two equilibria can emerge out of identical fundamentals. In the “American” (as opposed to the “French”) equilibrium, belief in the “American dream” is commonplace, workers exert effort, there are high powered contracts, income is unequally distributed and punishments are harsh. Economists who believe that deterrence (rather than retribution) shapes punishment can interpret the meanness parameter as pessimism about future economic opportunities and verify that two similar equilibria emerge.

Keywords: beliefs, multiple equilibria, illegal behavior, fines, sentences.

Journal of Economic Literature Classification Numbers: P16, K14, E62

1 Introduction

All societies that have laws must decide what to do to those who violate these laws. An interesting fact is that some societies, notably the US, choose punishments that would be

*For helpful conversations or comments we thank Federico Echenique, James Owen McLeod, Julio Rotemberg and Christopher Uggen.
considered too harsh in other societies. For example, each year in the US a small number of individuals receive capital punishment, whereas in Europe killing offenders is not an option. Even within the US there is some variation in this respect, with 38 states allowing the death penalty and some of them applying it with more enthusiasm than others. Beyond the death penalty, the incarceration rates in the US in 2004 exceeded 700 per 100,000 inhabitants, approximately 5 times those observed in most European countries. Anecdotal evidence also reports that the treatment of prisoners in the US is on the strict side. For example, a 1999 report states that Maricopa County Jail in Arizona makes “inmates pay for their meals, which some say are worse than those for the guard dogs. Canines eat $1.10 worth of food a day, the inmate 90 cents, the sheriff (Joe Arpaio) says.” Such treatment of inmates is not common in European prisons. Interestingly, crime rates for most crime categories are comparable across the Atlantic, the exception being homicide rates. Indeed, the criminology literature does not see the higher punitiveness of the American system as the consequence of higher crime rates. For example, Tonry (1998) opens the introductory chapter to The Handbook of Crime and Punishment with

“American punitiveness is not the result of higher crime rates or of a steeper increase in crime in recent years. For most serious crimes, America’s rates are not the highest among Western countries (Mayhew and van Dijk 1997), and other countries experienced equally sharp increases in crime rates during the 1970s and 1980s (Tonry and Hatlestad 1997, part 4). The difference is attributable to crime and punishment entanglement in American politics.”

We provide a theory of how a society’s penal code and economic system are jointly determined. We are motivated by the patterns observed across Europe and America. Recent work, both by political scientists working on “varieties of capitalism”, and by economists emphasizing redistributive institutions, has focused on the remarkable differences in beliefs

---

1 The report states that there are “chain gangs for men and women”, that inmates are “forced to wear old-fashioned prison stripes and pink underwear”, and that “prohibited items include cigarettes, adult magazines, hot lunches and television”. This has come at considerable cost since “the county has been hit with hundreds of inmate-related lawsuits, and ordered to pay millions in legal damages.” For example, in a case in April 1999, “a jury awarded $1.5 million to an inmate denied medical treatment for a perforated ulcer”. Reported in “Arizona criminals find jail too - in ‘tents’”, July 27, 1999, http://www.cnn.com/US/9907/27/tough.sheriff/, accessed July 26, 2006. Tonry (1998) discusses other extreme features of the American penal system such as “three-strikes-and-you-are-out laws”, mandatory minimum sentences laws and “sexual psychopath” laws. A recent US Department of Justice document comparing German and American prosecutions states “The overall percentage of defendants convicted is also similar, but the German system has many more trials and acquittals and many fewer dismissed cases. In addition, Germany imposes sentences much shorter than those imposed in the United States.” See, http://www.ojp.usdoj.gov/bjs/abstract/gap.htm accessed on August 1, 2006.
across the Atlantic. Survey evidence reported in Alesina and Glaeser (2004) reveals that views about the cause of personal wealth or the idea that “effort-pays” is more prevalent in America. When asked if the poor are lazy or unlucky, over 60 percent of Americans while only 20 percent of Europeans answer that the poor are lazy rather than unlucky. Piketty (1995) exploited these differences in beliefs to show how they can give rise to two economic systems that differ greatly in the amount of government intervention even when the underlying economic processes are quite similar.² Given that the punitiveness of the legal system and belief in the “American dream” are positively correlated across countries (see also Section 2 below), a natural question is to ask if these empirical patterns are predicted by models where beliefs, the penal system and the economic organization are all simultaneously determined.³

At least two approaches are possible in an attempt to link a belief in the “American Dream” and the demand for punishment. The first is a direct link: people who believe effort pays also happen to believe that punishment should be severe. Thus an exogenous difference in beliefs gives rise to a difference in the demand for punishment. One example of such a direct link is the argument presented in Lakoff (1996) in favor of an ideological typology where right wing individuals adhere to a “strict father” metaphor, who believe simultaneously that effort pays and that criminals should be punished.⁴ A second example of a direct link is “strain” theory. In an influential paper, Merton (1938) argued that high crime rates in America were a result of the psychological stress created by the gap between a

²Work by economists includes Benabou and Ok (2001), Benabou and Tirole (2005), Alesina and Angeletos (2005), inter alia. The political science literature on “varieties of capitalism” is vast (see, for example, the contributions in Hall and Soskice (2001)) and goes back at least to Alexis de Tocqueville’s Democracy in America. Interestingly this book was written as a result of his trip to America with Gustave de Beaumont (a public prosecutor at the court of Versailles) to study the American penal system which won them the French Academy’s Montyon Prize (the book was by de Tocqueville and de Beaumont was Du systeme penitentiaire aux Etats-Unis et de son application en France).

³There are, of course, ways to explain differences in punishment without connecting them to the economic system. One particularly simple approach is to invoke discrimination. More severe punishment would be observed in America if sentences where decided by one group and criminals were perceived to belong to a second, more disliked group. Indeed, race and crime appear closely connected in America and there is certainly some evidence consistent with discrimination in sentencing documented in Glaeser and Sacredote (2000). We are unaware, however, of evidence showing that states with larger proportion of black votes have also more lenient sentencing. Another simple approach is to apply Becker’s model of crime. Harsh punishment in America could then be the result of of higher potential bounties for criminals and or lower legal wages relative to Europe. On justifications used for sentencing amongst legal scholars, see Tonry (1998).

⁴Similarly, Benabou and Tirole (2006) explain the evidence in favor of Lerner’s theory of “belief in a just world” pointing out that such individuals “are more likely to give stiff sentences to defendants convicted of a crime such as negligent homicide, but also to find victims (e.g., in a rape case) more culpable and “deserving” of their fate”.

3
reality of limited opportunities and a generalized belief in the “American Dream”. However, Merton and subsequent research has not dealt with the problem of why punishment is so severe if such a mitigating circumstance is present.⁵

A second approach, and the one we follow in this paper, is to try to derive the connection between the choice of severe punishment on the one hand and the economic system induced by a belief in the “American Dream” on the other. In order to do this, we compare two otherwise identical societies which start out with different beliefs with respect to the role of luck relative to effort in the determination of income. In our economy beliefs about the validity of the “American dream” (i.e., whether effort pays) determine the types of contracts that firms offer and whether workers accept these contracts and exert effort. As in Piketty (1995) there is the potential for multiple equilibria, although failure to experiment is a result of a coordination failure in our case.⁶

The choice of becoming a criminal critically depends on a shock that we call “meanness”. It is this meanness level that a penal system based on “retribution” tries to determine when establishing the severity of the punishment. We find that when initial beliefs differ, two equilibria can emerge out of identical fundamentals. In the “American” (as opposed to the “French”) equilibrium, belief in the “American dream” prevails, workers exert effort, there are high powered contracts, income is unequally distributed and punishments are harsh. The economists who believe that deterrence (rather than retribution) shape punishment can interpret the meanness parameter as pessimism about future economic opportunities and verify that two similar equilibria emerge.

A focus on “retribution” in a theory of punishment, however, has some advantages. First, it is a correlate of “fairness”, a human tendency for which there is growing empirical evidence.⁷ In this spirit, Glaeser and Sacerdote (2000) find that sentences respond to victim characteristics in a way that is hard to reconcile with optimal punishment. Second, the models with the best predictive fit in the literature involve an element of reciprocal altruism which is particularly relevant in dispensing justice (see, for example, the models of Levine (2003) and Rotemberg (2005) where individuals respond “like with like” and the process of detecting the amount of altruism in other parties occupies center stage). In our theory, pun-

⁵See Agnew (1999), Rosenfeld and Messner (2001), inter alia. See also the review by Cullen and Agnew (2003) and the references cited therein.

⁶In Piketty (1995) failure to experiment results from a bandit problem where the natural trade-off between exploration (looking for more information) and exploitation (selecting the choice that is believed to provide the highest payoff) arises. Note that players in this setting demand more information and still cannot reconstruct other people’s information sets from their political or labor market outcomes. Benabou and Tirole (2006) resolve this issue by focusing on an environment where individuals choose to ignore new information to correct a willpower problem. In contrast, in our model agents want more information but in order to gather it they would need help from other players because given worker (firm) beliefs, firms (workers) find it optimal to stick to one type of contracts (effort level).

ishment occurs because voters want to harm criminals who display low levels of benevolence towards others. Third, our focus on retribution (rather than deterrence) is consistent with both practice and most work in other disciplines dealing with the problem of punishment. The Stanford Encyclopedia of Philosophy notes

“A generation ago sociologists, criminologists, and penologists became disenchanted with the rehabilitative effects (as measured by reductions in offender recidivism) of programs conducted in prisons aimed at this end (Martinson 1974). This disenchantment led to skepticism about the feasibility of the very aim of rehabilitation within the framework of existing penal philosophy. To these were added skepticism over the deterrent effects of punishment (whether special, aimed at the offender, or general, aimed at the public) and as an effective goal to pursue in punishment.”

Finally, our paper is also related to the literature on crime and punishment. Starting with Becker (1968) who first analyzed the possibility of entering the crime market as a rational economic choice, a series of papers has studied how societies fight crime taking into account the optimizing behavior of criminals. One of the early concerns of this literature was how to avoid the “burning in oil” paradox: if punishment is used for its deterrent effect, and harsher punishment does not cost more than monitoring, why wouldn’t societies choose infinite punishment? In this regard, Stigler (1970) emphasized that finite and differential punishments preserve marginal deterrence. Finite punishment is also derived in models where there is some probability of wrongful conviction (see, Harris (1970), Andreoni (1991) and Benoit and Osborne (1995)). Benoit and Osborne (1995) is also interesting for our purposes because they discuss two different policies, and their combinations, for fighting crime. One of them is redistribution which is related to the economic system, so that the authors can also explain some of the observed patterns across rich countries that motivate our study. In Benoit and Osborne (1995) these variations depend on exogenous differences in political processes and type of crime. In contrast, we explain varying levels of punishment in societies that are identical a priori.

In the next section we illustrate empirically some aspects of the connection between beliefs and crime and punishment. We then present our model, a discussion and conclude.

---

8 Related theories of punishment appear in Benoît and Dubra (2004) and Di Tella and MacCulloch (2006), although they did not have differing lengths of sentences.
2 Beliefs, Crime and Punishment: Empirical Illustration

Considerable evidence has been gathered on the importance of beliefs about self reliance and the “American Dream” in the determination of economic organization, including taxation, social insurance, education finance and regulation of markets (see, Alesina, Glaeser and Sacerdote (2001), Fong (2001), *inter alia*). In this section we briefly describe the patterns present in the data available for the severity of punishment and beliefs.

A first observation is that the US tends to use harsher punishments than Europe. For example, it allows for the death penalty and has extremely high levels of incarceration (even within America, incarceration rates are higher in the 38 death penalty states). Comparable data on severity of sentencing is harder to come by. Survey data from the International Crime Victim Survey (ICVS), however, has asked respondents in several countries a question on sentencing that also reveals a higher demand for punishment in the US than in Europe. The exact question employed is (all data is described in detail in Appendix 2)

Severity 1-R: “People have different ideas about the sentences which should be given to offenders. Take for instance the case of a man of 20 years old who is found guilty of burglary for the second time. This time, he has stolen a colour TV. Which of the following sentences do you consider the most appropriate for such a case (1) Fine, (2) Prison, (3) Community service, (4) Suspended sentence, (5) Any other sentence.” The variable Severity 1-R was defined as a categorical variable equals -1 if the answer is category (1), 0 if the answer is category (3), (4) or (5), and 1 if the answer is category (2).

Data on beliefs comes from the World Values Survey. We employ 5 different questions. The first is left right self placement. The answers to this question are obviously country specific, but it is perhaps interesting to note that on average French individuals self place more to the left than American respondents. In order to provide more content to such ideological self descriptions, and to allow for international comparisons, we also focus on four other beliefs. They are

Unfair for Poor-L: A dummy that is the response to the question: “Why, in your opinion, are there people in this country who live in need? Here are two opinions: which comes closest to your view? (1) They are poor because of laziness and lack of willpower, or (2) They are poor because society treats them unfairly.” The dummy takes the value 1 if the answer is (2) and 0 if the answer is (1).
No Escape–L: A dummy equal to 1 if the answer to the question: “In your opinion, do most poor people in this country have a chance of escaping from poverty, or there is very little chance of escaping? (1) They have a chance or (2) There is very little chance.” was category (2) and 0 if it was category (1).

Government Help Poor–L: The response to the question: “Do you think that what the government is doing for people in poverty in this country is about the right amount, too much, or too little? (1) Too much, (2) About the right amount, or (3) Too little.”. Government help Poor–L is a categorical variable equal 1 if the answer is (1), 2 if the answer is (2) and 3 if the answer is (3).

Business Ownership–L: The response to the question: “There is a lot of discussion about how business and industry should be managed. Which of these four statements comes closest to your opinion? (1) The owners should run their business or appoint the managers, (2) The owners and the employees should participate in the selection of managers, (3) The government should be the owner and appoint the managers, (4) The employees should own the business and elect the managers”. Business Ownership–L was defined as a dummy equals 1 if the answer is category (3) or (4) and 0 if the answer is category (1) or (2).

The simple correlations presented below reveal that our measure of severity of punishment is positively correlated with beliefs consistent with the “American dream” and right wing self placement.
Finally, it is also worth describing the patterns in the raw data on crime rates across countries. They reveal that overall crime rates are broadly similar across the US and Europe, with crime in Europe being *higher* for several crime categories. The main exception is the homicide rate, which is indeed substantially higher in the US. A similar pattern is reported in Tonry (1998). The following Table summarizes some of the evidence available.
Table 1: Crime rates in the US and Europe

<table>
<thead>
<tr>
<th></th>
<th>Crime</th>
<th>Victim</th>
<th>Car</th>
<th>Property</th>
<th>Sex</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>5,375</td>
<td>24.2</td>
<td>19.6</td>
<td>10.8</td>
<td>2.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Europe</td>
<td>7,983</td>
<td>25.2</td>
<td>19.0</td>
<td>9.6</td>
<td>2.9</td>
<td>4.0</td>
</tr>
<tr>
<td>Austria</td>
<td>6,285</td>
<td>18.8</td>
<td>11.7</td>
<td>6.6</td>
<td>3.8</td>
<td>2.1</td>
</tr>
<tr>
<td>Canada</td>
<td>9,979</td>
<td>25.2</td>
<td>17.3</td>
<td>13.1</td>
<td>2.7</td>
<td>4.0</td>
</tr>
<tr>
<td>England</td>
<td></td>
<td>30.9</td>
<td>24.7</td>
<td>12.8</td>
<td>2.0</td>
<td>5.9</td>
</tr>
<tr>
<td>Finland</td>
<td>7,650</td>
<td>18.9</td>
<td>12.9</td>
<td>5.0</td>
<td>2.5</td>
<td>4.1</td>
</tr>
<tr>
<td>France</td>
<td>6,765</td>
<td>25.3</td>
<td>20.7</td>
<td>9.5</td>
<td>0.9</td>
<td>3.9</td>
</tr>
<tr>
<td>Netherlands</td>
<td>7,422</td>
<td>31.5</td>
<td>25.9</td>
<td>13.3</td>
<td>3.6</td>
<td>4.0</td>
</tr>
<tr>
<td>Sweden</td>
<td>12,670</td>
<td>24.0</td>
<td>20.0</td>
<td>7.5</td>
<td>2.9</td>
<td>4.5</td>
</tr>
<tr>
<td>Switzerland</td>
<td>5,116</td>
<td>26.7</td>
<td>18.6</td>
<td>9.0</td>
<td>4.6</td>
<td>3.1</td>
</tr>
</tbody>
</table>

Notes: (1) Crime is the Total recorded crime per 100,000 population from the United Nations Surveys on Crime Trends and the Operations of Criminal Justice Systems, found at [http://www.uncjin.org/Statistics/WCTS/wcts.html accessed on August 1, 2006](http://www.uncjin.org/Statistics/WCTS/wcts.html). All data is from 1994 except for the Netherlands which is for 1986. (2) Victim is the victimization rate (the proportion of the population victimized in one year), for 1995 (the latest year available) in Mayhew, P. & Dijk, J.J.M. van. (1997). Criminal Victimisation in eleven Industrialised Countries. Key findings from the 1996 International Crime Victims Survey. The Hague: Ministry of Justice, WODC (3) Car is victimization rates for car theft, theft from car, car damage, motorcycle theft and bicycle theft from the same surveys (4) Property is victimization for burglary, attempt at burglary, robbery and theft of personal property from the same surveys (5) Sex is sexual offenses victimization from the same surveys and (6) Person is assault and threat victimization from the same surveys.

3 The Model

In this section we present a reduced form model of an economy with agency problems in which the firm has a choice of technology. In this economy there is one firm, one worker and the government. In the first period the firm must choose its technology and the worker must simultaneously choose his effort level. In the second period the worker chooses whether to go to the crime market, and the government simultaneously chooses the punishment level.

We now start with the description of the economy in the first period. The firm can choose a market technology, in which production levels depend on the effort level exerted by the worker, or it can choose a bureaucracy in which production is independent of effort. For $\pi_h > \pi_m > \pi_l$ (high, medium and low), the profits for the firm are as follows: $\pi_m$ if it chooses the bureaucracy, and $\pi_h$ or $\pi_l$ if it chooses the market economy and the worker chooses high or low effort respectively. The worker’s total utility is given by his utility from the wage minus his cost of effort, which is $e$ for high effort, and 0 for low effort. In the bureaucracy, wages are constant and yield a utility of $u_m$, and in the market technology the utilities provided by the firm are $u_H$ for high effort and $u_l$ for low effort, with $u_H > u_m > u_l$. Payoffs are presented in the following matrix.
As in agency models, in the market technology production is stochastic, and if the worker exerts high effort, the probabilities of high and low output are $p$ and $1 - p$ respectively. The utilities provided by the firm in case of high and low output are $u_H$ and $u_l$, so that $u_H = p \mu_H + (1 - p) \hat{\mu}_H$. We assume that $u_H - e > u_l$, which in terms of the parameters of the model means either that $e$ is small, or that the probability of high output in the market technology when the worker exerts low effort is small. With these assumptions there are two equilibria in this stage of the game: a market technology with high effort (the American equilibrium), and a bureaucracy with low effort (which following Benabou and Tirole (2004) we call the French equilibrium).

In the second period of the model, after his first period in the job and after observing the payoff, but before “collecting” it, the individual receives a taste shock about his taste for crime. In this second period, the individual must then decide whether to collect his market wages, or discard his earnings and engage in crime and the government must choose the punishment level. Regarding the worker’s decision, the interpretation is that the market wages are a first signal about his lifetime income, and he must decide whether to continue in the market, or go (forever) into the crime market (there is some evidence that crime is an absorbing state). If he goes for the market, he collects his wages, and the taste shock is irrelevant. If he goes for crime, his payoff is $\mu + \mu$, where $\mu$ is the expected utility of crime arising from the bounty (which we will consider fixed throughout), the probability of getting caught, and the disutility of the punishment, and $\mu$ is the taste shock, his meanness (a large $\mu$ is a mean individual). The taste shock $\mu$ is drawn from a density $f$ which is positive in its support, and has a c.d.f. $F$ (and $\hat{F} = 1 - F$).

In his decision about whether to go to the crime market, the individual compares his market utility $u$ with $\mu + \mu$ and commits a crime if and only if $u < \mu + \mu$.

We now study how the government fixes $\mu$. The government has a utility $v(t, \mu)$ of punishing with $t$ years a type $\mu$. Once the government has proved that the individual committed a crime (that is all the government knows, it does not know the income) it must decide the time in jail $t$ for the individual.\(^9\)

\(^9\)This theory of punishment is not consistent with the common view of economists that punishment rates
Let $g$ be the distribution of types that will arise in equilibrium (the distribution that the government will presume for its calculations). We will now describe the two types of equilibrium that we are interested in, which will give rise to two possible equilibrium distributions $g$.

### 4 Crime and Punishment

Take an equilibrium in which all individuals exert effort in their market activities. Then, there will be two types of criminals: those who had a bright future, $\tilde{u}_H - e$ utils, and those who didn’t, $\tilde{u}_h - e$ utils. The proportion of each type will depend on $\bar{u}$ and the prior density of $\mu$, $f(\cdot)$. The lucky types will commit a crime iff

$$\tilde{u}_H - e \leq \bar{u} + \mu \iff \mu \geq \tilde{u}_H - e - \bar{u}$$

and the unlucky iff $\mu \geq \tilde{u}_h - e - \bar{u}$. We will let $u_H = \tilde{u}_H - e$ and $u_h = \tilde{u}_h - e$, so that lucky types commit crimes if and only if $\mu \geq u_H - \bar{u}$ and unlucky types if $\mu \geq u_h - \bar{u}$. Therefore, after having caught an individual who committed a crime, the probability that he was lucky in the job market is

$$P(H | \text{crime}) = \frac{P(H \& \text{crime})}{P(\text{crime})} = \frac{P(\text{crime} | H) P(H)}{P(\text{crime} | H) P(H) + P(\text{crime} | h) P(h)} = \frac{1}{1 + \frac{[1 - F(u_h - \bar{u})][1 - P(H)]}{[1 - F(u_H - \bar{u})] P(H)}}$$

The complement is the probability that the individual was unlucky given that he committed a crime:

$$P(h | \text{crime}) = 1 - \frac{1}{1 + \frac{[1 - F(u_h - \bar{u})][1 - P(H)]}{[1 - F(u_H - \bar{u})] P(H)}} = \frac{1}{1 + \frac{[1 - F(u_h - \bar{u})][1 - P(H)]}{[1 - F(u_H - \bar{u})] P(H)}}.$$

Let $f_x$ denote the function $f$ on $\mu \geq x$, and 0 otherwise. The conditional density of types in this equilibrium with high effort is denoted $g^A$, corresponding to the American equilibrium.

---

*should be set so as to maximize their deterrent effects. See the references in The Stanford Encyclopedia of Philosophy cited in the introduction. The Theory of Punishment we use in this paper is consistent with the (nowadays) leading view about how penal systems work, and about how they should work. This view holds that they exist due to a mixture of the desire to incapacitate (imprisoned people can’t commit crimes) and to retribute, causing harm to evil-doers. This justifies punishing more the people who committed worse crimes. Although this view does not say that “meaner” people, as measured by a higher $\mu$, should be punished more, most legal systems (including the US and the UK), and many legal theories (see for example Primoratz (1989), Kleinig (1973) and the work by Michael Davis), place a great deal of emphasis on the “state of mind” (mens rea) of an alleged offender, in such a way that, other things being equal, the criminal with the more malicious state of mind deserves the harsher penalty.*
Lemma 1 The worker’s best response to a choice of \( \pi \) by the government is a conditional density of criminal types given by

\[
g^A(\mu) = \frac{f_{u_H - \pi}(\mu) p + f_{u_h - \pi}(\mu)(1 - p)}{F(u_H - \bar{u}) p + F(u_h - \bar{u})(1 - p)}
\]

in the American equilibrium.

All Proofs are in the Appendix.

Lemma 1 tells us that, following first period choices of a market technology and high effort, when the government chooses \( \pi \), there will be no criminal types below \( u_h - \bar{u} \); some types between \( u_h - \pi \) and \( u_H - \bar{u} \); and “a lot” of types larger than \( u_H - \bar{u} \).

Now consider the other type of equilibrium in which the firm chooses a bureaucracy and no individual exerts effort in the first period, our French equilibrium.

Lemma 2 The worker’s best response to a choice of \( \bar{u} \) by the government is a conditional density of criminal types given by

\[
g^F(\mu) = \frac{f_{u_m - \bar{u}}(\mu)}{1 - F(u_m - \bar{u})}.
\]

in the French equilibrium.

For a belief \( g \), the government must choose \( t \) to maximize

\[
\int v(t, \mu) g(\mu) d\mu.
\]

The American legal system demands that jurors place more weight on the evidence than on their beliefs or priors, so the use of \( g \) on the calculation of the optimal \( t \) may seem suspect. We note, however, that \( g \) is the result of the prior and the market equilibrium outcome, so it is not just the prior. Moreover, it is indisputable that jurors do put some weight on their priors, and, for example, the fact that the individual committed a crime will affect deliberations on what is the mens rea, or the criminal’s state of mind. That is, the judge and jurors will take into account the available information to infer the criminal’s state of mind.

We will now assume that for some increasing function \( q \), \( v(t, \mu) = -(q(\mu) - t)^2 \), so that higher types are worse than lower types, in the sense that the government wants to punish an individual according to \( q(\mu) \). This functional form only simplifies our analysis, but the main results do not hinge on the specific form. The next lemma presents the government’s best response to the workers’ choice of criminal behavior.

---

10 Although this interpretation may be disputed, in Smith v. Rapid Transit, Inc (1945), the court ruled that the bus company Rapid Transit could not be held liable for an accident on the sole basis that it was a priori likely that it owned a bus that had caused an accident.
Lemma 3 Let $t^k$ be the optimal punishment for belief $g^k$, for $k = A, F$. Then, $t^k = E_{g^k}(q(\mu))$.

In order to link the punishment rate, or sentencing rate, with the utility of the individuals, suppose that the utility of crime is a continuous function $\overline{u} = u(a, b, t)$ where $a$ is the probability of apprehension, and $b$ is the bounty. In order to simplify our analysis, we take $a$ and $b$ as exogenous, and we concentrate on the variable $t$, time in jail.\(^{11}\) Assume, of course, that $\overline{u}$ is decreasing in $t$.

We now show that there exists a density $f$, and a distaste for bad types $q$ and a utility function $u$ such that the American equilibrium leads to harsher punishments than the French equilibrium. Moreover, for any $f', q'$ and $u'$ close to $f$, $q$ and $u$ America still has harsher punishments.

Proposition 1 There exist parameters $u_H$, $u_m$ and $u_h$, and functions $f$, $q$ and $u$ such that: crime is higher in France than in America, and punishment is higher in America than in France ($t^A > t^F$). Moreover, for any set of parameters and functions which are close to these, we also get the same cross country comparative statics.

In Proposition 1 we have shown that there exists a set of parameters for which the equilibrium in America yields higher punishment rates than in France, and the opposite for crime rates. First, it must be clarified that the result that higher penalties result in lower crime is not trivial in this model, since the economic outcomes of the two countries are different. Second, it is worth emphasizing that although Proposition 1 shows the possibility of higher crime and less punishment in France, the model can accommodate higher punishment and higher crime in the US. The reason we have chosen to include the former configuration is that Table 1 shows that except for homicide rates, crime is larger in France.

We now clarify again the way the Proposition works.

- There are two identical countries, which differ only in their beliefs: in America, workers believe effort pays and firms believe workers will exert effort; in France, workers believe effort doesn’t pay and firms believe workers won’t exert effort.
- Americans exert Effort, and the French don’t;\(^{12}\)

\(^{11}\) Although $a$ and $t$ can be considered partial substitutes, since both would affect deterrence of crime, it is more natural in the context of this paper to concentrate on $t$, which is chosen once the judge knows that the individual has committed a crime, and is thus more related to the altruism-mens rea dimensions that we explore in this paper. On this issue see the interesting paper by Mookherjee and Png (1992).

\(^{12}\) Alesina, Glaeser and Sacerdote (2005) study differences in hours worked across Europe and America. They state: "In the early seventies hours worked per person were about the same in the US and in Western Europe (Europe in short). Today they are almost 50 per cent less in Europe than in the US. (Figure 1). Americans average 25.1 working hours per person in working age, Italians 16.7, French 18.0 and German 18.7."
• After their interaction in the market, individuals must choose whether to collect their wages or not, depending on the realization of their income, and the punishment they would face in the crime market;

• In America some good individuals who were unlucky in the market commit crimes, and of the lucky ones, only very mean individuals commit crimes. In France, fairly bad individuals commit crimes (the best French criminal is worse than the best American criminal).

• The government punishes individuals taking the equilibrium into account, and punishing more if the expected type is worse. It is true that this will mean that some unlucky (poor) get also punished, but if effort really pays, these are small in number. See also the extension in the Appendix where individuals have types and some don’t exert effort.

We now turn to an analysis of the comparative statics of this game. Suppose in the first stage play by the worker and the firm are as in the American equilibrium. Then, the subgame that follows can be rewritten as follows. As we already know, the worker will (optimally) choose two cutoffs for criminal behavior: \( u_H - \bar{\pi} \) and \( u_h - \bar{\pi} \) and will commit a crime after a high realization of output if \( \mu \geq u_H - \bar{\pi} \), or \( \mu \geq u_h - \bar{\pi} \) if the realization was low. Therefore, we can model the worker as if he just chose a strategy \( s^w \) in some compact subset \( S^w \) of \( \mathbb{R}^2 \), \( s^w_1 \) being the cutoff after a low realization of income, and \( s^w_2 \) the cutoff following a realization of a high level of income.\(^{13}\) The Government, chooses \( t \) and determines \( u(t) \).

The worker’s best response to a time in jail \( t \) is to set a cutoff

\[
B^w(t) = s^w(t) = (u_h - \bar{\pi}(t), u_H - \bar{\pi}(t));
\]

similarly, for any cutoffs \( s \) chosen by the worker, the Government’s best response is to choose a time in jail

\[
B^g(s) = \int q(\mu) \frac{(1 - p) f_{s_1}(\mu) + p f_{s_2}(\mu)}{1 - (1 - p) F(s_1) - p F(s_2)} d\mu.
\]

The equilibria of this game can be found by solving \( B^g(B^w(t)) = t \). Of course, since \( B^g \) and \( B^w \) are parametrized by \( u_H, u_h \) and \( p \), we can write the problem of finding the equilibria, as that of solving the equation \( D(t; u_H, u_h, p) \equiv B^g(B^w(t)) = t \). Following Milgrom and Roberts (1994), if one can show that \( D \) is increasing in \( p \), then the largest and smallest equilibria are increasing, and similar results hold for \( u_H \) and \( u_h \).\(^{14}\) The following comparative

\(^{13}\)That is, \( S^w \subset \{ s : s_2 \geq s_1 \} \).

\(^{14}\)In this game strategies are not complements, and so one can not apply the techniques of Echenique (2002) to ensure that stable equilibria have the “right” comparative statics properties. With the assumptions made so far, one can only make comparative statics assertions about the largest and smallest equilibria (or about
static result can be interpreted as a smaller gap between the “American dream” and reality. It asserts that as the assertion “effort pays” becomes truer, punishment becomes harsher, and crime decreases in the American equilibrium.

**Proposition 2** In the American equilibrium, when \( p \) increases, the equilibrium punishment increases and the cutoffs increase, resulting in less crime.

What is the effect of an increase in the wages of the poor in the American equilibrium? The next Proposition shows that it increases equilibrium punishment and reduces crime. The intuition is that any given criminal is more likely to be a worse type, since there are less poor criminals and on average poor criminals have a lower meanness level \( \mu \).

**Proposition 3** In the American equilibrium, when \( u_h \) increases, the equilibrium punishment increases and the cutoffs increase, resulting in less crime.

## 5 Discussion

Several comments are in order. First, in our model beliefs do not converge, a feature that our model shares with recent work in the field. In our model beliefs do not converge because co-ordination between two parties (the firm and the worker, or all workers) is required in order to experiment. This is in contrast to Benabou and Tirole (2006) where there is a persistent desire of individuals to avoid or distort information. In other words, in our model there is a demand for more information as in Piketty (1995), but the costly learning takes the form of a coordination problem in a game with two players (whereas in Piketty lack of convergence comes from a single player bandit problem and requires an inability to observe other people’s choices -the aggregate choices in the political market or the individual choices in the labor market- and heterogeneous priors).

It is interesting to link our results to Merton’s strain theory of crime. Merton (1938) argues that in societies where belief in the “American dream” prevails, some individuals that are discriminated against will fail to achieve the cultural goal of economic success and subject to stress and will thus be pressured into crime.\(^{15}\) In our model, some individuals also fail to achieve the cultural goal of success and commit crimes, although in our case this is a result of luck rather than discrimination. In our model, the prevalence of belief in the odd equilibria generically). For the following comparative statics results we will therefore assume that one of these equilibria is selected.

\(^{15}\)Merton (1938) also predicts that higher crime will prevail in such societies because of the strong emphasis on success and a relatively weak emphasis on obtaining it through legitimate means. Such societies are characterized by a state of “anomie” or normlessness. See Cullen and Agnew (2003) for a description.
“American dream” induces a society to choose high powered incentive contracts which means that a subgroup of individuals will be poor (the unlucky). Some of them will commit crimes even though they have similar “meanness” than some rich non-criminals. It is possible to argue that the unlucky are subject to “strain” because the fact that they are more likely to commit crimes is a direct result of the prevalence of the “American dream”. An alternative interpretation of “strain” is that the non-criminals see the criminals as both mean and lazy. An extension of the model (presented in Appendix 1) allows for different types (some types have high perceived cost of effort) so that in the equilibrium punishment arises to punish the mean and the lazy.

An important variation of the model that we have considered (see Appendix 1) is obtained by a small change in the retribution theory of punishment embedded in this model. Suppose an individual is deemed ‘bad’ if it is determined that his ‘state of mind’ (mens rea) is bad and he could have done something (in his past) to avoid getting to the point that his state of mind led him to commit the crime. That is, an individual who is morally questionable (a bad state of mind, or a propensity to commit crimes) is not deemed bad if he did not have opportunities. This theory of punishment is also popular amongst judges around the world.

In the appendix we present a full fledged model based on this other theory of punishment, showing how one can obtain the joint prediction of a high belief in the “American dream” and high punishment rates in America, and a low belief in effort pays, and low punishment in France. This model starts with a signalling stage in which there are ‘bums’ (individuals for whom studying or exerting effort is more costly) and active individuals. In America there is a separating equilibrium, and those who educated themselves receive a high wage relative to those who didn’t. In that sense, effort pays. In France, there is a pooling equilibrium, with an intermediate wage for all.

After the first stage, individuals receive a taste shock (similar to the one in the model presented in Section 3) and decide whether to work, or commit a crime. The bad guys, according to this alternative theory of punishment, will be the bums who did not study and committed crimes (in France, nobody can be accused of having opportunities pass by). Therefore, punishment in America will be harsher. Given the structure of the model, the crime rates are indeterminate: crime could be higher in France or America, depending on the parameters.

6 Conclusion

A striking aspect of American social and economic organization is the harsh treatment of criminals. As Tonry (1998) describes them, “Contemporary policies concerning crime and
punishment are the harshest in American history and of any western country”.¹⁶ The objective of this paper is to provide a theory of crime and punishment that can be incorporated into a theory of “American exceptionalism”.

As in recent work on “varieties of capitalism”, our theory gives a leading role to beliefs about the impact of luck -rather than effort- in the determination of income. Two otherwise identical societies start out with different degrees of belief in the “American dream”. As in Piketty (1995), these initial beliefs are self sustaining, and the society where the “American dream” prevails sets up high powered incentive contracts that induce high effort. In the second society, flat contracts prevail and people choose low effort. In our model, this occurs because of a complementarity in production whereby it does not pay for firms to offer a different type of contract given individual beliefs. Individuals compare their realized legal income with their payoff from committing crimes, which includes the expected punishment and an individual shock (which is interpreted as “meanness” or, if one favors a theory of punishment based on deterrence, a pessimism shock). With this in mind each society must decide on a punishment for an apprehended criminal. We find that “American” equilibrium is characterized by income inequality, more hours worked and more serious crimes (with similar overall crime rates). Our main result is that punishments are harsher in the “American” equilibrium than in the “European” equilibrium.

There are two reasons for this, depending on the theory of punishment that prevails. When punishment is set for “deterrence” reasons (as is common in economic models), harsh punishment corrects (ex ante) the tendency to commit crimes of the pessimists, which are over represented in the criminal population in the equilibrium with high powered contracts (relative to “France”). On the other hand, when punishment is set for “retribution” reasons (as in common in the criminology literature and in practice), punishment is harsh in the “American dream” because when effort pays only truly mean people would prefer to become criminals.

¹⁶It is unlikely that a political economy mechanism has driven punishment away from the socially desired level. For example, in their study of public perceptions of appropriate prison sentences Cohen et al (2002) find that "the public largely concurs with current sentencing decisions about incarceration and sentence length".
7 Appendix 1: Foregone opportunities in a theory of punishment.

In the first period of this economic system, the government chooses a punishment for individuals who (will later) commit crimes. The punishment is a combination of time in jail \( t \) and probability of catching a criminal \( q \).

There are two types of people: bums and active (maybe achievers is better), with \( \theta_b < \theta_a \). The proportion of \( a \) is \( p \). In the second period of the model, workers play a signalling game by choosing effort, or education. In the third period of the model, after they have completed their education, the firm pays the workers according to the expected value of what they are worth. Thus, in a separating equilibrium in which the types choose \((e_a, e_b)\) the firm pays the worker according to his type, if known, and education level.

Once the education level has been chosen, the worker has three choices: work and obtain the (equilibrium) wage; home production and obtain \( h(\theta_i, e_i) \); go to the crime market, and obtain \( 0 - \mu - e/\theta_i - t \) if caught (\( \mu \) is a taste shock, a moral cost, a dislike for crime, and \( t \) is time in jail. The education cost \( e \) has already been incurred) or \( b - \mu - e/\theta_i \) if the crime is successful. The value of the taste shock \( \mu \) is unknown at the time of choosing the education level, and becomes known before deciding whether to work, home-produce, or commit a crime. It can take only two values \( m \) and \( M > m \).

In the third and last period a type \( k = a, b \) that works in a firm, and attained education level \( e_j \) generates an income for the firm given by \( I(\theta_k, e_j) \). The worker has a utility function \( u \). The reservation utility is the maximum of \( h(\theta_i, e_i) \) and \( \bar{u} = f(b, \mu, t, q) \) the utility of crime (which depends on the bounty \( b \), the moral cost \( \mu \), the time in jail specified by the government \( t \), and the probability of being caught \( q \)).

We then have the following structure. In the first period the Government (or some earlier generation) chooses a punishment for criminals, a combination of \( t \), time in jail, and \( q \), probability of catching. In the second period, each type of individual chooses an education level (the payoff to his education will depend on the equilibrium in the third stage). In the third stage, the taste shock for crime is realized; the firm chooses an optimal wage schedule for each technology and (presumed) type; the individual chooses work, home production or crime.

We will study two types of equilibria. In the American equilibrium, in the first period the Government chooses a high punishment for crime, resulting in a low \( \bar{u}^A \), in the second period, there is a separating equilibrium and then Bums with moral cost \( m \) commit crimes. In the French equilibrium, the Government chooses a low punishment for crime, resulting in a relatively high \( \bar{u}^F \), in the second period there is a pooling equilibrium and then (some) individuals with moral cost \( m \) commit crimes.
We will now solve the model, starting with the French equilibrium.

## 7.1 French Equilibrium

The French equilibrium is as follows: the Government chooses a low punishment for crime, resulting in a relatively high $\pi^F$; in the second period there is a pooling equilibrium (of all the possible pooling equilibria, we assume that it is one with a relatively low level of effort-education, so that the value of home production is not larger than $\pi^F$ for $b$ types who studied $e_p$); all or some $m$ types choose crime while the rest choose to work.

Here effort doesn’t pay because even if you study (more than $e_p$) you won’t get paid more.

### 7.1.1 Third stage

The firm must pay (in equilibrium) more than the workers would get by engaging in home production (with the education level they chose in the previous period) and more than they would get in the crime market. The condition for an equilibrium is therefore that wages $s^F$ are set so that workers are indifferent between working and crime (we have assumed a low $e_p$)

$$ u (s^F) = \bar{u}^F \geq h(\theta_a, e_p) \geq h(\theta_b, e_p) $$

### 7.1.2 Second stage

In the second stage, we fix beliefs for the firm that are: for $e = e_p$, the firm believes that the individual is competent (active, $\theta_a$) with probability $p$, and for $e \neq e_p$ the firm believes that the individual is competent with probability $0$. In that case, we assume that the firm wants to offer a wage of 0, so the worker just gets his home production $h(\theta, e)$ (this could happen if in order for the plant to work, you need some competent employees).

Let $E_a$ and $E_b$ be the optimal levels of education for home production: for $k = a, b$

$$ E_k \in \arg \max_{\theta} h(\theta_k, e) - \frac{e}{\theta_k}. $$

Given the beliefs, the worker must choose between $e_p$ and $e = E_k$, and it must be the case that

$$ u (s^F) - \frac{e_p}{\theta_b} \geq h(\theta_b, E_b) - \frac{E_b}{\theta_b} $$

$$ u (s^F) - \frac{e_p}{\theta_a} \geq h(\theta_a, E_a) - \frac{E_a}{\theta_a}. $$
7.2 American

The American equilibrium is as follows: the Government chooses a high punishment for crime, resulting in a relatively low $\pi^A$; in the second period there is a separating equilibrium; $a$ types choose to work, and the $b$ types work if and only if the moral cost is $M > m$.

Here effort pays, because if you study, you get a high wage.

7.2.1 Third stage

The conditions for an equilibrium are therefore the profit maximization conditions for the firm. Wages $s^A(e_a)$ are set so that workers are indifferent between working and home production, and $s^A(e_b)$ so that $\theta_b$ is indifferent with crime

$$u(s^A_a) = h(\theta_a, e_a)$$
$$u(s^A_b) = \pi^A$$

7.2.2 Second stage

In the second stage, we fix beliefs for the firm that are: for $e = e_a$, the firm believes that the individual is competent (active, $\theta_A$) with probability 1, and for $e \neq e_a$ the firm believes that the individual is competent with probability 0.

Given these beliefs, a worker of type $\theta_b$ will choose $e = 0$. Wages must then satisfy (assuming $\pi^A \geq h(\theta_b, E_b) - \frac{E_b}{\theta_b}$)

$$u(s^A_a) - \frac{e_a}{\theta_a} \geq h(\theta_a, E_a) - \frac{E_a}{\theta_a} e_a \text{ better than best outside option}$$
$$u(s^A_a) - \frac{e_a}{\theta_a} \geq u(s^A_b) \text{ $e_a$ better than best alternative in the firm} (e = 0)$$
$$u(s^A_b) = \pi^A e_b = 0 \text{ indifferent with best outside option (eq. 3)}$$
$$u(s^A_b) \geq u(s^A_a) - \frac{e_a}{\theta_b} e_b = 0 \text{ better than only alternative which pays more than } s^A_b$$

7.3 First stage for both

There are two alternative choices for when workers observe their taste shocks. One alternative is that they observe it the day after signing their contracts and then decide whether to commit crimes. Then, there is no “lemons” problem for the firm (all workers are identical relative to their taste shocks but differ possibly in education). The firm sets the wage according to the expected utility in the crime market; mean guys leave the job; honest guys don’t (but their wage is fixed “by law”, so the firm can’t re-optimize). The interpretation of this way of doing things is that $m$ or $M$ is not a taste or distaste for crime, but for crime relative to working, so you only know it after you have tasted a day at the job.
The second alternative is that individuals observe the taste shock before accepting the offer, and the firm must decide whether to attract all workers, or only the honest ones. For the time being, we will stick with the first way of modeling.

### 7.3.1 Morality

The “bad guys” $B$ are those with a low distaste for crime, $m$, and that in previous stages could have done something different to avoid falling in the crime market. The utility of convicting these guys with $t$ years is $u_B(t)$. Similarly, the utility for convicting any of the rest, $R$, is $u_R(t)$. We assume the Carlos theory of punishment, which is “Since effort pays, I want to fry $B$ types, and not just $m$ types, because if an $m$ type works hard, he does not need to commit crimes.” Mathematically, this is

$$u_B(t) - u_R(t)$$

is strictly increasing in $t$ (Carlos)

The intuitive illustration of why this is the Carlos theory of punishment is the following. Imagine there is an $R$ type in jail with a prison sentence of $t > 0$. Your utility of “changing” an $R$ type for a $B$ type is $u_B(t) - u_R(t)$. This utility is larger for larger punishments.

We now show that with this theory of punishment, America has larger punishments than France.

Let $p_B$ be the probability that a criminal you just caught is of type $B$, and $p_R = 1 - p_B$ is the complement, the probability that a type is $R$. With these beliefs, you must choose $t$ to maximize

$$p_B u_B(t) + (1-p_B) u_R(t).$$

In America, only $B$ types commit crimes. In France no criminal had a chance, since in the first stage, they could have done nothing to avoid their current situation. So let us assume that $p^A_B > p^F_B$. Without further assumptions, we have that the optimal punishments are such that $t^A \geq t^F$. This is so, because since $t^A$ is optimal for $p^A$ and $t^F$ is optimal for $p^F$, we get

$$p^A_B u_B(t^A) + (1-p^A_B) u_R(t^A) \geq p^A_B u_B(t^F) + (1-p^A_B) u_R(t^F)$$

$$p^F_B u_B(t^F) + (1-p^F_B) u_R(t^F) \geq p^F_B u_B(t^A) + (1-p^F_B) u_R(t^A)$$

which imply (subtracting the rhs of the second from the lhs of the first, and the lhs of the second from the rhs of the first):

$$(p^A_B - p^F_B) [u_B(t^A) - u_B(t^F) - u_R(t^A) + u_R(t^F)] \geq 0$$

Since $p^A_B > p^F_B$, this means that

$$u_B(t^A) - u_R(t^A) \geq u_B(t^F) - u_R(t^F)$$

which holds iff $t^A \geq t^F$. 

21
7.4 Existence

We now check whether all the conditions in the previous section can be satisfied.

Set
\[ \theta_a = 2, \quad \theta_b = 1, \]
\[ a = 2, \quad b = 1; \quad e_a = E_a = 20, \quad e_p = 15, \quad E_b = 0, \]
\[ h(\theta_a, e_a) = h(\theta_a, E_a) = h(\theta_a, e_p) = 20, \quad h(\theta_a, e_p) = h(\theta_b, e_p) = 15, \quad h(\theta_b, E_b) = 10, \]
\[ \bar{u}^F = 30, \quad \bar{u}^A = 10. \]

We have:
\[ u(s^F) = \bar{u}^F \geq h(\theta_a, e_p) \geq h(\theta_b, e_p) \iff 30 \geq 15 \geq 15 \]
\[ u(s^F) - \frac{e_p}{\theta_b} \geq h(\theta_b, E_b) - \frac{E_b}{\theta_b} \iff 30 - 15 \geq 10 - 0 \]
\[ u(s^F) - \frac{e_p}{\theta_a} \geq h(\theta_a, E_a) - \frac{E_a}{\theta_a} \iff 30 - 15 \geq 20 - 10 \]
\[ u(s_a^A) = h(\theta_a, e_a) \iff 20 = 20 \]
\[ u(s_b^A) = \bar{u}^A \iff 10 = 10 \]
\[ \bar{u}^A \geq h(\theta_b, E_b) - \frac{E_b}{\theta_b} \iff 10 \geq 10 - 0 \]
\[ u(s_a^A) - \frac{e_a}{\theta_a} \geq h(\theta_a, E_a) - \frac{E_a}{\theta_a} \iff 20 - 10 \geq 20 - 10 \]
\[ u(s_b^A) - \frac{e_a}{\theta_a} \geq u(s_b^A) \iff 20 - 10 \geq 20 \]
\[ u(s_b^A) \geq u(s_b^A) - \frac{e_a}{\theta_b} \iff 10 \geq 20 - 20 \]

8 Appendix 2: Data

8.1 World Values Survey: Data Description and Variable Definitions


The Combined World Values Survey is produced by the Institute for Social Research, Ann Arbor, MI, USA. The series is designed to enable a cross-national comparison of values and norms on a wide variety of norms and to monitor changes in values and attitudes across the globe. Both national random and quota sampling were used. All of the surveys were carried out through face-to-face interviews, with a sampling universe consisting of all adult citizens, aged 18 and older, across over 60 nations around the world. The 1981-83 survey covered 22 independent countries; the 1990-93 survey covered 42 independent countries; the
1995-97 survey covered 53 independent countries. In total, 64 independent countries have been surveyed in at least one wave of this investigation (counting East Germany as an independent country, which it was when first surveyed). These countries include almost 80 percent of the world’s population. A fourth wave of surveys is being carried out in 1999-2000. The full set of countries covered is: Argentina, Armenia, Australia, Austria, Azerbaijan, Belgium, Bangladesh, Bulgaria, Bosnia-Herzegovina, Belarus, Brazil, Canada, Switzerland, Chile, China, Colombia, Czech Republic, East and Unified Germany, Denmark, Dominican Republic, Spain, Estonia, Finland, France, United Kingdom, Georgia, Ghana, Croatia, Hungary, India, Ireland, Northern Ireland, Iceland, Italy, Japan, South Korea, Lithuania, Latvia, Madagascar, Mexico, Macedonia, Montenegro, The Netherlands, Norway, Pakistan, Peru, Philippines, Poland, Puerto Rico, Portugal, Russia, Slovak Republic, Slovenia, Sweden, Turkey, Taiwan, Ukraine, Uruguay, United States of America, Venezuela, South Africa, Moscow, Tambov oblast, Montenegro, Spain, Nigeria, Romania, Moldova and Serbia.

Right Wing-R: is a categorical variable that is the answer to the question: “In politics people talk of the “left” and of the “right”. In a scale where “0” is left and “10” is right, where would you place yourself?”.

Unfair for Poor-L: A dummy that is the response to the question: “Why, in your opinion, are there people in this country who live in need? Here are two opinions: which comes closest to your view? (1) They are poor because of laziness and lack of willpower, or (2) They are poor because society treats them unfairly.” The dummy takes the value 1 if the answer is (2) and 0 if the answer is (1).

No Escape–L: A dummy equal to 1 if the answer to the question: “In your opinion, do most poor people in this country have a chance of escaping from poverty, or there is very little chance of escaping? (1) They have a chance or (2) There is very little chance.” was category (2) and 0 if it was category (1).

Government Help Poor–L: The response to the World Values question: “Do you think that what the government is doing for people in poverty in this country is about the right amount, too much, or too little? (1) Too much, (2) About the right amount, or (3) Too little.”. Government help Poor–L is a categorical variable equal 1 if the answer is (1), 2 if the answer is (2) and 3 if the answer is (3).

Business Ownership-L: The response to the World Values question: “There is a lot of discussion about how business and industry should be managed. Which of these four statements comes closest to your opinion? (1) The owners should run their business or appoint the managers, (2) The owners and the employees should participate in the selection of managers, (3) The government should be the owner and appoint the managers, (4) The employees should own the business and elect the managers”. Business Ownership-L was defined as a dummy equals 1 if the answer is category (3) or (4) and 0 if the answer is category (1) or
8.2 International Crime Victimization Survey: Data Description and Variable Definitions


The International Crime Victimization Survey (ICVS) series was developed by the ICVS international working group. Overall funding was provided by the Ministry of Justice of the Netherlands. The project was set up to fill the gap in adequate recording of offenses by the police for purposes of comparing crime rates in different nations and to provide a crime index independent of police statistics as an alternative standardized measure. The International Crime Victimization Survey (ICVS) is a far-reaching program of fully standardized surveys investigating householders’ experience of crime in different countries. The data were collected in four waves: 1989, 1992, 1996, and 2000. The main focus of the ICVS is whether the respondent was a victim of theft of or from vehicles, other thefts, vandalism, robbery, pickpocketing, sexual harassment or violence, or assault. The surveys also investigated the frequency of victimization, reasons for not reporting a crime to the police, familiarity with the offender in the case of a sexual offense, physical violence, injuries, fear of crime in the respondent’s local area, use of help agencies for victims, satisfaction with police behavior, preferred legal sanctions, punishment, and length of detention for offenders, safety precautions when leaving home, possession of a gun, burglar alarm, or insurance, and frequency of going out. Some of the 2000 surveys were administered nationally and some were restricted to a main city within a given country. The ICVS National Survey Data cover the following countries: Australia, Belgium, Canada, Catalonia, Denmark, England and Wales, Finland, France, Netherlands, Northern Ireland, Poland, Portugal, Scotland, Sweden, Switzerland, and the United States. The ICVS City Survey Data cover the following countries: Albania, Argentina, Azerbaijan, Belarus, Botswana, Bulgaria, Cambodia, Colombia, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lesotho, Lithuania, Mongolia, Mozambique, Namibia, Nigeria, Panama, Philippines, Poland, Republic of Korea, Romania, Russia, Slovenia, South Africa, Swaziland, Uganda, Ukraine, and Zambia.

Severity 1-R: The response to the Crime Victimization question: “People have different ideas about the sentences which should be given to offenders. Take for instance the case of a man of 20 years old who is found guilty of burglary for the second time. This time, he has stolen a colour TV. Which of the following sentences do you consider the most appropriate for such a case? (1) Fine, (2) Prison, (3) Community service, (4) Suspended sentence, (5) Any other sentence. Severity 1 was defined as a categorical variable equals -1 if the answer is category (1), 0 if the answer is category (3), (4) or (5), and 1 if the answer is category (2).
9 Appendix 3: Proofs.

Proof of Lemma 1. We have

\[ g^A (\mu) = P (H \mid \text{crime}) f (\mu \mid \mu > u_H - \overline{w}) + P (h \mid \text{crime}) f (\mu \mid \mu > u_h - \overline{w}) \]

\[ = P (H \mid \text{crime}) \frac{f_{u_H - \pi} (\mu)}{1 - F (u_H - \overline{w})} + P (h \mid \text{crime}) \frac{f_{u_h - \pi} (\mu)}{1 - F (u_h - \overline{w})} \]

\[ = \frac{f_{u_H - \pi} (\mu)}{1 - F (u_H - \overline{w})} + \frac{1}{1 - F (u_h - \overline{w})} \frac{1}{1 - F (u_h - \overline{w})} \frac{1 - F (u_h - \overline{w})}{P (H) \frac{P (H)}{P (H)}} \frac{f_{u_h - \pi} (\mu)}{1 - F (u_h - \overline{w})} \]

\[ = \frac{f_{u_H - \pi} (\mu) P (H) + f_{u_h - \pi} (\mu) (1 - P (H))}{F (u_H - \overline{w}) P (H) + F (u_h - \overline{w}) (1 - P (H))} \]

Using \( P (H) = p \), we obtain the desired result. ■

Proof of Lemma 2. In the proposed equilibrium the worker obtains a utility of \( u_m \), and will commit a crime if and only if \( \mu > u_m - \pi \). The conditional density is then given by equation (2). ■

Proof of Lemma 3. The first order condition for the maximization problem of the government is

\[ \int \frac{\partial v (t, \mu)}{\partial t} g (\mu) d\mu = \int 2 (q (\mu) - t) g (\mu) d\mu = 0 \Leftrightarrow t^* = E_g (q (\mu)) . \]

Proof of Proposition 1. Let \( u (t) = 2 - t \), \( q (\mu) = \frac{1}{2} \mu \) and let \( f \) be uniform on \([ -2, 2] \), so that \( F (x) = (x + 2) / 4 \) and \( \tilde{F} (2 - x) / 4 \).

America. Following choices of a market technology and high effort in the first period, we have that

\[ g^A = \begin{cases} \frac{1 - p}{4 - t - pu_H - (1 - p) u_h} & u_H + t - 2 \geq \mu > u_h + t - 2 \\ \frac{1}{4 - t - pu_H - (1 - p) u_h} & 2 \geq \mu > u_H + t - 2 \end{cases} \]

Then, using

\[ E_{g^A} \mu = P (\mu \leq u_H + t - 2) E (\mu \mid \mu \leq u_H + t - 2) + P (\mu > u_H + t - 2) E (\mu \mid \mu > u_H + t - 2) \]

and the fact that the conditional expectations are the midpoints of the intervals, we get

\[ \frac{3t}{4} = E_{g^A} \mu = \frac{(1 - p) (u_H - u_h)}{4 - t - pu_H - (1 - p) u_h} \left( \frac{u_H + u_h}{2} + t - 2 \right) + \frac{4 - u_H - t}{4 - t - pu_H - (1 - p) u_h} \left( \frac{u_H + t}{2} \right) . \]
The solution to the previous equation then yields the equilibrium punishment

\[ t^A = \frac{4 + p u_H + (1 - p) u_h}{2} \]

\[ - \sqrt{-24 (p u_H + (1 - p) u_h) + 2 p u_H u_h + 9 u_h^2 + 8 p u_H^2 - 10 p u_h^2 + p^2 (u_H - u_h)^2 + 16} \]

Equilibrium, crime is then given by

\[ p \tilde{F}(u_H - \bar{\mu}) + (1 - p) \tilde{F}(u_h - \bar{\mu}) = \frac{p \tilde{F}(u_H + t - 2) + (1 - p) \tilde{F}(u_h + t - 2)}{4 - t - pu_H - (1 - p) u_h} \]

\[ = \frac{4 - t - pu_H - (1 - p) u_h}{4} \]

**France.** Punishment in France is given by the density in equation (2),

\[ g^F(\mu) = \frac{1}{4 - u_m - t} \text{ for } \mu \geq u_m + t - 2 \]

so that the expected value of \( \mu \) is

\[ E_{g^F}\mu = \frac{u_m + t}{2} \Leftrightarrow \frac{3t}{4} = \frac{u_m + t}{2} \Leftrightarrow t^F = 2u_m. \]

Crime in France will then be

\[ \Pr(\mu \geq u_m - \bar{\mu}) = \Pr(\mu \geq u_m + t - 2) = \frac{4 - u_m - t}{4} = \frac{4 - 3u_m}{4}. \]

With \( u_m = 1, p = 90\%, u_h = 1/2, u_H = 3/2 \) we will show that punishment is higher in America and crime higher in France. These numbers have been chosen to match: a GDP per capita that is 40% larger in the US, which is consistent with the data adjusted by purchasing power parity; a poverty rate in the US of around 12% (we have chosen 10%). From equations (4) and (6) we get \( t^A = 2.26 > 2 = t^F \), as was to be shown. Notice that this implies sentencing standards 13% higher in the US. Moreover, from equations (5) and (7) we see that crime in the US is 8% whereas in France it is 25%.

Finally, we must check that the two first period equilibria are indeed equilibria. The reason we must do this, is that playing high effort does not yield an expected payoff of \( u_H - e \), but rather, it depends on the second period choices between collecting the wages, or going to the crime market. To accomplish this final step we let the probability of high output, with low effort, in the market technology be 0, and let \( e \), the cost of effort, be arbitrarily small.

Suppose then that the firm chooses a market technology. The expected payoff for the individual is then the combination of whether he will receive \( u_H \) or \( u_h \), and what will happen after observing \( \mu \):

\[ p \left[ F(u_H - \bar{\mu}) u_H + \int_{u_H - \bar{\mu}}^{u_H - \bar{\mu}} (\bar{\mu} + \mu) f(\mu) d\mu \right] + (1 - p) \left[ F(u_h - \bar{\mu}) u_h + \int_{u_h - \bar{\mu}}^{u_h - \bar{\mu}} (\bar{\mu} + \mu) f(\mu) d\mu \right]. \]
This equation becomes 1.4254, from the following calculation:

\[
\frac{9}{10} \left( \frac{126 - 3\sqrt{19}}{80} + \int_{-\frac{2\sqrt{19}}{10}}^{2} \left( \frac{\sqrt{19} - 7}{10} + \mu \right) \frac{1}{4} d\mu \right) + \frac{1}{10} \left( \frac{32 - \sqrt{19}}{80} + \int_{-\frac{12\sqrt{19}}{10}}^{2} \left( \frac{\sqrt{19} - 7}{10} + \mu \right) \frac{1}{4} d\mu \right)
\]

Notice that the ex ante expected value is larger than 1.4, which is \( pu_H + (1 - p) u_h \), given that the individual can re-optimize after observing \( u_H \) or \( u_h \). The uncertainty in the utility of playing low effort comes from the (unknown) value of \( \mu \). We then have that \( u_l = \hat{u}_l \approx u_h \) because the probability of high output is 0 and because the cost of effort is low. The expected utility of the worker of choosing low effort when the firm chooses the market technology is

\[
F(\bar{u}_H - \bar{u}) u_h + \int_{\bar{u}_h - \bar{u}}^{2} (\bar{u} + \mu) f(\mu) d\mu = \frac{32 - \sqrt{19}}{80} + \int_{-\frac{12\sqrt{19}}{10}}^{2} \left( \frac{\sqrt{19} - 7}{10} + \mu \right) \frac{1}{4} d\mu = 0.69093.
\]

(the large gap between 1.4254 and 0.69 shows that the probability of high output with low effort need not be 0, and that the cost of effort need not be arbitrarily small). We conclude that if the firm chooses the market technology it is better to choose high effort.

Suppose now that the workers are choosing high effort. Then, the firm must choose between \( \pi_h \) and \( \pi_m \), and we had assumed \( \pi_h > \pi_m \), so indeed the American equilibrium is an equilibrium.

We now check that the French equilibrium is an equilibrium. First notice that if the workers are choosing low effort, the firm would rather choose a burocratic technology, because \( \pi_m > \pi_l \). If the firm chooses a burocracy, for each value of \( \mu \) the individual is better off choosing low effort, and for some values, strictly better off because of the cost of effort. Hence, a burocracy with low effort is also an equilibrium.

In order to see that parameters and functions close to the ones we have chosen also have the property that \( t^A > t^F \), note that \( t^A = E_g \lambda q \) and \( t^F = E_g \rho q \) are continuous functions of all parameters and functions involved. Therefore, changing them slightly will change only slightly the punishment rates. Similarly, crime rates are a continuous function of all the parameters and functions, and of the punishment rate. Since small changes in parameters and functions lead to slight changes in punishment, crime will also change slightly.

**Proof of Proposition 2.** We will show that \( D(t; u_H, u_h, p) \equiv B^g (B^w (t)) \) is continuous in \( t \) and increasing in \( p \), and then apply Corollary 1 in Milgrom and Roberts (1994). Continuity follows from: the continuity of \((u_h - \bar{u}(t), u_H - \bar{u}(t))\) in \( \bar{u}(t) \); the continuity of \( \bar{u}(t) \) in \( t \); and the continuity of \( B^g(s) \) when the distribution of types \( \mu \) has a density (as we have assumed). To show that \( D \) is increasing in \( p \), notice that when \( p \) increases, for a fixed \( t \), \( B^w(t) \) is unchanged. Then, for any fixed strategy \( s \) (in this case, a fixed \( B^w(t) \)) of the
worker, the increase in \( p \) causes an increase (in first order stochastic dominance sense) of the posterior belief in equation (1)

\[
g^A(\mu) = \frac{f_{s_2}(\mu) p + f_{s_1}(\mu)(1-p)}{\bar{F}(s_2)p + \bar{F}(s_1)(1-p)}
\]

and hence an increase in the optimal punishment \( E_{g^A}(q(\mu)) = B^g(B^w(t)) \). Therefore, it only remains to show that an increase in \( p \) causes an increase in \( g^A \).

We have that for \( p' > p \) and any \( x \geq s_1 \), the cdf of \( g^A \) is

\[
G^A(x; p) = \int_{s_1}^{x} \frac{f(\mu)(1-p)}{\bar{F}(s_2)p + \bar{F}(s_1)(1-p)}d\mu + \int_{s_2}^{x} \frac{p f(\mu)}{\bar{F}(s_2)p + \bar{F}(s_1)(1-p)}d\mu \quad (8)
\]

The derivative of \( G^A \) with respect to \( p \) is then

\[
\frac{dG^A(x; p)}{dp} = \begin{cases} 
\frac{(F(x)-F(s_1))(1-F(s_2))}{[1-F(s_2)p-F(s_1)(1-p)]^2} \leq 0 & x \leq s_2 \\
\frac{(F(x)-F(s_2))(1-F(s_1))}{[1-F(s_2)p-F(s_1)(1-p)]^2} \leq 0 & x > s_2
\end{cases}
\]

We have therefore shown that for all \( x \), \( G^A(x; p') \leq G^A(x; p) \) for \( p' > p \), as was to be shown. ■

In the American equilibrium, when \( u_h \) increases, the equilibrium punishment increases and the cutoffs increase, resulting in less crime.

**Proof of Proposition 3.** The structure of the proof is as that of Proposition 2. Continuity has already been shown, so we will only show that \( D(t; u_{\bar{t}}; u_h, p) \equiv B^g(B^w(t)) \) is increasing in \( u_h \). For a fixed \( t \) and \( u'_h > u_h \), we get \( B^w(t; u'_h) = (u'_h - \bar{t} \cdot t, u_{\bar{t}} - \bar{t} \cdot t) \) and \( B^w(t; u_h) = (u_h - \bar{t} \cdot t, u_{\bar{t}} - \bar{t} \cdot t) \), so it will suffice to show that for \( s_1' > s_1 \) we obtain \( B^g ((s'_1, s_2)) \geq B^g ((s_1, s_2)) \). This follows from the fact that the posterior of \( f \) for \((s'_1, s_2)\) first order stochastically dominates the posterior of \( f \) for \((s_1, s_2)\): for \( G^A \) as in equation (8) we get

\[
\frac{dG^A}{ds_1} = \begin{cases} 
f(s_1)(1-p) \frac{F(x)(1-p) + F(s_2)p - 1}{[1-F(s_2)p-F(s_1)(1-p)]^2} \leq 0 & x \leq s_2 \\
f(s_1)(1-p)(F(x)-1) \frac{f(s_1)(1-p)(F(x)-1)}{[1-F(s_2)p-F(s_1)(1-p)]^2} \leq 0 & x > s_2
\end{cases}
\]

as was to be shown. ■
References


29


