NBER WORKING PAPER SERIES

# CRIME AND PUNISHMENT IN THE "AMERICAN DREAM"

Rafael Di Tella
Juan Dubra

Working Paper 12641
http://www.nber.org/papers/w12641

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
October 2006

For helpful conversations or comments we thank Rawi Abdelal, Fernando Alvarez, Jean-Pierre Benoit, Federico Echenique, Peter Gourevitch, Mary Katzenstein, James Owen McLeod, Julio Rotemberg, Christopher Uggen and seminar participants at Harvard and UTDT. We thank Javier Donna for excellent research assistance. The views expressed herein are those of the author(s) and do not necessarily reflect the views of the National Bureau of Economic Research.

Crime and Punishment in the "American Dream"
Rafael Di Tella and Juan Dubra
NBER Working Paper No. 12641
October 2006
JEL No. E62,K14,K42,P16

## ABSTRACT

We observe that countries where belief in the "American dream" (i.e., effort pays) prevails also set harsher punishment for criminals. We know from previous work that beliefs are also correlated with several features of the economic system (taxation, social insurance, etc). Our objective is to study the joint determination of these three features (beliefs, punitiveness and economic system) in a way that replicates the observed empirical patterns. We present a model where beliefs determine the types of contracts that firms offer and whether workers exert effort. Some workers become criminals, depending on their luck in the labor market, the expected punishment, and an individual shock that we call "meanness". It is this meanness level that a penal system based on "retribution" tries to detect when deciding 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 (and 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.

Rafael Di Tella
Harvard University
243 Concord Avenue #12
Cambridge, MA 02138
and NBER
rditella@hbs.edu

Juan Dubra
Universidad de Montevideo
Prudencio de Pena 2440
Montevideo, 11.600 URUGUAY
dubraj@um.edu.uy

# 1 Introduction

Societies that have laws must decide what to do when people violate these laws. An interesting fact is that some societies, notably the US, choose punishments that would be 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. More interesting, perhaps, is the fact that the incarceration rates in the US are extremely high. In the year 2004, for example, it exceeded 700 per 100,000 inhabitants, approximately 5 times those observed in Europe. Anecdotal evidence suggests that even the everyday treatment of prisoners in the US may be 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."[1] Such treatment of inmates is not common in European prisons. Interestingly, crime rates for most crime categories during the early 1990's were comparable across the Atlantic (the notable exception being the homicide rate), while Levitt (2004) documents a large decline -of the order of 30%- in virtually all crime categories in the US during the later part of that decade. 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."[2]

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

[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.

[2] The relative harshness of the american penal system is also emphasized in Whitman (2003) and the literature which views punishment as a form of oppression linked to the economic order (see Waquant (1999, 2000) for a recent example).

work, both by political scientists working on "varieties of capitalism", and by economists emphasizing redistributive institutions, has focused on the remarkable differences in beliefs across the Atlantic. Survey evidence reported in Alesina and Glaeser (2004) reveals that 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.[3] Given that the punitiveness of the legal system and belief in the "American dream" appear positively correlated across countries (see also Section 2 below), a natural question to ask is if these empirical patterns are predicted by models where beliefs, the penal system and the economic organization are all simultaneously determined.[4]

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

[3]Work by economists includes Benabou and Ok (2001), Rotemberg (2002), Benabou and Tirole (2005), Alesina and Angeletos (2005), *inter alia*. Related models (with less emphasis on differences in beliefs) are Banabou (2000), Saint Paul (2001), Hassler *et al* (2003) and Di Tella and MacCulloch (2003). The political science literature on "varieties of capitalism" is large (see, for example, the contributions in Hall and Soskice (2001) and the references cited therein) 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 *Du systeme penitentiaire aux Etats-Unis et de son application en France*).

[4]There are, of course, other approaches to explain differences in punishment without connecting them to the economic system. A particularly simple one is to invoke discrimination. More severe punishment would be observed in America if sentences where decided by one group and criminlas were perceived to belong to a second, more disliked group. Indeed, race and crime appear closely connected in America and the evidence documented in Glaeser and Sacredote (2000) is certainly consistent with discrimination in sentencing. 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 realtive to Europe. Alternatively, one could follow Mulligan and Shleifer (2005) and argue that setting up and running an institution requires a fixed cost so that the supply of regulation is limited by the extent of the market. Accordingly, one could argue that the administration of a serious judicial system is requires a jurisdiction with a large population (such as the US relative to France). On justifications used for sentencing amongst legal scholars, see Tonry (1998).

simultaneously that effort pays and that criminals should be punished.[5]

An alternative 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.[6] 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 how much effort pays determine the types of contracts that firms offer and whether workers accept these contracts and exert effort. 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 punishment. We find that when initial beliefs differ, two equilibria can emerge out of identical fundamentals. In the first equilibrium, which following the literature we call "American", belief in the "American dream" prevails, workers exert high effort, there are high powered contracts (income is unequally distributed) and punishment is harsh. In the second, "French" equilibrium, workers exert low effort and wages are independent of output. As in previous work, there is the potential for multiple equilibria, although it is not the result of a failure to experiment and find the true value of some parameter because in our model beliefs are correct in equilibrium (see the discussion in Section 7).

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 several advantages (see also the discussion in Section 7). 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, this empirical fact can easily be accomodated in formal models. Interestingly, those with the best predictive fit 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

[5] The evidence available is consistent with both a direct link and an indirect through the economic system. For example, Benabou and Tirole (2006) explain that believers in a just world "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". Alesina, *et al* (2001) study data from the US General Social Survey and find that "There is an extremely strong relationship between supporting capital punishment and opposing welfare in the US. Indeed, the correlation of these opinions (which is fairly high—16 percent in the US) is hardly natural. However, it makes sense if opposition to welfare comes from a desire to punish people who are seen as "stealing" from taxpayers."

[6] Nisbet and Cohen (1996), cited in Alesina et al (2001), link punitiveness in America to the importance of the frontier, where the need to enforce uncertain property rights was salient.

[7] See the results from ultimatum and dictator games of Guth *et al* (1982) and Forsythe *et al* (1994).

"like with like" and the process of detecting the amount of altruism in the other party occupies center stage). Similarly, in our theory punishment occurs because voters want to harm criminals who display low levels of benevolence towards others.[8] 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.

Finally, our paper is related to the economics literature on crime and punishment (see Becker, 1968), particularly to work linking crime to redistribution (see, Harris 1970, Benoît and Osborne 1995, Freeman, 1996, *inter alia*). For example, Benoît and Osborne (1995) analyze two different policies, and their combinations, for fighting crime. One of them is redistribution, so that the authors can also explain some of the empirical patterns that motivate our study. In their paper, however, there are exogenous differences in political processes and type of crime, whereas 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 in Sections 3-6, a discussion in Section 7 and then conclude.

# 2 Beliefs, Crime and Punishment: Empirical Illustration

Considerable evidence has been gathered on the importance of beliefs about self reliance and the "American dream" for the choice of economic system, including the determination of taxation, social insurance, education finance and the regulation of markets (see, Alesina and La Ferrara 2001, Alesina, *et al* 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.

We start with data on the severity of punishment. A first observation is that the there are several extreme features of the American penal system such as "three-strikes-and-you-are-out laws", mandatory minimum sentences laws and "sexual psychopath" laws. Although we lack formal comparative studies, these appear to be absent in other countries (but see Tonry 1998). A second point is that the US has extremely high levels of incarceration (interestingly, even within America, incarceration rates are higher in the 38 states that allow for the death penalty). Incarceration rates, however, are questionable as a measure of intended severity given their dependence on crime rates and enforcement. Comparable data on severity of sentencing is harder to come by. One well known difficulty in comparing legal systems

[8] Related theories of punishment appear in Benoît and Dubra (2004) and Di Tella and MacCulloch (2002), although they do not have differing lengths of sentences.

across countries is the many potential measures of severity. One example is a detailed recent US Department of Justice document comparing German and American prosecutions, which 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 US."[9]

Survey data from the International Crime Victim Survey (ICVS), however, has asked respondents in several countries a question on sentencing for a similar crime that can be used to compare harshness of punishment for several countries.[10] The exact question employed is (all data is described in detail in Appendix 2)

> Severity: "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 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).[11]

The raw data reveals that Severity is higher in the US than in Europe.[12] The only country in Europe with Severity comparable to the US is Northern Ireland (denoted NOR in the graphs below).

Data on beliefs comes from the four waves of the World Values Survey. We employ 5 different questions. The first is self placement on a 1 to 10 left-right scale. The answers to this question are obviously country specific, but it is perhaps interesting to note that

[9] See, http://www.ojp.usdoj.gov/bjs/abstract/gap.htm accessed on August 1, 2006. Difficulties in comparing severity are due, in part, to differences in the severity of pre sentencing inhibitions; in the severity of the first sentence; in the appeal system; in the effective incarceration -e.g., after reductions for good behavior or release under parole after serving the minimum required sentences; and differences in treatment.

[10] There is reserach revealing considerable consensus amongst individuals regarding the rank order severity of various offenses (Darley *et al* (1996), Kahneman, *et al* (1998) and Rossi *et al*, 1974).

[11] The correlations between this measure of severity and various measures of 'beliefs', GDP and Income Inequality that we present in this section are robust to changes in the definition of Severity. A natural alternative, which yields similar results, is to define Severity equal to 1 if the answer is category (2) or 0 otherwise.

[12] Of course, this data illustrates each country's people desired level of severity, while our model's predictions will be about the severity chosen by the Government. It is unlikely, however, that a political economy mechanism has driven punishment away from the socially desired level. For example, Cohen *et al* (2002) find that "the public largely concurs with current sentencing decisions about incarceration and sentence length". While Alesina et al (2001) report that 86% of respondents in the US think that the courts do not punish criminals harsh enough, while 4% thought the courts were too harsh.

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 better international comparisons, we also focus on four other beliefs. They are

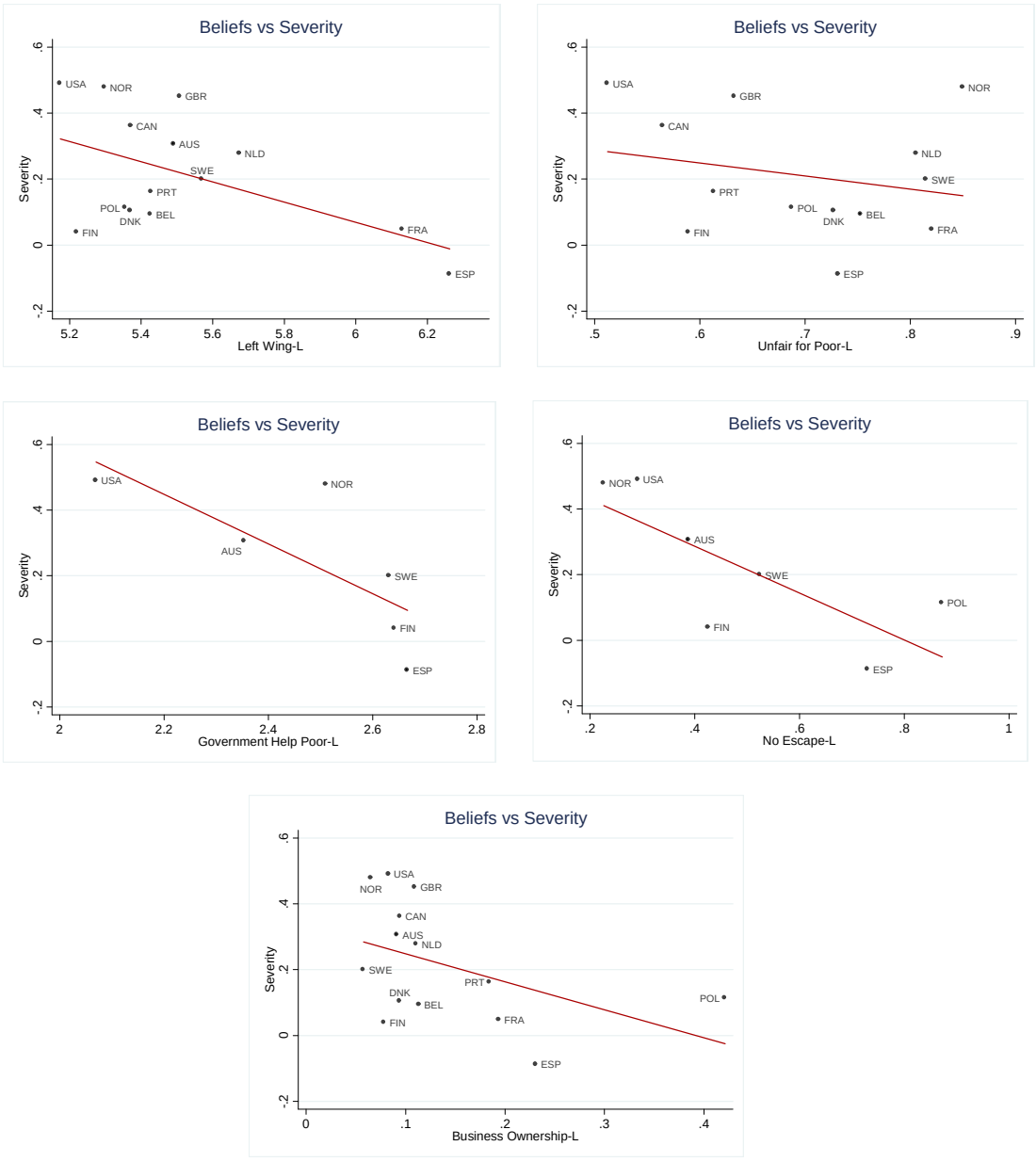
Unfair for Poor-L: A dummy equal to 1 if the answer to the question: "Why, in your opinion, are there people in this country who live in need? Here are two opinions: which comes closest to your view? (1) They are poor because of laziness and lack of willpower, or (2) They are poor because society treats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

Government Help Poor–L: The WVS question asked: "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 was defined as taking the values 1, 2 and 3 if the answers were (1), (2) or (3) respectively.

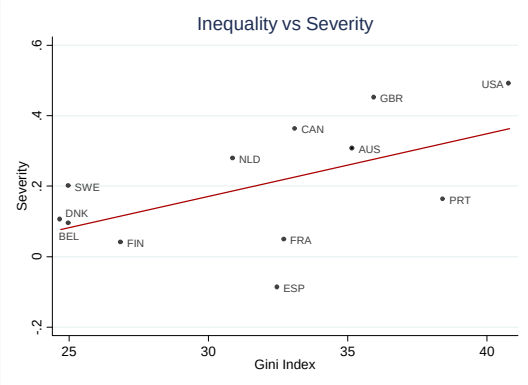
Business Ownership-L: The WVS question asked: "There is a lot of discussion about how business and industry should be managed. Which of these four statements comes closest to your opinion? (1) The owners should run their business or appoint the managers, (2) The owners and the employees should participate 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).

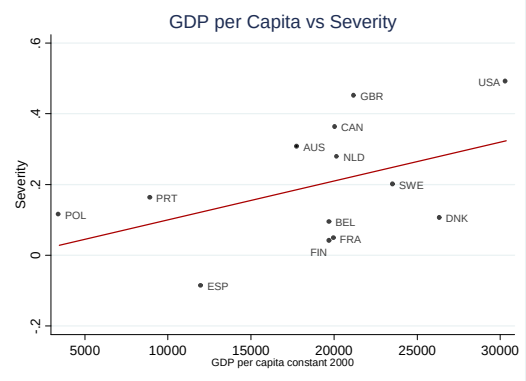
The simple correlations presented below reveal that our measure of severity of punishment is positively correlated with beliefs consistent with the "American dream" and right wing self placement (the variables are coded so that bigger numbers mean more left wing beliefs).




As a reference we note that Severity is also positively correlated with GDP per capita (measured in constant 2000 dollars) and the Gini coeffcient (average 1989-2000, source:

World Bank, World Development Indicators).




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 substantially higher in the US.[13] 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**

| | Crime[1] | Victim[2] | Car[3] | Property[4] | Sex[5] | Person[6] |
|---|---|---|---|---|---|---|
| US | 5,375 | 24.2 | 19.6 | 10.8 | 2.5 | 5.7 |
| | | | | | | |
| Europe | 7,983 | 25.2 | 19.0 | 9.6 | 2.9 | 4.0 |
| Austria | 6,285 | 18,8 | 11.7 | 6.6 | 3.8 | 2.1 |
| Canada | 9,979 | 25.2 | 17.3 | 13.1 | 2.7 | 4.0 |
| England and Wales | | 30.9 | 24.7 | 12.8 | 2.0 | 5.9 |
| Finland | 7,650 | 18.9 | 12.9 | 5.0 | 2.5 | 4.1 |
| France | 6,765 | 25.3 | 20.7 | 9.5 | 0.9 | 3.9 |
| Netherlands | 7,422 | 31.5 | 25.9 | 13.3 | 3.6 | 4.0 |
| Sweden | 12,670 | 24.0 | 20.0 | 7.5 | 2.9 | 4.5 |
| Switzerland | 5,116 | 26.7 | 18.6 | 9.0 | 4.6 | 3.1 |

**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. 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.

[13] Note that the evidence on severity of sentencing reported above relates to burglary, a simple economic crime (for which the punishment is never the hotly debated death penalty).

# 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.

*First Period*

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, productivity does not depend on effort, and neither does the wage which yields a utility of $u_M$. In the market technology output is stochastic, and the probability of a high output is larger when the worker exerts effort. In a manner consistent with agency models, we assume that the firm offers high powered contracts, in which the utility received by the worker is lower when the output is low. Thus, we let $\widehat{u}_H$ be the utility of the worker derived from his salary when output is high, and $\widehat{u}_L$ the utility of wages when output is low. For simplicity, $\widehat{u}_H$ and $\widehat{u}_L$ are assumed given, as we only need the fact that, in the optimal contract, payment in the good state is higher than in the low state. The expressions with the details of the optimal contract were used throughout a previous version of the paper. Our key results do not depend on this simplification. Payoffs are presented in the following matrix, for $p > r$.

| | | Technology Choice: Market | Technology Choice: Bureaucracy |
|---|---|---|---|
| Worker | High effort | $p\hat{u}_H + (1-p)\hat{u}_L - e,\ \pi_h$ | $u_M - e,\ \pi_m$ |
| | Low effort | $r\hat{u}_H + (1-r)\hat{u}_L,\ \pi_l$ | $u_M,\ \pi_m$ |

We assume that $(\widehat{u}_H - \widehat{u}_L)(p - r) > e$ : $p$ is high enough, relative to $r$, so that it compensates the cost of effort. With this assumption there are two equilibria in this stage of the game: a market technology with high effort , and a bureaucracy with low effort (which we call the American and French equilibrium respectively). Note that two interpretations of

belief in "effort pays" arise. First, effort pays to the worker because putting in effort yields a higher output than low effort when the firm chooses the Market technology. This corresponds to the notion of a Nash equilibrium. Second, given a choice of Market technology by the firm, exerting effort yields a higher expected output. This notion of belief correlates with the standard view in economics of a belief as a distribution of probabilities over an unknown parameter $p$ (the distribution is degenerate in that we know with probability 1 the true value of $p$). See Section 7 for a discussion. Our emphasis on the role of effort is consistent with the evidence in Alesina, *et al* (2005), who study differences in hours worked across Europe and America. They state: "hours worked per person ... 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."

It may be worth emphasizing that the timing of the decisions by the worker and the firm can be interpreted in ways consistent with different timings than the one we present. For example, consider a game where the firm moved first, but in which the worker was uncertain either about the firm's action or about his payoff conditional on the firm's choice.[14] This would yield a coordination problem similar to the one we present. The role of the rather artificial assumption of a simultaneous game is simply to capture the idea that when workers fail to believe in the "American dream", they will not be seduced by a firm offering the market technology. Conversely, when firm owners do not believe in effort pays, they will fail to believe that workers will exert effort.

*Second Period*

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 shock affecting his taste for crime. The individual must then decide whether to collect his market wage, or engage in crime (discarding his wage) 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, or his first paycheck, and he must decide whether to continue in the market, or go (forever) into the crime market.[15] If he goes honest, he collects his wages, and the taste shock is irrelevant. If he goes for crime, his payoff is $\overline{u} + \mu$, where $\overline{u}$ is the expected utility of crime and and $\mu$ is the taste shock. In order to link the punishment

[14] Uncertainty about the firm's choice of action arises if all aspects of the choice of technology are not verifiable to the worker.

[15] There is evidence of serial correlation in wages (see for example, Baker *et al,* 1994). Also, we have modeled the career choice between crime and market activities as a static problem, and not one in which the individual can move back and forth between the two paths. There is some evidence that crime is an absorbing state in the sense that once the individual enters crime it is unlikely that he will get out. For example, Lanagan and Levin (2002) report that among nearly 300,000 prisoners released in 15 States in 1994, 67.5% were rearrested within 3 years. A prior study estimated this number at 62.5%.

rate, or sentencing rate, with the utility of the individuals we assume that the direct utility from crime is a continuous function $\overline{u} = u(a, b, t)$ where $a$ is the probability of $a$prehension, and $b$ is the $b$ounty. In order to simplify our analysis, we take $a$ and $b$ as fixed, exogenous parameters, and we concentrate on the variable $t$, time in jail.[16] We also assume that $\overline{u}(\cdot)$ is decreasing in $t$. The taste shock $\mu$ is his meanness (a large $\mu$ is a mean individual) which is drawn from a density $f$ that is positive in its support $[\mu_{\min}, \mu_{\max}]$ and has a cumulative distribution function $F$.

In his decision about whether to enter the crime market, the individual compares his market utility $u$ with $\overline{u} + \mu$ and commits a crime if and only if $u < \overline{u} + \mu$. This $\mu$ parameter can be interpreted in two ways. First, our preferred interpretation is that of a taste for crime or "meanness" shock, so that "retribution" motive for punishment is natural. Similar results can be obtained if one interprets the shock as pessimism: a large $\mu$ means that individuals perceive the economic prospects in the legal market are bleak, and are pushed into the crime market. In this case we can use a "deterrence" theory of punishment.[17]

The Government must choose the time in jail for a criminal, which in turn determines $\overline{u}$. In other words, once the Government has proved that the individual has committed a crime it must decide the time he or she must spend in jail $t$. The Government has a utility $v(t, \mu)$ of punishing with $t$ years a type $\mu$. For a belief $g$ about the types of criminals, the Government must choose $t$ to maximize

$$\int v(t, \mu) g(\mu) d\mu.$$

Note that prior beliefs are not related to an observable type (otherwise the process would reflect discrimination and would be invalid). We will assume that for some increasing function $q$, $v(t, \mu) = -(q(\mu) - t)^2$. This functional form captures the idea that if the Government knew that an individual was of type $\mu$, it would set a punishment of $q(\mu)$, and since $q$ is increasing, it means that the Government wants to punish "worse" individuals more. In particular, for any belief $g$ of the government, it must choose $t$ to maximize its utility

$$\arg\max_t -\int (q(\mu) - t)^2 g(\mu) d\mu \equiv t^* = E_g q \tag{1}$$

This functional form, which is how we model the retributive theory of punishment, only serves to simplify our analysis (the main results do not hinge on the specific form). In the "retribution" theory of punishment that we employ, this function captures the societal desire

[16] 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 commited 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).

[17] See Becker (1968), Ehrlich (1975), Shavell (1987), Benoit and Osborne (1995), *inter alia*.

to respond to the meanness of the criminal.[18] There is a philosophical debate that makes a distinction between the meanness of the act and the meanness of the individual who commits this act, that we do not address in this paper. We assume that retribution means giving harsher punishment to meaner individuals, as measured by a higher $\mu$, and note that it is consistent with the practice of several legal systems (including the US and the UK). It is also consistent with the legal theories of Primoratz (1989), Kleinig (1973) and Davis (1992), who 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.

We note that modeling simultaneous action choices by the worker and Government is an attempt to keep "pure" our analysis of punishment as retribution. The reason is that if the Government moved first, it would take into account the effect of its punishment level on the behavior of the workers-criminals, making the theory work as a deterrence model.

# 4 A Simple Example

In order to show how our model works, we now present a simple example with the probability of high output, given effort equal to 1 and the probability of high output with low effort equal to 0.

| | | Market | Bureaucracy |
|---|---|---|---|
| Worker | High effort | $\hat{u}_H - e,\ \pi_h$ | $u_M - e, \pi_m$ |
| | Low effort | $\hat{u}_L\ ,\ \pi_l$ | $u_M\ ,\ \pi_m$ |

We normalize output in France (Bureaucracy with Low Effort) to $u_M = 1$ and set US (Market technology, High Effort) GDP per capita to be $\widehat{u}_H = 1.4$, which is consistent with observed differences in income adjusted by purchasing power parity. Also, set $e = 1/10$ and $\widehat{u}_L < 1$, for example $\widehat{u}_L = 1/2$. Finally, let the expected utility of the worker when time in jail is $t$, be $u(t) = 2 - t$, and let the utility of the Government be given by $v(t, \mu) = -(q(\mu) - t)^2$ with $q(\mu) = \frac{4}{3}\mu$. The density of types $\mu$ is $f$, uniform on $[-2, 2]$, so that $F(x) = (x + 2)/4$.

We will now show that in equilibrium, the optimal punishment in America is $t^A = 13/5$, while in France it is $t^F = 2$.

[18] In a "deterrence" interpretation the objective of the Government would be to minimize crime rates. Thus, the relationship between the time in jail and the $v(.)$ would be determined by the way in which criminals react to harsh sentencing.

When the workers know that $t^A = 13/5$, they commit crimes iff

$$\mu > \widehat{u}_H - e - \overline{u}\left(t^A\right) = \widehat{u}_H - e - \left(2 - t^A\right) = \frac{7}{5} - \frac{1}{10} - \left(2 - \frac{13}{5}\right) = \frac{19}{10}. \tag{2}$$

Given that types were uniformly distributed in $[-2, 2]$, the conditional expectation of $\mu$ given that $\mu > 19/10$, is the midpoint of the interval between $19/10$ and $2 : E(\mu \mid \text{crime}) = 39/20$. Then, by equation (1), the optimal punishment is

$$t^A = E(q \mid \text{crime}) = E(4\mu/3 \mid \text{crime}) = \frac{4}{3}E(\mu \mid \text{crime}) = \frac{4}{3}\frac{39}{20} = \frac{13}{5}$$

as was to be shown.

Similarly, after the French equilibrium, when workers know that $t^F = 2$, they will commit crimes if and only if

$$\mu > u_M - \overline{u}\left(t^F\right) = u_M - \left(2 - t^A\right) = 1. \tag{3}$$

This yields a conditional expectation of types (the midpoint between 1 and 2) of $E(\mu \mid \text{crime}) = 3/2$. By equation (1) the optimal punishment is

$$t^F = E(q \mid \text{crime}) = E(4\mu/3 \mid \text{crime}) = \frac{4}{3}E(\mu \mid \text{crime}) = \frac{4}{3}\frac{3}{2} = 2$$

as was to be shown.

In order to complete the example, one only needs to check that Low Effort-Bureaucracy and High Effort-Market Technology are still equilibria of the first stage (when workers know what awaits them in the second period). This is easy and ommitted.

In this simple example there is more punishment in America because the pool of criminals has an unambiguously higher level of meanness in America. Equation (2) tells us that an individual will commit a crime in America if and only if his meanness is above $19/10$, whereas in France he will commit a crime if and only if his meanness is larger than 1. This is the driving force behind most of our results. Note finally, that one can increase punishment in America (more than in France) by choosing $q$ functions that place more weight on the right tail of the distribution of $\mu$. This simple mechanism will also be feasible for the more general model.

We now return to the more general model described in Section 3, where we use high powered contracts when the firm chooses a market technology. Although this adds some complexity, it also more realistic and improves the explanatory power (as, for example, income in the American equilibrium will be more unequally distributed than in France). For evidence on this correlation between severity and inequality, see Section 2.

# 5 Crime and Punishment

Let $g$ be the distribution of types that will arise in equilibrium (the distribution that the Government will presume for its calculations). We now describe the two types of equilibrium that we are interested in, which will give rise to two possible equilibrium distributions $g$. We are interested in two of the subgames that follow after first stage play and before the worker receives his taste shock $\mu$[19] : those following play consistent with the American and the French equilibria. We begin with a description of the game that follows after the French equilibrium which is simpler.

## 5.1 France

In this subgame there are two players, the worker and the Government, who must choose actions simultaneously. The action space for the worker is $C = [\mu_{\min}, \mu_{\max}]$: he must choose a *c*utoff $c$. The interpretation of the cutoff is that the worker will commit a crime iff $\mu \geq c$. The analysis in the preceding section showed that for a given $\overline{u}$, the optimal cutoff is $c^*(t) = u_M - \overline{u}$, but in principle, the worker can choose any cutoff he desires. The action space for the Government is $T = [-M, M]$ for some (large) $M$ : it must choose a time in jail $t$ for the criminals.

The worker's expected utility for a strategy profile $(c, t)$, given that $\mu$ has a density $f$, is

$$w(c,t) = \int_{\mu_{\min}}^{c} u_M f(\mu)\, d\mu + \int_{c}^{\mu_{\max}} (\overline{u}(t) + \mu) f(\mu)\, d\mu.$$

The first term is the payoff when $\mu$ is small and induces the worker to stay in the legal market; the second corresponds to meanness levels that induce crime. As was noted before, this payoff is maximized at $c^*(t) = u_M - \overline{u}(t)$.

Any given choice of cutoff $c$, not necessarily the optimal cutoff, generates a certain criminal behavior. Conditional on having caught a criminal, and that the worker had chosen cutoff $c$, the Government has a posterior belief about the types of the criminal which is given by

$$\Pr(\mu \mid \text{crime}) = \frac{\Pr(\text{cr} \mid \mu) f(\mu)}{\Pr(\text{crime})} = \frac{\Pr(\text{cr} \mid \mu) f(\mu)}{1 - F(c)} = g^c(\mu) = \begin{cases} 0 & \mu < c \\ \frac{f(\mu)}{1-F(c)} & \mu \geq c \end{cases}. \qquad (4)$$

To ensure continuity of the posterior beliefs we assume (Bayes does not apply) that for $c = \mu_{\max}$, the Government is certain that $\mu = \mu_{\max}$.

[19] Technically the "subgame" that follows after play of High effort-Market technology is not a subgame since in the second stage the government does not know whether the worker it faces was lucky or unlucky in the first stage. But we now analyze this second stage as a Bayesian game "as if" there had not been a first stage, but rather that the game starts by a move of nature that chooses $u_H$ or $u_L$.

For any profile of strategies $(c,t)$ the Government's utility is

$$G(c,t) = -\int (q(\mu) - t)^2 g^c(\mu)\, d\mu.$$

Then, the Government's best response to a choice of $c$ by the worker is to set

$$t^*(c) = E_{g^c}(q) = \int q(\mu)\, g^c(\mu)\, d\mu.$$

Here we have implicitly assumed that $M$ is large enough that $-M \leq q(\mu_{\min}) < q(\mu_{\max}) \leq M$, so that the optimal $t$ is feasible.[20]

The next Lemma shows one of the insights that drives many of the results in this paper: when the worker increases his cutoff, the "average" type of criminal is worse (using $q$ and the posterior) since the best types that were formerly committing crimes are no longer criminals; this leads to a higher choice of punishment by the Government.

**Lemma 1** *In the subgame following play of No Effort by the worker and Bureaucracy by the firm, the Government's best response function $t^*$ is increasing in $c$.*

**Proof.** Since $q$ is increasing it will suffice to show that the c.d.f. of $g^{c'}$ first order stochastically dominates $g^c$ for $c' > c$ :

$$\int^x g^c(\mu)\, d\mu = \int_c^x \frac{f(\mu)}{1-F(c)} d\mu = \frac{F(x)-F(c)}{1-F(c)} \geq \frac{F(x)-F(c')}{1-F(c')} = \int^x g^{c'}(\mu)\, d\mu$$

as was to be shown. ■

In a similar vein, we already know from $c^*(t) = u_M - \overline{u}(t)$ that an increase in the punishment level by the Government leads to a higher cutoff and hence to less crime by criminals that are worse on average, than before the increase in $t$.

Before turning to the comparative statics of the equilibrium levels of $c$ and $t$ with respect to the exogenous parameters, we now show that an equilibrium exists.

**Proposition 1** *In the subgame following play of No Effort by the worker and Bureaucracy by the firm, there always exists an equilibrium.*

**Proof.** Continuity of the utility functions of the players follows from continuity of $\overline{u}$ and the fact that $f$ is a density, ensuring continuity of its posterior $g^c$. The strategy spaces are compact, so one only needs to check quasiconcavity of the utility functions in each player's

[20] We could have assumed that the strategy space of the Government was all of $\mathbf{R}$, and the Government would still choose punishments in the $[q(\mu_{\min}), q(\mu_{\max})]$ range. We have chosen a compact strategy space so that existence of an equilibrium can be easily checked from the primitives of the model.

own strategy. The derivative of $w(c,t)$ with respect to $c$ is $[u_M - \overline{u}(t) - c] f(c)$ which is positive for small values of $c$ and then negative, establishing quasiconcavity. Then, the derivative of $G(c,t)$ with respect to $t$ is $\int 2(q(\mu) - t) g^c(\mu) d\mu$ which is positive and then negative, establishing quasiconcavity. ■

With the assumptions we have made, there may be multiple equilibria: one with high levels of punishment and low crime and one with a lenient Government and high crime. This multiplicity does not affect our analysis and hence we will not make assumptions to ensure uniqueness.

We now turn to the comparative statics on $u_M$ : how do the equilibrium values of $c$ and $t$ change when $u_M$ changes? The next proposition shows that, if the equilibrium values of $(c(u_M), t(u_M))$ are continuous in $u_M$ (a reasonable property of any equilibrium selection criterion and trivially satisfied when there is a unique equilibrium), either: they are increasing in $u_M$ or the equilibrium is unstable.[21] The formal notion of stability in the following Proposition is "best case stability" of Echenique (2002).

**Proposition 2** *In the subgame following play of No Effort by the worker and Bureaucracy by the firm, if the equilibrium values of $c$ and $t$, as a function of $u_M$ are continuous, they are either increasing or unstable. Moreover, there are increasing equilibrium selections.*

**Proof.** See Appendix 3. ■

The result is consistent with the positive correlation between Severity and GDP per capita presented in Section 2.

## 5.2 America

Take a first stage play in which the individual exerts effort in his market activity and the firm chooses the market technology. Before receiving the taste shock, there will be two types of individuals: a proportion $p$ who had a bright future because they had earned $u_H \equiv \widehat{u}_H - e$ and a proportion $1-p$ who had a bleak future because they had earned $u_L \equiv \widehat{u}_L - e$. The strategy of the worker is therefore a choice of two cutoffs $(c_L, c_H)$, such that: a type who had earned $u_H$ (a type $H$ worker) will commit a crime if and only if $\mu \geq c_H$; a type who

[21] The equilibrium is unstable in the sense that, starting in a value of $u_M$ such that a slight increase in $u_M$ does not increase $(c(u_M), t(u_M))$, it happens that the following reasoning would take you to an equilibrium with higher values of $c$ and $t$ (contrary to what the equilibrium selector requires): an increase in $u_M$ makes the worker increase his cutoff for the fixed (old) equilibrium $t(u_M)$; given this change in the cutoff, it is optimal for the Government to increase its punishment level (by Lemma 1); given this increase in punishment, it is optimal for the worker to increase his cutoff; the process then continues with further increases in $c$ and $t$, leading to a new (larger) equilibrium.

had earned $u_L$ (a type $L$) will commit a crime if $\mu \geq c_L$. The strategy space for the worker is therefore $S = \{(c_L, c_H) : c_L, c_H \in [\mu_{\min}, \mu_{\max}] \text{ and } c_L \leq c_H\}$. The Government chooses a (single) punishment level $t$, since it is not able to observe "opportunities" or the first stage income.

A type $H$'s utility of a cutoff $c_H$ when the Government chooses $t$, is

$$w(c, t; H) = \int_{\mu_{\min}}^{c_H} u_H f(\mu)\, d\mu + \int_{c_H}^{\mu_{\max}} (\overline{u}(t) + \mu) f(\mu)\, d\mu.$$

Similarly, a type $L$'s utility of a cutoff $c_L$ when the Government chooses $t$, is

$$w(c, t; L) = \int_{\mu_{\min}}^{c_L} u_L f(\mu)\, d\mu + \int_{c_L}^{\mu_{\max}} (\overline{u}(t) + \mu) f(\mu)\, d\mu.$$

The best responses are given by

$$[c_L^*(t), c_H^*(t)] = [u_L - \overline{u}(t), u_H - \overline{u}(t)]. \tag{5}$$

The driving force behind the results in this paper, is that the Government has the same utility function as in the subgame following the French equilibrium, $v(t, \mu) = -(q(\mu) - t)^2$, but the pool of criminals it faces is different than in France and that this asymmetry was generated by the economic market outcomes. Therefore, in order to calculate the punishments by the Government, we now turn to the calculation of the Government's posterior beliefs about $\mu$, conditional on the fact that the individual is a criminal, and that the worker had chosen a pair of cutoffs $(c_L, c_H)$. After having caught an individual who committed a crime, the probability that he was lucky, $H$, in the job market is

$$\begin{aligned} P(H \mid \text{crime}) &= \frac{P(H \ \& \ \text{crime})}{P(\text{crime})} = \frac{P(\text{crime} \mid H) P(H)}{P(\text{crime} \mid H) P(H) + P(\text{crime} \mid L) P(L)} \\ &= \frac{[1 - F(c_H)] p}{[1 - F(c_H)] p + (1 - F(c_L))(1 - p)} \end{aligned}$$

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

$$P(L \mid \text{crime}) = \frac{[1 - F(c_L)](1 - p)}{[1 - F(c_L)](1 - p) + [1 - F(c_H)] p}.$$

For $c = (c_L, c_H)$, and letting $f_x$ denote the function $f$ on $\mu \geq x$, and 0 otherwise we then have

$$\begin{aligned} g^c(\mu) &= P(H \mid \text{crime}) f(\mu \mid \mu > c_H) + P(L \mid \text{crime}) f(\mu \mid \mu > c_L) \\ &= P(H \mid \text{crime}) \frac{f_{c_H}(\mu)}{1 - F(c_H)} + P(L \mid \text{crime}) \frac{f_{c_L}(\mu)}{1 - F(c_L)} \\ &= \frac{f_{c_H}(\mu) p + f_{c_L}(\mu)(1 - p)}{1 - pF(c_H) - (1 - p) F(c_L)} = \begin{cases} \frac{(1-p) f(\mu)}{1 - pF(c_H) - (1-p) F(c_L)} & c_L \leq \mu < c_H \\ \frac{f(\mu)}{1 - pF(c_H) - (1-p) F(c_L)} & \mu \geq c_H \end{cases} \end{aligned} \tag{6}$$

In order to see how our results will work, we now compare the conditional densities of types for $c_L < c_M < c_H$. We will later show that this choice of cutoffs is consistent with equilibrium choices of France and America. Notice that if $F(c_M) < pF(c_H) + (1-p)F(c_L)$, then the comparison of equation 6 with the conditional density in the French equilibrium

$$g^{c_M}(\mu) = \begin{cases} 0 & \mu < c_M \\ \frac{f(\mu)}{1-F(c_M)} & \mu \geq c_M \end{cases}$$

shows that the proportion of types larger than $c_H$, the really mean individuals, is larger in America than in France. The conditional density in America is such that there will be no criminal types below $c_L$; some types between $c_L$ and $c_H$; and "a lot" of types larger than $c_H$. This higher proportion of mean individuals in America will then result in higher punishments.

The next Lemma presents the Government's best response to a worker's choice of criminal behavior given by $c = (c_L, c_H)$.

**Lemma 2** *Let $c = (c_L, c_H)$ be a strategy choice by the worker, and let $g^c$ be given by equation 6. The optimal punishment for belief $g^c$ is $t^*(c;p) = E_{g^c}(q(\mu))$ or equivalently*

$$t^*(c;p) = \int_{c_L}^{c_H} \frac{(1-p) f(\mu) q(\mu)}{1 - pF(c_H) - (1-p) F(c_L)} d\mu + \int_{c_H}^{\mu_{\max}} \frac{f(\mu) q(\mu)}{1 - pF(c_H) - (1-p) F(c_L)} d\mu. \quad (7)$$

**Proof.** The first order condition for the maximization problem of the Government is

$$\int \frac{\partial v(t,\mu)}{\partial t} g^c(\mu) d\mu = \int 2(q(\mu) - t) g^c(\mu) d\mu = 0 \Leftrightarrow t^*(c;p) = E_{g^c}(q(\mu)).$$

■

In order to illustrate how the model works, we now present a Lemma that will also be useful in the comparative statics that follow in the next section. It says that:

- an increase in $c_L$ increases the Government's optimal punishment. The reason is that when $c_L$ increases, the lowest types of $\mu$ that were committing crimes are no longer in the pool of criminals, and therefore the "average" (according to $q$ and $g^c$) criminal has worsened, deserving a higher level of punishment.

- an increase in $p$ increases the Government's optimal punishment. As $p$ increases, the likelihood (as measured by $g^c$) that an individual was lucky (an $H$ type with utility $u_H$, with a higher cutoff $c_H \geq c_L$) in the first period increases, and since the pool of lucky criminals is worse than the pool of unlucky criminals, the Government sets higher punishments.

**Lemma 3** *The optimal punishment of the Government is increasing in $c_L$ and in $p$ and ambiguous in $c_H$.*

**Proof.** See Appendix 3. ■

The proof of this result is based on the fact that both increases, in $p$ and in $c_L$, cause a first order stochastic dominance increase in $g^c$ (an upward movement) and since $q$ is increasing, its expected value increases.

Finally, we note that in this subgame an equilibrium always exists.

**Proposition 3** *In the subgame following play of High Effort by the worker and Market Technology by the firm, there always exists an equilibrium.*

**Proof.** Given our assumptions, the aggregate best response $B(c,t) = [[c_L^*(t), c_H^*(t)], t^*(c)]$ is a continuous function in a convex and compact subset of the $\mathbf{R}^3$, so that by Brouwer's theorem, it has a fixed point, which is an equilibrium. ■

# 6 Main Results

We now show the main result of this paper. It states 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. The parameters in the Proposition were chosen to match a GDP per capita that is 50% larger in the US (GDP per capita adjusted by Purchasing Power Parity is 40% larger in the US) and a poverty rate in the US of around 12% (we have chosen 10%).

**Proposition 4** *Let $u(t) = 2 - t$, $q(\mu) = \frac{4}{3}\mu$ and let $f$ be uniform on $[-2,2]$. With $u_M = 1$, $p = 90\%$, $r = 0\%$, $u_L = 1/2$, $u_H = 3/2$: 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.*

**Proof.** See Appendix 3. ■

In Proposition 4 we have shown that there exists a set of parameters for which the equilibrium in America yields higher (lower) punishment rates (crime rates) than in France. 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,

note that although Proposition 4 shows the possibility of higher crime and less punishment in France, slight variations of the model can accommodate higher punishment *and* higher crime in the US. See, in particular Section 7. The reason we have chosen to include the former configuration is that Table 1 shows that in the mid nineties crime rates were comparable accross the Atlantic, and they have fallen dramatically over the past decade in America. Moreover, in Appendix 1 we show a related model where the American equilibrium with harsher punishment can involve higher or lower levels of crime.

We can summarize how 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;
- After trying out work, individuals must choose whether to stay in the labour market and collect their wages or desist and enter a life in crime. This choice depends on their income, the realization of their "meanness" shock and the punishment they would face in the crime market;
- In America some good individuals who were unlucky in the labour market commit crimes. Within the group of lucky workers, only the very mean commit crimes. In France, individuals with moderate levels of "meanness" commit crimes (the kindest French criminal is worse than the kindest American criminal).
- The Government punishes individuals taking the equilibrium into account, and delivering more punishment if the expected "meanness" is higher. This will result in some good but unlucky (poor) individuals also getting harsh punishment in America, 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 the equilibrium values of the cutoffs and punishment in the American equilibrium when $p$ and $u_L$ change (there isn't much that can be said about changes in $u_H$). In order to do so, we define the composed best response function $B\left(t;p,u_L,u_H\right)$, a function of $t$ parametrized by $p$, $u_L$ and $u_H$, through

$$B\left(t;p,u_L,u_H\right)=t^*\left(c^*\left(t;u_L,u_H\right);p\right)$$

where $t^*\left(c;p\right)$ is defined by equation (7) and $c^*\left(t;u_L,u_H\right)=\left[c_L^*\left(t;u_L\right),c_H^*\left(t;u_H\right)\right]$ is defined by equation (5).

The equilibria of the game following play of the American equilibrium in the first stage can be found by solving $B(t; p, u_L, u_H) = t$. Then, the equilibrium values of $c$ and $t$ are a function of the exogenous parameters $p, u_L$ and $u_H$.

We begin with the comparative statics on $p$. This analysis will answer the question "how do equilibrium crime and punishment change when it is more true that 'effort pays'?" A similar way of interpreting the result is "what happens when there is a smaller gap between the 'American dream' and reality?"[22] Another, more subtle interpretation of the comparative statics is the following. Note that the only way in which $B$ depends on $p$ is through its effect on $t^*(\cdot; p)$. If instead of interpreting $p$ as the actual probability of high output in the first period (conditional on having exerted effort) we interpret $p$ as the *belief* that the Government has about the probability of high output (which could be wrong, and for example higher than the true $\widetilde{p}$) the comparative static result that follows would answer the question "how do the equilibrium crime and punishment change when the Government is run by a party that is more convinced that 'effort pays'?"

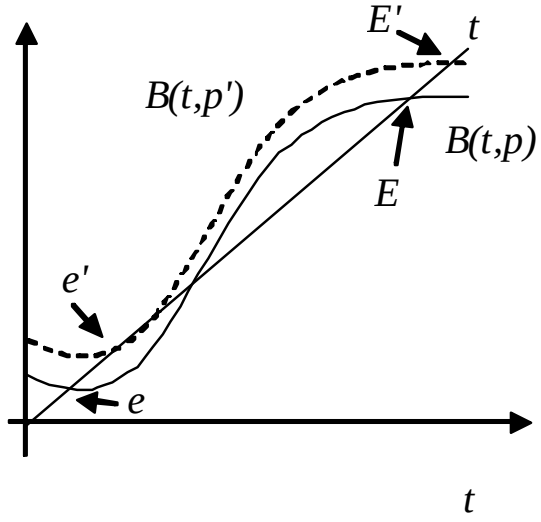
The result establishes that as people become more convinced that "effort pays", punishment becomes harsher, and crime decreases in the American equilibrium. In this game strategies are not complements, and so one can not apply the techniques of Echenique (2002) to ensure that stable equilibria have the "right" comparative statics properties (as we did in Proposition 2). With the assumptions made so far, one can only make comparative statics assertions about the largest and smallest equilibria (or about the odd equilibria generically). Therefore, for the following comparative statics results, we will assume that one of these equilibria is selected.

**Proposition 5** *In the American equilibrium, when $p$ increases, the equilibrium punishment increases and the cutoffs increase, resulting in less crime.*

**Proof.** We will show that $B(t; p, u_L, u_H)$ is continuous in $t$ and increasing in $p$, and then apply Corollary 1 in Milgrom and Roberts (1994). Continuity follows from: the continuity of $(u_L - \overline{u}(t), u_H - \overline{u}(t))$ in $\overline{u}(t)$; the continuity of $\overline{u}(t)$ in $t$; and the continuity of $t^*(c; p)$ when the distribution of types $\mu$ has a density (as we have assumed). To show that $B$ is increasing in $p$, notice that when $p$ increases, for a fixed $t$, $c^*(t; u_L, u_H)$ is unchanged. Then, for any fixed pair of cutoffs $(c_L, c_H)$ (in this case, a fixed $c^*(t; u_L, u_H)$) of the worker, the increase in $p$ causes an increase (in first order stochastic dominance sense) of the posterior belief in the Government's posterior and therefore in the Government's optimal punishment $t^*(c^*(t; u_L, u_H); p)$ as was shown in Lemma 3. ■

[22] As noted above, moving $p$ changes average income in America but it still does not mean that we are assuming a difference between the two countries because the choice of a risky technology was available to the French at the start. The French did not choose it because they did not think that effort paid.

The proof of Proposition 5 is illustrated in the following picture, an adaptation of Figure 2 in Milgrom and Roberts (1994). The key for establishing our comparative statics results was showing that $B(t,p)$ is increasing in $p$. In particular, an increase in $p$ keeps the worker's optimal strategy fixed (for fixed $t$) and makes the Government increase its optimal punishment (see Lemma 3). As was argued before, the equilibria of this game are those in which $B(t,p) = t$ in the picture:




For $p' > p$, when $B(t,p') > B(t,p)$, we get that the smallest equilibrium $e$ moves to the right to $e'$, and similarly for $E$, the largest equilibrium.

Two more remarks are in order. First, as was pointed out above, our model can be interpreted as a reduced form of a principal agent model. In a in a full fledged principal-agent model the comparative statics with respect to $p$ would be more involved, since a change in $p$ would typically change the optimal $u_H$ and $u_L$ chosen by the firm. A second, more interesting, observation is that if one interprets the change in $p$ not as a real change in the technology, but rather as a change in the perception of the Government about whether effort pays (say, a more right wing Government), then Proposition 5 ensures that punishment becomes harsher.

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 6** *In the American equilibrium, when $u_L$ increases, the equilibrium punishment increases and the cutoffs increase, resulting in less crime.*

**Proof.** See Appendix 3. ■

The proof of Proposition 6 is similar to that of Proposition 5. This result is related to a strand of the economic literature that has analyzed the link between redistribution of wealth and crime. In particular, Eaton and White (1991) have shown that in an economy with crime, redistribution of wealth can lead to Pareto improvements. Also, Benoît and Osborne (1995) have considered the interaction of redistributive policies and punishment in the reduction of crime.

# 7 Discussion

*Retribution and Deterrence as Motivation for Punishment:* In this paper we have assumed that retribution is the basis for punishment, although we note that similar results obtain if we focus on deterrence. First, and beyond the three advantages listed in the introduction, we note that retribution has long historical roots, associated with the phrase "an eye for an eye, a tooth for a tooth" and is the basis for one of the earliest sets of laws found, the Code of Hammurabi. Second, there is some experimental evidence that individuals are motivated by retribution concerns (over deterrence) when choosing punishment. For example, Carlsmith *et al* (2002) ask respondents to read a short vignette describing a theft and the eventual apprehension of the criminal. They then ask the respondent for a sentence recommendation. The authors show that when the original vignette is altered so that the probability of catching the thief changes from "almost impossible to detect" to "very easy to detect", the sentencing recommendation does not change, contrary to what deterrence suggests (since deterrence is concerned with the ex-ante utility of committing a crime). They then change the vignette by varying the motivation of the thief (so as to change the perceived meanness of the individual). In one case he wanted money to redistribute to poorer people and in another he needed it for cancelling betting debts. The authors found that the betting manipulation increased sentencing significantly.

Third, there are some philosophical discussions rejecting the morality of non-retributive punishment following the work of Immanuel Kant (1952), who argued that "punishment can never be administered merely as a means for promoting another good" and should be "pronounced over all criminals proportionate to their internal wickedness" (cited in Carlsmith *et al*, 2002). Furthermore, it has become the dominant theory of punishment as noted in *The Stanford Encyclopedia of Philosophy:*

> "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, it has become explicitly the basis for some of the observed moves towards harsher punishment in America. For example, California has been the most explicit in embracing the retributive justice model. In 1976, Governor Jerry Brown signed the Determinate Sentencing Law, which made retribution the sole objective of the state's sentencing system with "The Legislature finds and declares that the purpose of imprisonment for crime is punishment." (California Penal Code 1170).

In order to interpret our model when the motivation for punishment is deterrence (instead of retribution) we must change the interpretation of the individual shock $\mu$ from "meanness" to "pessimism". In that case a judge facing a criminal is in front of a person who decided that his/her legal opportunities where so bad that they were seduced by a criminal life. In America there are two types. Those that faced a good initial output shock (in the proportion $p$) but a particularly severe pessimism shock and those that were unlucky ($1-p$ of them) that where on average less pessimistic than the previous group (but the low initial income veered them towards the crime decision).

Finally, our model is designed for identical societies. Of course, a feature of criminal activity is its high correlation with ethnic segregation, which is higher in America. The ideas presented in the model can easily be extended to a setting where there are groups with different (real or perceived) net returns to education. These differences could arise because of a higher cost of getting educated or because of expected discrimination once in the labor market. In Appendix 1 we present such a model, where criminals in the end are punished because they are perceived to be both mean and lazy. Criminals are again harshly punished in America because they had opportunities which they failed to take. Given the structure of the model, the crime rates are indeterminate: crime could be higher in France or America, depending on the parameters.

*Beliefs:* We model the idea that effort pays through the parameter $p$ (and the parameter $r$). This means that belief in "effort pays" in our model captures two slightly different conceptions. First, it suggests that if the firm chooses market technology, then effort (for the worker) pays more than being lazy. This belief is confirmed in equilibrium. This follows the idea of a Nash equilibrium, so it really is a "belief" in the sense that if worker thinks that the firm plays $Market$, then the worker holds the belief that effort pays, which gets confirmed in equilibrium. And second, the bigger is $p$, the more true it is that "effort pays".

This is the traditional notion in economics of a distribution of probabilities over an unknown parameter $p$ (the distribution is degenerate in that we know with probability 1 the true value of $p$).[23] Note that in the American equilibrium, everyone is exerting high levels of effort and a relatively large part of the population is doing well in economic terms ($p > r$). Individuals also understand that everyone believes that effort pays because they can observe the majority of the population doing well (otherwise there would only be $r$ rich) and high powered contracts are being offered. Thus, beliefs get fully confirmed in equilibrium.

It is worth emphasizing that we have chosen to allow for the income process (which determines whether effort pays) to be fully determined by the institutional choices of society. This is compatible with Weber's view of instituons, Denzau and North's (1994) discussion of "shared mental models", and the models where reality is "socially constructed" of Ruggie (1998) and Searle (2005). More importantly, there is no demand for new information, and there is no convergence of beliefs across the Atlantic as in each place beliefs get fully confirmed in equlibrium. Even if by mistake a person wanted to change effort levels and see if their belief in the value of $p$ is justified, such experimentation would require the cooperation of another party (i.e., it would require coordination between the firm and the worker). Contrast this with previous results by Piketty (1995), which is a single agent decision problem. There, failure to experiment results from the natural trade-off between exploration (looking for more information) and exploitation (selecting the choice that is believed to provide the highest payoff). Differences in initial beliefs lead Europe and America to different steady states. Note that full convergence on the "truth" is prevented by assuming an inability to observe other people's choices -the aggregate choices in the political market or the individual choices in the labor and crime market. A different approach is taken by Benabou and Tirole (2006), where a persistent desire of individuals to avoid or distort new information to correct a willpower problem results in lack of convergence on the "truth". In contrast, multiplicity survives in the model of Alesina and Angeletos (2005), even when beliefs are unbiased, as long as the volatility of income derived from "fair" sources (savings and effort) is more sensitive to taxes than the volatility of income due to luck.[24]

[23] It may be confusing that the unknown parameter $p$ is also a probability. In this case, note that when we increase $p$, we can say that beliefs change (it is more true that effort pays) because the parameter increases although it would be better to say that both the truth (the true $p$) and beliefs about the truth have shifted towards the right (i.e., more weight on bigger values of $p$). We considered focusing on the difference between $u_H$ and $u_L$ as an alternative way to model changes in belief in effort pays. However, this seemed unattractive in this model because, in a full fledged principal agent contract these values would be set by the firm and would be determined with knowledge of how punishment affects the worker's outside opportunities.

[24] Alesina and Angeletos (2004) presents a model which yields precisely those features. In it, the "unfair" income is derived from corruption and rent seeking, and higher taxes result in more rent seeking. Bowles and Gintis (1976) argue that economic status is passed on to children in part by means of unequal educational opportunity, but that the economic advantages of the offspring of higher social status families go beyond the

*Crime Rates Across the Atlantic*: In our model, higher punishment in America obtains because there is a lower crime rate. This relationship was consistent with the empirical evidence in some crime categories in 1994, as noted in Table 1, and has become the norm for most crime categories (except homicides): Tonry (1998) emphasizes both lower crime rates in the US and declinig more rapidly; Levitt (2004) emphasizes the big decline on all crime rates in the US during the 1990's. There are, however, three natural extensions of our model that could accomodate a prediction of harsher punishment in America even if crime rates exceed those observed in Europe. First, crime rates in America are the product of both black and white criminals. The majority of the incarcerated population is black, suggesting that it is possible that the white crime rate in the US is lower than the overall crime rate in Europe. In this case our theory would explain white crime and punishment in the American dream. Although this would imply potentially different theories for the determination of crime and punishment for whites and blacks, it could encompass the fact that there seems to be discrimination against blacks both in the economic market and in the sentencing procedures.

Second, it is possible to argue that beliefs in effort pays are more prevalent than they should in America. Benabou and Tirole (2006) cite evidence of similar mobility levels in Europe and America, while Americans believe that mobility is large. One can use this difference to obtain a high crime rate (determined by a relatively low $p$) and high punishment (determined by a high perception of what $p$ is, as in Proposition 5) in America. That is, high punishment is linked to perceptions of high mobility and perceived rewards to effort, while high crime rates would follow from the reality of limited opportunities.

Finally, in our model everyone that is willing to commit a crime finds an opportunity to become a criminal and commits a crime. This is for simplicity, as it is more logical to assume that the process generating the arrival of crime opportunities is not the same as crime disposition. In a richer model where crime opportunities arrive (exogenously) to only a fraction of potential criminals, the average type in the pool of criminals in America is meaner than in Europe (because when $p$ increases only mean criminals are "available" in the US) but crime rates are determined by some "supply" process that we have not modeled.

*Link to Merton (1938):* 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 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. See Agnew (1999), Rosenfeld and Messner (2001), *inter alia,* as well as the review by Cullen and Agnew (2003) and the references cited

superior education they receive.

therein.[25] 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 "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-crimnals. 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", although it should be emphasized that we are not modelling a psychological effect that increases the predisposition to commit crimes in America.

# 8 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". The objective of this paper is to provide a theory where both crime and punishment as well as other features of the economic system (such as the role of incentives) are determined simultaneously in a way that fit the observed empirical patterns. In other words, we seek to incorporate crime and punishment into an economic theory of "American exceptionalism".

As in recent work in this area, our theory gives a leading role to beliefs in the "American dream". Two otherwise identical societies start out with different degrees of belief about the impact of luck -rather than effort- in the determination of income. Two equilibria can emerge. In one society, beliefs in the "American dream" prevail, firms offer high powered incentive contracts and workers exert effort. In the second society, people tend to believe that income is independent of effort, flat contracts prevail and workers 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. Some workers become criminals, depending on their luck in the labor market, an individual shock that we call "meanness" and the expected punishment. Our main result is that punishment for criminals is harsher in the "American" equilibrium than in the "French" equilibrium. There are two reasons for this, depending on the theory of punishment that prevails. 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. When punishment is set for "deterrence" reasons

[25] 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.

(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").

# 9 Appendix 1: Foregone opportunities in a theory of punishment.

In this model we have made the Government a non-strategic player, in order to simplify the analysis and focus on a different set of issues. Therefore, the timing of the Government's setting of the punishment is irrelevant, but for descriptive purposes we kept the same timing of the movements: in the last period of this economic system, the Government chooses a punishment for individuals and individuals simultaneously choose whether to commit crimes.

There are two types of people: *b*ums and *a*ctive, with types $\theta_b < \theta_a$. The proportion of $a$ is $p$. In the first period of the model, workers play a signalling game by choosing effort, or education. In the second period of the model, after they have completed their education, the firm sets a wage schedule that pays workers according to the expected value of what they are worth.[26] 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 and the firm has set its wage schedule, in and the third period the worker has two choices:

- home production and obtain $h(\theta_i, e_i)$;
- work and obtain the (equilibrium) wage, with the option of becoming a criminal. Once the worker has entered the firm, he observes his taste shock $\mu$, a meanness level, and then decides whether to enter the crime market. This timing has two justifications: the first is simplicity, in order to avoid the lemons problem that would arise for the firm if the taste shock was observed before entering; the second is that in order to decide whether to commit a crime or stay in the market, the worker "must" know whether he likes the job or not. With this in mind, the taste shock is a taste for crime *relative* to that of working.

It will then happen that mean guys leave the job; honest guys don't (but their wage is fixed "by law", so the firm can't re-optimize and offer the good guys a lower wage). When an individual goes to the crime market, he obtains: $b + \mu - e/\theta_i$ if the crime is successful, where $b$ is the bounty and $-e/\theta_i$ is the (sunk) cost of education; $0 + \mu - e/\theta_i - t$ if caught, where $t$ is time in jail. The taste shock $\mu$ 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 $\overline{u} = f(b, \mu, t, q)$ the utility of

[26] This can be the result of competition by firms, or by setting a utility function similar to that of the Government in the model in Section 3.

crime (which depends on the bounty $b$, the moral shock $\mu$, the time in jail specified by the Government $t$, and the probability of being caught $q$). As was argued before, we model the Government as setting $\overline{u}$ in this last period, but in a non strategic manner (i.e. we don't specify its action space, or its utility function).

We then have the following structure. In the first period each type of worker chooses his education level (the payoff to his education will depend on the choice of wages and punishment in the second and third stages). In the second period the firm sets its wages optimally, which results in wages for workers equal to their worth. In the third period, the worker and Government simultaneously make their choices: the Government chooses punishment and probability of catching, and the worker chooses whether to work, home produce or commit crimes.

We will study two types of equilibria. In the American equilibrium, in the first period there is a separating equilibrium and then $B$ums with moral shock $M$ commit crimes. In the French equilibrium, in the first 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.

## 9.1 French Equilibrium

The French equilibrium is as follows: 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 the reservation utility of crime that the Government will choose in the last stage, $\overline{u}^F$, 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.

In the last stage, consistent with what will happen in that same stage, and in previous ones, the Government chooses a relatively high $\overline{u}^F$. At the same time, all or some $M$ types choose crime while the rest choose to work. In the second 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 $e_p$)

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

### 9.1.1 Signalling in the first stage

In the first 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 $k = a, b$

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

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

$$\begin{aligned} u\left(s^F\right) - \frac{e_p}{\theta_b} &\geq h(\theta_b, E_b) - \frac{E_b}{\theta_b} \\ u\left(s^F\right) - \frac{e_p}{\theta_a} &\geq h(\theta_a, E_a) - \frac{E_a}{\theta_a}. \end{aligned}$$

## 9.2 American

The American equilibrium is as follows: the Government chooses a high punishment for crime, resulting in a relatively low $\overline{u}^A$; in the first period there is a separating equilibrium; in the final period $a$ types choose to work, and the $b$ types work if and only if the meanness level $m < M$. Here effort pays, because if you study, you get a high wage. 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

$$\begin{aligned} u\left(s_a^A\right) &= h(\theta_a, e_a) \\ u\left(s_b^A\right) &= \overline{u}^A \end{aligned} \tag{8}$$

### 9.2.1 Signalling in the first stage

In the first 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 $\overline{u}^A \geq h(\theta_b, E_b) - \frac{E_b}{\theta_b}$)

$$\begin{aligned}
u\left(s_a^A\right) - \frac{e_a}{\theta_a} &\geq h(\theta_a, E_a) - \frac{E_a}{\theta_a}\ e_a \text{ better than best outside option} \\
u\left(s_a^A\right) - \frac{e_a}{\theta_a} &\geq u\left(s_b^A\right)\ e_a \text{ better than best alternative in the firm } (e=0) \\
u\left(s_b^A\right) &= \overline{u}^A\ e_b = 0 \text{ indifferent with best outside option (eq. 8)} \\
u\left(s_b^A\right) &\geq u\left(s_a^A\right) - \frac{e_a}{\theta_b}\ e_b = 0 \text{ better than only alternative which pays more than } s_b^A
\end{aligned}$$

## 9.3 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 individuals with $t$ years is $u_B(t)$. Similarly, the utility for convicting any of the rest, $R$, is $u_R(t)$. We assume a theory of punishment, which is based on retribution, but incorporates concerns for the economic opportunities the individual had before becoming a criminal and whether he tried to use them. A verbalization of our theory could be the following: "Since effort pays, I want to punish harshly $B$ types, and not just $M$ types, because if an $M$ type works hard, he does not need to commit crimes." Mathematically, this is

$$u_B(t) - u_R(t) \text{ is strictly increasing in } t \tag{9}$$

The intuitive illustration of why this is the verbalized 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 $p_B^A > p_B^F$. 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

$$\begin{aligned}
p_B^A u_B\left(t^A\right) + \left(1 - p_B^A\right) u_R\left(t^A\right) &\geq p_B^A u_B\left(t^F\right) + \left(1 - p_B^A\right) u_R\left(t^F\right) \\
p_B^F u_B\left(t^F\right) + \left(1 - p_B^F\right) u_R\left(t^F\right) &\geq p_B^F u_B\left(t^A\right) + \left(1 - p_B^F\right) u_R\left(t^A\right)
\end{aligned}$$

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):

$$\left(p_B^A - p_B^F\right)\left[u_B\left(t^A\right) - u_B\left(t^F\right) - u_R\left(t^A\right) + u_R\left(t^F\right)\right] \geq 0$$

Since $p_B^A > p_B^F$, this means that

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

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

### 9.4 Existence

We now give a set of parameters for which the reader can check that all the conditions in the previous section are satisfied. Set $\theta_a = 2$, $\theta_b = 1$, $e_a = E_a = 20$, $e_p = 15$, $E_b = 0$, $h\left(\theta_a, e_a\right) = h\left(\theta_a, E_a\right) = h\left(\theta_a, e_p\right) = 20$, $h\left(\theta_a, e_p\right) = h\left(\theta_b, e_p\right) = 15$, $h\left(\theta_b, E_b\right) = 10$, $\overline{u}^F = 30$, $\overline{u}^A = 10$.

## 10 Appendix 2: Data

The set of countries for which we have both data on beliefs and on the severity of crime are, England and Wales, Scotland, Northern Ireland, Netherlands, Switzerland, Belgium, France, Finland, Sweden, Portugal, Denmark, Spain (catalonia), US, Canada, Australia, Poland.

### 10.1 World Values Survey: Data Description and Variable Definitions

World Values Survey and European Values Survey (WVS-EVS, 1981-84, 1990-92, 1995-97)

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.

Left Wing-L: 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?". Defined so that higher numbers are more left wing.

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 (2).

## 10.2 International Crime Victimization Survey: Data Description and Variable Definitions

The International Crime Victim 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 Victim 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.

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).

# 11 Appendix 3: Proofs.

**Proof of Proposition 2.** The result that increasing equilibria exist follows from Corollary 1 in Milgrom and Roberts (1990) applied to $t^*(c^*(t;u_M))$. We now establish the instability of continuous equilibrium selections that are not increasing. Lemma 1 showed that $t^*(c)$ is increasing, and from $c^*(t;u_M) = u_M - \overline{u}(t)$ we obtain that $c^*(t;u_M)$ is also increasing, so that $[c^*(t;u_M), t^*(c)]$ is an increasing family of functions as required by Theorem 2 in Echenique (2002) which then yields our desired result. ■

**Proof of Lemma 3.** We must show that the c.d.f. $G^c$ of $g^c$ increases in first order stochastic dominance sense when $p$ or $c_L$ increase. For $p' > p$ we have that

$$\begin{aligned} G^c(x;p) &= \int_{c_L}^{x} \frac{f(\mu)(1-p)}{1-pF(c_H)-(1-p)F(c_L)}d\mu + \int_{c_H}^{x} \frac{pf(\mu)}{1-pF(c_H)-(1-p)F(c_L)}d\mu \quad (10) \\ &= \begin{cases} \frac{(F(x)-F(c_L))(1-p)}{1-F(c_H)p-F(c_L)(1-p)} & x \leq c_H \\ \frac{F(x)-F(c_H)p-F(c_L)(1-p)}{1-pF(c_H)-(1-p)F(c_L)} & x > c_H \end{cases} \end{aligned}$$

The derivative of $G^c$ with respect to $p$ is then

$$\frac{dG^c(x;p)}{dp} = \begin{cases} -\frac{(F(x)-F(c_L))(1-F(c_H))}{[1-pF(c_H)-(1-p)F(c_L)]^2} \leq 0 & x \leq c_H \\ \frac{(F(c_L)-F(c_H))(1-F(x))}{[1-pF(s_H)-(1-p)F(c_L)]^2} \leq 0 & x > c_H \end{cases}$$

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

Now set $c_L' > c_L$ and note that we get again a first order stochastic increase in $G^c$ :

$$\frac{dG^c}{dc_L} = \begin{cases} f(c_L)(1-p)\frac{F(x)(1-p)+F(c_H)p-1}{[1-pF(c_H)-(1-p)F(c_L)]^2} \leq 0 & x \leq c_H \\ \frac{f(c_L)(1-p)(F(x)-1)}{[1-pF(c_H)-(1-p)F(c_L)]^2} \leq 0 & x > c_H \end{cases}$$

as was to be shown.

The ambiguity in the direction of movement of $t$ when $c_H$ changes is a consequence of the fact that for higher $c_H$ it will happen that for some densities $f$ the posteriors for the two levels of $c_H$ won't be ranked in first order stochastic sense, and that implies that there will be some $q$s for which the low level of $c_H$ yields higher punishment, and some $q$s for which the high level of $c_H$ will yield higher punishments. ■

**Proof of Proposition 4.** **America**. Following choices of a market technology and high effort in the first period, we have that

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

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

$$\frac{3t}{4} = E_{g^A}\mu = \frac{(1-p)(u_H - u_L)}{4 - t - pu_H - (1-p)u_L}\left(\frac{u_H + u_L}{2} + t - 2\right) + \frac{4 - u_H - t}{4 - t - pu_H - (1-p)u_L}\frac{u_H + t}{2}.$$

The solution to the previous equation then yields the equilibrium punishment

$$\begin{aligned} t^A &= \frac{4 + pu_H + (1-p)u_L}{2} \\ &\quad - \frac{\sqrt{-24(pu_H + (1-p)u_L) + 2pu_H u_L + 9u_L^2 + 8pu_H^2 - 10pu_L^2 + p^2(u_H - u_L)^2 + 16}}{2} \end{aligned} \tag{11}$$

Equilibrium, crime is then given by

$$\begin{aligned} 1 - pF(u_H - \overline{u}) - (1-p)F(u_L - \overline{u}) &= 1 - pF(u_H + t - 2) - (1-p)F(u_L + t - 2) \\ &= \frac{4 - t - pu_H - (1-p)u_L}{4}. \end{aligned} \tag{12}$$

**France**. Punishment in France is given by the density in equation (4),

$$g^F(\mu) = \tfrac{1}{4 - u_M - t} \quad \text{for } \mu \geq u_M + t - 2$$

so that the expected value of $\mu$ is

$$E_{g^F}\mu = \frac{u_M + t}{2} \Leftrightarrow \frac{3t}{4} = \frac{u_M + t}{2} \Leftrightarrow t^F = 2u_M. \tag{13}$$

Crime in France will then be

$$\Pr(\mu \geq u_M - \overline{u}) = \Pr(\mu \geq u_M + t - 2) = \frac{4 - u_M - t}{4} = \frac{4 - 3u_M}{4}. \tag{14}$$

We will show that punishment is higher in America and crime higher in France. From equations (11) and (13) 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 (12) and (14) 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 $u_L$, and what will happen after observing $\mu$ :

$$p\left[F(u_H - \overline{u})u_H + \int_{u_H - \overline{u}}^{2}(\overline{u} + \mu)f(\mu)d\mu\right] + (1-p)\left[F(u_L - \overline{u})u_L + \int_{u_L - \overline{u}}^{2}(\overline{u} + \mu)f(\mu)d\mu\right].$$

This equation becomes 1.4254, from the following calculation:

$$\frac{9}{10}\left(\frac{126-3\sqrt{19}}{80}+\int_{\frac{22-\sqrt{19}}{10}}^{2}\left(\frac{\sqrt{19}-7}{10}+\mu\right)\frac{1}{4}d\mu\right)+\frac{1}{10}\left(\frac{32-\sqrt{19}}{80}+\int_{\frac{12-\sqrt{19}}{10}}^{2}\left(\frac{\sqrt{19}-7}{10}+\mu\right)\frac{1}{4}d\mu\right)$$

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

$$F\left(u_L-\overline{u}\right)u_L+\int_{u_L-\overline{u}}^{2}\left(\overline{u}+\mu\right)f\left(\mu\right)d\mu=\frac{32-\sqrt{19}}{80}+\int_{\frac{12-\sqrt{19}}{10}}^{2}\left(\frac{\sqrt{19}-7}{10}+\mu\right)\frac{1}{4}d\mu=0.69093.$$

(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 bureaucratic technology, because $\pi_m > \pi_l$. If the firm chooses a bureaucracy, 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 bureaucracy 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 $t^A = E_{g^A}q$ and $t^F = E_{g^F}q$ 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 6.** The structure of the proof is as that of Proposition 5. Continuity has already been shown, so we will only show that $D\left(t;u_H,u_L,p\right)\equiv B^g\left(B^w\left(t\right)\right)$ is increasing in $u_L$. For a fixed $t$ and $u_L' > u_L$, we get $B^w\left(t;u_L'\right)=\left(u_L'-\overline{u}\left(t\right),u_H-\overline{u}\left(t\right)\right)$ and $B^w\left(t;u_L\right)=\left(u_L-\overline{u}\left(t\right),u_H-\overline{u}\left(t\right)\right)$, so it will suffice to show that ■

# References


[1] Agnew, Robert (1999) "A General Strain Theory of Community Differences in Crime Rates", *Journal of Research in Crime and Delinqunecy*, **36**, 123-155.

[2] Alesina, Alberto and George-Marios Angeletos (2005): "Corruption, Inequality and Fairness," *Journal of Monetary Economics*, vol. **52(7)**, pp. 1227-44.

[3] Alesina, Alberto and George-Marios Angeletos (2005): "Fairness and Redistribution," *American Economic Review*, **95**(4), 960-980.

[4] Alesina, Alberto, Edward Glaeser and Bruce Sacerdote (2005) "Work and Leisure in the US and Europe: Why so Different?", mimeo.

[5] Alesina, Alberto, Edward Glaeser and Bruce Sacerdote (2001) "Why Does´'t the US have a European Style Welfare State?", *Brookings Papers on Economic Activity.*

[6] Alesina, Alberto, and Eliana La Ferrara (2005), "Redistribution in the Land of Opportunities," *Journal of Public Economics*, LXXXIX, 897–931.

[7] Baker, George, Michael Gibbs, and Bengt Holmstrom (1994) "The Internal Economics of the Firm: Evidence from Personnel Data", *Quarterly Journal of Economics,* 109.

[8] Becker, G. (1968) "Crime and Punishment: an Economic Approach," *Journal of Political Economy*, **76**(2), 169-217.

[9] Benabou, Roland (2000) "Unequal Societies: Income Distribution and the Social Contract", *American Economic Review*, 90, March, 96-129

[10] Benabou, Roland and Efe A. Ok (2001) "Social Mobility and the Demand for Redistribution: The POUM Hypothesis", *Quarterly Journal of Economics*, **116**(2), 447-487.

[11] Benabou, Roland and Jean Tirole (2005) "Belief in a Just World and Redistributive Policies", forthcoming *Quarterly Journal of Economics.*

[12] Benoît, J-P and J. Dubra, (2004), "Why do Good Cops Defend Bad Cops?," *International Economic Review*, **45**.

[13] Benoît, J-P and M. Osborne (1995), "Crime, Punishment, and Social Expenditure," *Journal of Institutional and Theoretical Economics* **151**, 326-347.

[14] Bowles, Samuel and Herbert Gintis (1976) *Schooling in Capitalist America: Educational Reform and the Contradictions of Economic Life*, NewYork: Basic Books.

[15] Cohen, Mark, Rust, Roland and Sara Steen (2002) "Measuring Public Perceptions of Appropriate Prison Sentences", mimeo.

[16] Cullen, Francis and Robert Agnew (2003), "Anomie/Strain Theories of Crime", Part V in Criminological Theory: Essential Readings, Francis Cullen and Robert Agnew (editors), Los Angeles, California: Roxbury Publishing Company.

[17] Darley, J. M., Sanderson, C. A. and LaMantia, P. S. (1996). "Community standards for defining attempt: Inconsistencies with the Model Penal Code," *American Behavioral Scientist*, **39**, 405–420.

[18] Davis, Michael (1992) *To Make the Punishment Fit the Crime, Essays in the Theory of Criminal Justice*, Westview Press.

[19] Denzau, Arthur and Douglass North, (1994) "Shared Mental Models: Ideologies and Institutions," *Kyklos*, vol. 47(1), pages 3-31.

[20] Di Tella, Rafael and Robert MacCulloch (2002) "Why doesn't Capitalism flow to poor Countries", mimeo, Harvard Business School.

[21] Di Tella, Rafael and Robert MacCulloch (2003) "Europe vs America: Institutional Hysteresis in a Simple Normative Model", mimeo Harvard Business School, forthcoming *Journal of Public Economics*.

[22] Eaton, B.C. and W.D. White (1991), "The Distribution of Wealth and the Efficiency of Institutions," *Economic Inquiry*, **29**, 336-50.

[23] Echenique, F. (2002), "Comparative Statics by Adaptive Dynamics and The Correspondence Principle," *Econometrica*, **70**(2).

[24] Ehrlich, I. (1975), "The Deterrent Effect of Capital Punishment: a Question of Life and Death," *American Economic Review*, **55**, 397-417.

[25] Fong, Christina (2001) "Social Preferences, Self Interest, and the Demand for Redistribution", *Journal of Public Economics*, LXXXII, 225-46.

[26] Forsythe, R., Horowitz, J.L., Savin N.E. and M. Sefton (1994) "Fairness in Simple Bargaining Games", Games and Economic Behavior **6**, 347-369.

[27] Freeman, Richard (1996) "Why do so many young american men commit crimes and what might we do about it?" *Journal of Economic Perspectives*, **10**(1), 25-42..

[28] Glaeser, Ed and Bruce Sacerdote (2000) "The Determinants of Punishment: Deterrence, Incapacitation and Vengeance", NBER Working Paper No. W7676.

[29] Guth, W., Schmittberger, R. and B. Schwarze (1982) "An Experimental Analysis of Ultimatum Bargaining", *Journal of Economic Behavior and Organization*, **3**, 367-388.

[30] Hall, Peter and David Soskice (2001) *Varieties of Capitalism: The Institutional Foundations of Comparative Advantage*, Oxford: Oxford University Press.

[31] Harris, J. (1970), "On the Economics of Law and Order," *Journal of Political Economy,* **78**(1), 165-174.

[32] Hassler, John, Jose´ V. Rodriguez-Mora, Kjetil Storesletten, and Fabrizio Zillibotti, "The Survival of the Welfare State," *American Economic Review*, XCIII (2003), 87–112.

[33] Kant, Immanuel (1952). *The science of right* (W. Hastie, Trans.). In R. Hutchins (Ed.), Great books of the Western world: Vol. 42. Kant (pp. 397–446). Chicago: Encyclopedia Britanica. Hillsdale, NJ: Erlbaum.

[34] Kleinig, John, 1973, *Punishment and Desert*, The Hague: Martinus Nijhoff.

[35] Kahneman, D., Schkade, D. and Sunstein, C. R. (1998) "Shared outrage and erratic awards: The psychology of punitive damages," *Journal of Risk and Uncertainty*, **16**, 49–86.

[36] Lakoff, George (1996) *Moral Politics: How Liberals and Conservatives Think,* London: University of Chicago Press

[37] Langan, Patrick and David Levin, (2002) "Recidivism of Prisoners Released in 1994," Bureau of Justice Statistics Special Report.

[38] Levine, David K. (1998) "Modelling Altruism and Spitefulness in Experiments", *Review of Economic Dynamics* **1**, 593-622.

[39] Levitt, Steven (2004) "Understanding Why Crime Fell in the 1990s: Four Factors That Explain the Decline and Six That Do Not," *Journal of Economic Perspectives*, **18**(1), pp. 163-90.

[40] Nisbet, R. and D. Cohen (1996) *Culture of Honor: The Psychology of Violence in the South*, Boulder: Westview Press.

[41] Martinson, Robert, 1974, "What Works? – Questions and Answers About Prison Reform," *The Public Interest*, **10**, pp. 22-54.

[42] Mayhew, Pat and Jan van Dijk (1997) *Criminal Victimization in 11 Industrialized Countries,* The Hague: Dutch Ministry of Justice.

[43] Merton, Robert K. (1938) "Social Structure and Anomie", *American Sociological Review*, **3**, October, 672-82.

[44] Messner, Steven and Richard Rosenfeld (2001) "Crime and the American Dream", Chapter 19 in *Criminological Theory: Essential Readings*, Francis Cullen and Robert Agnew (editors), Los Angeles, California: Roxbury Publishing Company.

[45] Milgrom, P. and J. Roberts, (1994) "Comparing Equilibria," *American Economic Review*, **84**(3), 441-59.

[46] Milgrom, Paul and Chris Shannon (1994) "Monotone Comparative Statics", *Econometrica*, **62**(1), 157-180.

[47] Mookherjee, Dilip and Ivan Png (1992) "Monitoring vis a vis Investigation in the Enforcement of Law", *American Economic Review*, **82(**3), 556-565.

[48] Mulligan, Casey and Andrei Shleifer (2005) "The Extent of the Market and the Supply of Regulation", *Quarterly Journal of Economics*, 120(4), 1445-73.

[49] Piketty, Thomas (1995) "Social Mobility and Redistributive Politics", *Quarterly Journal of Economics*, **110**, 551-584.

[50] Primoratz, Igor (1989), "Justifying Legal Punishment", Atlantic Highlands, NJ: Humanities Press International.

[51] Rotemberg, Julio J., "Perceptions of Equity and the Distribution of Income," *Journal of Labor Economics,* XX (2002), 249–288.

[52] Rotemberg, Julio (2003) "Minimally Acceptable Altruism and the Ultimatum Game", mimeo.

[53] Rossi, P. H., Waite, E., Bose, C. E. and Berk, R. E. (1974) "The seriousness of crimes: Normative structure and individual differences," *American Sociological Review*, **39**, 224–237.

[54] Ruggie, John (1998) "What Makes the World Hang Together? Neo-utilitarianism and the Social Constructivist Challenge", *International Organization*, 52 (4), 855-85.

[55] Saint-Paul, Gilles, "The Dynamics of Exclusion and Fiscal Conservatism," *Review of Economic Dynamics,* IV (2001), 275–302.

[56] Searle, John (2005) "What is an Institution?", *Journal of Institutional Economics,* 1 (1), 1–22.

[57] Shavell, Steven (1987) "The Optimal Use of Nonmonetary Sanctions as a Deterrent," *American Economic Review,* **77**(4), 584-592.

[58] Tonry, Michael and Kathleen Hatlestad (1997) *Sentencing Reform in Overcrowded Times, a Comparative Perspective*, New York: Oxford University press.

[59] Tonry, Michael (1998) "Introduction: Crime and Punishment in America", in *The Handbook of Crime and Punishment*, Michel Tonry (editor), New York: Oxford University Press.

[60] Wacquant, Loïc (1999) *Le Prisions de la misêre*, Éditions Raisons D' Agir, Ediciones Manantial.

[61] Wacquant, Loïc (2000) "Deadly symbiosis: when ghetto and prison meet and mesh," *Punishment and Society* **3**(1): 95-134

[62] Whitman, James Q. (2003) *Harsh Justice: Criminal Punishment and the Widening Divide between America and Europe*, Oxford: Oxford University Press.