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## Law enforcement and criminality: Europe vs. USA

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## Nontechnical Summary

For most types of crimes but especially for violent ones, the number of offenses per inhabitant is larger in the US than in Europe. In the same time, expenditures for police, courts and prisons are also higher in the US than in Europe. Thus, surprisingly, the American law enforcement system seems to produce less security by spending more.

In the present paper we show that this apparent contradiction can be explained by different attitudes towards the welfare state. Our argument is based on the economic theory of criminality which describes illegal behavior as the result of a rational choice. Among other things, this choice depends on how much one has to lose in case of a conviction. Consequently, by raising the living standards of the poor through welfare payments, the government can reduce the crime rate.

Taking this effect into account, we derive the optimal combination of law enforcement expenditures and welfare benefits. We distinguish between two different motivations for paying transfers. First, we assume that the welfare state has no other purpose but fighting criminality. In this situation, one finds that a higher demand for safety leads to higher welfare payments and higher law enforcement expenditures. According to the evidence, however, higher law enforcement efforts go in hand with a lower level of security.

As a second motivation for the welfare state, we consider altruism. In this situation, a minimum income level for poor persons is fixed exclusively by justice or equity considerations. Although motivated differently, however, transfers reduce criminality as a side effect. Thus, the more generous attitude towards welfare recipients in Europe can explain why crime rates are lower there than in the US. Moreover, the increase in welfare payments affects the optimal choice of law enforcement expenditures. We show that these expenditures are reduced if one increases social transfers for altruistic reasons. Thus, in accordance with the evidence, our model predicts lower crime rates together with lower law enforcement expenditures as the welfare state expands.

We conclude that the evidence on the transatlantic differences in crime rates and enforcement efforts is not consistent with a view of the welfare state as a mere instrument to fight criminality. In contrast, if transfers are motivated by altruism, they influence law enforcement activities and the level of security in a way which corresponds to empirical observations.

# Law Enforcement and Criminality: Europe vs. USA

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## ABSTRACT

We use a stylized model to show that, if transfers to the poor are founded on a security argument, there is a negative trade-off between law enforcement expenditures and criminality. In contrast, if transfers are based on altruism, the correlation between the same variables may appear positive. We argue that it provides a plausible explanation for the startling difference between the US and Europe in crime statistics and law enforcement expenditures [JEL: K0, H3].

KEYWORDS: Criminality, law enforcement, social system.

## 1. INTRODUCTION

Comparing crime statistics and law enforcement expenditures between the United States of America and the member states of the European Union, we find two peculiar observations. On the one hand, law enforcement outlay in the US is much higher than in Europe.<sup>1</sup> Yet despite this, reported crime rates are generally higher in the US. For some crime categories the difference is minor. In other cases it is very significant

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<sup>1</sup>We interpret law enforcement expenditures as including police, court and prison costs. Though the US does employ on average more police than European counterparts, it is in particular for prison costs that the differences are staggering. Specifically, according to the United Nation Survey of Crime Trends, in 1990 the US incarceration rate (465 persons for 100,000 inhabitants) was more than 7 time as high as for the average of Denmark, France, Germany and the Netherlands (60 persons for 100,000 inhabitants).

with US rates as much as 2 to 3 times higher than its European counterpart.<sup>2</sup> Given that these countries are all highly developed with similar political and economic institutions, and have a comparable historical and cultural heritage, the distinct behavior is startling, to say the least.

>From the point of view of an economist, the dissimilarities are also puzzling. To see why, suppose we interpret the provision of public safety as a production process where law enforcement enters as one input. Since relative prices do not appear widely different across both continents and since there are no reasons to believe that inputs in safety are inferior, one would expect that more law enforcement would go hand in hand with a higher level of security. Yet, despite a much higher spending for its police and justice system, the US appears to exhibit more criminality.

There have been numerous attempts to explain these facts. Arguments range from the analysis of the formal justice system and police procedures to less formal institutions like family, schools and community, the availability of firearms, the percentage of young male in the population, measurement and reporting errors, etc. Notwithstanding the relevance of any of these arguments, we suggest yet another answer based on the different willingness of governments to intervene with redistributive taxation.

Specifically, we introduce a stylized model with just two types of agents distinguished by their productivity. This results in a two class society with rich and poor individuals. We introduce an income maintenance policy towards the disfavored which is theoretically justified by one of two standard arguments found in the existing literature. Either redistributive taxation is determined to maximize the welfare function of an altruistic social planner<sup>3</sup> or it is legitimized on the grounds that it contributes to a reduction in criminality.<sup>4</sup>

We examine two scenarios. First, we formalize the foregoing production theoretic argument. In that case, redistribution is based on security considerations alone. Law enforcement and transfers are two instruments solely devoted to the production of public safety. We provide simple conditions for both inputs to be normal so that an increase in safety requires a raise in either policy variable. In the alternative setup, redistribution is determined by the social planner on the reason of altruism. For that case, we show that raising transfers for the disfavored crowds out law enforcement expenditures, yet boosts security. We argue that this trade-off provides a rationale for the different transatlantic pattern of transfers to the poor, as well as, law enforcement policies and crime rates.

>From a modelling perspective, our paper is closely related to three recent articles.

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<sup>2</sup>For example according to the Interpol International Crime Statistics 1996, the US had with 202 per 100,000 inhabitants more than twice as many robberies and violent thefts than the average for Denmark, France, Germany and the Netherlands.

<sup>3</sup>See, e.g. Mirrlees (1971) or Sheshinski (1972).

<sup>4</sup>See, for example Pauly (1973: 38) "if poverty contributes to the incidence of crimes against property and persons, one way to reduce crime may be to redistribute income". For an earlier similar view, see Hayek (1960). There is also empirical support for the argument. For instance, Entorf and Spengler (1998) find that higher income inequality leads to higher crime rates.

Benoit and Osborne (1995), Imrohglu, Merlo and Rupert (1998), and Demougin and Schwager (1998) also use a general equilibrium model where the government taxes individuals to finance crime reducing policies. In this note, we focus exclusively on an issue not addressed by these articles. More generally, our analysis is part of a broad literature initiated by Becker's (1968) seminal work on the economics of crime.

The remaining of the note is organized as follows. The next section presents a microeconomic model. Sections 3 and 4 examine the cases of a security based and an altruistically motivated transfer policy. The last section offers some concluding remarks.

## 2. THE MODEL

We stylize society by a model with a public sector and two types of agents distinguished by their respective ability to generate legal earnings. High productivity individuals make a gross income denoted by  $a$ , they pay a tax  $t$  and are subject to random criminality. Their preferences are represented by the function

$$v_a(t, n) = a - b(t) - c(n), \quad (1)$$

where  $b(t)$  and  $c(n)$  represent the utility loss caused by taxation and by criminality, respectively. The expression  $b(t)$  includes the actual tax payment, as well as the ensuing excess burden of taxation. We assume  $b', b'' > 0$  which means that from the point of view of individuals, taxes are costly at an increasing rate.

In analogy to the cost of taxation, we interpret  $c(n)$  as incorporating both the expected loss of wealth and the *excess burden* caused by criminality. That excess burden can be explained either on the grounds of risk aversion considerations or by the possibility of physical harm (for a discussion of this interpretation, see Demougin and Schwager (1998)). The function  $c(n)$  satisfies  $c' > 0$  and  $c'' \geq 0$ , the intuition being that additional criminality is harmful and that marginal damage should not be decreasing.

For parsimony, we assume that the low productivity agents do not generate any legal earnings<sup>5</sup> and are never the victim of a crime.<sup>6</sup> Through a welfare system, these agents may receive a lump sum transfer  $\tau \geq 0$ . Altogether, the utility of low productivity individuals reduces to:

$$v_0(\tau) = \tau. \quad (2)$$

Alternatively, agents may engage in criminal activities. As has been done in previous work (see Brennan (1973), Imrohglu, Merlo and Rupert (1998), and Demougin

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<sup>5</sup>A natural interpretation of this assumption is that the productivity of these individuals is below a minimum wage. We note that, introducing a small positive income for poor individuals would not alter either the analysis nor its intuition, provided the poor remain net welfare recipients.

<sup>6</sup>It is well known that poor persons also suffer from criminality. To include a damage function analogous to  $c(n)$  in the utility of unproductive individuals would not alter our main conclusions, but unnecessarily clutter the analysis.

and Schwager (1998)), we could model the occupational decision process explicitly. Instead, we refer to the existing literature and focus on the aggregate solution.

Following standard reasoning in the economic theory of criminality, incentives to commit a crime are taken to depend on the probability as well as on the opportunity cost of being convicted. In the current analysis, we restrict attention to two public inputs affecting occupational choice, transfers  $\tau$  and law enforcement activities summarized by the variable  $\rho$  (for brevity, we sometime refer to the second public activity as police but, of course, it is thought to aggregate many other policy variables like court, prison etc.). Naturally, more police is presumed to increase the arrest probability, whereas transfers are assumed to raise the opportunity cost of a conviction.

We denote with  $n(\rho, \tau)$  the resulting number of crimes. From the above argument,  $n(\rho, \tau)$  is decreasing in both policy instruments.<sup>7</sup> We further assume that  $n$  is convex in both inputs with  $n_{\rho\tau} = 0$ . The constraints on direct second order derivatives are natural restrictions reflecting diminishing marginal productivity of police and transfers. The requirement  $n_{\rho\tau} = 0$  states that the marginal crime reducing impact of one instrument is independent of the level of the other.<sup>8</sup> This assumption is done mainly to simplify the presentation. What is really needed is that the cross derivatives are small enough, such that, in the comparative static analysis direct effects remain dominant.

In order to finance these policies, the state collects taxes. In order to write the budget constraint, we express with  $e(\rho, \tau)$  the public outlays in per capita of the productive population. Thus, government policies are restricted by the condition

$$t = e(\rho, \tau). \quad (3)$$

The function  $e$  is assumed increasing and convex in both variables reflecting increasing marginal costs. Furthermore, since police and social transfers are two separate items in the government budget, we impose the natural requirement  $e_{\rho\tau} = 0$ .

### 3. TRANSFERS BASED ON SECURITY

In this section, we formalize the heuristic discussed in the introduction. For this purpose, we assume that the government expenditure is determined by taxpayers, for the sole purpose of financing their security. Accordingly, if transfers occur, their only justification results from their crime reducing impact. Analytically, we solve the following problem:

$$\max_{\rho, \tau} v_a = a - b(e(\rho, \tau)) - c(n(\rho, \tau)) \quad (I)$$

$$\text{subject to } v_0 = \tau \geq 0. \quad (4)$$

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<sup>7</sup>We follow standard notation with  $n_\rho = \frac{\partial n}{\partial \rho}$ , etc.

<sup>8</sup>The above requirement  $n_{\rho\tau} = 0$  is a slight abuse of notation. Since  $n_\tau < 0$ , we know that the graph of  $n$  as a function of  $\rho$  is shifted downwards as  $\tau$  increases. What we assume is that this shift is parallel. Obviously, at the lower bound where  $n = 0$ , such a parallel shift is no longer possible. For the analysis, this is of no consequence since optimal  $n$  is never equal to zero.

In this optimization problem, the public policy is only restricted by the impossibility to tax the unproductive part of the population. The ensuing first-order conditions for the solution  $(\rho^*, \tau^*)$  are

$$-b'e_\rho - c'n_\rho = 0, \quad (5)$$

$$-b'e_\tau - c'n_\tau + \mu = 0, \quad (6)$$

$$\mu\tau^* = 0, \quad (7)$$

where  $\mu \geq 0$  is the Lagrange multiplier from the wealth constraint of the poor.

Two scenarios can arise. Either the wealth constraint for the disfavored is binding – in which case  $\mu > 0$ , no transfers are paid and  $\rho$  implicitly follows from (5) – or  $\mu = 0$  and transfers are positive. In that later case, the multiplier can be eliminated and the first-order conditions imply

$$\frac{e_\rho}{e_\tau} = \frac{n_\rho}{n_\tau}. \quad (8)$$

In the equality, the left hand side is the marginal rate of transformation between transfers and police in the government budget. It measures by how much transfers can increase if police is reduced by one unit, while keeping total public spending constant. The right hand side gives the marginal rate of substitution between transfers and law enforcement outlay along an isocriminality curve defined by  $\bar{n} = n(\rho, \tau)$ . It states by how much transfers have to vary, if one wants to keep criminality unchanged after reducing police by one unit. In an interior solution, these two marginal rates must obviously be equal.

The equality (8) also defines the expansion path  $\rho^*(\tau)$  which characterizes the optimal policy mix for any desired level of public safety. In order to obtain the optimal level of criminality and taxes,  $\rho^*(\tau)$  can be inserted in either (5) or (6). Solving the ensuing equation yields  $\tau^*$  as well as  $\rho^* = \rho^*(\tau^*)$ .

We now want to use this framework to reformulate the observations made in the introduction. First, there is no reason to expect the expansion path in (8) to be very different between Europe and the US. Our reasoning being that relative prices, police productivity, crime technology etc. should not be very different across these two continents. The only remaining candidates for an explanation are the functions  $b$  and  $c$ . Suppose, for example, that the marginal damage of crime  $c'$  is exogenously raised. Criminality would go down and the optimal policy mix would adjust along the expansion path. In order to derive the exact adjustment, we use the implicit function theorem to calculate the slope of  $\rho^*(\tau)$ :

$$\frac{d\rho^*}{d\tau} = -\frac{e_\rho n_{\tau\tau} - n_\rho e_{\tau\tau}}{n_\tau e_{\rho\rho} - e_\tau n_{\rho\rho}} > 0. \quad (9)$$

Given that this slope is positive, we conclude that the reduction in criminality is obtained by using more of both instruments, financed via higher taxes.

This consequence means, however, that the above line of reasoning cannot explain the transatlantic differences, since it leads to a counterfactual result otherwise. Even

though appealing to a greater risk aversion on the part of European taxpayers would explain lower crime rates, higher transfers and higher taxes, it yields a contradiction in the case of police expenditures. The foregoing argument would suggest that European law enforcement should be higher than in the US, contrary to empirical facts. A natural question raised by this shortcoming is whether the model can be enriched to overcome this counterfactual conclusion? Our explanation will rely on transfers not being solely determined for security reasons.

#### 4. TRANSFERS BASED ON ALTRUISM

Even though it is generally conceded that transfers reduce incentives for crimes, most economists and the public at large would maintain that equity considerations are the main driving force behind income maintenance programs. Taking this into account, we examine how the optimal law enforcement policy varies when we exogenously introduce a minimum level of welfare for the poor.

Specifically, we solve the following optimization problem:

$$\max_{\rho, \tau} v_a = a - b(e(\rho, \tau)) - c(n(\rho, \tau)) \quad (\text{II})$$

$$\text{subject to } v_0 = \tau \geq \bar{v}_0. \quad (10)$$

Here,  $\bar{v}_0$  is the predetermined level of utility for the poor. The resulting optimality conditions are the same as in the foregoing section except for the complementary slackness requirement. The ensuing solution  $(\rho^{**}, \tau^{**})$  of (II) is characterized by the conditions (5), (6) and

$$\mu(\tau^{**} - \bar{v}_0) = 0. \quad (11)$$

Again, there are two possibilities, depending on whether the wealth constraint for the poor is binding or not. From the foregoing section, we conclude that for  $\bar{v}_0 \leq \tau^*$  the constraint will not be binding. Analytically, we are in the case where the solutions of (I) and (II) coincide and transfers are solely determined on the basis of security considerations.

In the other case the wealth constraint for the disfavored is binding, requiring  $\bar{v}_0 = \tau^{**} > \tau^*$ . Here, transfers are dictated entirely by altruism. Nevertheless, the redistributive payments still influence criminality. Consequently, transfers to the disfavored must be taken into account when deriving the optimal law enforcement policy. The ensuing relationship  $\rho = \rho^{**}(\tau)$  is defined by (5). In the remaining, we focus solely on this case.

Paralleling the procedure of the foregoing section, suppose we consider an exogenous change, which triggers higher transfers. Given the current structure, this can only occur through an increase in  $\bar{v}_0$ . Applying the implicit function theorem, yields

$$\frac{d\rho^{**}}{d\tau} = -\frac{b''e_\rho e_\tau + c''n_\rho n_\tau}{b''e_\rho^2 + b'e_{\rho\rho} + c''n_\rho^2 + c'n_{\rho\rho}} < 0. \quad (12)$$

In contrast to the foregoing situation, where income maintenance was based on security reasons alone, the current trade-off founded on altruism features a negative



correlation between police and redistributive expenditures. This suggests that heterogeneous attitudes towards the welfare state can provide a plausible explanation for the difference in law enforcement policies on both sides of the Atlantic. According to this line of reasoning, it would be the high level of redistribution in Western Europe which crowds out police expenditures.

To complete the argument, we now show that our model also explains the second stylized fact discussed in the introduction. Specifically, we prove that if transfers are raised above  $\tau^*$ , then not only are police expenditures reduced, but security is also raised.

At  $\tau^*$  the level of criminality is defined by  $n(\rho^{**}(\tau^*), \tau^*)$ . To prove the claim, we need to show that

$$\frac{dn}{d\tau}(\rho^{**}(\tau^*), \tau^*) = n_\rho \frac{d\rho^{**}}{d\tau} + n_\tau < 0. \quad (13)$$

Since by construction  $(\rho^*, \tau^*) = (\rho^{**}(\tau^*), \tau^*)$ , The above inequality is equivalent to:

$$\frac{n_\tau}{n_\rho} > -\frac{d\rho^{**}}{d\tau} = \frac{b''e_\rho e_\tau + c''n_\rho n_\tau}{b''e_\rho^2 + b'e_{\rho\rho} + c''n_\rho^2 + c'n_{\rho\rho}}. \quad (14)$$

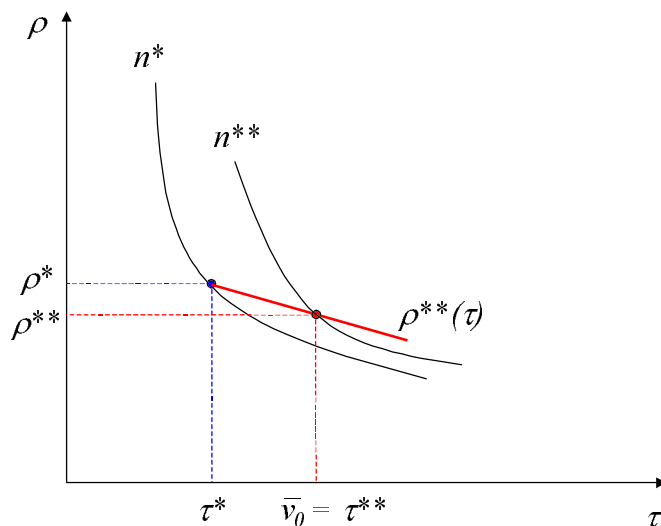
Using (8), to rewrite the inequality yields

$$1 > \frac{b''e_\rho^2 + c''n_\rho^2}{b''e_\rho^2 + b'e_{\rho\rho} + c''n_\rho^2 + c'n_{\rho\rho}}, \quad (15)$$

which is obviously true, since  $b'e_{\rho\rho} + c'n_{\rho\rho} > 0$ .

The result can be represented geometrically. In figure 1, we have drawn the optimal solution  $(\tau^*, \rho^*)$  from the case where transfers are justified alone on the grounds of lowering criminality. The resulting level of security is shown by the associated isocriminality curve  $n^* = n(\rho, \tau)$ . It is easy to derive from the initial assumptions that all the isocriminality curves are decreasing and convex, and that a shift to a higher curve implies a reduction in crimes.

As long as  $\tau^* \geq \bar{v}_0$ , the solutions to both problems coincide. However, to the right of  $\tau^*$ , income maintenance to the poor is determined exogenously and justified on the basis of altruism. In that case  $\rho^{**}$  is defined by  $\rho^{**}(\tau)$ . From (12) we know that this function slopes downwards. Furthermore, we see from the inequality (14) that the isocriminality curve is steeper than  $\rho^{**}(\tau)$ . Consequently, moving locally to the right of  $\tau^*$  along  $\rho^{**}(\tau)$  leads to a higher isocriminality curve, which also denotes more security.



Law enforcement versus transfers

For completeness, we note that the foregoing logic cannot be more than a local argument. Indeed, as the exogenously given level of transfer to the poor increases, it must, at some point, totally crowd out law enforcement expenditures due the budget constraint of the government. The argument being that public revenue is necessarily restricted by the Laffer curve effect. Of course, at that point, despite a high level of income maintenance, criminality should be on the raise again! Indeed, transfers can only be effective to fight illegal behavior if there is a possibility to be deprived of them when an agent undertakes a crime. Hence, one must always rely on some level of law enforcement for transfers to have any impact.

## 5. CONCLUDING REMARKS

The different pattern for criminal behavior, across otherwise fairly conform societies as Europe and the US, is a challenge to understand. In the current analysis, we have emphasized the potential role played by redistribution as a possible explanatory variable. A conclusive analysis would require much more. Not only would it necessitate some empirical work, but also the integration of alternative explanatory variables, in particular, the diverging legislation on arms and drugs. Nevertheless, the note suggests that part of the explanation might be due to differing attitudes across both continents towards redistributive taxation.

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