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Crime, Education and Peer Pressure

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Abstract

We present a dynamic two-period model of individual behaviour with heterogeneous agents in which individuals decide how to allocate their disposable time between education, crime and work in the legal sector. Education has a multiple role: it implies higher expected wages in the legal sector, increasing the opportunity cost of committing crime and it has a sort of “civilization” effect that makes more costly to engage in criminal activities. We model this effect by introducing a peer pressure function.

Key words: Crime; Education; Peer Pressure

JEL Classification: I2; J24; K42

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1 Introduction

In 2001 more than 75% of the overall convicted population in Italy¹ had not graduated from high school.² These data are quite striking, even if they are not surprising. In fact, as confirmed by several studies criminals tend to be less educated and from poorer economic backgrounds than non-criminals [e.g. Wilson and Herrnstein (1985)]. Freeman (1991) asserted that criminals tend to be less educated and from poorer backgrounds than others in the U.S. in 1986, over two thirds of all 18-24 year old imprisoned men and three fourths of the 18-24 year old black prisoners had fewer than 12 years of schooling. Thus, one could expect that areas with higher average educational levels should have a lower incidence of crime. Similar results have been obtained by Grogger (1998), who underlies the role of age and education in criminal activities, and by Lochner (1999), that stated that “older, more intelligent, and more educated workers tend to commit less of some property crimes than others”.

Thus, identifying low education as one of the main causes of criminal activities could be helpful in designing effective and proper policies aimed at increasing the level of education and schooling in order to reduce crime rate.

Education may affect the decision to engage in criminal activities in several ways. First, higher levels of educational attainment are associated with higher wage rate, a higher wage rate raises the opportunity cost of criminal behaviour and may reduce crime participation. Second, education may alter personal preferences in a way, that affects decisions to engage in crime. In particular education may have a sort of “civilization” effect and then could represent a valid policy in preventing crime. Fajnzylber et al. (2002) assert that “education, through its civic component, may increase the individual’s moral stance. On the other hand, education may reduce the costs of committing crimes. . . because education may open opportunities for an individual to enter higher-paying crime industries. Hence the net effect of education on the individual’s decision to commit a crime is, *a priori*, ambiguous.” But “we can conjecture, however, that if legal economic activities are more skill or education intensive than illegal activities, then it is more likely that education will induce individuals not to commit crimes” (p. 1328).

Third, school enrolment alone (independently of the level of educational attainment) reduces the time available for participating in the crime activity [e.g. Witte and Tauchen (1994)].

Hence, education appears to be an important variable in determining

¹At 15 January 2002 the prison in Italy were hosting 55.751 persons. In particular, 0.85% has a university degree, 7.52% has a high school degree, 37.36% has 8 years of schooling (*licenza media*), 29.16% has 5 years of schooling (*licenza elementare*), 8.23% has no degree, 1.52% is illiterate, 15.36% has not been recorded.

²Data obtained by the Official Statistics of Ministero della Giustizia, year 2001

crime rate both for its direct economic implications and for its “civilization” effect.

In this paper, we develop a simple two-period model of criminal behaviour. In our framework individuals decide how to allocate their disposable time among education, crime³ and work in the legal sector. Education in our model has a multiple role: i) by investing in education agents raise their productivity/skills and improve their labour market perspectives thus incurring a higher opportunity cost of crime; ii) by investing in education during adolescence, merely by the fact of attending school individuals have less time to spend in criminal activities and iii) education has a sort of “civilization” effect that makes more costly to engage in criminal activities [e.g. Usher (1997) and Fajnzylber et al. (2002)].

We model this “civilization” effect of education by introducing a peer pressure function, following Kandel and Lazear (1992). In particular, by using a peer pressure function, our goal is to analyze how individuals are affected in taking their decisions by peer group components (i.e. parents, relatives, schoolmates, neighbourhood).

Education has a negative effect on criminal activities and in particular, it can be as effective as other policies in preventing crime. Our model predicts that education also has an indirect effect that affects the preferences of individuals. The “socialization” effect makes criminal decision more costly in psychological terms, then more educated individuals will commit less property crimes than others.

Our model has a number of predictions about crime. An increase in education subsidy or otherwise a reduction in tuition fees will raise time spent in education by adolescents and this leads to a lower level of crime during adulthood. In general, a higher education subsidy leads to an equilibrium with more education and less crime during adolescence and less crime during adulthood. In insecure societies, where there is a high probability of suffering a property damage, agents will have less incentives to engage legal activities. Finally, the model suggests that law enforcement policies that reduce the expected returns from illegal activities or otherwise increase the cost of committing crime, lead to an equilibrium characterized by lower crime and higher employment.

The remainder of the paper is structured as follows. In Section 2 we present in details the model and the equilibrium. Section 3 presents the results and Section 4 concludes.

³We will focus our attention on property crime, as it is more likely to depend on economic motivations than violent crime (i.e. murder, assault, rape, etc.).

2 The Model

We consider a two-period model of individual behaviour with heterogeneous agents in which adolescents and adults⁴ decide how to allocate their disposable time among education, crime and work in the legal sector. Level of ability and endowments achieved in primary school are taken as given. We analyze the impact of education subsidies, taxes, law enforcement (i.e. probability of apprehension), victimization rate, peer pressure and level of wages on crime behaviour. Below we describe the various components of our framework.

2.1 Preferences

The economy is populated by a large number of individuals who are ex-ante heterogeneous with respect to their learning abilities (ε_i). Each individual maximizes the present value of her lifetime utility with respect to the time allocated to education in the first period ($s_{i,1}$) and the time allocated to criminal activities in the first ($d_{i,1}$) and in the second period ($d_{i,2}$):

$$\max_{s_{i,1}, d_{i,1}, d_{i,2}} U_{i,1} + \frac{1}{1 + \rho} U_{i,2} \quad (1)$$

The utility function is defined as

$$U_{i,t} = c_{i,t} - \gamma(s_{i,t-1})(d_{i,t} - \bar{d}_t) \quad (2)$$

where $c_{i,t}$: consumption of individual i in period t , $s_{i,t}$: time spent studying, $d_{i,t}$: time spent committing crime, $\bar{d} = \frac{\sum_{i \neq j} d_{j,t}}{N - 1}$: average time spent committing crime by others belonging to the same peer group, $\gamma(s_{i,t-1})(d_{i,t} - \bar{d}_t)$: peer pressure function, ρ : intertemporal discount factor. The share of type- i individual in the population is given by the fraction χ_i , $\sum_{i=1}^I \chi_i = 1$,

where I is the number of ability types.

The individual's utility depends on her consumption and on her disutility, comparable with consumption, coming from her decision about crime. The peer pressure function can be interpreted as implying that individuals get disutility from committing more crimes than their peer group components. The magnitude of these effect is caught by $\gamma(s_{i,t-1})$ and depends on education.

⁴As we will discuss in the subsection 2.7, we make the hypothesis that adults will only choose between work in the legal sector and criminal activities. Namely they will not invest in education.

2.2 Occupational Opportunities

Denoting with w_t the wage rate in period t , with $l_{i,t}$ the time spent working in the legal sector and with τ the tax rate, disposable income from legitimate activities of a type- i individual is given by

$$y_{i,t} = (1 - \tau)w_t h_{i,t} l_{i,t} \quad (3)$$

$$= (1 - \tau)w_t h_{i,t} [1 - s_{i,t} - d_{i,t}] \quad (4)$$

where $h_{i,t}$ represents the level of ability of individual i at time t .

The individual ability is defined as:

$$h_{i,t+1} = \varepsilon_i s_{i,t}^\alpha \text{ with } 0 < \alpha < 1 \quad (5)$$

Individual ability is an increasing function of the level of education acquired in the previous period by agents and of ε_i , learning ability different among individuals. We assume $h_{i,0}$, that represents the level of ability acquired during primary school, is given.

2.3 Criminal Opportunities

During their lives agents optimally choose whether to be engaged or not in criminal activity. If an agent is engaged in criminal activity, she obtains with probability $(1 - \pi_a)$ a return $R(d_{i,t}, h_{i,t})$, function of the time devoted to crime activities and individual ability. With probability π_a a criminal is apprehended and punished. An apprehended criminal goes to jail for the entire period in which she is apprehended.⁵

2.4 Victimization

Each individual faces an equal probability π_v of being victim of a crime, where π_v is equal to the endogenous fraction of criminals in the population.⁶ If victimized, an individual loses a fraction δ of her disposable income from legitimate activities.

⁵Our analysis is general and will not change allowing that an apprehended criminal goes to jail for a fraction of her disposable time.

⁶By using the Law of Large Numbers we can consider π_v to be the same both for criminals and non criminals.

2.5 Peer Pressure Function

“The peer pressure function is an attempt to formalize the discussion of taste” [e.g Kandel and Lazear (1992), p. 804]. Starting from the analysis by Kandel and Lazear in their paper on “Peer Pressure and Partnerships”, we try to apply this function to the model of crime. Usher (1997) states that “education promotes good citizenship. Education does more than teach skills to enhance one’s capacity to earn income. It perpetuates the values of society, enculturates people to serve their communities, and promotes the virtues of hard work and honesty” (p. 368). Education affects individuals’ preferences and modifies their perception of phenomena as crime, corruption and other illegal attitudes. In this sense education may alter individuals’ behaviours and in particular may be particularly helpful in reducing or enhancing the influence of peer group components. In other words, if education promotes the virtues of hard work and honesty it is likely that an individual living in a “bad” neighbourhood will be affected in taking her decision and will act differently with respect to her peer group components, on the other hand if an individual lives in a context where honesty is a shared values it is likely that education may enhance her adherence to the prevalent social rules.

Individuals are affected in taking their decisions by peer group components (i.e. relatives, parents, schoolmates, neighbourhood). In this sense the role of socioeconomic background is relevant in affecting individuals’ decisions, but we think that the role of education may be important in modifying some “bad” attitudes coming from peer group.

We define the peer pressure function in the following way:

$$\gamma(s_{i,t-1})(d_{i,t} - \bar{d}_t) \quad (6)$$

where $\gamma(s_{i,t-1})$ is an increasing function of the education level attained in the previous period and $(d_{i,t} - \bar{d}_t)$ is the difference between individual’s time spent committing crime and average time spent committing crime by others belonging to the same peer group. We can identify $\gamma(s_{i,t-1})$ as a “socialization” moralization effect of education, while the component $(d_{i,t} - \bar{d}_t)$ represents the effect determined by deviating from the average behaviour of components of respective peer group.⁷

The effect of the peer pressure function on utility is negative if overall individual will commit more crime than her peer group average and is positive if she will commit less crime than her group average. The magnitude of this effect is given by the first component $\gamma(s_{i,t-1})$. In particular, more

⁷We consider linear deviation from average behaviour, then if the level of crime chosen by individual is less than the average level of crime chosen by her peer this leads to an increase in her utility.

educated people tend to suffer more disutility, while less educated tend to underestimate these effects.

2.6 Function Properties

We briefly described the properties of the functions introduced until now in our model:

$$\begin{aligned} \frac{\partial R(d_{i,t}, h_{i,t})}{\partial d_{i,t}} &> 0; \frac{\partial^2 R(d_{i,t}, h_{i,t})}{\partial d_{i,t}^2} < 0 \\ \frac{\partial R(d_{i,t}, h_{i,t})}{\partial h_{i,t}} &> 0; \frac{\partial^2 R(d_{i,t}, h_{i,t})}{\partial h_{i,t}^2} < 0 \\ \frac{\partial}{\partial h_{i,t}} \frac{\partial R(d_{i,t}, h_{i,t})}{\partial d_{i,t}} &> 0 \\ \frac{\partial \gamma(s_{i,t-1})}{\partial s_{i,t-1}} &> 0; \frac{\partial^2 \gamma(s_{i,t-1})}{\partial s_{i,t-1}^2} < 0 \end{aligned}$$

In words, return from crime are increasing at decreasing rate in time devoted to crime itself and in individual ability; internal pressure (the first component of the peer pressure function) is increasing at decreasing rate in the level of education.

2.7 Time Endowment

Disposable time is allocated among each activity: school, work in the legal sector and crime. Individual time endowment is: $l_{i,t} + s_{i,t} + d_{i,t} = 1$ and $l_{i,t}, s_{i,t}, d_{i,t} \geq 0$. If apprehended, individual will go to jail for the entire length of the model period. In the second period schooling is equal to 0, namely individuals can choose only between work in the legal sector and be engaged in criminal activities. Then in the second period the individual time endowment is: $l_{i,2} + d_{i,2} = 1$ and $l_{i,2}, d_{i,2} \geq 0$.

2.8 Honest and Criminal Consumption level

Given the assumptions made in the previous subsection, the consumption level of an individual who chooses not to be a criminal is given by

$$c_{i,t} = \begin{cases} y_{i,t} - s_{i,t}T & \text{with probability } (1 - \pi_v) \\ (1 - \delta)y_{i,t} - s_{i,t}T & \text{with probability } \pi_v \end{cases} \quad (7)$$

Similarly, the consumption level of an individual who chooses to be a criminal is:

$$c_{i,t} = \begin{cases} y_{i,t} + R(d_{i,t}, h_{i,t}^i) - s_{i,t}T & \text{with prob } (1 - \pi_v)(1 - \pi_a) \\ (1 - \delta)y_{i,t} + R(d_{i,t}, h_{i,t}) - s_{i,t}T & \text{with prob } \pi_v(1 - \pi_a) \\ \bar{c} & \text{with prob } \pi_a \end{cases} \quad (8)$$

where T represents the direct cost of education, namely tuition fees paid by agents minus education subsidy obtained by the government ($T = F - S$) and \bar{c} is the level of consumption of a convicted criminal.⁸

2.9 Agent's Decision

Given the tax rate (τ), the wage rate in the first and in the second period (w_1 and w_2), the tuition fee (F), the education subsidy (S) and the learning ability (ε_i), individuals choose how to allocate their disposable time among education, work in the legal sector and crime by solving the following maximization problem:

$$\max_{s_{i,1}, d_{i,1}, d_{i,2}} U_{i,1} + \frac{1}{1+\rho} U_{i,2} \quad (9)$$

subject to (7), (8) and the time constraint.

2.10 Equilibrium

The problem faced by an individual can be written as:

$$\max \left\{ \begin{array}{l} \max_{s_{i,1}} \theta w_1 h_1(s_{i,0})(1 - s_{i,1}) - s_{i,1}T - \gamma(s_{i,0})(d_{i,1} - \bar{d}_1) \\ \quad + \frac{1}{1+\rho} \left[\theta w_2 h_2(s_{i,1}) - \gamma(s_{i,1})(d_{i,2} - \bar{d}_2) \right], \\ \max_{s_{i,1}, d_{i,1}, d_{i,2}} \phi w_1 h_1(s_{i,0})(1 - s_{i,1} - d_{i,1}) + \\ \pi_a \bar{c} - s_{i,1}T + (1 - \pi_a)R(d_{i,1}, h_{i,1}) - \gamma(s_{i,0})(d_{i,1} - \bar{d}_1) \\ + \frac{1}{1+\rho} \left[\begin{array}{l} \phi w_2 h_2(s_{i,1})(1 - d_{i,2}^*) + \\ \pi_a \bar{c} + (1 - \pi_a)R(d_{i,2}^*, h_{i,2}) - \gamma(s_{i,1})(d_{i,2}^* - \bar{d}_2) \end{array} \right] \end{array} \right\} \quad (10)$$

where $\phi = (1 - \tau)(1 - \pi_a)(1 - \delta\pi_v)$ and $\theta = (1 - \tau)(1 - \delta\pi_v)$.

Due to the fact that agents are heterogeneous with respect to their learning ability, there will be a level of learning ability $\hat{\varepsilon}$ such that for $\varepsilon_i > \hat{\varepsilon}$ agents will be honest and for $\varepsilon_i < \hat{\varepsilon}$ agents will be engaged in criminal activities.⁹

Then, the problem of an individual who chooses to be engaged in criminal activities is:

$$\max_{s_{i,1}, d_{i,1}, d_{i,2}} \left\{ \begin{array}{l} \phi w_1 h_1(s_{i,0})(1 - s_{i,1} - d_{i,1}) + \pi_a \bar{c} - s_{i,1}T + \\ (1 - \pi_a)R(d_{i,1}, h_{i,1}) - \gamma(s_{i,0})(d_{i,1} - \bar{d}_1) \\ + \frac{1}{1+\rho} \left[\begin{array}{l} \phi w_2 h_2(s_{i,1})(1 - d_{i,2}^*) + \pi_a \bar{c} + \\ (1 - \pi_a)R(d_{i,2}^*, h_{i,2}) - \gamma(s_{i,1})(d_{i,2}^* - \bar{d}_2) \end{array} \right] \end{array} \right\} \quad (11)$$

⁸As in Imrohoroglu *et al.* (2000a) we assume that apprehended criminals cannot work or access their assets to finance their consumption while they are in jail.

⁹This is due to the fact that if the return from legal activity, relative to that from illegal activity, increases increasing ability then agent problem satisfy the reservation property. This imply that agent will be honest above a certain level of ability and she will engage in criminal activities below.

The first order conditions with respect to $s_{i,1}$, $d_{i,1}$ and $d_{i,2}$ for an interior solution are:

$$d_{i,1} : \phi w_1 h_1(s_{i,0}) = (1 - \pi_a) R_{d_1}(d_{i,1}, h_{i,1}) - \gamma(s_{i,0}) \quad (12)$$

$$s_{i,1} : (1 + \rho) [\phi w_1 h_1(s_{i,0}) + T] = \quad (13)$$

$$\left[\begin{array}{c} \phi w_2 h_2'(s_{i,1})(1 - d_{i,2}^*) \\ + (1 - \pi_a) R_{h_2} h_2'(s_{i,1}) - \gamma'(s_{i,1})(d_{i,2}^* - \bar{d}_2) \end{array} \right]$$

$$d_{i,2} : \phi w_2 h_2(s_{i,1}) = (1 - \pi_a) R_d(d_{i,2}, h_{i,2}) - \gamma(s_{i,1}) \quad (14)$$

The FOCs allow us to study individual behaviour and in particular how agents allocate their disposable time among school, work in the legal sector and crime.

Equations (12) and (14) show that individuals spend time in committing crime up to the point in which the expected marginal return from crime equal the expected marginal return from legal activities after taxes plus the marginal effect of peer pressure. With peer pressure expected return from illegal activities is lower than it would be without peer pressure. If, as we have supposed, the internal pressure function is increasing in the level of education, then individuals more educated will find more costly to commit crimes because they get disutility from the criminal activity.

Equation (13) allows us to study the costs and returns of education. On the one hand, a higher level of education implies higher returns both from legal activities and criminal activities. This depends on the fact that education affects both ability in the legal sector and in the criminal sector. On the other hand, an individual with an high level of education if apprehended and convicted experiences greater losses in earnings.

2.11 Specific Functional Forms

In order to find an explicit solution for the model we suppose that the functions presented in the previous sections have the following functional forms displaying the functions' properties discussed above:

$$h_{i,t}(s_{i,t-1}) = \varepsilon_i s_{i,t-1}^\alpha \quad \text{with } 0 < \alpha < 1 \quad (15)$$

$$\gamma_{i,t}(s_{i,t-1}) = s_{i,t-1}^\beta \quad \text{with } 0 < \beta < 1 \quad (16)$$

$$R(d_{i,t}, h_{i,t}) = d_{i,t}^\eta h_{i,t}^{1-\eta} \quad \text{with } 0 < \eta < 1 \quad (17)$$

Hence, by using these functional form we can rewrite the FOCs for an interior solution as:

$$d_{i,1} : \phi w_1 \varepsilon_i s_{i,0}^\alpha + s_{i,0}^\beta = (1 - \pi_a) \eta d_{i,1}^{\eta-1} s_{i,0}^{\alpha(1-\eta)} \quad (18)$$

$$s_{i,1} : (1 + \rho) [\phi w_1 \varepsilon_i s_{i,0}^\alpha + T] = \quad (19)$$

$$\left[\begin{array}{l} \phi w_2 \alpha \varepsilon^i s_{i,1}^{\alpha-1} (1 - d_{i,2}^*) + \\ (1 - \pi_a) (1 - \eta) d_{i,2}^{*\eta} s_{i,1}^{-\alpha\eta} \alpha \varepsilon^i s_{i,1}^{\alpha-1} - \beta s_{i,1}^{\beta-1} (d_{i,2}^* - \bar{d}_2) \end{array} \right] \quad (20)$$

$$d_{i,2} : \phi w_2 \varepsilon_i s_{i,1}^\alpha + s_{i,1}^\beta = (1 - \pi_a) \eta \varepsilon^i d_{i,2}^{\eta-1} s_{i,1}^{\alpha(1-\eta)}$$

By solving the FOCs we can obtain an explicit function for time devoted to criminal activities:

$$d_t = \left[\frac{(1 - \tau)(1 - \delta\pi_v) w_t s_{i,t-1}^{\alpha\eta}}{\eta} + \frac{s_{i,t-1}^{\beta-\alpha+\alpha\eta}}{(1 - \pi_a) \varepsilon_i \eta} \right]^{\frac{1}{\eta-1}} \quad (21)$$

We know that $-1 < \frac{1}{\eta-1} < 0$ and $(1 - \pi_a) \eta \succ 0$.

In this section we briefly present the effects of policy variables, we will discuss in details the implications of the model in the following sections. An increase in education received in $t - 1$, also primary schooling, will lead to a reduction in the level of crime in the following period. Moreover, an increase in taxes and an increase in $\delta\pi_v$, that determine the incentive to work of agents,¹⁰ will have a positive effect on time devoted to crime. Finally, both an increase in wages and in the probability of apprehension (π_a) have a negative effect on time spent committing crime.

We are interested in finding an equation for $s_{i,1}$. By using (19), that represent the FOC with respect to $s_{i,1}$, we can define:

$$\delta \varepsilon^i (1 - \pi_a) \left[(1 - \tau)(1 - \delta\pi_v) w_2 s_{i,1}^{\alpha-1} (1 - d_{i,2}^*) + (1 - \eta) d_{i,2}^{*\eta} s_{i,1}^{\alpha-1-\alpha\eta} \right] \quad (22)$$

$$- \beta s_{i,1}^{\beta-1} (d_{i,2}^* - \bar{d}_2) = (1 + \rho) [(1 - \tau)(1 - \pi_a)(1 - \alpha\pi_v) w_1 \varepsilon_i s_{i,0}^\alpha + T]$$

where

$$d_2 = \left[\frac{(1 - \tau)(1 - \delta\pi_v) w_2 s_{i,1}^{\alpha\eta}}{\eta} + \frac{s_{i,1}^{\beta-\alpha+\alpha\eta}}{(1 - \pi_a) \varepsilon_i \eta} \right]^{\frac{1}{\eta-1}} \quad (23)$$

¹⁰ $\delta\pi_v$ determines the incentive to work of agents. In fact, $\delta\pi_v$ determines the expected net (post-tax) salary that a worker will spend for consumption considering that she will be victimized with probability π_v and a fraction δ of her salary will be subtracted. If we consider very insecure society (i.e. with high levels of both the fraction of net salary stolen (δ) and the probability of being victimized (π_v)) the expected net income from work of a worker is very low and it does not compensate her disutility of going to work. In other words, if with high probability a big fraction of salary will be stolen an agent will prefer not to work. Then in very insecure society agents will work less or, even if it is not considered in our model, will spend part of their income for private security in order to be safe of eventually attacks.

rearranging and defining

$$(1 - \tau)(1 - \pi_a)(1 - \delta\pi_v) = \phi$$

$$(1 - \pi_a)(1 - \eta) = \mu$$

we obtain

$$\begin{aligned} \phi w_2 \varepsilon_i s_{i,1}^{\alpha-1} (1 - d_{i,2}^*) + \mu \varepsilon^i d_{i,2}^{*\eta} s_{i,1}^{\alpha-1-\alpha\eta} - \beta s_{i,1}^{\beta-1} (d_{i,2}^* - \bar{d}_2) = \\ (1 + \rho) [\phi w_1 \varepsilon_i s_{i,0}^\alpha + T] \end{aligned} \quad (24)$$

that represents an implicit function in $s_{i,t}$. By simulating and calibrating this equation for different values of the parameters we found that the left hand side of equation (24) is decreasing in $s_{i,1}$. Furthermore, we can determine the effects of policy parameters on education. In particular, both an increase in income tax (τ) and in $\delta\pi_v$ leads to a reduction in education, while a reduction in T , obtained either by an increase in education subsidy or a reduction in tuition fees paid by agents, will raise time spent in education. Moreover, an increase in second period wages will lead to an increase in education in the first period, while an increase in first period wages will reduce time spent in school.¹¹ Finally, the effects of learning ability and probability of apprehension on time spent in education are ambiguous.

3 Predictions of the Model

In presenting the results and the implications of the model we focus our attention on interior solutions. This is mainly due to the fact that available data and several empirical studies stress that between 60% and 80% of individuals who decide to commit crimes are engaged at the same time in the legal sector or school [Lochner (1999) and Imrohoroglu et al. (2001)]. Then, it appears more relevant to focus on them, than to study boundary solutions in which individuals either not commit crimes or spent the whole amount of their disposable time in criminal activities.

3.1 Crime and Education

As previously asserted in the above paragraphs, education may have a negative effect¹² on criminal activities and in particular, it can be as effective

¹¹In particular, note that increasing the level of the first period wage implies that education is more costly in terms of foregone income. Moreover, *ceteris paribus*, the increase in adolescence wage will reduce the time spent in criminal activities.

¹²Anyway, it is possible that there will be a positive correlation between crimes and education, when the returns to education are higher in the criminal sector than in the legal sector. In particular, it is the case of white-collar crime. But in general for typical property crime education negatively affects crime.

as other policies in preventing crime. From the explicit solution for $d_{i,t}$ [equation (21)], we observe that an increase in the time spent in receiving education tends to reduce property crime unambiguously. A higher level of education implies higher expected wages (or returns) in the legal sector, increasing the opportunity cost of committing crime. Moreover, a compulsory attendance reduces available disposable time, then the merely fact of attending school is a deterrent for crime by reducing available time for criminal activities.¹³ But our model also predicts that education has an indirect effect (“socialization effect”) that affects the overall individual’s decision of engaging in criminal activities. The socialization effect makes criminal decision more costly in psychological terms (internal pressure), while the overall effect of the peer pressure depends on average peer group behaviour. More educated individuals will commit less property crimes than others.

3.2 Crime and Wages

From equation (21), we observe that an increase in the wage rate has a negative effect on crime. In particular, we have to distinguish between adolescents and adults. In adulthood an increase of wage unambiguously reduces the time spent in criminal activities, during adolescence we have a more complex effect. In fact, a higher wage implies that adolescents spend more time working in the legal sector but they reduce both the time for education and the time spent in committing crime. This result is confirmed by equation (24). In particular the effect on education of an increase in adolescence wage rate is negative, while an increase of adulthood wage rate will lead to an increase in time spent for education during adolescence. On the one hand, a higher wage during adolescence implies that education is costly in terms of foregone income, then individuals will prefer to allocate more time to legal work than to education. This will also imply that by choosing less education during adolescence individuals will have a lower wage in the second period, then their opportunity cost of being criminal will be lower, and furthermore γ will be lower.¹⁴ On the other hand, a higher wage during adulthood implies that more skilled workers will benefit from it, and then individuals are prone to study more during adolescence in order to exploit higher wages when adults. Furthermore, higher wages during adolescence will lead to a higher level of criminal activity in adulthood because of less education attained and then in the second period individuals will commit more crimes.

¹³In this context it is reasonable to expect that increasing the compulsory school age could have a negatively effect on crime.

¹⁴Education in the first period has a double effects in adulthood. In fact, it will affect the level of wage of individual and her peer pressure function. In particular the $\gamma(s_{i,t-1})$ component that is a function of the education level attained in the previous period.

3.3 Crime and Victimization

Insecure societies are characterized by a higher level of victimization rate than others. It is reasonable to expect that in this kind of society the probability of being victim of a crime will affect individual decision. From equation (21), we observe that a joint increase in the probability of victimization (π_v) and in the fraction of disposable income stolen if victimized (δ) has a positive effect on crime. In fact, we can consider the joint effect of $\delta\pi_v$ as the incentive to work for individuals. The more likely they will be stolen of a fraction δ of their income the less they work. In particular, if $\delta\pi_v = 1$ individuals will not work at all and they will spend their time by committing crime. We can also assume, even if we have not considered in our model, that in very insecure society level of crime is higher, individuals can also decide to spend a fraction of their income for personal security (e.g. security camera, private police force).

3.4 Crime and Probability of Apprehension

From equation (21), we observe that an increase in the probability of apprehension reduces the level of time spent in committing crime. Increasing the probability of apprehension corresponds to a reduction of the expected return from illegal activities. This means that prevention and effective law enforcement policies will allow to reduce the overall crime rates. At the same time, by reducing the time spent in committing crime, an increase in π_a implies that individuals will spend more of their disposable time in education or work, when they are adolescent, or in legal work when adults. Hence, more intensive law enforcement will reduce the expected returns from illegal activities. The new equilibrium is characterized by lower crime and higher adult employment. Adolescents will both invest more in education and spend more time in working in the legal sector. Spending more time in education when adolescent leads to higher legal returns when adults making crime decision more costly.

3.5 Crime and Education Subsidies

By simulating equation (24), we observe that an increase in education subsidy or otherwise a reduction in tuition fees will raise time spent in education by adolescents. On the one hand, this implies that during adolescence individuals will spend less time committing crime, but we need to distinguish between working and not working adolescents. In fact, working adolescents are not affected by education subsidies, because the amount of time spent committing crime is only determined by their potential wage. Non-working

adolescents will spend more time in school and reduce their criminal activities in response to higher education subsidies. On the other hand, a higher level of education during adolescence means a lower level of crime during adulthood, as previously discussed in paragraph 2.3.1. In general, a higher education subsidy leads to an equilibrium with more education and less crime during adolescence and less crime during adulthood.

3.6 Crime and Taxes

From equation (21), we observe that a tax reduction reduces crime by implying a higher disposable wage.¹⁵ This means that a correct and effective fiscal policy will allow to reduce crime rate. At the same time, by reducing the time spent in committing crime, a reduction in τ implies that individuals will spend more of their disposable time in education or work, when they are adolescent, or in legal work when adults. The new equilibrium is characterized by lower crime and higher adult employment. Adolescents will both invest more in education and spend more time in working in the legal sector. Spending more time in education when adolescent lead to higher legal returns when adults making crime decision more costly. We need to notice that by reducing taxes government will have less resources to spend on crime prevention, then this will turn out in a reduction of π_a , that will imply more crime and more insecure society. The overall effect depends on the strenght of these two different effects.

4 Conclusion

Crime generates a negative externality and produces relevant economic and social costs. Crime is primarily a problem among uneducated and disadvantaged individual as well as from poor and “bad” neighbourhoods. A higher level of education implies higher expected wages in the legal sector, increasing the opportunity cost of committing crime. Education also has an indirect effect (“socialization” effect) that affects the overall decision of individual of participating in criminal activities. The socialization effect

¹⁵In our model a reduction in taxation has a negative effect on crime, because it implies a higher disposable wage, while as stressed by Chiu and Madden (1998) increase in income tax progressivity reduces the crime rate. In their model they “show how the level of crime may be higher under regressive taxation” (p. 136) and “in particular, a poll tax would induce a higher crime rate than a proportional tax, which would in turn induce a higher crime rate than a progressive tax” (p. 135). We need to distinguish between relative and absolute inequality. In our model we simply care about disposable resources of individuals, but we do not consider relative inequality as in Chiu and Madden, this is why we obtain an opposite result.

makes criminal decision more costly in psychological terms (internal pressure), while the overall effect of the peer pressure depends on average peer group behaviour (social background). Thus more educated individuals will commit less property crimes than others.

Education is an important determinant of criminal behaviour and identifying low education as one of the main causes of criminal activities could be helpful in designing effective and proper policies aimed at increasing the level of education in order to reduce crime rate. It is interesting to notice that impatient societies, with a higher intertemporal discount rate, will be more prone to undertake policies aiming at increasing the probability of apprehension, while more patient societies will prefer to adopt measures that allow for a persistent reduction of crime in the long run, as by increasing the education level.

Our analysis suggests that a correct mix of enforcement, education subsidies and taxation policies reduces crime. In particular, increases in enforcement and in education (via education subsidies) are likely to considerably affect the level of crime and to be important components of an effective crime-fighting strategy.

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