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CRIME AND EDUCATION IN A MODEL OF INFORMATION TRANSMISSION

by

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ABSTRACT: *We model the decisions of young individuals to stay in school or drop out and engage in criminal activities. We build on the literature on human capital and crime engagement and use the framework of Banerjee (1993) that assumes that the information needed to engage in crime arrives in the form of a rumour and that individuals update their beliefs about the profitability of crime relative to education. These assumptions allow us to study the effect of social interactions on crime. In our model, we investigate informational spillovers from the actions of talented students to less talented students. We show that policies that decrease the cost of education for talented students may increase the vulnerability of less talented students to crime. The effect is exacerbated when students do not fully understand the underlying learning dynamics.*

Keywords: Human capital, The economics of rumours, Social interactions, Urban economics

JEL classification: D82, D83, I28

1 Introduction

Many developing countries and poor areas in developed countries are plagued by high crime rates and low levels of education. Young people seem to be particularly vulnerable

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to crime engagement. Oftentimes, once crime has started it spreads in an epidemiological way through a community. We here suggest a theory of juvenile crime that is motivated by the idea that the further people are from receiving a return on educational investments they have made, and the more likely they are to be surrounded by other young criminals, the more they will be willing to engage in crime. It allows us to investigate the effect that educational policies have on the diffusion of crime among young people.

Following Becker (1968), economic theory sees crime as an occupational choice or investment opportunity. A person compares the streams of payoffs from crime versus other occupations or investments in human capital such as going to school to obtain a good job later. Lochner (2004) builds a dynamic model of education and crime engagement and explains the decreasing age–petty crime pattern. The more individuals have invested in education, the larger the opportunity cost of crime. Hence, older people who have accumulated more human capital or are closer to graduation will be less prone to engaging in crime. But, crime is also a social phenomenon. The first economic models of social interactions and crime were developed by Sah (1991) and Glaeser et al. (1996). The former develops a model in which the decision of a person to commit crime reduces the probability of other offenders to be arrested. The latter develop a model in which the individuals decision about crime depends on their neighbors' decisions about criminal activities. Particularly relevant for our theory are Calvó-Armengol and Zenou (2004) and Calvó-Armengol et al. (2009) who investigate effects of social networks on crime and education.

There is strong evidence supporting the ideas of Becker and Lochner (see Levitt 1998; Mocan and Rees 2005). But there is also evidence showing that social interactions are important determinants of crime engagement. Ludwig et al. (2001) and Kling et al. (2005) show that a neighborhood's wealth has an effect on incidence of youth crimes. Particularly important to our paper is the evidence found by Case and Katz (1991) who show that in low-income Boston neighborhoods the behavior of peers appears to affect youth behaviors in a manner suggestive of contagion models. Another important piece of evidence is provided by Luallen (2006) who shows that reducing school incapacitation increases crime rates among youngsters. More recently, Damm and Dustmann (2014) and Rotger and Galster (2019) find a positive relation between the share of criminals in a neighborhood and later convictions of young males. Using individual data, Drago and Galbiati (2012) and Corno (2017) disentangle (contagious) endogenous social network from exogenous social network effects and show that criminal behavior is learned.

Taken together, the literature shows that the causal link between crime and low levels of human capital is quite complex (Card and Giuliano 2013). However, there seems to be agreement that fostering education is a good way to fight crime (Card 1999; Deming 2011; Machin et al. 2011) and that interactions in school might foster crime specially when there is school segregation (Billings, Deming and Ross 2019).

We investigate the interaction between educational policies and juvenile crime. We assume that everybody is rational, but that information on the opportunity to become a criminal is not readily available. Rather it is transmitted through an information diffusion process in society: people who have become criminals meet students and students learn about the possibility to become a criminal rather than going to school. Our assumption is in line with the evidence cited above. We investigate the nature of the information transmission process between criminals and students and carry out an

investigation on the policies that reduce the cost of education such as scholarships, meals or transport subsidies, better teachers and materials.

In our model people are rational, they are young and go to school but they can drop out and engage in crime. Going to school costs some effort or money. Individuals will only drop out *if they believe* crime is more profitable than staying in school. Some of the students are more talented, thus they have lower costs, while others are less talented, and have higher costs of going to school. Talent (or ability) is private information.

We introduce social interactions using a model of a rumour process *à la* Banerjee (1993).¹ There is aggregate uncertainty: crime may pay or not and, because of differences in the opportunity costs of crime engagement, the pay off of engaging in crime depends on whether you are talented or not. Three cases are possible: (i) crime can be profitable for talented and less talented individuals, (ii) only for the less talented or (iii) for neither of them. Initially, everybody knows that dropping out to engage in crime is feasible, but everybody also believes that the expected net return of engaging in crime is too low for dropping out from school to be worth it (case (iii)). However, the information individuals have about the profitability of crime changes over time and, thus, their belief about that profitability. There is a rumour process by which individuals may learn that some other individual dropped out from school to engage in crime ruling out case (iii) above. When individuals meet other individuals, they only learn whether the other has engaged in crime or not but not how profitable crime is. Nor do they learn whether the individual is talented or less talented. When individuals listen to the rumour they also form their beliefs about the likelihood of being in case (i) or (ii) above and decide whether to stay in school or become a criminal. These probabilities change in time because the time that passes before a given student meets a criminal for the first time provides crucial information about the probability that crime is profitable. This is so because the speed of the rumour transmission depends on the number of criminals, which in turn depends on the profitability of crime.

But whether an individual engages in crime upon hearing the rumour also depends on how much time he has spent in school and on how much of the costs needed to finish high school he has already incurred. The two mechanisms imply that there is a point in time after which students will not be tempted any more to become criminals. This time occurs earlier for the talented than for the less talented. Hence, the less talented are more vulnerable to crime engagement. However, the rumour process is responsible for the fact that the difference between these stopping times do not depend only on differences in individual types (talented and less talented) but also on externalities from talented to less talented students.

These spillover effects give rise to our main result which is relevant for policy considerations. Consider a policy reducing the cost of schooling for talented students (for instance, a meritocratic scholarship program). Of course, the objective of the policy is to reduce the number of students that drop out from school. This policy directly

1 There is a broader literature on information diffusion, such as Banerjee (1992) and Scharfstein and Stein (1990), who develop models of herd behavior. In those models information goes through a process of word-of-mouth learning and they are thought to explain financial runs, behavior facing new products, etc. In the context of social economics, Jackson and Yariv (2011) reviewed the literature on the influence of social networks on diffusion processes in different realms, such as disease contagion, technology adoption, vote decisions, etc.

reduces the vulnerability to crime of talented students. Ideally it should also reduce the vulnerability of less talented students; however this is not guaranteed.

To understand the effect on less talented students, the way the rumour about crime spreads at any time afterwards is crucial. Individuals update their beliefs of the profitability of crime by taking into account the time that passes until they meet a criminal for the first time. Older rumours are a signal that crime is less profitable; this is the effect that appears in Banerjee (1993). Banerjee (1993) carries out comparative statics showing that the parameters may have ambiguous effects on the adoption of the investment opportunity (in our case this will be engaging in crime). Our analysis decomposes this effect to understand why policies that target the reduction of education costs of talented students may have the effect of increasing vulnerability of the less talented. With the policy, talented students stop engaging in crime earlier and after this moment only less talented students engage in crime. This has three effects: first, there are less students contributing to the dispersion of the rumour. Second, as a consequence, the dispersion of the rumour is slower. Third, less talented students know that the speed is reduced because the cost of schooling of the talented is lower and not because a change in the fundamentals of the profitability of crime. The first two effects play in favor of a reduction of less talented students that become criminals in any posterior moment. The last goes in the opposite direction. Consequently, a policy reducing the cost of education of talented students may increase or decrease the vulnerability of less talented students depending on the strength of each of the two effects. We show that it is possible that the net effect is an increase in the vulnerability of less talented students.

This implies that meritocratic policies may hurt less talented students and should be accompanied by policies that neutralize this effect. We also show that when students do not fully understand the learning dynamics, the effect on the less talented students become exacerbated, and we hence conclude that meritocratic policies, such as those studied by Angrist et al. (2016), Bettinger et al. (2016) and Marx and Turner (2015) should be accompanied by information campaigns.

2 Model setting

We consider a population of students given by the interval $[0,1]$ with equal life length T . We denote s the length of schooling of a student. After graduation, students earn an income of W in each moment of the rest of their lives. Education is costly; the instantaneous cost of education (in terms of effort, tuition etc.) is e . There are two types of students: a proportion q of the students have high costs, \bar{e} , and a proportion $1 - q$ of the population have low costs, \underline{e} . Leaving problems of access to credit markets aside (a topic that is beyond the scope of this paper), notice that we can refer for simplicity to high-cost students as ‘less talented’ and low-cost students as ‘talented’. To simplify the model, we assume that the discount rate is equal to zero.

Education is a riskless project.² Its value depends on the moment of life of a person. At any moment in time $t < s$ the instantaneous continuation value of education is

² One can argue that education may also be a risky project. However, the existence of institutions like minimum wages, that are common in both developed and developing countries, make the education project less risky than the crime project. Moreover, in those contexts in which education is riskier than crime, rumours about criminal projects may be more pervasive. Hansen