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Agglomeration, city size and crime ☆

Carl Gaigné [a,b], Yves Zenou [c,d,e,*]

[a] INRA, UMR1302 SMART, Rennes, France
[b] Laval University, Québec, Canada
[c] Stockholm University, Sweden
[d] IFN, Sweden
[e] GAINS, France

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ABSTRACT

This paper analyzes the relationship between crime and agglomeration where the land, labor, product, and crime markets are endogenously determined. Our main theoretical findings are the following: (i) better accessibility to jobs decreases crime in the short run but may increase crime in the long run; (ii) the per-capita crime rate increases with city size; (iii) when allowing for endogenous policing, lower commuting costs make the impact of police on crime more efficient.

1. Introduction

Assuming that individuals are rational decision-makers who engage in either legal or illegal activities according to the expected utility from each activity, the economic literature shows that different crime-fighting urban policies can be implemented. First, more police resource may reduce the crime rate by reducing the net benefits of crime because of a higher risk of detection and punishment. Some empirical studies reveal that an increase in the urban police force produced a 3% to 10% long-term decline in crime rates (Levitt, 1997).[1] Second, better access to legal labor markets may raise the opportunity cost of illegal activity. Third, institutions may influence the aversion to illegal activities of individuals.

However, the analysis of the crime-reduction strategy fails to take into account the effects of space (*i.e.* the location of jobs and people) on criminal activities. Crime is an important social problem but also an urban phenomenon. It is well documented that there is *relatively* more crime in big than in small cities (Glaeser and Sacerdote, 1999; Kahn, 2010).[2] For example, the rate of violent crime in cities with more than 250,000 inhabitants is 346 per 100,000 inhabitants whereas in

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* Corresponding author. Tel.: +468162880.
E-mail addresses: carl.gaigne@rennes.inra.fr (C. Gaigné), yves.zenou@ne.su.se (Y. Zenou).

[1] Instrumenting with election cycles to take account of the endogeneity of police staffing, Levitt (1997) finds that the elasticity of violent crime with respect to sworn officers is estimated to be approximately −1.0 while, for property crime, the elasticity is around −0.3. See also the natural experiment of Di Tella and Schargrodsky (2004) who look at a redeployment in Buenos Aires that followed the bombing of a Jewish center in 1994. Car thefts fell by 75 percent on the blocks where the extra police were stationed, and did not rise elsewhere. Klick and Tabarrok (2005) for Washington, D.C., Poutvaara and Priks (2009) for Stockholm, and Draca et al. (2011) for London find similar results.

[2] Glaeser and Sacerdote (1999) use police jurisdictions as their geographic units while Kahn (2010) uses counties.

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cities with less than 10,000 inhabitants, the rate of violent crime is just 176 per 100,000 (Glaeser, 1998). Similar figures can be found for property crimes or other less violent crimes. Agglomeration creates a multiplier effect on the crime rate through two channels. On the one hand, as mentioned in Glaeser and Sacerdote (1999), a larger city size induces greater expected pecuniary returns because criminals face a larger number of potential victims and a lower probability of being arrested. On the other hand, more workers in a city increase the land rents or the commuting costs, thereby diminishing the opportunity cost of illegal activity.

The aim of this paper is to propose a model that captures some of the stylized facts observed in real-world cities and to analyze policies aiming at reducing crime in a spatial context. Our model delivers a full analytical solution that captures in a simple way how interactions among land, product, crime and labor markets yield agglomeration and criminal activity.

For this purpose, we develop a model where city size and the type of activities (crime and labor) are endogenous within a full-fledged general equilibrium model. Individuals are freely mobile between and within the cities. We consider four different markets in each city: land, labor, product, and crime. The land market is assumed to be competitive and land is allocated to the highest bidders in each city. Land is owned by absentee landlords. The labor market is also competitive and wages are determined by free entry. Monopolistic competition prevails in the product market, which implies that each firm has a monopoly power on her variety. Finally, the crime market is competitive and the mass of criminals is determined by a cost–benefit analysis for each person. Hence, a land market, spatial frictions, and agglomeration economies are introduced in our general equilibrium model.

Let us be more precise. We first develop a framework where the city size measured as population is exogenous (Section 3). Although, under this configuration, our model has a partial equilibrium flavor, it is rich enough to take into account the following fundamental aspects of urban development: larger cities are associated with higher nominal wages (Baum-Snow and Pavan, 2011), more varieties (Handbury and Weinstein, 2015), higher housing and commuting costs (Fujita and Thisse, 2013) and a higher crime rate (Glaeser and Sacerdote, 1999). Individuals are heterogeneous in their incentives to commit crime. They freely choose their location within the city and decide whether to become a criminal or a worker. In Section 4, we show the following results: (i) higher commuting costs or, equivalently, worse job access lead to more criminal activities in the city; (ii) the impact of commuting costs on criminal activities is higher when the city size increases; and (iii) criminal activities increase more than proportionally when there is an increase in city size.

Most of these results are empirically documented. For example, concerning (i), using 206 census tracts in the city of Atlanta and Dekalb county and a state-of-the-art job accessibility measure, Ihlanfeldt (2002, 2006, 2007) demonstrates that modest improvements in the job accessibility of male youth, in particular blacks, cause marked reductions in crime, especially within the category of drug-abuse violations. He found an elasticity of 0.361, which implies that 20 additional jobs will decrease the neighborhood's density of drug crime by 3.61%. If we now consider (iii), then this is true in most cities in the world. Glaeser and Sacerdote have shown that this was true for the United States. Similarly, looking at U.S. metropolitan areas, O'Flaherty and Sethi (2015) show (see their Table 9) that this is true for motor vehicle theft and robbery and their elasticities were 0.23 and 0.33, respectively, both significant, and not far from the Glaeser–Sacerdote elasticity. If we now look at European cities, the same pattern emerges. Fig. 1a and b documents this pattern for France for offences against persons (Fig. 1a) and property crimes (Fig. 1b) and where the spatial unit is the department.

Nevertheless, we have to discuss the robustness of the results by considering that households have two options in response to crime risk: they can vote for anti-crime policies or they can vote with their feet (Linden and Rockoff, 2008). In Section 5, we introduce an urban government that levies a tax on workers in order to finance policy resources to fight criminal activities. We show that there is a U-shaped relationship between the crime rate in the economy and the tax rate so that increasing resources to fight crime financed by taxes on workers can backfire if the tax rate is too high. We also show that *lower commuting costs or better job access make the impact of police on crime more efficient*.

These are short-run effects. In the long run, the individuals can migrate to avoid the high levels of crime in the large city. In Section 6, we extend our model by considering a system of two cities where the city size is endogenous because of the mobility of individuals between the two cities. This extension implies that even if cities are *ex ante* identical, the *ex post* differences in the crime rate, the economic structure and the population size across cities emerge as the unintentional outcome of a myriad of decisions made by firms and households pursuing their own interest. We characterize the three different stable equilibria as a function of commuting costs. When the commuting costs are high enough, the population of workers and criminals is evenly distributed between the two cities. When the commuting costs take intermediate values, there is a large and a small city where there are more criminals and workers in the former than in the latter. When the commuting costs are low enough, there is a single city. This means that when the commuting costs take intermediate values, even though the level of criminal activity creates a negative externality on workers, agglomeration takes place and attracts the majority of workers and the largest city has the higher share of criminals.

This framework allows us to study the effects of lower commuting costs in each city on criminal activity in the economy. If a decrease in commuting costs (or better access) reduces crime in the short run (when the city size is unchanged) because the urban costs experienced by workers decline, this is no longer true in the long run when agents are perfectly mobile between cities. Indeed, a reduction in commuting costs induces more people and jobs to move to the larger city. In that case, a decrease in commuting costs has an ambiguous effect on crime since, in bigger cities, people earn higher wages but also experience higher urban costs and obtain higher proceeds from crime. We show that criminal activity increases in the economy when commuting costs decline only if the size of the agglomeration is high enough. This implies that the improvement of transportation will decrease crime only in very large cities where agglomeration is important but the global