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Why Is Law Enforcement Decentralized?

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Abstract:
Law enforcement is decentralized. It is so despite documented interjurisdictional externalities which would justify its centralization. To explain this fact, we construct a political economy model of law enforcement. Under decentralization, law enforcement in each region is in accord with the preferences of regional citizens, but interjurisdictional externalities are neglected. Under centralization, law enforcement for all regions is chosen by a legislature of regional representatives which may take externalities into account. However, the majority rule applies for decisions made by the central legislature and this implies that the allocation of enforcement resources may be skewed in favour of those who belong to the required majority. We show that the choice between centralization and decentralization depends on the technology of law enforcement and the nature of the interjurisdictional externalities.

Keywords: Crime, Law enforcement, Decentralization, Externalities

JEL Classification: K42

1 Introduction

In several countries, a significant portion of law enforcement is undertaken at the local level. As reported in Table 1, in Canada, 57% of expenditures on police protection were made at the local level in 2005, and 60.4% of police forces worked at that same level in 2006. For the USA, the numbers in Table 2 point to even more decentralization. Indeed, in 2003, 64.6% of expenditures on police protection were made at the local level and 76.5% of police forces worked at that level. Why such an arrangement? Why is police protection, and more generally law enforcement, left in the hands of local authorities? Given that the decentralization of law enforcement is not without problems, this phenomenon certainly requires an explanation.

— TABLE 1 HERE —

— TABLE 2 HERE —

When law enforcement increases, criminals may react in a variety of manners. Of course, criminals may simply decide not to commit a crime, which is the ideal outcome from the perspective of the authorities. But things are unfortunately not so simple and criminals can also adapt to new circumstances. For instance, when increased enforcement takes place at a specific time (e.g. curfew), criminals may decide to operate at a different time, a phenomenon labeled temporal displacement.[1] Criminals may also change target, method, and type of crime. More importantly for us, when increased enforcement is targeted at a specific area, criminals may decide to operate in a different location, a phenomenon labeled spatial displacement, which is in fact a standard negative externality. The nature and the size of spatial displacement is debated among criminologists, but many believe it has to be taken into account in the design of law enforcement policies.[2] On the other hand, some criminologists argue that the benefits of enforcement in a specific location may actually diffuse to nearby locations in which criminality is reduced.[3] In such case, the externality of enforcement would be positive.

In our analysis, there are two regions which may undertake law enforcement. We remain agnostic as to whether law enforcement entails spatial displacement or diffusion of its benefits, from one region to the other. Both possibilities are allowed for in our modeling. However, we note that provided law enforcement entails displacement or diffusion, then it is likely that there would be benefits to its centralization as a central authority could internalize negative — spatial displacement — and positive — diffusion of benefits — externalities between regions. Of course, the internalization of

[1] Jacob *et al.* (2004) argue that in the short run, there is substantial displacement of crime over time.
[2] See Bowers and Johnson (2003) for an interesting discussion of the issues.
[3] For example, see Weisburd *et al.*(2006).

externalities would justify centralization if governments behaved as benevolent dictators and were allowed to set differentiated levels of enforcement for each region.

In Oates (1972), two key arguments in favour of decentralization are put forward. The first one is the preference-matching argument according to which regional governments are better at selecting policies that reflect the preferences of regional citizens. In Oates (1972), this is because central governments are viewed has being unable to set differentiated policies for different regions. Because they choose uniform policies for all regions, these policies simply do not reflect regional tastes. More recently, the preference-matching argument has been re-formulated by Besley and Coate (2003). Besley and Coate allow central governments to select different policies for different regions, but the ill-functioning of central legislatures, which choose policies for all regions, creates a mismatch between policies and regional tastes. Thus, because of a political failure at the central government level, policies chosen by regional governments are more likely to reflect the preferences of regional citizens.[4] The second argument in favour of decentralization is that it leads to more accountability — less rent-seeking— of elected officials.[5] In this paper, the accountability argument is left aside and our focus is on the preference-matching benefits of the decentralization of law enforcement, which has to be traded-off against the benefits associated with the internalization of externalities under centralization.

There is a growing literature that analyzes enforcement externalities between *individuals*.[6] But to our knowledge, the literature on the enforcement externalities between adjacent *jurisdictions* is more limited. Marceau (1997), Marceau and Mongrain (2007), Newlon (2001), and Teichman (2005) are the few analyzes that take into account the spatial displacement of crime between jurisdictions. However, none of them provide an explanation for the decentralization of law enforcement to local governments, an arrangement which makes it more likely for crime displacement to take place. The current paper provides such an explanation by adapting the Besley and Coate (2003) framework to a world with crime. Hence, a political economy model of two regions is built in which law enforcement can be left in the hands of a central government, or decentralized to regional governments. The nature of crime in this world is such that both displacement and diffusion between regions may occur. Governments are elected. In particular, central government policies are decided in a legislature composed of elected regional representatives, a simple majority of those representatives being required for a policy to be adopted. The majority rule in the central legislature makes possible

[4] A verification of this argument is found in Strumpf and Oberholzer-Gee (2002). In the USA, following the lifting of alcohol prohibition in 1933, the States became responsible for liquor control. Some States chose to keep control liquor at the state level, while others chose to decentralize it at the county level. Strumpf and Oberholzer-Gee show that the States that chose to decentralize liquor control were those that were more heterogenous in terms of preferences for liquor control at the county level.

[5] See Hindriks and Lockwood (2005) for a recent theoretical analysis of political accountability.

[6] Interesting examples include Glaeser *et al.* (1996), Hotte and Van Ypersele (2003), Kling *et al.* (2005), and Shavell (1991).

the exploitation of a region outside of the majority. As will be seen, this possibility is the main weakness of centralization.[7] On the other hand, no such problem will plague regional legislatures, but as already discussed, regional legislatures will neglect externalities and this will lead to an inadequate allocation of resources. Eventually, we are able to ascertain the conditions under which a society, at some initial constitutional stage, would make the choice of centralizing or decentralizing law enforcement. As the analysis shows, this depends on the technology of law enforcement, and in particular, on the relative size of the parameters reflecting displacement and diffusion.

This paper is organized as follows. In next section, we lay out the basic two-region model, and in particular, the technology of law enforcement. Section 3 examines the first best law enforcement policies that would be chosen by a benevolent dictator. In Section 4, we examine the choice of law enforcement by elected governments under decentralization, while in Section 5, we turn to the choice of law enforcement policies by a central government in which decisions are made by a legislature of elected regional representatives. The constitutional stage in which citizens choose between centralization and decentralization is examined in Section 6. This choice is shown to depend on the relative size of the parameters reflecting displacement and diffusion in the law enforcement technology. Our concluding remarks follow.

2 The Model

The economy is divided into two distinct regions indexed by $i \in \{1, 2\}$. Under decentralization, there is a legislature in each region, while under centralization, there is a unique central legislature. Each region has a continuum of citizens of unit mass, so total population in the economy is of measure 2. Each citizen is endowed with some private income x, with x distributed over the $[\underline{x}, \overline{x}]$ interval. The mean income in region i is denoted by m_i, and we assume that this also equals median income.

In each region, a proportion of the income of each voter is robbed by criminals. This proportion is equal to the number of criminals operating in region i and is denoted by c_i. Therefore the amount of income that is left for consumption for an individual of type x is $(1 - c_i)\, x$. The number of criminals in region i depends on the level of enforcement in the two regions, denoted by α_i for $i = \{1, 2\}$. We assume an increasing marginal cost of enforcement. Specifically, we assume that to achieve a level of enforcement α_i in region i, it costs $\alpha_i^2/2$. We also assume that a head tax (i.e. equal lump-sum tax) can be imposed on voters to finance expenditures in enforcement. Under decentralization, the level of enforcement α_i in region i is chosen by the legislature of region i, and the cost is borne by the voters of region i only. Since there is a unit mass of voters in region i, each voter bears a cost $\alpha_i^2/2$. Under centralization, the central legislature makes the choice of enforcement levels (α_1, α_2)

[7] On the functioning of legislatures, see also Ferejohn *et al.* (1987) and Lockwood (2002).

for the two jurisdictions. The cost of achieving (α_1, α_2) is then borne equally by the voters of the two regions so that each voter has to bear a cost of $(1/2)[(\alpha_1^2/2) + (\alpha_2^2/2)] = (\alpha_1^2 + \alpha_2^2)/4$.

Under decentralization, assuming region i has chosen enforcement level α_i, the welfare of a voter with income x living in region i is given by

$$W_i = (1 - c_i)\, x - \frac{1}{2}\alpha_i^2 \tag{1}$$

As for the situation under centralization, assuming enforcement levels α_i and α_j for region i and region j, respectively, the welfare of a voter with income x living in region i is given by

$$W_i = (1 - c_i)\, x - \frac{1}{4}(\alpha_i^2 + \alpha_j^2) \tag{2}$$

We assume that the number of criminals operating in each region depends on the level of enforcement in both regions. We specifically assume:

$$c_i\,(\alpha_i, \alpha_j) = \frac{1}{2}\,[1 - a_1\alpha_1 - a_2\alpha_2] - \gamma_i\,[\alpha_i - \alpha_j]\,; \quad i \neq j. \tag{3}$$

In this expression, $\gamma_i \geq 0$ is a parameter reflecting displacement which can also be interpreted as a mobility cost for criminals. When $\gamma_i = 0$, mobility costs are infinite, no displacement occurs, and the two regions have half of the total number of criminals operating on their territory. If, however, $\gamma_i > 0$, there is displacement and the number of criminals operating in region i is decreasing in the difference between the levels of enforcement in the two regions. In addition, the total number of criminals who operate in the two regions depends negatively on the levels of enforcement of the two regions, as happens when there is diffusion. The diffusion parameter $a_i \geq 0$ can be interpreted as a measure of the efficiency of the technology in deterring criminal activities. It could reflect the occupational choice of individuals who must choose between honest work and a criminal life, the return of the latter being reduced when any of the regions invest in enforcement. In what follows, we assume, for simplicity, that $a_1 = a_2 = a$ and that $\gamma_1 = \gamma_2 = \gamma$. Therefore, from now on, γ is the displacement parameter and a is the diffusion parameter.

In this paper, one of our objective is to characterize the choice of enforcement of adjacent regions when decisions are made by elected governments (legislatures). We also would like to understand why it is commonly observed that crime enforcement is decentralized. Our characterization and our answer will be obtained by studying a three-stage game which can be described as follows.

1. *Constitutional stage.* Citizens in each of the two regions decide, by majority voting, whether decisions on crime enforcement are to be decentralized (i.e. left in the hands of regional legislatures) or centralized (i.e. made by a central legislature).

2. *Choice of representatives.*

- Under Decentralization: Citizens in each region elect a representative to their regional legislature.
- Under Centralization: Citizens in each region elect a representative to the central legislature.

3. *Choice of enforcement levels.*
   - Under Decentralization: The representative in each regional legislature simultaneously choose the level of enforcement for their region.
   - Under Centralization: The two representatives in the central legislature choose the levels of enforcement for the two regions.

In what follows, after examining the choices of a benevolent central government dictator, our benchmark, we will examine the last two stages of the above described games in which decision are either made by citizens or by elected representatives. We will examine these last two stages under decentralization in Section 4 and under centralization in Section 5. The constitutional stage will then be examined in Section 6, anticipating the results of Section 4 and 5.

3 The First Best Benchmark: Benevolent Central Government

As our benchmark, we consider a benevolent central government dictator who can and will internalize the externalities and accommodate differences in incomes by imposing differentiated policies in each region. The first best levels of enforcement can be obtained by maximizing a utilitarian welfare function given by the sum of the voters' individual welfare or, given the assumed risk neutrality, by the sum of the mean voters' individual welfare, i.e. $\widetilde{W} = W(m_1) + W(m_2)$. For heuristic reasons, we assume that the sum of the costs of enforcement is borne equally by the voters of the two regions, i.e. each voter bears a cost $(\alpha_1^2 + \alpha_2^2)/4$, as in equation (2) above. Note that because of risk neutrality, the manner in which these costs are shared has obviously no impact on the optimal choice of (α_1, α_2) by a benevolent central government.

The first-order conditions are given by:

$$\begin{aligned} -\frac{\partial c_1}{\partial \alpha_1} m_1 - \frac{\partial c_2}{\partial \alpha_1} m_2 &= \alpha_1, \\ -\frac{\partial c_1}{\partial \alpha_2} m_1 - \frac{\partial c_2}{\partial \alpha_2} m_2 &= \alpha_2 \end{aligned} \tag{4}$$

We obtain

$$\begin{aligned} \widetilde{\alpha}_1 &= [0,5a + \gamma] m_1 + [0,5a - \gamma] m_2, \\ \widetilde{\alpha}_2 &= [0,5a - \gamma] m_1 + [0,5a + \gamma] m_2. \end{aligned} \tag{5}$$

If we compare $\widetilde{\alpha}_1$ and $\widetilde{\alpha}_2$, we find that

$$\widetilde{\alpha}_1 \underset{<}{\geq} \widetilde{\alpha}_2 \text{ as } m_1 \underset{<}{\geq} m_2. \tag{6}$$

In other words, the optimal level of enforcement is higher in the richer region. Observe also that when $a \geq 2\gamma$, both $\widetilde{\alpha}_1$ and $\widetilde{\alpha}_2$ are strictly positive independently of m_1 and m_2. Suppose now that $a < 2\gamma$ and that, for example, $m_1 > m_2$. In this case, $\widetilde{\alpha}_1$ is strictly positive and $\widetilde{\alpha}_2$ is also strictly positive if and only if $m_1/m_2 < (\gamma + 0.5a)/(\gamma - 0.5a)$. Hence, a benevolent central government optimally invests in deterrence activities in both regions if the median wealth asymmetry is not too strong, otherwise he/she does not invest in the poorer region (providing that negative investment is not possible). In this paper, we will assume throughout that if $a < 2\gamma$ and $m_i > m_j$ then $m_i/m_j < (\gamma + 0.5a)/(\gamma - 0.5a)$ which implies that the first best levels of investment in deterrence activities both in the richer and in the poorer regions are strictly positive.

In addition, the equilibrium numbers of criminals in the two regions are

$$\begin{aligned} c_1(\widetilde{\alpha}_1, \widetilde{\alpha}_2) &= \frac{1}{2}\left[1 - a^2(m_1 + m_2)\right] - 2\gamma^2(m_1 - m_2), \\ c_1(\widetilde{\alpha}_1, \widetilde{\alpha}_2) &= \frac{1}{2}\left[1 - a^2(m_1 + m_2)\right] - 2\gamma^2(m_2 - m_1). \end{aligned} \tag{7}$$

Assume that region 1 is richer than region 2, i.e. $m_1 > m_2$. In this case, $c_1 < c_2$, i.e. the number of criminals who operate in region 1 is lower than that in region 2. This is because the marginal benefit of enforcement is larger in the richer region than in the poorer region whereas the marginal cost is independent of regions' wealth. Hence, it is optimal to invest more in enforcement in region 1 than in region 2 which in turn implies a lower number of criminals in region 1.

We now turn to the determination of welfare levels under optimal policies. The welfare of region i when first best policies are in place is

$$W_i = \left[1 - c_i(\widetilde{\alpha}_1, \widetilde{\alpha}_2)\right] m_i - \frac{[\widetilde{\alpha}_1]^2 + [\widetilde{\alpha}_2]^2}{4} \tag{8}$$

We then find

$$\begin{aligned} \widetilde{W}_1 &= \left[0,5 + a^2(m_1 + m_2) + 2\gamma^2(m_1 - m_2)\right] m_1 \\ &\quad -\frac{1}{4}\left[\left(0,5a^2 + 2\gamma^2\right)\left(m_1^2 + m_2^2\right) + \left(a^2 - 4\gamma^2\right) m_1 m_2\right], \\ \widetilde{W}_2 &= \left[0,5 + a^2(m_1 + m_2) + 2\gamma^2(m_2 - m_1)\right] m_2 \\ &\quad -\frac{1}{4}\left[\left(0,5a^2 + 2\gamma^2\right)\left(m_1^2 + m_2^2\right) + \left(a^2 - 4\gamma^2\right) m_1 m_2\right]. \end{aligned} \tag{9}$$

Welfare is higher for the richer region than for the poorer one for two reasons. First, more wealth directly translates into more welfare. Second, the richer region benefits from a larger level of enforcement and a lower crime rate than the poorer region, while it pays only for the average cost of enforcement in the two regions.

Having established our benchmark, we now turn to the analysis of the last two stages of our three-stage game with citizens and representatives as decision-makers. We first consider decentralization.

4 Decentralization with Elected Governments

Under decentralization, the choice of enforcement in region i is made by its regional legislature. This regional legislature is assumed to be composed of a single representative chosen by and amongst the voters of the region. More precisely, to determine who is to serve we use the citizen-candidate model of representative democracy due to Besley and Coate (1997) and Osborne and Slivinski (1996). Thus, we have a two-stage policy game to solve. In the first stage, voters in each region elect a representative by majority rule. In the second stage, the representatives in each regional legislature simultaneously choose the level of enforcement for their region.

4.1 Enforcement Levels

As usual, we work backward. Let the types of the elected representatives in region 1 and 2 be x_1 and x_2, respectively. Each representative then decides the optimal level of enforcement given the other representative's policy choice. For the representative of region i, the first-order condition is

$$-\frac{\partial c_i}{\partial \alpha_i} x_i - \alpha_i = 0 \tag{10}$$

We can solve for the Nash equilibrium and obtain

$$\alpha_i(x_i) = [0,5a + \gamma]\, x_i \tag{11}$$

This equilibrium level is increasing in x_i, a and γ. The equilibrium number of criminals in region i is then

$$c_i\left(\alpha_i, \alpha_j\right) = \frac{1}{2}\left[1 - a\left(0,5a + \gamma\right)\left(x_1 + x_2\right)\right] - \gamma\left(0,5a + \gamma\right)\left(x_i - x_j\right); \quad i \neq j \tag{12}$$

Hence, in a decentralized equilibrium, if the representative of region i is richer than that of region j, then the level of enforcement is higher in region i than in region j, which in turn induces a lower number of criminals in region i.

4.2 Choice of Representatives

We now turn to the election stage. Citizens, in each region, vote simultaneously to elect their representatives to their regional legislature. A political equilibrium is such that given the identity of the representative of the other region, the domestic representative is preferred by a majority of the domestic voters. The solution of this majority voting problem is given by the median voter theorem, i.e. the elected representative that is most preferred by the voter with the median income

m_i in each region. This is because the difference in welfare between citizens in a region is linear in income. Hence, single-peakedness holds.

The payoff of region i's median voter with income m_i, given representatives (x_i, x_j) is given by

$$W^D_{m_i}(m_i, x_i, x_j) = \{0,5 + (0,5a + \gamma)[0,5a(x_1 + x_2) + \gamma(x_i - x_j)]\} m_i - 0,5(0,5a + \gamma)^2 x_i^2; \quad i \neq j \tag{13}$$

The optimal representative type x_i for the median voter in region i is therefore given by the solution to

$$\frac{\partial W^D_{m_i}(m_i, x_i, x_j)}{\partial x_i} = 0 \Leftrightarrow (0,5a + \gamma)^2 (m_i - x_i) = 0 \tag{14}$$

which is independent of x_j. In equilibrium, we then have $x_i = m_i$ for $i \in \{1, 2\}$. Thus, we have

Lemma 1 : *Under a decentralized system, the median voter in each region prefers a representative of his own type. The equilibrium level of enforcement, under decentralization, is then given for* $i \in \{1, 2\}$ *by*

$$\alpha^D_i(m_i) = [0,5a + \gamma] m_i. \tag{15}$$

It is interesting to compare these levels with the first best optimal levels given in equation (5)

$$\widetilde{\alpha}_i \underset{<}{\geq} \alpha^D_i(m_i) \text{ as } a \underset{<}{\geq} 2\gamma. \tag{16}$$

Therefore when a is high enough relative to γ, the diffusion externality dominates the displacement externality and there is under-deterrence (with respect to the optimal level) in the Nash equilibrium. If, however, γ is relatively strong, there is too much enforcement in a decentralized equilibrium. This is because with strong displacement potential, each region tries to invest more than the other to export its criminals.

The decentralized equilibrium payoff of a voter with income x living in region i is then given by

$$W^D_i(x) = \{0,5 + (0,5a + \gamma)[0,5a(m_1 + m_2) + \gamma(m_i - m_j)]\} x - 0,5(0,5a + \gamma)^2 m_i^2; \quad i \neq j. \tag{17}$$

Recall that by assumption, there is a continuum of citizens of mass of unity in each region and that the median of the income distribution also corresponds to its mean. Hence, the payoff of region i's median voter also represents aggregate welfare. Aggregate welfare in region i is thus given by

$$W^D_i(m_i) = \left[0,5 + 0,5(0,5a + \gamma)^2 m_i + \left(0,25a^2 - \gamma^2\right) m_j\right] m_i; \quad i \neq j. \tag{18}$$

5 Centralization with an Elected Government à la Besley and Coate

Under centralization, the policy outcome is also determined by a two-stage policy game. In the first stage, citizens in each region elect their representative to the central legislature. In the second stage, the two representatives in the central legislature choose the level of enforcement for each region. To model this policy stage, we follow Besley and Coate (2003) and in particular, the minimum winning coalition approach. Under this view, a policy is adopted by the central legislature when a minimal number of its members support the policy. We assume that the minimum size of the coalition required to "win a vote" is 50% of the members of the central legislature. Thus, given the central legislature has two members, each representative can be thought of as a minimum winning coalition. Therefore, it is assumed that each region's representative forms the minimum winning coalition and chooses policy with a probability of 1/2. In other words, enforcement levels (α_1, α_2) are chosen by the representative of region 1 with probability 1/2, and by that of region 2 with the same probability.

5.1 Enforcement Levels

We first determine the outcome of the policy stage. Let the types of the elected representatives in region 1 and 2 be x_1 and x_2. Since the costs of enforcement are equally shared, the optimal level of enforcement for region i's representative is obtained by maximizing

$$W_i = (1 - c_i)\, x_i - \frac{\alpha_1^2 + \alpha_2^2}{4} \tag{19}$$

with respect to α_1 and α_2. We assume that the representative of region i cannot choose a negative level of enforcement for region j. Hence, we impose a positivity constraint $\alpha_i \geq 0$ for $i = \{1, 2\}$. Let the levels of enforcement chosen by a representative of type x_i of region i be denoted by $\alpha_1(x_i)$ and $\alpha_2(x_i)$. The first-order conditions characterizing these levels of enforcement are

$$\begin{aligned} \left[\frac{1}{2}a + \gamma\right] x_i - \frac{1}{2}\alpha_i(x_i) &= 0 \\ \left[\frac{1}{2}a - \gamma\right] x_i - \frac{1}{2}\alpha_j(x_i) &= 0, \quad i \neq j. \end{aligned} \tag{20}$$

Solving this system, we find

$$\begin{aligned} \alpha_i(x_i) &= [a + 2\gamma]\, x_i \\ \alpha_j(x_i) &= \begin{cases} [a - 2\gamma]\, x_i, & i \neq j, \quad \text{if } a \geq 2\gamma, \\ 0, & \text{if } a < 2\gamma. \end{cases} \end{aligned} \tag{21}$$

We thus have $\alpha_i(x_i) > \alpha_j(x_i)$ irrespective of the level of income of representative x_i. In addition, if the diffusion parameter a is low relative to the displacement parameter γ, then the elected representative will invest in enforcement only in his/her region. If, however, the diffusion parameter

is relatively high, the elected representative will optimally invest in the two regions because of the convexity of the cost of enforcement functions. We thus need to consider two cases, depending on whether or not a is greater than 2γ. Abusing notation, we denote by $c_j(x_i) \equiv c_j\left(\alpha_i\left(x_i\right), \alpha_j\left(x_i\right)\right)$ the equilibrium number of criminals in region j when representative x_i of region i chooses the levels of enforcement. Using the equilibrium levels of enforcement in equation (21), we obtain the following equilibrium number of criminals

$$\begin{array}{lll} \text{If} \quad a \geq 2\gamma & \left\{ \begin{array}{l} c_i\left(x_i\right) = 0,5 - a^2 x_i - 4\gamma^2 x_i \\ \\ c_j\left(x_i\right) = 0,5 - a^2 x_i + 4\gamma^2 x_i, \quad i \neq j \end{array} \right. \\ \\ \text{If} \quad a < 2\gamma & \left\{ \begin{array}{l} c_i\left(x_i\right) = 0,5 - 0,5\left(a + 2\gamma\right)^2 x_i \\ \\ c_j\left(x_i\right) = 0,5 - 0,5\left(a^2 - 4\gamma^2\right) x_i, \quad i \neq j. \end{array} \right. \end{array} \tag{22}$$

Observe that in both cases, we have $c_i\left(x_i\right) < c_j\left(x_i\right)$. In other words, elected representatives always spend more in enforcement in their region of origin than in the other region, and this translates into the number of criminals in their region of origin being smaller than that in the other region.

5.2 Choice of Representatives

We now turn to the election stage. If the representatives are of types x_1 and x_2, the policy outcome in the second stage of the game will be $\left(\alpha_1\left(x_1\right), \alpha_2\left(x_1\right)\right)$ with probability $1/2$, and $\left(\alpha_1\left(x_2\right), \alpha_2\left(x_2\right)\right)$ with probability $1/2$. In the first stage, a political equilibrium is such that given the identity of the representative of the other region, the domestic representative is preferred by a majority of the domestic voters. Because of the linearity of individual welfare in x, the majority rule equilibrium coincides with the decision that is optimal for the median voter.

When the representatives in the central legislature are of type x_i and x_j, region i's median voter m_i has the following expected payoff function

$$\begin{array}{rcl} W_{m_i}^C\left(m_i, x_i, x_j\right) & = & \dfrac{1}{2}\left[\left(1 - c_i\left(x_i\right)\right) m_i - \dfrac{\alpha_i\left(x_i\right)^2 + \alpha_j\left(x_i\right)^2}{4}\right] \\ & + & \dfrac{1}{2}\left[\left(1 - c_i\left(x_j\right)\right) m_i - \dfrac{\alpha_i\left(x_j\right)^2 + \alpha_j\left(x_j\right)^2}{4}\right]; \quad i \neq j. \end{array} \tag{23}$$

The most preferred representative of region i's median voter m_i is given by

$$\begin{array}{lll} \text{If} \quad a \geq 2\gamma: & \dfrac{\partial W_{m_i}^C\left(m_i, x_i, x_j\right)}{\partial x_i} = 0 \Leftrightarrow \dfrac{1}{2}\left(a^2 + 4\gamma^2\right)\left(m_i - x_i\right) = 0, \\ \\ \text{If} \quad a < 2\gamma: & \dfrac{\partial W_{m_i}^C\left(m_i, x_i, x_j\right)}{\partial x_i} = 0 \Leftrightarrow \dfrac{1}{4}\left(a + 2\gamma\right)^2\left(m_i - x_i\right) = 0. \end{array} \tag{24}$$

In equilibrium, independently of x_j, we have $x_i = m_i$, for $i \in \{1, 2\}$.

Lemma 2 : *Under a centralized system with a non-cooperative legislature, the median voter in each*

region prefers a representative of his own type. Region i's median voter has a probability $1/2$ *of being the decision-maker for the two regions in which case the equilibrium levels of enforcement are*

$$\begin{aligned} \alpha_i^C(m_i) &= [a+2\gamma]\, m_i, \\ \alpha_j^C(m_i) &= \begin{cases} [a-2\gamma]\, m_i, & i \neq j \quad \text{if} \quad a \geq 2\gamma \\ 0 & \text{if} \quad a < 2\gamma. \end{cases} \end{aligned} \tag{25}$$

We can compare these equilibrium levels with the first best optimal levels of enforcement given in equation (5). First consider the equilibrium choice of enforcement by a representative for his/her region of origin.

$$\alpha_i^C(m_i) \underset{<}{\geqq} \widetilde{\alpha}_i \qquad \text{as} \qquad \frac{m_i}{m_j} \underset{<}{\geqq} \frac{0,5a-\gamma}{0,5a+\gamma}. \tag{26}$$

When $a < 2\gamma$, region i's representative will spend too much in enforcement in his/her region of origin relative to the optimal level independently of m_i and m_j. When $a \geq 2\gamma$, this will be also the case if region i is richer than region j. Further, even if $a \geq 2\gamma$ and region i is poorer than region j ($m_i < m_j$), region i's representative may spend too much in enforcement in his/her region of origin, although the reverse is also possible.

Consider now the equilibrium choice of enforcement by a representative of region i for region j.

$$\begin{aligned} &\alpha_j^C(m_i) \underset{<}{\geqq} \widetilde{\alpha}_j \quad \text{as} \quad \frac{m_i}{m_j} \underset{<}{\geqq} \frac{0,5a+\gamma}{0,5a-\gamma} \quad \text{if} \quad a \geq 2\gamma, \\ &\alpha_j^C(m_i) < \widetilde{\alpha}_j \quad \text{if} \quad a < 2\gamma. \end{aligned} \tag{27}$$

Again, the comparison depends on the relative size of all parameters m_i, m_j, a and γ. More precisely, when $a \geq 2\gamma$, region i's representative is likely to choose, for region j, a lower level of investment than the optimal level except if he/she is significantly more wealthier than region j's representative. When $a < 2\gamma$, region i's representative does not invest in the other region whether he/she is wealthier or poorer than region j's representative and so, there is under-investment in region j with respect to the optimal level. (Recall that we assumed $m_i/m_j < (\gamma + 0.5a)/(\gamma - 0.5a)$ when $a < 2\gamma$ and $m_i > m_j$, which implies that $\widetilde{\alpha}_j > 0$).

We can also compare equilibrium enforcement under centralization and decentralization. The following can be observed

$$\begin{aligned} &\alpha_i^C(m_i) = 2\alpha_i^D(m_i), \\ &\alpha_j^C(m_i) \underset{<}{\geqq} \alpha_j^D(m_j) \quad \text{as} \quad \frac{m_i}{m_j} \underset{<}{\geqq} \frac{0,5a+\gamma}{2(0,5a-\gamma)} \quad \text{if} \quad a \geq 2\gamma, \\ &\alpha_j^C(m_i) < \alpha_j^D(m_j) \quad \text{if} \quad a < 2\gamma. \end{aligned} \tag{28}$$

In words, if region i's median voter is the decision maker under centralization, he will choose a higher level of enforcement at home than under decentralization and in most cases, a lower level for the other region than that the other region would have chosen under decentralization (except if region i's representative is much more wealthier than region j's representative and $a \geq 2\gamma$).

The expected level of welfare of a voter with income x in region i under a centralized system is then

$$\begin{aligned} \text{If} \quad a \geq 2\gamma: \quad W_i^C(x) &= \frac{1}{2}\left[1 + a^2(m_1 + m_2) + 4\gamma^2(m_i - m_j)\right] x \\ &\quad -\frac{1}{4}\left(a^2 + 4\gamma^2\right)\left(m_1^2 + m_2^2\right); \quad i \neq j, \\ \text{If} \quad a < 2\gamma: \quad W_i^C(x) &= \frac{1}{2}\left[1 + 0,5(a + 2\gamma)^2 m_i + 0,5\left(a^2 - 4\gamma^2\right) m_j\right] x \\ &\quad -\frac{1}{8}(a + 2\gamma)^2\left(m_1^2 + m_2^2\right); \quad i \neq j. \end{aligned} \tag{29}$$

Finally, the expected level of welfare for region i's median voter, hence aggregate welfare in region i, can be computed as follows

$$\begin{aligned} \text{If} \quad a \geq 2\gamma: \quad W_i^C(m_i) &= 0,5m_i + \left(0,25a^2 + \gamma^2\right)\left(m_i^2 - m_j^2\right) + \left(0,5a^2 - 2\gamma^2\right) m_1 m_2; \quad i \neq j, \\ \text{If} \quad a < 2\gamma: \quad W_i^C(m_i) &= 0,5m_i + 0,125(a + 2\gamma)^2\left(m_i^2 - m_j^2\right) + 0,25\left(a^2 - 4\gamma^2\right) m_1 m_2; \quad i \neq j \end{aligned} \tag{30}$$

6 Constitutional Stage: Centralization or Decentralization

Suppose now that voters in the two regions have to decide on the best manner to deal with criminality. As is understood from previous sections, the technology of crime and crime enforcement can be described by parameters (a, γ). In practice, there are many types of crimes and associated crime enforcement, and they can be described by various combinations of the technological parameters. Suppose for now that all crime is of specific type (a, γ). Given this, we now wish to determine which system, between centralization and decentralization, would actually be chosen by voters to fight this specific type of crime. Thus, suppose that prior to the two-stage games (choice of representatives and choice of enforcement) described and analyzed in previous sections, voters in each region can decide in an initial constitutional stage, by majority voting, whether or not the regions should agree to a centralized system. We assume that for centralization to occur, it must be supported by a majority of voters in both regions. Focusing on subgame perfect equilibria, we now analyze the initial constitutional stage of this game, anticipating the outcomes of the subsequent two-stage games.

To determine the outcome of this constitutional stage, we need a measure, for each voter, of the difference in welfare under centralized and decentralized policy-making. Let $\Delta_i(x, m_i, m_j) \equiv W_i^C(x, m_i, m_j) - W_i^D(x, m_i, m_j)$ be that measure for a voter with income x in region i. Hence, this voter will vote for centralization (decentralization) if and only if $\Delta_i(x, m_i, m_j)$ is positive (negative).

In addition, in what follows, we need to make a distinction between $a < 2\gamma$ and $a \geq 2\gamma$ since this crucially affects the outcomes of the subsequent stages. Actually, this distinction parallels the difference between over-deterrence ($a < 2\gamma$) and under-deterrence ($a \geq 2\gamma$) with respect to the first best levels, when decisions are decentralized (see equation (16)). We first consider the simplest case, i.e. $a < 2\gamma$.

6.1 General Case With $a < 2\gamma$ (Low Diffusion, High Displacement)

Recall that in this case and under centralized policy-making, the central legislature of elected representatives will invest in enforcement activities only in the region that belongs to the minimum winning coalition. There is no investment in such activities in the other region. In this case, the welfare difference between centralization and decentralization, with the use of equations (17) and (29), is given for $i =\in \{1, 2\}$ by:

$$\Delta_i (x, m_1, m_2) = -0,125 (a + 2\gamma)^2 m_j^2, \quad i \neq j.$$

We then have the following Proposition.

Proposition 1 : *When $a < 2\gamma$, a majority of voters in both regions vote for decentralization irrespective of the asymmetry in median wealth between the two regions.*

In this situation, i.e. for any $a < 2\gamma$, there is always unanimity for decentralization. The reason is that under a centralized system, each region has a probability 1/2 of getting all the criminals since with probability 1/2 the representative of the other region is chosen as the agenda-setter, in which case, he will only invest in enforcement at home (see Lemma 2).

6.2 General Case With $a \geq 2\gamma$ (High Diffusion, Low Displacement)

In this case and using equations (17) and (29), the welfare difference between centralization and decentralization is given for $i =\in \{1, 2\}$ by:

$$\begin{aligned} \Delta_i (x, m_1, m_2) &= (0,5a - \gamma) [0,5a (m_1 + m_2) - \gamma (m_i - m_j)] x \\ &\quad - \left(0,25a^2 + \gamma^2\right) m_j^2 - 0,5 (0,5a - \gamma)^2 m_i^2, \quad i \neq j. \end{aligned} \tag{31}$$

Observe that these expressions are monotonically increasing in x. Because the coefficient of x differs in the two expressions, there must be a $\widetilde{x}_i$ corresponding to the income type of the voter who is indifferent between centralization and decentralization in region i. Thus, $\widetilde{x}_i$ is such that $\Delta_i (x, m_1, m_2) = 0$. Clearly, all voters x in region i with $x \geq \widetilde{x}_i$ prefer centralization to decentralization. Because single-peakedness holds, it must then be that a majority of voters in region i prefer centralization if and only if $\widetilde{x}_i \leq m_i$. We then have the following Lemma

Lemma 3 : *Under majority voting, centralization will occur in equilibrium if and only if* $\widetilde{x}_i \leq m_i$ *for* $i = \{1, 2\}$ *with*

$$\widetilde{x}_i = \frac{(0,5a - \gamma)^2 m_i^2 + \left(0,5a^2 + 2\gamma^2\right) m_j^2}{(a - 2\gamma)\left[0,5a\left(m_1 + m_2\right) - \gamma\left(m_i - m_j\right)\right]}; \qquad i \neq j. \tag{32}$$

Before analyzing the outcome of the constitutional stage for any (a, γ), we first consider particular cases to better understand the effects at work.

6.2.1 Case With No Displacement ($\gamma = 0$) and Heterogenous Regions

Consider the case in which $a > 0$ and $\gamma = 0$ so that $a > 2\gamma$ obviously holds. Assuming $m_1 \neq m_2$ and using (33), we have

$$\widetilde{x}_i = \frac{m_i^2 + 2m_j^2}{2\left(m_i + m_j\right)}; \qquad i \neq j. \tag{33}$$

In region i, all individuals with $x \geq \widetilde{x}_i$ vote for centralization while individuals with $x < \widetilde{x}_i$ vote for decentralization. Observe also that $\widetilde{x}_i$ depend only on m_1 and m_2 (and then do not depend on a). We then have the following Proposition.

Proposition 2 : *Assume no displacement occurs, i.e.* $\gamma = 0$. *Then, for any* $a > 0$, *centralization will occur in equilibrium if and only if the median income of the richer region is not larger than* $\left[1 + \sqrt{3}\right]/2$ *the median income of the poorer region.*

According to Lemma 3, centralization will occur in equilibrium if and only if both $\widetilde{x}_i \leq m_i$ for $i = \{1, 2\}$. Using (34), this inequality reduces to $\left(m_j - m_i\right)\left(m_i + m_j\right) \leq m_j\left(2m_i - m_j\right)$. Assume region 2 is the richer region, i.e. $m_2 > m_1$. In this case $\widetilde{x}_2 \leq m_2$ is obviously verified. To determine under which condition the inequality $\widetilde{x}_1 \leq m_1$ is satisfied let $m_2 = \kappa m_1$ with $\kappa > 1$. With this notation, the above inequality reduces to $2\kappa^2 - 2\kappa - 1 \leq 0$. It is immediately checked that this inequality is indeed negative for any $\kappa > 1$ if and only $\kappa \leq \left[1 + \sqrt{3}\right]/2$.

Put another way, a majority a voters in both regions will vote for centralization if and only if the difference in median wealth between the two regions is relatively small. When criminals cannot move from one region to the other, there is only one inter-regional externality stemming from local investment in deterrence activities. Policy centralization allows to internalize the diffusion externality but each median voter has only a probability 1/2 of being the policy-maker. Since the cost of law enforcement is shared equally between the two regions, a majority of voters vote for centralization in the two regions if and only if the asymmetry in wealth between the two regions is not too strong relative to the benefits of internalizing the diffusion externality.

If however, the difference in median wealth between the two regions is strong, decentralization will prevail. Suppose, for example, that in region 1, the distribution of wealth is skewed with most individuals having little or almost no wealth (i.e. m_1 is close to 0). In this case, we have

$$\begin{aligned} \lim_{m_1 \to 0} \widetilde{x}_1 &= m_2, \\ \lim_{m_1 \to 0} \widetilde{x}_2 &= \frac{m_2}{2}. \end{aligned} \tag{34}$$

In this case, a majority of voters in region 2 will vote for centralization while a majority of voters in region 1 vote for decentralization (since $m_1 \lll m_2$). So in equilibrium, centralization will not take place. This is because under decentralization, the level of enforcement in region 1 is almost equal to 0 (since most individuals are already very poor), while under centralized policy-making, this region has a probability 1/2 of not being the agenda-setter in which case it will have to pay 1/2 of the level of enforcement that is preferred by the median voter of the other region (who is actually much more wealthier). Voters in region 1 are afraid of this possibility and they therefore vote against centralization.

6.2.2 Case With Displacement $\gamma \neq 0$ and Homogenous Regions ($m_1 = m_2$)

We now examine the case in which $\gamma \neq 0$ (but $a \geq 2\gamma$) and we impose homogenous regions so that $m_1 = m_2 = m$. Using (33), $\widetilde{x}$ the income of the voter who is indifferent in both regions between centralized and decentralized policy-making is given by

$$\widetilde{x} = \frac{\left[3a^2 + 12\gamma^2 - 4a\gamma\right] m}{4a\left(a - 2\gamma\right)}. \tag{35}$$

The derivative of $\widetilde{x}$ with respect to a is given by

$$\frac{\partial \widetilde{x}}{\partial a} = \frac{\left[12\gamma^2\left(\gamma - a\right) - a^2\right] m}{2\left[a\left(a - 2\gamma\right)\right]^2} < 0. \tag{36}$$

Therefore, a higher a (i.e. a higher diffusion effect of law enforcement) translates into a voter who is indifferent between centralized and decentralized policy-making with a lower income and, therefore, into a higher proportion of voters who prefer a centralized system (provided that $a \geq 2\gamma$). When the parameter reflecting diffusion goes to infinity, we have $\widetilde{x} = (3/4)m$. In that case, all voters with income higher than 3/4 of the median income prefer a centralized system and therefore a majority of individuals in both regions will vote for centralized policy-making. On the other extreme, when $a = 2\gamma$, $\widetilde{x}$ goes to infinity and all voters in both regions prefer a decentralized system.

Similarly, the derivative of $\widetilde{x}$ with respect to γ is given by

$$\frac{\partial \widetilde{x}}{\partial \gamma} = \frac{\left[12\gamma\left(a - \gamma\right) + a^2\right] m}{2a\left(a - 2\gamma\right)^2} > 0. \tag{37}$$

Therefore, a higher γ (i.e. more potential for displacement) translates into a voter who is indifferent between centralized and decentralized policy-making with a higher income and, therefore, into a higher proportion of voters who prefer a decentralized system (provided that $\gamma \in [0; a/2]$). When the displacement parameter goes to zero, we have again $\widetilde{x} = (3/4)m$ and so all voters with income higher than 3/4 of the median income prefer a centralized system and therefore a majority of individuals in both regions will vote for centralized policy-making. At the other extreme, when $\gamma = a/2$, $\widetilde{x}$ goes to infinity and all voters in both regions prefer a decentralized system.

To summarize, the lower the spatial displacement effect and the higher the diffusion effect of law enforcement, the higher the proportion of voters that will vote for centralization. Following Lemma 3, centralization will occur in equilibrium if and only if $\widetilde{x} \leq m$ with $\widetilde{x}$ given by (36). This inequality reduces to $12\gamma^2 + 4a\gamma - a^2 \leq 0$. We can thus establish the following Proposition.

Proposition 3 : *Suppose that $a > 2\gamma$ and that the two median voters are equally wealthy, i.e. $m_1 = m_2 = m$, then a majority of voters in both regions will vote for centralization (respectively decentralization) if and only if $a \geq \widetilde{a}(\gamma)$ (respectively $a < \widetilde{a}(\gamma)$) with $\widetilde{a}(\gamma) = 6\gamma$.*

This result obtains because under a centralized system, each region's representative has a probability one half of *not* being the decision-maker. In that situation, the other region's representative overinvests in his/her region and underinvests in enforcement in the other. As the diffusion effect of law enforcement increases, this policy is less detrimental for the region that is not the decision-maker. This induces the two regions to prefer a centralized system. If, however, the diffusion effect is low relative to the displacement effect of law enforcement (i.e. γ is relatively large), both regions will vote for decentralization. Note that the case in which γ is large is precisely that in which the externality due to the mobility of criminals is large and in which a well-functioning central government would prove useful.

6.2.3 Different Types of Crimes

We now turn to the most general case when $a \geq 2\gamma > 0$. According to Lemma 3, centralization will occur in equilibrium if and only if a majority of voters in both regions vote for centralization, i.e. if and only if $\widetilde{x}_i \leq m_i$ for $i = \{1, 2\}$ with $\widetilde{x}_i$ given by (33). The two inequalities reduce to $a \geq \widetilde{a}_1(\gamma, m_1, m_2)$ and $a \geq \widetilde{a}_2(\gamma, m_1, m_2)$ with $\widetilde{a}_1(\gamma, m_1, m_2)$ and $\widetilde{a}_2(\gamma, m_1, m_2)$ given by

$$\begin{aligned} \widetilde{a}_1(\gamma, m_1, m_2) &= \frac{\gamma\left[2m_1^2 + 5,66m_2\sqrt{m_1^2 - 0,5m_2^2}\right]}{m_1^2 + 2m_1m_2 - 2m_2^2}, \\ \widetilde{a}_2(\gamma, m_1, m_2) &= \frac{\gamma\left[2m_2^2 + 5,66m_1\sqrt{m_2^2 - 0,5m_1^2}\right]}{m_2^2 + 2m_1m_2 - 2m_1^2}. \end{aligned} \tag{38}$$

Suppose now that region 1 is poorer than region 2, i.e. $m_2 > m_1$. If we denote $m_2 = km_1$ with $k > 1$, the above expressions can be written as follows

$$\begin{aligned} \widetilde{a}_1(\gamma, k) &= \frac{\gamma\left[2 + 5,66k\sqrt{1 - 0,5k^2}\right]}{1 + 2k - 2k^2}, \\ \widetilde{a}_2(\gamma, k) &= \frac{\gamma\left[2k^2 + 5,66\sqrt{k^2 - 0,5}\right]}{k^2 + 2k - 2}. \end{aligned} \tag{39}$$

Observe first that both expressions are linear with respect to γ. Second, $\widetilde{a}_2(\gamma, k)$ is strictly positive for any $k > 1$ and $\widetilde{a}_1(\gamma, k)$ is also strictly positive if and only if $1 + 2k - 2k^2 > 0$. If however, $1 + 2k - 2k^2 < 0$, then $\widetilde{a}_1(\gamma, k) < 0$ and $\widetilde{x}_1 > m_1$ for any couple (a, γ). In this case, a majority of voters in region 1 vote for decentralization irrespective of the technology of crime enforcement. Therefore, there exists a threshold value of the parameter reflecting the diffusion externality above (below) which centralization (decentralization) is preferred by a majority of voters in region 1 if and only if $1 + 2k - 2k^2 > 0$ or $k < \left[1 + \sqrt{3}\right]/2$.[8]

Furthermore, calculating the derivative of $\widetilde{a}_1(\gamma, k)$ with respect to k yields

$$\frac{\partial \widetilde{a}_1(\gamma, k)}{\partial k} = \frac{\gamma\left[4\left(2k - 1\right) + 5.66\left(1 - 0.5k^2\right)^{-1/2}\left(1 + k^2 - k^3\right)\right]}{\left[1 + 2k - 2k^2\right]^2}. \tag{40}$$

Since $1 + k^2 - k^3 > 0$ for any $k < \left[1 + \sqrt{3}\right]/2$, this derivative is unambiguously positive. Calculating the derivative of $\widetilde{a}_1(\gamma, k)$ with respect to k yields

$$\frac{\partial \widetilde{a}_2(\gamma, k)}{\partial k} = -\frac{\gamma\left[4k\left(2 - k\right) + 5.66\left(k^2 - 0.5\right)^{-1/2}\left(k^3 + k - 1\right)\right]}{\left[k^2 + 2k - 2\right]^2}. \tag{41}$$

This derivative is unambiguously negative for any $k < \left[1 + \sqrt{3}\right]/2$. Since $\widetilde{a}_1(\gamma, k) = \widetilde{a}_2(\gamma, k)$ when $k = 1$, we can conclude that $\widetilde{a}_1(\gamma, k) \geq \widetilde{a}_2(\gamma, k)$ for any $k \in \left[1; \left[1 + \sqrt{3}\right]/2\right[$. Then, a majority of voters in both regions will vote for centralization if and only if $a > \widetilde{a}_1(\gamma, k) \geq \widetilde{a}_2(\gamma, k)$. The analysis above is summarized as Proposition 4.

Proposition 4 : *Suppose that $a > 2\gamma > 0$ and that $m_2 = km_1$ with $k > 1$, then*

(i) *If the median wealth asymmetry is relatively strong, i.e. if $k > \left[1 + \sqrt{3}\right]/2$, a majority of voters in the poorer region vote for decentralization irrespective of the levels of the diffusion effect and displacement effect of law enforcement given by (a, γ) and so, decentralization occurs in equilibrium.*

[8] The term in $\sqrt{}$ in the denominator of $\widetilde{a}_1(\gamma, k)$ must also be positive in order to have a real positive number. This is the case for any $k < \left[1 + \sqrt{3}\right]/2 < \sqrt{2}$.

(ii) *If the median wealth asymmetry is not too strong, i.e. if* $k < \left[1+\sqrt{3}\right]/2$, *then centralization occurs in equilibrium if and only if a majority of voters in the poorer region vote for centralization, i.e. if and only if* $a \geq \widetilde{a}_1(\gamma, k)$ *with* $\widetilde{a}_1(\gamma, k)$ *given by* (40), *otherwise decentralization occurs. The threshold value of the diffusion effect* $\widetilde{a}_1(\gamma, k)$ *is increasing both in* γ *and in* k *and so, the greater the displacement effect of law enforcement (the greater* γ*) or the greater the median wealth asymmetry (the greater* k*), the less likely centralization will occur in equilibrium.*

Observe that the critical value of the median wealth asymmetry above which decentralization is always preferred by a majority of voters in the poorer region is identical to that obtained when there is no displacement effect, i.e. when $\gamma = 0$ (see Proposition 2). However, in contrast with the case of no displacement, a value of k below this critical level is not sufficient to yield centralization of law enforcement as an equilibrium outcome when $\gamma > 0$. Indeed, with $k < \left[1+\sqrt{3}\right]/2$, centralization is preferred by a majority of voters in the poorer region, and in turn in the richer region, if and only if the diffusion effect relative to the displacement effect of law enforcement is sufficiently large, i.e. if and only if $a \geq \widetilde{a}_1(\gamma, k)$. If, however, $\widetilde{a}_2(\gamma, k) \leq a \leq \widetilde{a}_1(\gamma, k)$ or $a \leq \widetilde{a}_2(\gamma, k)$, a majority of voters in the poorer region or in both regions prefer decentralization to centralization so that, in equilibrium, decentralization occurs.

To better understand Proposition 4, note that the decision-maker, under centralization, chooses a level of enforcement in deterrence activities for both regions that is increasing in a. However, the decision-maker chooses a level of enforcement that is skewed towards his/her own region and, in addition, that is increasing in γ at home and decreasing in γ abroad (see equation (25)). Hence, the greater a relative to γ, the less detrimental is the centralized system for the region whose representative is not the decision-maker. If a is sufficiently large, a majority of voters in both regions then vote for centralization so as to internalize the positive externality of law enforcement. If, however, a is not sufficiently large relative to γ, then one region or both prefer decentralization since a relative high mobility of criminals exacerbates the selfishness of the minimum winning coalition. Furthermore, the poorer region is more disadvantaged than the richer region when its representative is outside the winning coalition. The reason is that the cost of law enforcement is equally shared between the two regions. Therefore, individuals in the poorer region are less likely to vote for centralization than those in the richer region. Actually, the greater the median wealth asymmetry is, the stronger the opposition at the constitutional stage between the individuals of the two regions and the less likely centralization will occur.

We can summarize, for various combinations of (a, γ), the choice of each region between centralization and decentralization with the help of Figure 1.

— FIGURE 1 HERE —

In Figure 1, because $m_2 > m_1$, the locus $\widetilde{a}_1(\gamma, k)$ lies above the locus $\widetilde{a}_2(\gamma, k)$, which itself lies above the locus $a = 2\gamma$, since we assumed $a \geq 2\gamma$. The set of parameters (a, γ) for which centralization is preferred is larger for region 2 than for region 1. As centralization occurs only if both regions agree, it follows that centralization of enforcement will only be accepted at the constitutional stage for crimes with (a, γ) that belong to the region above the $\widetilde{a}_1(\gamma, k)$. As explained above, for values of a that are large relative to γ, centralization is preferred by a majority of voters in both regions while the reverse holds for values of a that are low relative to γ. For intermediate values of a (relative to γ), centralization is preferred by a majority of voters in the region 2, but decentralization is preferred by a majority of voters in region 1. In this last case, decentralization is the equilibrium. Thus, our prediction is that at the constitutional stage, centralization of enforcement will occur only for crimes which entail a relatively high level of diffusion and a relatively low level of displacement.

7 Conclusion

A feature of crime enforcement (in particular for property crime) is that it is typically decentralized. This is despite the fact that there are interjurisdictional externalities which would justify the centralization of crime enforcement if governments were benevolent. However, if decisions are made by a legislature of locally elected representatives, as is typically the case in centralized systems, centralization has also a drawback. This is because the minimum wining coalition of representatives may distort policies in its favor and against the members outside the majority. Hence, when voting over the (de)centralization issue, voters in each region trade-off the economic benefits of internalizing externalities and the political costs of being outside the majority of the legislature with positive probability. The political choice of centralized and decentralized law enforcement crucially depends on the extent of the externalities. For example, if the negative - spatial displacement - externality is sufficiently large relative to the positive - diffusion of benefits - externality, a majority of voters in both regions vote for decentralization irrespective of the respective wealths of the two regions. Centralization, however, may occur in equilibrium only if both the parameter reflecting the displacement effect and the asymmetry in median wealth between the two regions are sufficiently low.

These results provide reasons why law enforcement is more often decentralized than we would expect. Of course, this is very much a first step in understanding the question of the decentralization versus centralization of law enforcement from a political economy perspective. A limitation of our analysis is that we have restricted our analysis to the extreme cases where law enforcement is either fully centralized or fully decentralized. In reality, both centralized and decentralized governments

invests in law enforcement, even though more investments in deterrence activities is undertaken at the local level than at the central level. Another limitation of our analysis is that we have assumed that there is a political failure at the central level but not at the local level. However, in general, the process of decision-making at the local level is also subject to political conflicts between several elected local representatives. These considerations require an analysis more subtle than the one developed in this paper in order to improve our understanding of the institutional aspects of law enforcement from a political economy perspective.

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Table 1:

Police Protection Expenditure and Employment by Level of Government, Canada

	Local government	*Provincial Government*	*Federal government*	*Total*
Expenditure, 2005 [millions of CAN $]	5 298 (57.0%)	2 092 (22.6%)	1 891 (20.4%)	9 282 (100%)
Employment, 2006	36 739 (60.4%)	9 336 (15.3%)	14 791 (24.3%)	60 866 (100%)

Source: Statistics Canada (2006), "Police Resources in Canada, 2006", by Julie Reitano, Minister of Industry, Catalogue No 85-225-XIF, November.

Table 2:

Police Protection Expenditure and Employment by Level of Government, USA

	Local government	*State Government*	*Federal government*	*Total*
Expenditure, 2003 [millions of US $]	57 503 (64.6%)	11 144 (12.5%)	20 422 (22.9%)	89 069 (100%)
Employment, 2003	856 396 (76.5%)	105 933 (9.5%)	156 607 (14.0%)	1 118 936 (100%)

Source: U.S. Department of Justice (2006), "Justice Expenditure and Employment in the United States, 2003", *Bureau of Justice Statistics Bulletin*, Office of Justice Programs, NCJ 212260, April.

Figure 1: **The choice between centralization (C) and decentralization (D)**