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The Firm and the self-enforcing dynamics of crime and protection

Eva Kløve Halvor Mehlum

Abstract

We model the symbiotic relationship between criminals and a partnership of protection providers - the Firm. In the absence of state authority, insecurity and crime generate a demand for protection. When the protection providers themselves are recruited among criminals, the prospect of graduating to the Firm magnifies the incentive for violent crime. More violence in turn increases the income of the protection providers. The result is a violence multiplier. Combining elements from tournament and rent-seeking theory, we derive results that contrast with standard results from the rent-seeking literature. For example, a decrease in the cost of violence increases violence more than *pari passu* and increases the value of being a criminal. The violence multiplier also generates an incentive for the protection providers to welcome new partners into the Firm. This is a crucial premise in explaining the viability of many violent structures. We confirm the empirical relevance of key elements of our framework by exploring unique data on incarcerated youth in South Africa.

JEL: H1, K0 ,L8
Keywords: Organized crime, violence

1 Introduction

In an ideal Weberian world, the state has monopoly on legitimate use of violence in the enforcement of its order[1]. This monopoly includes a public police and a military. Over the last two decades, however, a massive expansion in private provision of security has taken place, which has both complemented and substituted many of the tasks traditionally performed by the public police. The degree to which such private policing is regulated by the state varies considerably between countries.

This expansion in private security has been the largest in countries in transition to a market-based economy where law enforcement has been weak, such as post-communist Eastern Europe, Latin America and some African countries. Such contexts may attract illicit private security companies that take advantage of high levels of violence and social unrest to make a profit. We model how violent gangs compete for recruitment to a partnership of protection firms (hereafter called the Firm), which collects protection fees from its clients. This results in a violence multiplier effect, as the supply of violence creates its own demand.

We show how a symbiotic relationship between crime and protection produces results that contrast with some well-established results from the rent-seeking literature. In the presence of the violence multiplier, decreasing cost of violence and increased competition between violent entrepreneurs may actually be beneficial to all parties. In addition, such violent structures may in fact be stable in the long run.

Private security companies differ from the public police force in ways that may matter for the level and pattern of crime and violence in a given society. One important aspect is accountability; whereas the police are accountable to government and therefore to the public at large, the private security industry is accountable to the clients who contract it. The implication may be that only the rich are protected - as observed for instance in Jamaica and South Africa where poorer areas are left to themselves, resulting in vigilante groups or gang members taking the role as protectors. Another aspect is that private companies may face perverse incentives not felt by the public police. A private security company may benefit from higher levels of violence and crime, as this is likely to increase the number of clients or their willingness

[1]From Max Weber's lecture "Politics as a Vocation" (1918). URL:http://anthropos-lab.net/wp/wp-content/uploads/2011/12/Weber-Politics-as-a-Vocation.pdf.

to pay for protection, and as such increase the company's profits. This may tempt the company to adopt provocative strategies rather than strategies that minimise violence. It may even create incentives to deliberately induce violence to increase profits, as in our model.

The private security industry in South Africa is perhaps the largest in the world, with an annual turnover of USD 7 bn in 2011[2]. From 1997 to 2010, the number of registered security businesses increased by almost 70 percent, and the number of registered security officers almost tripled to reach about 400,000 officers in 2010. Although the number of sworn police officers also grew in the period, they lagged far behind with a growth of 37 percent. In 2010, security officers outnumbered the police by 2.5 to 1, whereas thirteen years before they were at par (South Africa Survey Online 2010/11). In addition to the registered security officers, there are large numbers of unregistered ones; some set numbers as high as 200,000[3].

Eighteen years after the first democratic election in 1994, South Africa is still a country in transition where vast challenges remain. Unemployment is severe[4], there is extreme inequality[5], and violent crime is rife. The overall rate of serious crime has gone down by 20 percent since 1994, yet the daily incidence of the 20 most serious crimes have increased by three percent during the same period (South Africa Survey Online 2010/11). South Africa's murder rates of 36 in 100,000 people (2008), only compares with countries such as Colombia, Burundi and the Democratic Republic of Congo. In most developed countries the murder rate lies between 0.5 and 2.0.

The World Bank Enterprise Survey of Business Managers asks manufacturing firms about crime-related costs of doing business. This shows that 76.4 percent of firms pay for security in South Africa, relative to 57 percent worldwide. Almost 40 percent of firms identify crime, theft and disorder as a major constraint.

There are numerous causes for the growth in the private security industry.

[2]http://pressportal.co.za/industry-and-real-estate/item/6026-the-private-security-industry-in-south-africa.html, accessed January 2014.

[3]http://pressportal.co.za/industry-and-real-estate/item/6101-challenges-in-the-south-african-private-security-industry.html, accessed January 2014.

[4]The unemployment rate is 24.9 percent, increasing to 37.8 percent when including so-called discouraged job-seekers, i.e. those willing to work but who have given up searching (Labour Force Survey, 2nd quarter of 2012, Statistics South Africa).

[5]The Gini index is 63.1, the national poverty rate is 17.4 percent (World Bank data from 2009 and 2006 respectively).

Extreme inequality, unemployment and poverty coupled with crime are important candidates. Yet weak public law enforcement, common for countries in transition, might be a key factor that has enabled this industry to grow with such force. A vacuum in law enforcement does not only attract legitimate private security companies but also illicit ones, along with mafia-like organisations or syndicates. In South Africa, there is a wide range of protection providers, from organised crime groups via vigilante groups, to large legal private security providers. Somewhere in this spectrum is Mapogo a Mathamaga, a security provider with 60,000 clients that charges a yearly fee to protect businesses against crime. They pride themselves in their efficiency by the threat, or use, of 'African medicine'.

Inspired by these observations we model the symbiotic relationship between criminal gangs and protection firms. The private protection discussion is related to Dixit (2004) and Anderson and Bandiera(2005) who both studies private protection and compares the case of free entry versus monopoly pricing among protection providers. Here, we concentrate on the monopoly case and focus on the violent competition that arises as a result of gangsters competing to be recruited to the monopolist - The Firm. We envisage a hierarchy with crime rents and advancement prospects at the bottom, and protection fees at the top. In this respect our model relates to Mehlum, Moene and Torvik (2002) and Levitt and Venkatesh (2000). Levitt and Venkatesh find that the foot soldiers in the gang earn much less than officers and leaders, and that officers are recruited in a tournament. Underlying our analysis is the idea that violence goes hand in hand with protection. This finds support in the mafia literature. Gambetta, who defines the mafia as "a specific economic enterprise, an industry which produces, promotes, and sells private protection", states explicitly that the characteristics of protection mean that "whenever competition emerges, violence must follow almost automatically" (Gambetta 1993). Illegality reinforces the need for violence - the protectors are protecting criminals who are already challenging state prohibition and therefore might be less easily deterred than legal businessmen. In a similar manner, violence is key in our model for a gangster to ensure he wins the contest and graduates to become a partner of the Firm.

More generally, our work is inspired by the literature on weak states and mafias and extortion, in particular Fiorentini and Peltzman (1995), Grossman (2001), Konrad and Skaperdas (1997, 1998) and Skaperdas (1992, 2001). We also build on the theory of rent seeking with Tullock's (1967, 1980) early contributions and Skaperdas (1996) as another significant reference.

Contrary to previous and well-established results from the rent-seeking literature, we find that 1) tougher competition between criminal gangs benefit all of them; 2) more competitors may actually also benefit all gangs; and 3) restricting graduation to the Firm may hurt the insiders to the Firm. These results all hinge on the violence multiplier obtained in the model; increased violence generates a need for protection for producers. This raises the profits for the Firm, and therefore increases the value of graduation for the criminals. The upshot is more violence, and so the cycle continues.

To document the relevance of our framework, we use a unique data set on youth offenders in South Africa to identify the effect of gang membership on violence. The data was collected by the Centre for Justice and Crime Prevention (CJCP) in 2006, and includes information about almost 400 incarcerated youth, of which a little more than a quarter belonged to a gang prior to incarceration. This allows us to compare gang members with criminals who do not belong to a gang, avoiding some of the common selection issues related to comparing criminal with non-criminal individuals. Our results indicate that the gang structure indeed promotes violence.

2 The Model

There is a partnership of protection providers, the Firm, at the top of the hierarchy in the violent economy. The Firm is made up of a number of equal protection firms, and it monitors and has the capacity to control most elements of the illegal economy. The Firm does not always exercise its force, however, as it is well served by having a number of lesser gangsters who generate the need for protection by the Firm itself. In this model we look at the "industrial organisation" of such a violent economy.

The violent economy consists of (legal) producers as well as gangsters. Gangsters specialise either in ordinary crime, or in protection provision as partners of the Firm. We call the former group "criminals" and the latter group "partners". The Firm collects protection money from the producers of the economy. The amount that the Firm can extract depends on the extent of violence in society. An increase in violence exerted by criminals increases the demand and the willingness to pay for protection.

In each period there is entry of χ new gangsters and exit of gangsters by

the probability θ. The steady state number of gangsters is therefore

$$\chi = N\theta \iff N = \frac{\chi}{\theta} \tag{1}$$

At each point in time, N_c of these are operating as criminals while N_p are partners of the Firm. All gangsters enter as criminals. Over time they may or may not end up as partners of the Firm. A criminal that has become a partner of the Firm stays a partner until he exits with the common exogenous probability θ.

2.1 The returns to criminals

Criminals compete over rents and over the prospect of graduation to become a partner of the Firm. All gangsters are assumed equal in size and force, and their size and force are exogenous to the model. It makes sense to think of them as individual bosses, surrounded by a crew of loyal individuals.

The present value of being a criminal is denoted V_c while the present value of being a partner in the Firm is denoted V_p. For criminals, the per period rent from crime is denoted R while the value of graduating to become partner is given by the difference in present values $(V_p - V_c)$. The crime rent accrues from illegal activities like trafficking and drugs trade.[6] The share of R that each criminal obtains is given by the relative effort of each criminal π_c, determined by the violence created by each gangster y_c relative to total violence Y.

$$\pi_c = y_c/Y \tag{2}$$

As we will derive below, the use of effort y_c will be balanced against has an opportunity cost γy_c.

The probability of graduation p_c is also determined by the extent of violent record. The reason is that, as we will elaborate below, the credibility of the Firms guarding services builds on the violent track record of its partners. The firm will therefore invite partners with an established violent record. Graduation is an attractive proposition for the gangsters as the outside option is to remain a criminal.[7] The probability of graduation then also

[6] As will be clear below; even though criminals pose a threat to formal producers, in equilibrium R does not contain return from stealing from these producers.

[7] We assume that starting a competing Firm is a too costly and risky option.

increases with violence and for simplicity we assume that it is determined by π_c, multiplied by a constant α. The parameter α is the graduation intensity. Hence relative violence determines both the share of R that each criminal obtains, and the probability of graduation.

$$p_c = \pi_c \alpha \tag{3}$$

Here $\alpha = 1$ would imply that one prospective protection provider graduates per period. It then follows that the individual value of being a criminal is given by (4) and the aggregate surplus from crime is given by (5).

$$V_{c,t} = \pi_{c,t} Z_t - \gamma y_{c,t} + (1-d) V_{c,t+1} \tag{4}$$

$$\text{where } Z_t = R + \alpha(1-d)(V_{p,t+1} - V_{c,t+1}) \tag{5}$$

In this notation Z is the prize that each criminal fights for in each period. It consists of the per period rent R *and* the expected value of graduation. The parameter d is the discount rate. It reflects both time preferences and the exogenous probability of dying θ. The parameter γ is the unit cost of effort.

Focusing on symmetric and stationary equilibria we can suppress time subscripts and individual criminal subscripts. In a symmetric equilibrium

$$\pi_c = \frac{1}{N_c} \tag{6}$$

It follows, when combining (2) and (3) with (4) and (5), that

$$V_c = \frac{\pi_c}{\pi_c \alpha(1-d) + d}(R + \alpha(1-d)V_p - \gamma Y) \tag{7}$$

$$Z = \frac{1}{\pi_c \alpha(1-d) + d}(d(R + \alpha(1-d)V_p) + (1-d)\gamma Y \pi_c \alpha) \tag{8}$$

From the rent seeking literature, e.g. Skaperdas (1996), we know that with the particular ratio sharing rule[8] given by (2), then in the symmetric equilibrium total fighting is

$$Y = \frac{1}{\gamma}(1 - \pi_c) Z \tag{9}$$

[8] Each criminal maximizes $(y_c/Y)Z - \gamma y_c$ with respect to own fighting y_c, which gives the first order condition

$$\frac{Y - y_c}{Y^2} Z - \gamma = 0 \iff \frac{1 - \pi_c}{Y} Z - \gamma = 0$$

and (9) follows. The last expression follows from the symmetry requirement $\pi_c = 1/N_c$.

showing, combined with (6), that the opportunity cost of effort, summed over all criminals, γY, is equal to $(N-1)/N \times Z$. Hence, as N_c increases the opportunity cost all but wastes the total prize.

As we focus on highly violent societies, with weak law enforcement, we will abstract from legal law enforcement. However, it is worth noting at this stage that an improvement in law enforcement could increase the cost of effort γ and lower the rent from crime R both lowering violence.

The exact effect is more involved[9], however, as the violence not only determines the sharing of rents between criminals; it also determines the private agents willingness to pay for protection by the Firm and we move to this next.

2.2 The return to the Firm

The productive formal sector has high value and is willing to pay whatever it takes to avoid a criminal attack. In equilibrium they will consequently not be attacked. The sufficient safeguarding will depend on the extent of violence. The assumption is that the criminals will direct their violent capacity towards any producer with insufficient protection. Preventing an attack can be done in two ways; hiring guards from a formal regulated guarding company, or paying for the services of the Firm.

The regulated guarding business is assumed to be competitive with the cost of one guard being fixed and exogenous. The number of guards needed by one single property in order to prevent an attack, when all other producers also prevent attacks, is assumed to increase linearly with criminal violence Y. When relying on regulated protection providers a property owners' outlay for protection will be ωY. The amount ωY therefore establishes the maximum willingness to pay for alternative protection.

The Firm provides this alternative protection. They build their operation on the violent reputation of their partners, but with an otherwise legitimate facade. Rather than getting their hands dirty by engaging in violent competition with the formal guarding companies or by engaging in direct extortion, the Firm simply undercuts the price of the formal sector. Building on reputation and fear, protection by the Firm is absolute. We assume that the fear factor is determined independently of the number of partners in the

[9]The model does therefore not exhibit the familiar homogeneity property between R and γ. Thanks to a referee for pointing this out.

Firm, while the capacity of the Firm depends on the number of partners. Yet, the nature of the Firm's protection causes an heterogeneity in the manning requirement between various types of property. For some properties the company sticker is enough, for other properties some patrolling is needed in addition. The Firm may be more effective in protecting a shop from robbery than in protecting a private home from burglary. In the case of shop robbery the culprit will typically be observed and eventually tracked down by the Firm, hence a sticker should be sufficient protection. Preventing home burglary may require spending time paroling.

Knowing where it is most cost effective, the Firm will price its services like a monopoly faced with a competitive fringe. It will set a price that just undercuts the regulated suppliers. The Firm will start by supplying the owners of properties where it is most cost-effective and work its way downward until the capacity constraint, given by N_p, is met. As a result the average revenue of the Firm is decreasing in the number of partners. The Firm will supply effective protection for F number of properties. In equilibrium F is given by

$$F = \beta N_p^{\rho} \text{ when } N_p \geq 1 \text{ and } F < M \tag{10}$$

Here $\beta > 0$ is a technological constant while the decreasing returns feature, caused by the varying cost effectiveness, is captured by the parameter $0 < \rho < 1$. We also restrict the domain at unity, assuming at least one partner of the Firm.

The return to the Firm is thus $F\omega Y$. The income per partner of the Firm is therefore

$$\frac{F}{N_p} = \hat{\beta} Y \tag{11}$$

$$\hat{\beta} \equiv \frac{\omega\beta}{N_p^{1-\rho}} \tag{12}$$

For a single partner of the Firm, the value of partnership is consequently

$$V_p = \hat{\beta} Y + (1-d)V_p \iff V_p = \frac{1}{d}\hat{\beta} Y \tag{13}$$

The equations (7) - (9) together with (13) simultaneously determine V_c, Z, Y, and V_p. We restrict our attention to cases where graduation is attractive.

For this to be the case we need $V_p > V_c$. By setting $V_p = V_c$ in the equations above, graduation is attractive when:

$$p_c^2 \frac{Y\gamma}{1-p_c} < \hat{\beta} Y_t \Rightarrow \frac{\omega\beta}{\gamma} > \frac{\alpha^2}{N_c} \frac{{N_p}^{1-\rho}}{N_c - \alpha} \tag{14}$$

where the last expression follows from using (3), (6) and 12.

2.3 The violence multiplier

When combining (13) with (8) and (9), we see that an exogenous increase in crime rents R raises total violence Y. Higher levels of violence sets off a self-enforcing process whereby the return from graduation increases, raising violence even further. This is the violence multiplier. In order to get an exact expression for this multiplier we combine (8), (9) and (13), which yields

$$Y = \frac{d(1-\pi_c)R}{d\gamma - \alpha(1-d)\left((1-\pi_c)\hat{\beta} - \pi_c^2\gamma\right)} \tag{15}$$

$$Y = \frac{1}{1-A}(1-\pi_c)\frac{R}{\gamma} \tag{16}$$

$$A \equiv \frac{\alpha(1-d)}{d\gamma}\left((1-\pi_c)\hat{\beta} - \pi_c^2\gamma\right) > 0 \tag{17}$$

where the multiplier is $1/(1-A)$. Expression (16) reveals the main mechanisms. The sign of A follows from (14).

Proposition 1. *The graduation prospect increases the violence resulting from a given crime rent.*

Proof. From (16) it follows directly that any positive α generates more violence compared to a case where $\alpha = 0$, in which case the relationship between rents and violence simply is

$$Y = (1-\pi_c)\frac{R}{\gamma} \tag{18}$$

The graduation prospect therefore increases violence compared to the case without any graduation prospect.[10] This is not surprising as the graduation prospect simply gives the gangsters more to fight for. The consequences of the graduation mechanism becomes more involved, and we witness the *violence multiplier*, when graduation is seen in connection with other incentives for violence.

Proposition 2. *An exogenous increase in violence initiates a self-enforcing spiral whereby total violence increases by more than it would without graduation. This multiplier effect is stronger the higher the graduation flow and the lower the discount rate.*

Proof. Recall equations (16) and (18). An increase in violence may come about by an increase in the rents R or by a lowering of the cost of violence, γ. The total effect on violence is determined by the multiplier $1/(1-A)$. It is readily seen that the value of the multiplier increases when the graduation flow α increases or the discount rate d decreases.

The presence of a violence multiplier modifies well-known results from the rent-seeking and conflict literature. This becomes clear when considering a decrease in the cost of violence.

Proposition 3. *A decrease in the cost of violence increases violence more than pari passu and increases the value of being a criminal.*

Proof. From (16) it follows that when $\alpha = 0$ there is a unit elasticity relationship between R and Y. When $\alpha > 0$, however, A will increase as γ decreases. Therefore Y will increase relatively more than the reduction in γ.

Increased violence, due to cost reduction, benefits the gangsters. Hence, the equilibrium level of violence in itself positively affects the return to gangsters. The reason is that violence is more than the waste associated with sharing rents; it also generates increased willingness to pay for protection. This effect is largely external to each gangster, and this externality determines how changes to the graduation intensity affect the return to the Firm partners.

[10] The equation 18 also shows that Y is homogeneous in degree zero in γ and R only when the graduation is shut down ($\alpha = 0$).

2.4 Behaviour of the Firm

We have so far worked under the assumption that the graduation intensity α is an exogenous parameter. However, we have seen that α affects both violence and the return to criminals. In the long run, therefore, an increase in α will also affect the number of partners of the Firm. The graduation intensity α determines the inflow of partners per unit of time. In equilibrium the inflow must be equal to the outflow. Formally

$$\theta N_p = \alpha \iff N_p = \frac{\alpha}{\theta} \tag{19}$$

Hence there is a unit elasticity relationship between N_p and α. With an exogenous exit probability θ, a doubling in α will double the number of partners of the Firm. An increase in α therefore has a positive effect on the return to the partners of the Firm as violence increases, but has a negative effect on the return as the number of partners increases and profits consequently are diluted.

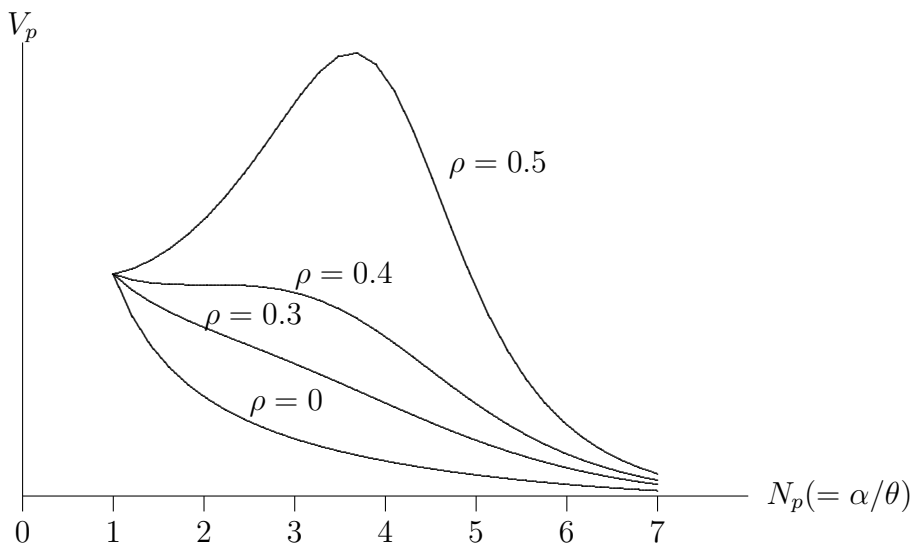
When deriving the long run implications for the return, both N_p and N_c are endogenous functions of α. With the equation for N_p given above and

$$N_c = N - N_p \tag{20}$$

we see that an increase in α has several effects. First, there is the direct effect from proposition 1 that higher α increases the graduation flow and as such increases incentives for violence. Second, in the long run, the number of partners of the Firm goes up, from (12), lowering $\hat{\beta}$ and therefore lowering V_p. Third, as N_p goes up, N_c goes down and the value of being a criminal increases. This reduces the incentive for violence both because competition is less fierce and because it becomes less critical to graduate. The balance of all these three effects determines the net effect on the value of partnership V_p. It may therefore be the case that existing partners of the Firm benefit from increasing the graduation intensity even though their own share of the Firm's profit goes down. This possibility is particularly relevant if ρ is large so that also the last partner is relevant as a revenue generating addition to the Firm.

Proposition 4. *Increased graduation flow α may boost total return to the Firm to the extent that each of its partners benefit, even in the long run.*

Figure 1: Steady state returns to partners of the Firm



Proof. We need to demonstrate that the statement in the proposition is true at least for some parameters. Combining (12) with (13) and (15), it follows that the value of being a partner is

$$V_p = \frac{(1-\pi_c)\,\hat{\beta}R}{d\gamma + \alpha\gamma\pi_c^2(1-d) - \alpha(1-d)(1-\pi_c)\hat{\beta}} \tag{21}$$

Inserting from (12), (19) and (20), and taking the derivate with respect to α, and evaluating for $\alpha = \theta$ (where $N_p = 1$) and $\delta = 0$ yields

$$\frac{\partial V_p}{\partial \alpha} = \frac{\beta R\left((N-1)^2(N-2)^2\beta - (N^2(2-\rho) + 3N\rho - 4N - 2\rho + 1)\gamma\right)}{\theta^2((N^2 - 3N + 2)\beta - \gamma)^2}$$

It is readily seen that when β is sufficiently large, the first term in the numerator will dominate and an N larger than 2 but not too large is sufficient for V_p to increase with the long run value of N_p.

This proposition shows the dual effects of α. Four examples are given in Figure 1. The four lines show V_p as a function of long run N_p, given by $N_p = \alpha/\theta$, for different values of Firm productivity ρ. When ρ=0, the revenue generation of new partners approaches zero and the dilution effect dominates. Therefore V_p is decreasing monotonously with the number of partners N_p. For a somewhat less concave revenue function, $\rho = 0.5$, the

violence effect dominates in an interval, and V_p reaches an interior optimum for $N_p = 4$.

Even if V_p is increasing in N_p for intermediate values of N_p it will always decrease as the number of criminals, N_c, approaches one. The reason is that the incentive to exert violent effort goes away when there is only one criminal left. And when the incentive to exert violence is gone, so is the earnings potential of the Firm. Hence for ρ not too small there will be an intermediate value of N_p where the return to the partners of the Firm reaches its maximum.[11] In such an interior maximum, all partners of the firm have a common interest in restricting the entry to the level set by the optimal $\alpha = N_p\theta$. Moreover, none of the partners have any incentive to expel other partners. All in all the partners share a common interest in upholding the optimal α. Such shared interest is a crucial premise in explaining the viability of many violent structures.

3 Do gangs breed violence?

The theoretical model outlined above builds on the assumption that the interaction between crime and protection enhances violence among the gangs. The gangs fight both for their share of ordinary crime and to become partners of the Firm. Competency in violence is therefore required for gangs aspiring to graduate and become partners of the Firm. Once these gangs are established as partners of the Firm, however, they do not necessarily exert violence. Their mere reputation is enough to secure the protection fees being paid by producers. Are these assumptions reflected in the empirical analysis?

That gang members generally are violent is a trivial fact. But even though gangs recruit among violent individuals it is still an open question whether gang membership in itself is a determinant of violence or whether background variables determine both violence and gang membership. According to the model one should observe a hierarchy with non-gang members at the bottom, followed by unreputed gang members in the middle, and hard-core, reputed gang members at the top. An interesting question, therefore, is whether the same hierarchy is reflected in individual offenders' violent record. In other words; are criminals with a violent record more often found in reputed gangs?

[11] The problem is only well defined for integer values of N_p. That is why we have drawn the curves starting at $N_p = 1$. In the figure we have used the following parameter values $\beta = 4, R = 2, \theta = 2/10, \chi = 2, \delta = 1/10, \gamma = 11, N = 10$.

Moreover; do we find support for our claim that gangs earn their reputation by virtue of having members with a violent record?

We provide a partial answer to these questions by analysing a unique data set collected in a study on South African youth offenders. We separate between youth offenders who belonged to a gang prior to incarceration and youth offenders who did not belong to a gang prior to incarceration, and refer to these individuals as "gang members" and "non-gang members". We also split the gang members into two categories according to whether a gang figures in the media or academic reports and therefore can be seen as well-known, or "reputed" gangs. Accordingly, we refer to offenders belonging to these gangs as "reputed gang members" and those who belong to less known gangs as "non-reputed gang members". The idea is to capture a hierarchy in the gang structure, where we could think of reputed gang members as members of the Firm in our theoretical model. In other words, reputed gang members leave ordinary crime behind and enter the protection market. With a violent past, they have the clout they need to be respected, and do no longer have incentives to exert violence.

We address three issues. The first is the relationship between violent record and current violence for gang and non-gang members. We will show that gang members have more of a violent record but currently engage less in violence than non-gang members do. This effect is strengthened for members of reputed gangs, with even more of a violent record and even less involvement in violent crime. The second issue is whether criminals with a violent record are found more often in gangs than among independent criminals, and more often in reputed gangs than in non-reputed gangs. We find that this is indeed the case. The third issue is the relationship between gang membership and violent record. We show that also after controlling for relevant background variables gang membership remains a strong predictor of a youth's violent record, and again this is enhanced for membership in a reputed gang.

We test the underlying assumptions of the theoretical model rather than the propositions. Nevertheless, our results support the idea that there are incentives for violence at the bottom of the hierarchy that decrease as a criminal works his way to the top. Criminals know that it pays off to have a violent reputation, as they observe that well-known gangs consist of individuals with a violent past. Also, violence is required to become a gang member in the first place. Further, our results do not undermine the existence of a multiplier effect. Finally, although we do not have explicit data on whether offenders take part in the protection market, the results seem to indicate that

this is the case for the reputed gang members.

3.1 Data

The data used in this study was collected by the Centre for Justice and Crime Prevention in 2006, with the aim of understanding factors that strengthen resilience to crime among youth. This is important given the fact that about half of the South African population is 24 years or younger. This population cohort is at the same time the one most at risk of engaging in criminal activity, and the most vulnerable to violent crime. The study juxtaposed two samples; an offender sample of young offenders and their families, and a non-offender sample of young non-offenders and their families. Both samples contain information about a respondent's life history, community context, family and peer networks, access to resources and services, education, life opportunities and employment possibilities (Bonora et al 2009). Data was collected from four provinces; Gauteng, Western Cape, Eastern Cape and KwaZulu Natal.

In this paper we use the youth offender sample, which consists of data on around 400 incarcerated youth in the age group 10 to 26 years old. The data includes information about whether the offender belonged to a gang before being incarcerated. In the sample, a little more than a quarter of the offenders are gang members. A number of background variables are included in the data, and key variables are included in Table 1.

This simple comparison of means shows that there are significant differences between youth offenders who did, and youth offenders who did not belong to a gang prior to incarceration. One exception stands out, though, and that is whether the offense that the youth is incarcerated for is classified as violent; i.e. belongs to the categories (armed) robbery, murder, assault or rape[12]. We will return to this variable later, and to the variable labelled "violent record".

The incarcerated youth have an extreme level of drug consumption. Almost all (96 percent) gang members consume a drug, as do 85 percent of non-gang members. Alcohol and cannabis top the list, and more than half of all gang members have used mandrax (not reported here). Significantly more gang members had a criminal income prior to incarceration, and come from

[12]The remaining categories are car theft, theft, housebreaking, fraud, possession of illegal substances, attempted crimes and "other" crimes.

Table 1: Descriptive statistics by gang membership status

	(1) Gang		(2) Non-gang		(3) Difference	
	mean/b	sd/se	mean/b	sd/se	mean/b	sd/se
Violent record	0.84	(0.37)	0.43	(0.50)	-0.41***	(0.053)
Violent offense	0.52	(0.50)	0.58	(0.49)	0.060	(0.056)
Drug use	0.96	(0.19)	0.85	(0.36)	-0.11***	(0.037)
Criminal income	0.29	(0.46)	0.12	(0.32)	-0.18***	(0.041)
Age	19.5	(2.07)	20.1	(2.38)	0.68***	(0.26)
Ever worked	0.57	(0.50)	0.50	(0.50)	-0.070	(0.057)
Over 8 yrs education	0.42	(0.50)	0.44	(0.50)	0.027	(0.057)
Has children	0.14	(0.35)	0.20	(0.40)	0.056	(0.044)
Lived with father only	0.047	(0.21)	0.070	(0.26)	0.023	(0.028)
Not always enough to eat	0.21	(0.41)	0.20	(0.40)	-0.0062	(0.046)
Fam ever in prison	0.54	(0.50)	0.38	(0.48)	-0.16***	(0.056)
HH member(s) work	0.72	(0.45)	0.69	(0.46)	-0.031	(0.052)
HH size	5.59	(3.06)	5.71	(2.72)	0.11	(0.32)
HH receives grants	0.48	(0.50)	0.50	(0.50)	0.017	(0.057)
N	106		288		394	

Table 2: Gangs and recruitment criteria

Gang name	Recruitment criteria
Americans	murder / shoot rival gang members / stab someone / get a tattoo / have sex with others
American mafiasos	shoot rival gang members
KGB	stab someone
Hard Livings	sell drugs / commit robbery
Young warrior boys	stab a rival gang member
The Firm	shoot a rival gang member
Dog pound gangsters	shoot someone

families where someone has been in prison. Other than age, the remaining individual and household level variables show no significant difference between the two types of offenders.

The gangs

Several of the interviewed gang members come from well-known gangs featuring in South African media, such as the Americans, Hard Livings and KGB, as well as prison gangs such as the 28s.[13] Almost half of them make use of violent crime as qualification criteria. Most of these qualification criteria are strikingly brutal. The most serious ones are murder, often of a rival gang member, and robbery or violent assaults. Drug dealing, including buying drugs for gang leaders, is another common criteria. Others are required to buy their gang leaders expensive clothes or mobile phones. Table 2 summarizes some of these criteria.

3.2 Analysis

Our first question is whether gang membership in itself is a determinant of violence or whether background variables determine both violence and gang membership. The next two questions relate directly to the theoretical model: We want to know whether violent record increases as a criminal climbs the career ladder, and whether we find support for our claim that reputed gangs earn their reputation by virtue of having violent members.

[13]These four gangs are amongst the reputed gangs in the analysis.

We provide a partial answer to these questions by exploring a variable capturing violent record. This variable measures whether the incarcerated youth has "ever threatened to hurt anyone with the use of a weapon such as a gun, knife etc.". This variable is a measure of a violent past. It does not measure whether the youth at present is incarcerated for a violent offense. The variable is rather a measure of whether the incarcerated youth have a deserved record as being violent. In order to emphasise this we label the variable *Violent record*. This is in contrast to the case where the youth currently is incarcerated for a violent offense. The latter variable is labeled *Violent offense*. These two variables are described at the top of Table 1.

We see that gang members are typically much more violent than non-gang members in the sense that they have a violent record.[14] When comparing whether the crime the youth is incarcerated for was violent or not, however, there is no significant difference between the two groups. A little more that fifty percent in each group are incarcerated for violence.[15]

This lack of relationship between "violent record" and "violent offense" for gang members is not only an aggregate phenomenon. First, we see that it is confirmed, even enhanced, for subgroups of gang members; 91 percent of reputed gang members have a violent record, while only 37 percent of them are incarcerated for a violent offense.

Second, the correlation coefficient between "violent record" and "violent offense" for the whole sample is 0.2. Hence, overall, there is a substantial relationship between the individual feature of having a violent record and that of being in prison for a violent offense. Yet when splitting the sample we see that this correlation only holds for non-gang members, with a correlation coefficient of 0.3. For gang members the correlation is exactly zero. This leads us to the first result:

Result 1: Gang members have a more violent record but are less often incarcerated for violence than non-gang members.

[14] With 84 percent of gang members having a violent record, the number of gang members without a violent past is quite low. However, we see that when regressing reputed and unreputed gang members on violent record (see Table 3.2, we nevertheless obtain statistical significant results.

[15] There is an apparent inconsistency for the non-gang members as 51 percent are incarcerated for a violent offense while only 43 percent have ever "ever threatened to hurt anyone with the use of a weapon". The reason for the difference is the many violent offenses not involving a weapon.

This result is in accordance with our interpretation of the gangs' violent reputation as something it is possible for them to profit from even without currently being violent.

What this also indicates, is a hierarchy in crime, where violent reputation is a quality that is increasingly valued as a criminal progresses to the top. It is a feature observed for 43 percent of criminals not involved in gang activity, 79 percent of non-reputed gang members, and for 91 percent of all reputed gang members. Both "jumps" are statistically significant.[16] We see that reputed gangs, defined by their appearance in the media or in research reports, seem to have an even stronger preference for members with a violent record than "ordinary" gangs do. So although all gangs value a violent record, this is amplified for the most reputed gangs. This fits with our theoretical model in that the Firm recruits the toughest thugs - perhaps those who have the longest or most brutal track record of violence. We arrive at the second result:

Result 2: There is a hierarchy in the gang structure defined by the violent record of members.

This proposition is also confirmed when looking at the recruitment criteria of the gangs. While 63 percent of reputed gang members report a recruitment criteria involving stabbing or shooting, only 20 percent of members of non-reputed gangs report the same.

The gang as facilitator of violence

The question of interest here is whether gang membership affects the degree to which a criminal engages in violent behaviour. If so, this can be because gang members are more violent types than other criminals, or it can be that it is the gang itself that makes them more violent.

The question of whether gang members and non-gang members are inherently different types is a standard selection problem. Selection is also acknowledged in the criminology literature and Guay (2012) refers to three models[17] explaining the influence of gangs on their members' crimes. The

[16]The difference between non-gang members and non-reputed gang members is statistically significant at the one percent level, and the corresponding difference between non-reputed and reputed gang members is statistically different at the 10 percent level (p=0.086).

[17]The three models were developed by Thornberry et al (1993).

"selection model" describes gang members as individuals who a priori are more predisposed to committing crimes. In our analysis, this would mean that individuals seek gang membership because they are violent. He also refers to the "facilitation model", which is based on the principles of social learning. This model states that individuals are inherently the same, but that the gang culture, the group dynamics and the incentives facilitate crime. In our case, this would mean that it is the gang itself that makes the criminals more violent.[18]

Regression

Having the variable ViolRec (violent record) on the left hand side we estimate the following relationship using OLS[19]:

$$\text{ViolRec}_i = \alpha + \beta_1 \text{UnreputedGang}_i + \beta_2 \text{ReputedGang}_i + \gamma X_i + \epsilon_i$$

Here ReputedGang is a dummy taking the value 1 if the incarcerated youth was a member of a reputed gang prior to incarceration. UnreputedGang is a dummy taking the value 1 if the incarcerated youth was a member of an unreputed gang prior to incarceration. X is a vector of individual and family background variables as detailed below, and epsilon is the error term. The subscript i denotes the individual.

Table 3.2 presents the results from the OLS regression. The model in the first column regresses violent record on gang membership without any controls. We see that there is a positive and significant correlation between belonging to a gang, and the likelihood of having a violent record. Gang membership seems to have a strong impact on violence, yet this estimate may suffer from endogeneity bias.

[18]There is also an "enhancement model", where the relationship between "individual crimes and gang participation is based on the interactive effects of selection and facilitation". It holds the view that individuals who join gangs do have a higher predisposition to crimes that those who do not, but that the gang itself plays a role in increasing this tendency. The selection model is seen as outdated, with little empirical support. The facilitation and the mixed model, however, are both seen as good candidates for explaining gang membership. Which one works best seems to depend on the length of gang membership to the gang and the age of the participants. Yet, Guay(2012) calls for caution in using these conclusions as most studies have been done of teenagers 14-17 years old.

[19]In the reported regressions we use a linear probability model. Probit and logit models yield the same results.

Table 3: OLS Regression Violent reputation versus Gang Members.

	(1) Violent record	(2) Violent record	(3) Violent record
Reputed gang member	0.489***	0.409***	
	(0.0523)	(0.0741)	
Unreputed gang member	0.362***	0.262***	
	(0.0614)	(0.0665)	
Fam ever in prison		0.0886*	0.100**
		(0.0494)	(0.0507)
Druguse		0.260***	0.292***
		(0.0641)	(0.0688)
Criminal income		0.190***	0.257***
		(0.0640)	(0.0620)
Constant	0.422***	-1.899**	-1.913*
	(0.0303)	(0.884)	(1.000)
Other controls	No	Yes	Yes
N	373	373	373
R-squared	0.146	0.251	0.179

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Generally there are three potential sources of endogeneity, i.e. correlation between the right hand side variables and the error term. The three are omitted variable bias, measurement error and simultaneity. Omitted variable bias will result if there is an observed or unobserved variable that is correlated both with the left hand side variable and one or more right hand side variables. This potential source will be discussed below. Measurement errors in surveys are not uncommon. However, there is no reason to believe that any measurement error in the CJCP survey is systematic in a way that would impede our analysis. Simultaneity, or reverse causation, happens if the left hand side variable causes changes in the right hand side variable of interest or if the two are jointly determined.

The theoretical model portrays a story where causality runs both ways. Gang membership can stimulate members to build or strengthen their record of violence (for instance if they want to become partners of the Firm). At the same time, the Firm explicitly targets gangs with violent record, so a violent record can qualify for gang membership; hence the causation is turned around. In our regression model, therefore, causation is not our main concern. Gangs can either recruit individuals with a record of violence, or gangs stimulate individuals to gain such a reputation. What we want to show is that the correlation between gang membership and violent reputation is a substantial one and not a spurious relationship. The next paragraphs will demonstrate this.

We want to make sure that there is no omitted variable that is correlated both with gang membership and with violent record. The first step is to add a number of controls that are likely to influence both these factors, and we do this in column two of Table 3.2 as explained below. But what about the selection problem presented above? What if criminal individuals who join gangs are different from criminals who choose not to join a gang, in the sense of having different personalities? Because we here deal with unobservables it is not obvious that we can make this distinction. One possibility is to look at background factors that cause an individual to be violent, but that pre-dates gang membership. The second column therefore includes a family background dummy variable stating whether any household member has ever been in prison. This variable is in itself an important predictor of violence, yet does little to change the coefficients of interest, the β_1 and β_2.

In the second column we also add a number of individual and household controls, which were all explained above. The individual controls include drug use and having a criminal income prior to incarceration, and both show

a strong correlation with violence. Results not reported here show that a criminal individual who has ever worked is less likely to engage in violent behaviour, whereas having had one or more household members work or having a stable income is positively correlated with violence. In addition we include a number of additional controls that show no significant relationship with the dependent variable.[20] The positive relationship between gang membership and violence is not substantially affected by adding all of these controls to the regression, indicating some robustness to individual and family characteristics.

In the third column we take out the two variables of interest; reputed gang member and unreputed gang member. These results suggest that gang membership has an independent effect on violent record. Moreover, members of reputed gangs have somewhat more of a violent record than members of unreputed gangs, again confirming the hierarchy previously defined.

It does not seem to be a coincidence that many gang members have a violent record. Either the gangs recruit individuals with a record or they stimulate them to gain a reputation. Either way, gaining a violent record is a core criteria to becoming and remaining a member of a gang, and even more so for gangs at the top of the hierarchy. This leads us to our third empirical result:

Result 3: A violent record is an essential part of gang membership.

In the theoretical model we saw how the Firm values violence and therefore recruits the toughest thugs. Hence, criminals who want to graduate to the Firm have an additional incentive to exert violence. The empirical result above is in accordance with such a violence incentive.

4 Concluding remarks

The theoretical model in this paper described an environment where a partnership of private protection providers, the Firm, has an incentive to create

[20] These are individual controls such as age and age squared, a dummy for being incarcerated in the Western Cape province, for education level of 8 years or more, for whether or not the incarcerated has any children, whether he lives with his father only, and whether he has enough to eat in the household. In addition, they include household controls such as the size of the household and whether or not the household receives any government grants.

a violent environment to increase the demand for its services. The Firm achieves this by recruiting protection firms through a tournament, where gangsters compete over the prospect of graduating to become part of the Firm. In addition criminals compete over ordinary criminal rents. As explained this creates a multiplier that contrasts with standard results from the rent-seeking literature. We showed how a decrease in the cost of violence increases violence more than *pari passu* and increases the value of being a criminal. The violence multiplier additionally generates an incentive for the protection providers to invite new partners into the Firm. Another finding in this paper is that increased graduation intensity in some cases improves total returns to each partner of the Firm. Such a shared interest between each partner to the Firm can explain the viability of many violent structures. The empirical relevance of our framework was confirmed in an analysis of unique data on incarcerated youth in South Africa.

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