



WINPEC Working Paper Series No.E1716
September 2017

Welfare effects of forming a criminal organization

Ken Yahagi

August,28,2017

Waseda INstitute of Political EConomy
Waseda University
Tokyo,Japan

Welfare effects of forming a criminal organization

Ken Yahagi *

August, 28, 2017

Abstract

This paper develops a simple conflict model to examine the welfare effects of forming a criminal organization such as the mafia by focusing on conflictual aspects. We compare the social efficiency and welfare of players in this economy in two different situations. The first situation is a competitive and anarchic case with individual criminals engaging in appropriative activities against other criminals and the government. The second situation is a monopolistic case with collective criminals organized by a rent extracting boss and engaging in appropriative activities against the government. In this respect, the role of a criminal organization is to provide social order among criminals. Our result shows that a transition from a competitive situation to a monopolistic situation with a predatory boss can contribute to enhancement of welfare of players and a reduction in wasted resources in the economy. This result supports the classical view that states the desired effect of the existence of a monopolistic criminal organization. Therefore, this paper provides justification for the presence of a criminal organization in the competitive and anarchic situation.

keywords: Conflict, Organized Crime, Rent-seeking

JEL Classification: D74, K4

*Graduate School of Economics, Waseda University, 1-6-1, Nishiwaseda, Shinjuku-ku, Tokyo, 169-8050, Japan. Email: yhgkn@moegi.waseda.jp

1 Introduction

An economic approach has been used for decades to analyze criminal organizations. An economic analysis of illegal activity by individuals proposed by Becker (1968) has been extended to a criminal organization's activities, i.e., Garoupa (2000). This is known as the optimal law enforcement approach¹. Another related strand of literature analyzes illegal markets related to one of the main activities of a criminal organization, i.e., Poret (2002) and Poret and Tejedo (2006). Florentini and Peltzman (1995) provide an overview of another strand of literature addressing organized crime activities.

What is the feature of a criminal organization? The answer to this question is a monopolistic aspect. In this case, a criminal organization, by employing coercive measures, can succeed at establishing control over an area. This monopolistic view of a criminal organization is discussed by Buchanan (1973), Schelling (1971) and Garoupa (2000). Their approach is to compare welfare between a monopoly situation with organized criminals and a competitive situation with individual criminals. The main conclusion of this monopolistic view is that the monopolistic criminal market is better than the competitive criminal market because there tends to be less participants in the criminal market

In this paper, we follow this monopolistic criminal organization theory. The previous literature does not discuss how a criminal organization emerges from competitive criminal market with individual criminals or an anarchic situation that individual criminals are in a hostile relation against other criminals to monopolistic criminal market with organized criminals. Hence, this paper tries to provide a theoretical framework that individual criminals agree to be organized by a boss of criminal organization with hierarchical organization structure. In other words, this paper tries to investigate how a criminal organization emerges and the effects of organizing crimes on society. In this framework, this paper considers some important features of a boss who can organize individual criminals. As well observed in reality, this paper assumes that a boss of criminal organization is a rent extracting actor². Thus, we assume a contractual relation between a predatory principal and dominated agents. Another important feature of a boss is that a boss can provide and enforce rules and criminal constitutions within the organization (Leeson and Skarbek (2010)). Moreover, this indicates that a criminal organization can organize criminal activities (Leeson and Rogers (2012)). According to Leeson and Skarbek (2010), criminal constitutions promote cooperative behaviors of members in the organization and regulate behaviors that are costly for their organizations such as the use of violence. Under this criminal constitutions that are well observed in a criminal organization, a criminal organization can transform a conflict among individual criminals and the police into a conflict between organized criminals and the government. In other words, a boss can provide social order within a criminal organization³.

Considering the above characteristics, we formalize a theoretical model to analyze the welfare effects of forming a criminal organization and the transition from a competitive situation to a monopolistic situation.. This paper adopts the rent-seeking approach. The most impor-

¹For an analysis of the public law enforcement literature, see Garoupa (1997) and Polinsky and Shavell (2000). Their motivation is to identify the deterrence effects of the law.

²Usually, the boss of a criminal organization behaves like a rent-seeker in organizations, and Gambetta (1993) notes the existence of such an exploitative hierarchical feature in the Italian mafia.

³This characteristic is also considered by Skaperdas and Spolaore (1995) and Skaperdas (2001), who contend that a criminal organization can serve the same roles as the government: as an alternative provider of collective goods.

tant difference between the rent-seeking approach and other previous work is that it explicitly focuses on the use of violence by criminals and the government ⁴. By this formalization, we treat criminal activities as the appropriation and the measure for the costly redistribution of wealth.

This paper develops a basic conflict theory that incorporates the conflictual aspects mentioned above and compares the social efficiency and welfare of players in the economy in two different situations⁵. In the first situation, each individual criminal engages in appropriation activities or costly conflict against other criminals and the government. In this situation, each individual criminal attempts to steal the property of citizens while the government defends them. In the second situation, by introducing a boss who can organize individual criminals, the criminals are able to engage in cooperative activities. In this case, a boss faces a constraint that individual criminals find joining a organization attractive. Furthermore, the social welfare can be measured by the rent dissipation and the amount of wasted resources in a conflict, as proposed by Nitzan (1991, 1994).

This paper shows that forming a criminal organization and organizing criminal activities contribute to enhancement of social welfare and a reduction in wasted resources. In other words, the existence of a criminal organization contributes to a reduction in efforts of law enforcement and the use of violence. This result is very intuitive. Because a criminal organization can eliminate conflict among individual criminals, the government and a criminal organization can avoid wasted resources in the conflict. In the case of a monopolistic situation, this paper assumes that a boss must consider participation constraints, so organization members obtain sufficient payoff to join this organization. Moreover, the extra benefit that is achieved from avoiding the conflict is distributed between a rent extracting boss and the government or the victim of criminals. Hence, the result of this paper supports the classical view of stressing the desired monopolistic criminal market as in Schelling (1971), Buchanan (1973), Baccara and Bar-Isaac (2008) and Garoupa (2000)⁶. The main difference from these previous works is the use of violence that is wasteful activities for society in the process of gaining illegal profit. This result in this conflictual and rent-seeking situation should be emphasized as considering a process of organizing criminal activities because criminal activities must be costly in almost cases and illegal gain depends on these unproductive efforts by criminals and the government. Hence, each economic player acts strategically in investing the enforcement efforts.

Another contribution is that this paper provides sufficient reason to justify the existence of a criminal organization. Hill (2003) noted that Japanese criminal organization as known as Yakuza plays the important role for a reduction in crimes. According to Hill (2003), the severe punishment to eradicate Yakuza by the Japanese government induces an increase of

⁴Grossman (1995) is one of the most influential papers employing this approach. Grossman considers that a criminal organization, such as the mafia, is formed to combat the police and the government.

⁵Garoupa (2000) also compares these two situations. Garoupa (2000) assumes that potential individual criminals must purchase a license from a monopolistic criminal organization to engage in criminal activities in the area that the organization controls. He studies the welfare effects of such extortion in this economy. In this respect, the role of a criminal organization in Garoupa's paper is a regulator rather than an organizer of violence as in this paper.

⁶Buchanan (1973) is one of the classical and seminal papers on the social-welfare-improving effects of a monopolistic criminal organization. He asserts that monopolistic supply of an illegal good will cause less consumption compared to competitive markets. Baccara and Bar-Isaac (2008) focus on information structures within organizations.

crimes. In this respect, our result may be able to support Hill's argument.

Our formalization in this paper is also applied to the theory of the state, i.e., Bates et al.(2002) and Grossman (2002). In lawlessness society, if households must protect their property by themselves against an organized violence group, victimized households need to be organized by a strong and charismatic boss to combat against the opponent. However, it is well observed that this organizer of this group is self-interested and rent extracting. If our original situation is interpreted in this way, the results in the original situation have some implications for this new situation. Such a similarity between a criminal organization and the state is also discussed in Skaperdas (2001).

The paper is organized as follows. In the next section, we formalize basic settings of the conflict model and specify the role of a rent-extracting boss. Applying these settings, we obtain results. In Section 3, we compare the outcomes obtained in Section 2. Section 4 concludes the results of this paper.

2 A Basic Setting

Consider a conflict with $n+1$ risk-neutral players competing for a prize ⁷. Player $i \in \{1, \dots, n\}$, where $n > 1$, and player k are involved in a conflict over a prize of value $v > 0$ to all of them. At the beginning, every player i engages in conflict against all other players $j \neq i$ and player k ; thus, they are isolated and helpless. However, every player i can be organized, and thus, a group can be formed with n members. We assume that player k has a comparative advantage in a conflict and is thus the dominant player. To obtain a prize, each player invests resources that are a sunk cost. In other words, in this paper, we assume that committing crimes is the same meaning as robbing and taking property illegally by using or threatening to use violence or force. This setting indicates that illegal gain depends on efforts and investment of criminals and the government.

The aim of the setting above is to describe main two situations. The first situation is that player i is an individual criminal, while player k represents the police and the government. In this situation, every i attempts to steal property, v , and player k acting as the government defends them. The second situation is that player i represents individual households defending their goods, while player k represents an organized crime group. In the following section, we introduce a rent-extracting boss who can organize n players and form a new group. A strong but predatory authority is often needed. For example, individual criminals involved in illegal activities join a criminal group organized by the predatory mafia, and individuals defending their property against robbers need a strong state controlled by a dictator. In these two situations, the strong boss can manage group activities and organize potential group members by forcing them to obey rules of the group. In other words, the strong boss can work as a conflict resolution device within that group. Consequently, a conflict among $n+1$ players will become one between a group and player k .

Therefore, in the following section, to examine the social welfare effects of forming a group organized by a rent-extracting boss, we consider a simple model and derive equilibrium outcomes in two different situations: (1) a competitive case in which there exists no boss and (2) a monopoly case with a rent-extracting boss.

⁷We follow a basic conflict model. See Garfinkel and Skaperdas (2007) and Konrad (2009).

2.1 A Competitive Case

In this section, each individual player $i \in \{1, \dots, n\}$ cannot cooperate with other players because no boss exists. Every player i and k invests $a_i \geq 0$ and $B \geq 0$ resources simultaneously in a conflict. Each player's probability of winning or each share of the prize depends on the amount of resources invested by every player. Furthermore, we assume that player k has a relative ability to use his resource. Let p_i be the winning probability of player i and p_k be the winning probability of player k , where $\sum_{i=1}^n p_i + p_k = 1$. Thus, we have

$$p_i = \frac{a_i}{\sum_{i=1}^n a_i + \gamma B} \quad \text{and} \quad p_k = \frac{\gamma B}{\sum_{i=1}^n a_i + \gamma B}. \quad (1)$$

The value of γ , where $\gamma \geq 1$, represents the relative ability of player k in terms of the effectiveness of investments, and we assume that the value is exogenously given⁸. This means that if every player invests the same resources, the winning probability of player k is greater than that of any other player.

Hence, the expected payoff for players i and k is

$$\pi_i = p_i v - a_i = \left(\frac{a_i}{\sum_{i=1}^n a_i + \gamma B} \right) v - a_i \quad \text{and} \quad (2)$$

$$\pi_k = p_k v - B = \left(\frac{\gamma B}{\sum_{i=1}^n a_i + \gamma B} \right) v - B. \quad (3)$$

Since every player determines a_i and B to maximize his or her own expected payoffs, the first-order conditions for each i and k are

$$\frac{d\pi_i}{da_i} = \frac{\sum_{i=1}^n a_i + \gamma B - a_i}{(\sum_{i=1}^n a_i + \gamma B)^2} v - 1 = 0 \quad \text{and} \quad (4)$$

$$\frac{d\pi_k}{dB} = \frac{\gamma \sum_{i=1}^n a_i}{(\sum_{i=1}^n a_i + \gamma B)^2} v - 1 = 0. \quad (5)$$

Because every i has the same objective function, we assume the symmetric equilibrium, $a_i = a \quad \forall i$ ⁹.

Thus, the equilibrium outcomes obtained in a competitive case, denoted by the superscript C , are summarized in Lemma 1.

Lemma 1. In a competitive case, the equilibrium results are as follows: $\forall i \in \{1, \dots, n\}$,

$$a_i^C = \frac{\gamma n v}{(\gamma n + 1)^2}, \quad p_i^C = \frac{1}{\gamma n + 1}, \quad \pi_i^C = \frac{v}{(\gamma n + 1)^2},$$

$$B^C = \frac{(\gamma n - n + 1) n v}{(\gamma n + 1)^2}, \quad p_k^C = \frac{\gamma n - n + 1}{\gamma n + 1} \quad \text{and} \quad \pi_k^C = \frac{(\gamma n - n + 1)^2 v}{(\gamma n + 1)^2}. \quad (6)$$

⁸This formalization of a winning probability in a conflict is often used in conflict theory. In particular, this probability function is called the asymmetric contest success function, i.e., Baik (1994) and Nti (2004). The simple probability function with $\gamma = 1$ is called as the Tullock lottery contest function, as proposed in Tullock (1980).

⁹This symmetric equilibrium outcome also satisfies the second-order conditions.

2.2 A Monopoly Case

In this section, we introduce a rent-extracting boss into our basic model. In this case, a boss will make an important contribution to group activities. A boss can organize n individuals to avoid a conflict among them and enforce cooperative activities against player k . This role indicates that the boss is able to maintain political order among group members by organizing the use of violence. As observed in some papers, i.e., Gambetta (1993) and Paoli (2004), the mafia type criminal organization tends to succeed in appropriative activities. Because a criminal organization has a rigid rule within the organization, members are well organized by a boss¹⁰.

Let us describe the precise roles of a boss. In our settings, when a boss organizes n members, they can act like a unitary actor to compete for a prize. When the group wins, the prize will be allocated to all n members equally¹¹. A boss has to collect resources from all n members and uses them in a conflict against player k . Resources are collected from group members to maximize the total welfare of members. Let $A = \sum_{i=1}^n a_i$ be the resources collected from n members. Thus, a boss must choose $A = \sum_{i=1}^n a_i$ to maximize $\pi = \sum_{i=1}^n \pi_i$. In our assumption, a boss has no interest in obtaining a prize; his purpose is to obtain the leadership rents¹² from n group members in the process of exercising his leadership. A boss can obtain some part of $A = \sum_{i=1}^n a_i$ as leadership rents in exchange for exercising his leadership on behalf of group members. Formally, a boss can gain a fraction $1 - \sigma$, where $\sigma \in [0, 1]$, out of $A = \sum_{i=1}^n a_i$; thus σA will be used in the conflict. We call $R = (1 - \sigma)A$ the leadership rent. We assume that resources A will be shared equally among n members. In this respect, we model a boss as a profit maximizing taxation actor. Furthermore, a boss must provide a sufficient payoff for all group members to join that group. Hence, a boss must take participation constraints into account.

Let p and $1 - p$ be the winning probability for the group organized by a boss and player k . Therefore, the winning probability is

$$p = \frac{\sigma \sum_{i=1}^n a_i}{\sigma \sum_{i=1}^n a_i + \gamma B} = \frac{\sigma A}{\sigma A + \gamma B} \quad \text{and} \quad 1 - p = \frac{\gamma B}{\sigma A + \gamma B}. \quad (7)$$

Hence, the expected payoffs for players i and k are

$$\begin{aligned} \pi_i &= pv/n - A/n = \left(\frac{\sigma A}{\sigma A + \gamma B}\right)v/n - A/n \quad \text{and} \\ \pi_k &= (1 - p)v - B = \left(\frac{\gamma B}{\sigma A + \gamma B}\right)v - B. \end{aligned} \quad (8)$$

A boss chooses σ in the first stage, and the group organized by a boss and player k simultaneously invest resources in the second stage. A boss must choose A to maximize

¹⁰According to Leeson and Rogers(2012), the Sicilian mafia type criminal organization has a boss that can control competitive criminal protection providers. Thus, our settings also can be interpreted that a boss is an organizer of small criminal organizations.

¹¹The idea that after a group is formed, it becomes a unitary actor is not new, i.e., Epstein and Mealem (2012).

¹²Konrad and Skaperdas (2007) use this term but with different meanings. They examine the relationship between leadership rents and succession rules in political survival situations. To achieve survival, leaders must share rents with their supporters.

$\pi = \sum_{i=1}^n \pi_i$, and player k attempts to maximize π_k . Therefore, the first-order conditions for the group and player k are

$$\frac{d\pi}{dA} = \frac{\sigma\gamma B}{(\sigma A + \gamma B)^2} v - 1 = 0 \quad \text{and} \quad \frac{d\pi_k}{dB} = \frac{\sigma\gamma B}{(\sigma A + \gamma B)^2} v - 1 = 0.^{13} \quad (9)$$

As given $\sigma \in [0, 1]$, the equilibrium outcomes obtained in a monopoly case, denoted by the superscript M , are summarized in Lemma 2.

Lemma 2. In a monopoly case, the equilibrium results are as follows: $\forall i \in \{1, \dots, n\}$,

$$\begin{aligned} a_i^M &= \frac{\sigma\gamma v}{n(\sigma + \gamma)^2}, \quad p_i^M = \frac{\sigma}{\sigma + \gamma}, \quad \pi_i^M = \left(\frac{\sigma}{\sigma + \gamma}\right)^2 v/n \\ B^M &= \frac{\sigma\gamma v}{(\sigma + \gamma)^2}, \quad \pi_k^M = \left(\frac{\gamma}{\sigma + \gamma}\right)^2 v \quad \text{and} \quad R^M = (1 - \sigma) \frac{\sigma\gamma v}{(\sigma + \gamma)^2}. \end{aligned} \quad (10)$$

So that individual criminals find joining an organized crime group beneficial, a boss must consider the participation constraints for potential group members. The condition for joining the group is

$$\pi_i^M = \left(\frac{\sigma}{\sigma + \gamma}\right)^2 v/n \geq \pi_i^C = \frac{v}{(\gamma n + 1)^2}, \quad (11)$$

$$\text{or, } \sigma \geq \frac{\gamma n^{1/2}}{\gamma n - n^{1/2} + 1} = \bar{\sigma} \quad (12)$$

Under this constraint, a boss must choose $\sigma \in [0, 1]$ to maximize $R = (1 - \sigma)A$; thus, the first-order condition is

$$\frac{dR}{d\sigma} = \frac{\gamma v(\gamma - (1 + 2\gamma)\sigma)}{(\sigma + \gamma)^3} = 0. \quad (13)$$

Thus, we have $\sigma^* = \gamma/(1 + 2\gamma)$. Therefore, what is the relation between σ^* and $\bar{\sigma}$?

Lemma 3. In a monopoly case, if the number of potential individual criminals are large, or n is larger than \bar{n} , where $\gamma\bar{n}^{1/2}/(\gamma\bar{n} - \bar{n}^{1/2} + 1) = \gamma/(1 + 2\gamma)$, $\sigma^* = \gamma/(1 + 2\gamma)$ is chosen by a rent extracting boss. Otherwise, $\bar{\sigma} = \gamma n^{1/2}/(\gamma n - n^{1/2} + 1)$ is chosen.

Proof. A relationship between n and $\bar{\sigma}$ is

$$\frac{d\bar{\sigma}}{dn} = \frac{-1/2\gamma^2 n^{1/2} + 1/2\gamma n^{-1/2}}{(\gamma n - n^{1/2} + 1)^2} < 0. \quad (14)$$

When $n = 1$, we have $\bar{\sigma} = 1 > \sigma^* = \gamma/(1 + 2\gamma)$. Since $\bar{\sigma}$ decreases as n increases, so we must have \bar{n} , where $\gamma\bar{n}^{1/2}/(\gamma\bar{n} - \bar{n}^{1/2} + 1) = \gamma/(1 + 2\gamma)$. Q.E.D.

This result is very intuitive. Because welfare loss of potential group members in the competitive conflict situation is very severe as potential rivals are large, avoiding conflict is attractive for them. This means that a boss who has an ability to provide political order

¹³The equilibrium aggregate group contribution is uniquely determined because the second-order conditions are satisfied.

within that group does not need to provide high expected profit for potential members. In particular, in a large potential members situation, a boss does not have to consider this constraint in collecting group members.

Lemma 4. In a monopoly case, if $\sigma^* = \gamma/(1 + 2\gamma)$ is chosen by a rent extracting boss, the equilibrium results are as follows: $\forall i \in \{1, \dots, n\}$,

$$\begin{aligned} a_i^M &= \frac{(1 + 2\gamma)v}{4n(1 + \gamma)^2}, \quad p^M = \frac{1}{2(1 + \gamma)}, \quad \pi_i^M = \frac{v}{4n(1 + \gamma)^2}, \\ B^M &= \frac{(1 + 2\gamma)v}{4(1 + \gamma)^2}, \quad \pi_k^M = \frac{(1 + 2\gamma)^2 v}{4(1 + \gamma)^2} \\ \text{and } R^M &= \frac{v}{4(1 + \gamma)}. \end{aligned} \quad (15)$$

In a monopoly case, if $\bar{\sigma} = \gamma n^{1/2}/(\gamma n - n^{1/2} + 1)$ is chosen by a rent extracting boss, the equilibrium results are as follows: $\forall i \in \{1, \dots, n\}$,

$$\begin{aligned} a_i^M &= \frac{\bar{\sigma}\gamma v}{n(\bar{\sigma} + \gamma)^2}, \quad p_i^M = \frac{\bar{\sigma}}{\bar{\sigma} + \gamma}, \quad \pi_i^M = \left(\frac{\bar{\sigma}}{\bar{\sigma} + \gamma}\right)^2 v/n \\ B^M &= \frac{\bar{\sigma}\gamma v}{(\bar{\sigma} + \gamma)^2}, \quad \pi_k^M = \left(\frac{\gamma}{\bar{\sigma} + \gamma}\right)^2 v \quad \text{and} \quad R^M = (1 - \bar{\sigma}) \frac{\bar{\sigma}\gamma v}{(\bar{\sigma} + \gamma)^2}. \end{aligned} \quad (16)$$

According to Dixit (1980) and Epstein and Mealem (2012), a player whose winning probability is less than 1/2 is called the underdog player. Hence, the group becomes the underdog player. If a boss chooses $\sigma^* = \gamma/(1 + 2\gamma)$, the leadership rent is independent of n . This is because a boss chooses total investments for conflict to maximize total welfare of group members, so the number of group members does not have an effect on the chosen group activities. Thus, providing order within the group to avoid conflict among potential group members is attractive for them, rent extracting behavior of a boss can be acceptable. In this case, a boss does not have to consider the constraint associated with group numbers.

3 Comparing Results

In this section, we will compare some results obtained in the last section. In particular, the main concerns in this paper are to examine and compare the results from two important viewpoints: (1) the welfare of player i and k and (2) the social welfare. First, to examine the individual welfare, we compare the expected payoffs in two different cases.

Group member welfare. Let us compare the welfare of player $i \in \{1, \dots, n\}$ in two different situations. Since we consider the participation constraint, the expected payoff of group members will be higher compared to the competitive case. Thus, according to Lemma 2 and 4, the welfare comparison with respect to player i is summarized in Proposition 1:

Proposition 1. Potential group members i prefer to be organized by a rent extracting boss, $\pi_i^M \geq \pi_i^C$. If the number of potential individual criminals are large, or n is larger than \bar{n} , where $\gamma \bar{n}^{1/2}/(\gamma \bar{n} - \bar{n}^{1/2} + 1) = \gamma/(1 + 2\gamma)$, we have $\pi_i^M > \pi_i^C$.

We can provide an intuitive explanation for whether forming a group is beneficial for group members. If there are a large number of group members (i.e., large n), a competitive case means that player i has many rivals compared to a monopoly case. Because individual criminals are isolated and helpless, avoiding a conflict with many rivals will be beneficial for every player i . What will happen if we do not consider the participation constraint? If n is small, potential group members prefer competitive situation with the same reason as mentioned before.

Player k 's welfare. In the following, we will identify the welfare effect for player k . According to Lemmas 1 and 2, we have $\pi_k^C = (\gamma n - n + 1)^2 v / (\gamma n + 1)^2$ and $\pi_k^M = (1 + 2\gamma)^2 v / 4(1 + \gamma)^2$ or $\pi_k^M = (\gamma / (\bar{\sigma} + \gamma))^2 v$. Hence, the welfare comparison with respect to player k is summarized in Proposition 2:

Proposition 2. Player k prefers the existence of a rent extracting boss or forming a criminal organization, $\pi_k^M > \pi_k^C$.

Proof. According to simple calculation, we always have $\pi_k^C = (\gamma n - n + 1)^2 v / (\gamma n + 1)^2 > \pi_k^M = (1 + 2\gamma)^2 v / 4(1 + \gamma)^2$. If $\gamma n / (\gamma n - n + 1) > \bar{\sigma}$ is satisfied, we have $\pi_k^C = (\gamma n - n + 1)^2 v / (\gamma n + 1)^2 > \pi_k^M = (\gamma / (\bar{\sigma} + \gamma))^2 v$. However, we can easily observe that the condition $\gamma n / (\gamma n - n + 1) > \bar{\sigma}$ is always satisfied, then we have always $\pi_k^M > \pi_k^C$. Q.E.D.

The social welfare. Finally, let us determine the social welfare or efficiency. Following the conflict theory literature, the criterion for determining social efficiency concerns the amount of resources wasted in a conflict¹⁴. We will examine whether the resources wasted in a conflict are increased by forming a group. First, we need to derive the equilibrium wasted resources in the two situations. According to previous Lemmas, the equilibrium outcomes are summarized in Lemma 5:

Lemma 5. In a competitive case, the amount of wasted resources is $D^C = \sum_{i=1}^n a_i^C + B^C = (2\gamma n - n + 1)nv / (\gamma n + 1)^2$. In a monopoly case, the amount of wasted resources is $D^M = \sigma^* \sum_{i=1}^n a_i^M + B^M = (1 + 3\gamma)v / 4(1 + \gamma)^2$ or $D^M = \bar{\sigma} \sum_{i=1}^n a_i^M + B^M = (1 + \bar{\sigma})\bar{\sigma}\gamma / (\bar{\sigma} + \gamma)^2$.

According to Lemma 5, we have Proposition 3:

Proposition 3. In a monopoly case, if $\sigma^* = \gamma / (1 + 2\gamma)$ is chosen by a rent extracting boss and the number of potential group members is large, $D^M < D^C$. In a monopoly case, if $\bar{\sigma} = \gamma n^{1/2} / (\gamma n - n^{1/2} + 1)$ is chosen by a rent extracting boss, we always have $D^M \leq D^C$.

Proof. The relation between D^C and n is

$$\frac{dD^C}{dn} = \frac{(3\gamma - 2)n + 1}{(\gamma n + 1)^3} > 0. \quad (17)$$

The, if $\sigma^* = \gamma / (1 + 2\gamma)$ is chosen, D^M is independent of n . Therefore, if n is large enough, we have $D^M \leq D^C$. On the other hand, if $\bar{\sigma} = \gamma n^{1/2} / (\gamma n - n^{1/2} + 1)$ is chosen, a marginal

¹⁴Nitzan (1991) terms the resources wasted in a conflict as rent dissipation. He also assumes that wasted resource in a conflict is non-productive. We follow this assumption.

effect of n on D^M is

$$\frac{dD^M}{dn} = \frac{d\bar{\sigma}}{dn} \left(A + \frac{\gamma(1 + \bar{\sigma})(\gamma - \bar{\sigma})}{(\bar{\sigma} + \gamma)^3} \right) < 0. \quad (18)$$

This is because we assume that γ is larger than 1. Since in case of $n = 1$, we have $D^M = D^C$, we must have $D^M \leq D^C$. Q.E.D.

Our result indicates that forming a criminal organization and violence group has a welfare enhancing effect for all economic actors in my model. This is because although engaging in conflict leads to the welfare loss, it is inevitable. However, introducing a boss with an ability to avoid conflict and organize a group contribute to a reduction in wasted resources in conflict. As a result, all participants in this conflictual situation can be beneficial. However, in a monopolistic situation, if n is larger than \bar{n} , we may have a jump from $D^M = (1 + \bar{\sigma})\bar{\sigma}\gamma/(\bar{\sigma} + \gamma)^2$ to $D^M = (1 + 3\gamma)v/4(1 + \gamma)^2$. In this case, an increase of potential group members may cause an increase of social wasted resources.

One possible contribution for the results is to provide the reason why the mafia is formed from an anarchic situation. Potential members agree to join the mafia even if they are extracted by a boss under the hierarchical organizational structure. We show that this mutually beneficial relationship gives an explanation to the emergence of the mafia¹⁵.

4 Concluding Remarks

This paper develops a simple conflict model to examine the effects of forming a criminal organization and organizing criminal activities on the welfare of players in the economy and the reduction of resources wasted in the conflict. In this paper, we introduce a boss who can form a monopolistic criminal organization and attempts to extract rent from group members in exchange for providing protection within the group to combat against a dominant opponent such as the government. Based on the monopolistic view of a criminal organization, as in Buchanan (1973), this paper compares two different cases: (1) a competitive case with individual criminals engaging in conflict against other criminals and the government and (2) a monopolistic case with criminals organized by a rent extracting boss engaging in conflict against the government. This paper considers criminal activities as robbing and taking property illegally by using or threatening to use violence or force, hence the use of violence determines the amount of illegal gain. In this respect, the important role of a boss of this organization is to avoid inter-criminals conflict and provide social order within the organization.

Our result shows that a transition from a competitive and anarchic situation to a predatory situation with a boss by forming a criminal organization can contribute to enhancement of welfare of players and a reduction in wasted resources in the economy. This result supports the classical view that states the desired effect of the existence of a monopolistic organized crime group as in Schelling (1971), Buchanan (1973) and Garoupa (2000). And this paper gives a framework to analyze the social welfare effects of criminal constitutions that provides order among criminals. Moreover, this paper provides justification for the presence of a criminal organization in this anarchic situation. Although this implication may be counterintuitive, if we focus on effects of social order for organizing crimes as observed in mafias, our conclusion is reasonable.

¹⁵Bandiera (2003) discusses why the Sicilian mafia developed in a more detailed way.

Since we study a conflictual situation with appropriative activities, our result can be applied to an emergence of a rent extracting state. Since the predatory state plays the same role of a criminal organization, this paper provides a economic framework as to why the rent extracting boss can organize members and can be supported.

References

- [1] Baccara, M. and Bar-Isaac, H. (2008) How to organize crime. *The Review of Economic Studies* 75: 1039-1067
- [2] Baik, K. H. (1994) Effort levels in contests with two asymmetric players. *Southern Economic Journal* 61: 367-378
- [3] Bandiera, O. (2003) Land reform, the market for protection, and the origins of the Sicilian mafia: theory and evidence. *Journal of Law, Economics, and Organization* 19: 218-244
- [4] Bates, R., Greif, A. and Singh, S. (2002) Organizing violence. *Journal of Conflict Resolution* 46: 599-628
- [5] Becker, G.S. (1968) Crime and Punishment: An Economic Approach. *The Journal of Political Economy* 76: 169-217
- [6] Buchanan, J.M. (1973) A defense of organized crime? In: Rottenberg, S. (eds.), *The Economics of Crime and Punishment*, 119-132. Washington, DC: American Enterprise Institute for Public Policy Research.
- [7] Dixit, A. (1987) Strategic Behavior in Contests. *The American Economic Review* 77: 891-898
- [8] Epstein, G. S. and Mealem, Y. (2012) Governing interest groups and rent dissipation. *Journal of Public Economic Theory* 14:423-440
- [9] Gambetta, D.(1993) *The Sicilian Mafia : The Business of Private Protection*. Cambridge, Mass: Harvard University Press.
- [10] Garfinkel, M. R. and Skaperdas, S. (2007) Economics of Conflict: An Overview. In: Sandler, T. and Hartley, K. (eds.), *Handbook of Defense Economics: Defense in a Globalized World (Vol. 2)*, 649-709. Amsterdam: Elsevier.
- [11] Garoupa, N. (1997) The theory of optimal law enforcement. *Journal of Economic Surveys* 11: 267-295
- [12] Garoupa, N.(2000) The economics of organized crime and optimal law enforcement. *Economic Inquiry* 38: 278-288
- [13] Grossman, H.I. (1995) Rival kleptocrats: The mafia versus the state. In: Fiorentini, G. and Peltzman, S. (eds.), *The Economics of Organised Crime*, 143-156. Cambridge : Cambridge University Press.
- [14] Grossman, H. I. (2002) “ Make us a king ” : anarchy, predation, and the state. *European Journal of Political Economy*18: 31-46

- [15] Hill, P. (2003) *The Japanese Mafia: Yakuza, Law, and the State*. New York: Oxford University Press.
- [16] Konrad, K. A. (2009) *Strategy and Dynamics in Contest*. Oxford: Oxford University Press.
- [17] Konrad, K. A. and Skaperdas, S. (2007) Succession rules and leadership rents. *Journal of Conflict Resolution* 51:622-645
- [18] Leeson, P. T. and Rogers, D. B. (2012). Organizing crime. *Supreme Court Economic Review* 20(1): 89-123
- [19] Leeson, P. T. and Skarbek, D. B. (2010). Criminal constitutions. *Global Crime* 11(3): 279-297
- [20] Nitzan, S. (1991) Collective Rent Dissipation. *Economic Journal* 101: 1522-34
- [21] Nitzan, S. (1994) Modelling rent-seeking contests. *European Journal of Political Economy* 10: 41-60
- [22] Nti, K. O. (2004) Maximum efforts in contests with asymmetric valuations. *European Journal of Political Economy* 20: 1059-1066
- [23] Paoli, L. (2004) Italian organised crime: Mafia associations and criminal enterprises. *Global Crime* 6: 19-31
- [24] Polinsky, A.M. and Shavell, S. (2000) The Economic Theory of Public Enforcement of Law. *Journal of Economic Literature* 38: 45-76
- [25] Poret, S. (2002) Paradoxical effects of law enforcement policies: the case of the illicit drug market. *International Review of Law and Economics* 22: 465-493
- [26] Poret, S. and Tejedo, C. (2006) Law enforcement and concentration in illicit drug markets. *European Journal of Political Economy* 22: 99-114
- [27] Schelling, T. C. (1971) What is the Business of Organized Crime. *Journal of Public Law*, 20, 71-84. reprinted In: Schelling, T. C. (eds.) (1984), *Choice and Consequences*, 179-194. Cambridge : Cambridge University Press.
- [28] Skaperdas, S. (2001) The political economy of organized crime: providing protection when the state does not. *Economics of Governance* 2: 173-202
- [29] Skaperdas, S. and Syropoulos, C.(1995) Gangs as primitive states. In: Fiorentini, G. and Peltzman, S. (eds.), *The Economics of Organised Crime*, 61-82. Cambridge : Cambridge University Press.
- [30] Tullock, G. (1980) Efficient rent seeking. In: Buchanan, J. M., Tollison, R. D. and Tullock, G. (eds.), *Toward a Theory of the Rent-seeking Society*, 97-112. College Station, TX: Texas A and M University Press.