
Organizing Crime

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This paper investigates the industrial organization of criminal enterprise. We argue that differences in contestability across criminal industries crucially shape how producers in those industries organize. In more contestable criminal industries, producers use organizational hierarchy to enforce collusion and preserve their returns. However, hierarchy creates scope for boss self-dealing and so is costly. In less contestable criminal industries, where producers' benefit from colluding is smaller, this cost exceeds organizational hierarchy's benefit. Here producers organize "flatly" instead. To examine our hypothesis we explore history's most infamous criminal organizations: the Sicilian Mafia and Caribbean pirates.

* We thank Kenneth Binmore, Pete Boettke, Chris Coyne, seminar participants at Emory University, the editors, two anonymous reviewers, and especially Jesse Shapiro for helpful comments and suggestions on an earlier draft of this paper. Leeson thanks the Becker Center on Chicago Price Theory at the University of Chicago, where this research was partly conducted, and the Mercatus Center at George Mason University. Email: Peter T. Leeson PLeeson@GMU.edu. Address: Department of Economics, George Mason University, MS 3G4, Fairfax, VA 22030.

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IN MEMORIAM

Douglas Bruce Rogers passed away in January 2011 at the age of 26 due to injuries sustained in a car accident. Doug graduated summa cum laude from West Virginia University with a B.A. in economics in 2007. He earned his Ph.D. in economics at George Mason University, awarded posthumously, in May 2011. Doug's dissertation, *Organizing Crime: Towards a Theory of the Criminal Firm*, won the 2011 Israel M. Kirzner Award for outstanding dissertation in Austrian economics. His family, friends, and colleagues lovingly remember him for his astuteness of thought, his creativity in research, and his dedication to understanding and explaining the principles that underpin a free and prosperous society. Doug was a remarkable person. He is missed immensely by all who knew him.

I. INTRODUCTION

Criminal organizations display significant variation in their organizational forms. Some, such as the Sicilian Mafia, are organized on the basis of a pronounced hierarchy.¹ Hierarchical criminal organizations involve at least two levels of power and decision-making authority: (1) a higher level consisting of individuals who make autonomous decisions and use violence to regulate the behavior of individuals who occupy a lower level and (2) a lower level consisting of individuals whose behaviors are directed by, accountable to, and thus punishable or capable of being rewarded by higher-level decision makers. Other criminal organizations, such as that of Caribbean pirates, involve only one level of decision-making authority for most decisions.² They are organized "flatly." What explains these differences in criminals' organizational forms?

This paper explores that question by investigating the industrial organization of criminal enterprise. Following Schelling, who pioneered the economics of organized crime, existing research tends to treat criminal organization as hierarchically organized criminal activity or, what is nearly the same, suggests that all criminal organizations are hierarchical.³ For instance, according to Abadinsky, a

¹ Pino Arlacchi, *Men of Dishonor: Inside the Sicilian Mafia: An Account of Antonio Calderone* 21, 33, 34 (Morrow 1992); Diego Gambetta, *The Sicilian Mafia: The Business of Private Protection* 68 (Harvard 1993); Peter Reuter, *Disorganized Crime: The Economics of the Visible Hand* 156 (MIT 1983).

² Peter T. Leeson, *An-arrgh-chy: The Law and Economics of Pirate Organization*, 115 *J Polit Econ* 1049, 1069–73 (2007); Peter T. Leeson, *The Invisible Hook: The Hidden Economics of Pirates* 29–37 (Princeton 2009).

³ Thomas C. Schelling, *Choice and Consequence* (Harvard 1984).

criminal organization is an "enterprise that involves a number of persons in close social interaction, organized on a hierarchical basis for the purpose of securing profit and power by engaging in illegal . . . activities."⁴ As Skaperdas puts it, "the great majority of . . . [criminal] groups are hierarchically organized. . . . Only some small youth gangs are a possible exception."⁵

This approach to criminal organization rules criminal organizations not hierarchically organized out of court and thus inscrutable by economic analysis. Further, it sidesteps a key question about criminal organizations that needs answering: *Why* are many criminal organizations hierarchical? And what about those that are not? An approach to organized crime that defines it as hierarchical assumes the very feature of many (though not all) criminal enterprises that we want to explain.

A growing literature examines the economics of criminal organizations. This research considers organized crime's economic impact, criminal organizations' activities and profit-maximizing practices, optimal strategies for preventing organized crime, and reasons for its emergence.⁶ Some recent examples include Chang, Lu, Chen, Varese, Leeson, Skarbek, Sobel, and Osoba.⁷

⁴ Howard Abadinsky, *Organized Crime* 5 (Nelson-Hall 1997).

⁵ Stergios Skaperdas, *The Political Economy of Organized Crime: Providing Protection When the State Does Not*, 2 *Econ of Governance* 184 (2001).

⁶ This literature is large and takes its inspiration from Becker, who was the first to apply economic logic to criminal decision making. Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 *J Polit Econ* 675 (1968). Besides those cited above see, for example, Annelise Graebner Anderson, *The Business of Organized Crime: A Cosa Nostra Family* (Hoover Inst 1979); Reuter, *Disorganized Crime* (cited in note 1); Peter Reuter, *Racketeering in Legitimate Industries: A Study in the Economics of Intimidation* (RAND 1987); William P. Jennings, Jr, *A Note on the Economics of Organized Crime* 10 *Eastern Econ J* 315 (1984); Pino Arlacchi, *Mafia Business: The Mafia Ethic and the Spirit of Capitalism* (Verso 1986); Martin Sanchez Jankowski, *Islands in the Street: Gangs and American Urban Society* (California 1991); Gianluca Fiorentini and Sam Peltzman, eds, *The Economics of Organized Crime* (Cambridge 1995); Kai A. Konrad and Stergios Skaperdas, *Extortion* 65 *Economica* 461 (1998); Gambetta, *The Sicilian Mafia* (cited in note 1); Diego Gambetta, *Inscrutable Markets*, 6 *Rationality & Society* 353 (1994); Nuno Garoupa, *The Economics of Organized Crime and Optimal Law Enforcement*, 38 *Econ Inquiry* 278 (2000); Steven D. Levitt and Sudhir Alladi Venkatesh, *An Economic Analysis of a Drug-Selling Gang's Finances*, 115 *Q J Econ* 755 (2000); Alastair Smith and Federico Varese, *Payment, Protection, and Punishment: The Role of Information and Reputation in the Mafia* 13 *Rationality & Society* 349 (2001); Federico Varese, *The Russian Mafia: Private Protection in a New Market Economy* (Oxford 2001); Oriana Bandiera, *Land Reform, the Market for Protection, and the Origins of the Sicilian Mafia: Theory and Evidence*, 19 *J L, Econ, & Org* 218 (2003).

⁷ Some recent examples include Juin-Jen Chang, Huei-Chung Lu, and Mingshen Chen, *Organized Crime or Individual Crime? Endogenous Size of a Criminal Organization and the Optimal Law Enforcement*, 43 *Econ Inquiry* 661 (2005); Federico

Dick explores the industrial organization of criminal enterprise but “considers why particular illegal activities are carried out within the firm while others are supplied through the market by an organized criminal firm.”⁸ Leeson and Skarbek examine criminal organizations’ internal structures but focus on governance institutions for preventing intra-organizational predation rather than on the reason for variation in these structures.⁹ As Levitt and Venkatesh point out, in contrast to these aspects of criminal organizations, “there has been little attention paid to . . . the market structure, [and] organizational forms” of varying criminal enterprises.¹⁰

This article fills that gap. We argue that differences in contestability across criminal industries crucially shape how producers in those industries organize. In more contestable criminal industries, producers use organizational hierarchy to enforce collusion and preserve their returns. However, hierarchy creates scope for boss self-dealing and so is costly. In less contestable criminal industries, where producers’ benefit from colluding is smaller, this cost exceeds organizational hierarchy’s benefit. Here producers organize “flatly” instead.

Our theory is a *ceteris paribus* one. It predicts more organizational hierarchy in more contestable criminal industries and more organizational flatness in less contestable ones holding other factors constant. Although potential competitive pressure is not the only factor that influences criminal organizations’ forms, we argue that it is an important determinant of the industrial organization of criminal enterprise.

To examine our hypothesis we explore history’s most infamous criminal organizations: the Sicilian Mafia and Caribbean pirates.

Varese, *How Mafias Migrate: The Case of the “Ndrangheta” in Northern Italy*, 40 *L & Society Rev* 411 (2006); Federico Varese, *The Secret History of Japanese Cinema: The Yakuza Movies*, 7 *Global Crime* 105 (2006); Peter T. Leeson, *The Invisible Hook: The Law and Economics of Pirate Tolerance*, 4 *NYU J L & Liberty* 139 (2009); Peter T. Leeson, *Pirational Choice: The Economics of Infamous Pirate Practices*, 76 *J Econ Behavior & Org* 497 (2010); David B. Skarbek, *Criminal Extortion* (unpublished paper 2009); Russell Sobel and Brian J. Osoba, *Youth Gangs as Pseudo-Governments: Implications for Violent Crime*, 75 *S Econ J* 996 (2009).

⁸ Andrew R. Dick, *When Does Organized Crime Pay? A Transaction Cost Analysis*, 15 *Intl Rev L & Econ* 39 (1995).

⁹ Leeson, 115 *J Polit Econ* 1049 (cited in note 2); Leeson, *The Invisible Hook* (cited in note 2); Peter T. Leeson, *The Calculus of Piratical Consent: The Myth of the Myth of Social Contract*, 139 *Pub Choice* 443 (2009); David B. Skarbek, *Putting the ‘Con’ into Constitutions: The Economics of Prison Gangs*, 26 *J L, Econ & Org* 183 (2010).

¹⁰ Sudhir Alladi Venkatesh and Steven D. Levitt, *Are We a Family or a Business? History and Disjuncture in the Urban American Street Gang*, 29 *Theory & Society* 457 (2000).

We consider the Mafia and pirates because they are among history's most successful criminal organizations and, most important, because they are involved in illicit industries that exhibit substantial variation in the key independent variable that our theory suggests should influence criminal organizations' structure: the potential for competition. As our theory predicts, we find that low producer startup costs in the Sicilian Mafia's primary business—private protection—and comparatively high startup costs in Caribbean pirates' primary business—maritime marauding—led producers in Sicily's private protection industry to organize hierarchically and producers in the Caribbean maritime plunder industry to organize flatly. Although we examine only these two criminal organizations in the light of our theory, we intend our theory as a general one and encourage future researchers to investigate its validity in the context of other criminal organizations.

Our theory of the criminal firm departs in important ways from the theory of the classic firm. According to Alchian and Demsetz, "It is common to see the firm characterized by the power to settle issues by fiat, by authority, or by disciplinary action superior to that available in the conventional market. This is delusion. The firm . . . has no power of fiat, no authority, no disciplinary action any different in the slightest degree from ordinary market contracting between any two people."¹¹ Thus boss authority is not part of the theory of the legitimate firm. Instead Alchian and Demsetz identify the legitimate firm as a means of facilitating team production.

In contrast, the *criminal* firm's distinguishing feature is precisely the potential for "power to settle issues by fiat, by authority, or by disciplinary action superior to that available in the conventional market." Sicilian Mafiosi's saying about their organization—"blood in, blood out"—highlights this important difference between boss-employee relations in a legitimate firm and those in a hierarchical criminal firm.¹²

Although the criminal firm may emerge to facilitate team production, that motivation for firm formation does not explain why a criminal firm might organize hierarchically. Similarly, although the criminal firm may emerge to permit otherwise independent producers to exploit scale economies, that motivation for firm formation

¹¹ Armen Alchian and Harold Demsetz, *Production, Information Costs, and Economic Organization*, 62 *Am Econ Rev* 777 (1972).

¹² As Sicilian Mafioso Antonio Calderone was informed during his Mafia initiation ceremony, one "goes in and comes out of the Cosa Nostra with blood. One cannot leave, one cannot resign from the Cosa Nostra. You'll see for yourselves, in a little while, how one enters with blood. And if you leave, you'll leave with blood because you'll be killed." Arlacchi, *Men of Dishonor* at 68 (cited in note 1).

does not explain the why a criminal firm might organize hierarchically either.

A theory of criminal organization must go beyond pointing to various reasons why criminals might want to form firms and explain why criminals might want to form firms that are organized in a particular way. Our theory based on contestability does precisely that. It identifies the *hierarchical* criminal firm as a means of collusion that may emerge even without team production or scale economies when competitive pressures are naturally strong.

II. A THEORY OF CRIMINAL ORGANIZATION

The potential for competition varies across criminal industries.¹³ Natural barriers to entry are significantly higher in some criminal industries than others. Differences in startup costs are an important determinant of these barriers. Startup costs include physical capital, labor, and human capital requirements that would-be criminals must satisfy to engage in their desired enterprise.

Differences in physical capital requirements across criminal enterprises are straightforward. For example, the technology of safecracking is considerably more capital intensive than that of pickpocketing. Because potential criminals typically cannot use traditional credit markets to finance such technology, differences in physical capital requirements can produce significant differences in barriers to entry and thus potential competitive pressures across criminal businesses.

A second startup cost that differs significantly across criminal enterprises is labor requirements. For example, to heist a large and well-protected bank successfully, several criminals must work together as a team. In contrast, a single criminal can successfully substitute. When production in a particular criminal industry requires team production and thus a minimum of several laborers, barriers to entering that industry are higher, reducing potential competitive pressure.

¹³ "Demand-side" factors, such as the intensity of consumer demand if the criminal enterprise involves the production of a valued good or service or, if it does not, the number of potential victims available, will influence the extent of competition across criminal enterprises. In criminal markets where for these or other reasons demand is stronger, *ceteris paribus*, competitive pressures will be higher and vice versa. However, in what follows we focus on the "supply-side" factors driving the variation in contestability across criminal markets—namely, those relating to producer startup costs. In this sense, we assume away demand-side factors to focus on supply-side ones or, what is the same, assume that demand-side factors are the same across criminal markets so we can focus on the influence of the supply-side factors we are concerned with.

A third startup cost that differs across criminal enterprises is human capital requirements. The most important of these is information about criminals' customer or victim base. In criminal industries that supply valued goods or services, such as loan sharking or prostitution, would-be customers seek out criminals. Criminals require little information to identify and locate individuals who supply their revenue. In contrast, in criminal industries that generate revenue exclusively by plunder, such as art thievery, would-be victims seek to prevent criminals from locating or identifying them. Here criminals require more information to identify and locate their revenue base.

Criminals also require more specialized knowledge about ancillary markets to participate in certain criminal industries. For example, a bookmaker (where bookmaking is illegal) does not require much knowledge beyond how to balance bets to secure revenue in his criminal enterprise. His proceeds are cash. So once his bookmaking is complete, his work is done. In contrast, an art thief requires more knowledge about ancillary markets to operate in his illicit trade. Unlike the fruits of a bookmaker's efforts, the art thief's aren't immediately forthcoming. Acquiring knowledge about potential buyers' identity and stolen art's value requires human capital investments and may also involve social capital investments if the stolen art dealer must forge new relationships or tap into art networks to make this possible.

In criminal industries that are highly contestable because of low startup costs, producers have a strong incentive to collude to preserve their returns. Collusion prevents competitive pressures from eroding returns by allocating production rights among cartel members. It also helps prevent new producers from entering the market by enabling existing producers to overcome the free-rider problem that undermines their incentive to invest in blocking new entrants when they act independently.

However, enforcing collusive agreements is difficult. To enforce collusive agreements, colluders must be able to punish cheaters.¹⁴ The menu of punishments for this purpose available to cartels composed of criminal producers differs from the one available to cartels composed of legitimate producers. Unlike their legitimate counterparts, criminal colluders can use violence to enforce collusion.

¹⁴ For a discussion of ways legitimate producers recruit the assistance of government enforcement to punish cheating on collusive agreements, see Ian Ayres, *How Cartels Punish: A Structural Theory of Self-Enforcing Collusion*, 2 Colum L Rev 295 (1987). For other useful discussions of legitimate producer collusion, see David Genesove and Wallace P. Mullin, *Rules, Communication, and Collusion: Narrative Evidence from the Sugar Institute Case*, 91 Am Econ Rev 379 (2001); John M. Conner, *Global Price Fixing: Our Customers Are the Enemy* (Kluwer 2001).

Although a legitimate colluder's marginal cost of violently punishing a cheating cartel member is large, a criminal colluder's marginal cost of doing so is much smaller because he is a criminal. For example, members of a hitman cartel find it cheaper to murder chiselers than members of a vitamin C cartel do. Unless "white-collar colluders" are willing to become professional criminals and face the stiffer legal penalties, such as lifetime imprisonment and capital punishment, that these criminals face, they cannot violently punish cheating cartel members as criminal colluders can.

Violent punishments can secure more cooperation than nonviolent punishments and thus improve collusive agreements' enforcement. Violent punishments supply colluders with additional enforcement options, which enhances their ability to find the combination of penalties and rewards that best enforces collusion. Most important, violent punishments can inflict much harsher penalties on cheaters than nonviolent punishments. A colluder may be willing to hazard chiseling if the strongest punishment his fellow cartel members can impose on him is financial. But he is much less likely to cheat if he knows his comrades will kill him if they catch him.

Criminal colluders prefer violent punishments to nonviolent ones. However, they confront a problem when they use violence to enforce collusion. When each cartel member has the power to enforce collusion violently, mistakes are very costly. Individuals who use violence to punish cheating cannot undo their punishments if they later believe they have made a mistake, as they can if they use transfers to punish cheating instead. Fines can be refunded, but dead men cannot be brought back to life. When each cartel member has the power to punish cheating violently, the prospect of such mistakes is multiplied.

Further, if criminal colluders' enforcement regime requires the punishment of wrongful punishers and there is ambiguity about who cheated and who punished wrongfully, a mistake by one cartel member can lead to a war that engulfs every cartel member and not only dissolves the cartel but ends with the death of most or even all producers. When every cartel member has the power to enforce collusion violently, the social losses of the "trembling hand" are large.

Cartel members can significantly reduce these losses if instead each member, save one, surrenders his power to punish cheaters violently, leaving a single member with the ability to deal violently with the others.¹⁵ When only one cartel member has the power to

¹⁵ Although it relates to the American Mafia rather than the Sicilian one, it is interesting to note that at various times "the American families" similarly "decided not to admit any new members" and "punished those who sold Mafia membership to others." Gambetta, *The Sicilian Mafia* at 124 (cited in note 1).

use violence to enforce collusion, mistakes are less costly for colluders. The odds that a cartel member will be punished errantly fall substantially and enforcement errors do not degenerate into cartel-wide massacres. Violent enforcement and organizational hierarchy are complements.

This complementarity explains why criminals organize cartels through hierarchical firms instead of forging collusion contracts with one another through the market. To enforce such contracts through the market, each criminal producer would require the “right” to wield violence. But this would subject producers to the costs of the “trembling hand” discussed above. To realize the benefits of violent enforcement in a way that avoids these costs, criminal producers require hierarchy: the establishment of a residual claimant on collusive enforcement between them who alone wields violent authority for this purpose. That hierarchy requires a firm. Thus criminal producers for whom collusion is important organize under the auspices of a single hierarchically structured firm.

This firm consists of a boss who alone wields violent authority over the firm’s employees and becomes the residual claimant on investments that improve the profitability of producing in that market and employees who are former (or would-be) independent producers in that market.¹⁶ The boss uses his violent authority to regulate his employees’ production activities. Depending on the number of employees, one or more layers of managers may exist between the boss and the bulk of his employees to help the boss monitor his employees and punish those who do not comply with his orders.

Under this organizational arrangement the criminal boss acts as a third-party enforcer of collusion between otherwise independent criminal producers.¹⁷ Criminal producers for whom collusion is important are able to enjoy the superior level of cooperation that violent

¹⁶ The firm’s creation generates the asymmetry in producers’ ability to use violence with each other that gives the boss coercive authority. Pre-firm, each producer wields coercive power and no producer wields substantially more coercive power than any other. The firm’s creation elevates one producer (the boss) over the others in terms of coercive power. Post-firm, he alone can martial the entirety of the firm’s resources to support him.

¹⁷ The logic behind would-be independent producers’ decision to surrender decision-making autonomy and authority—including the use of coercion—to a boss by subordinating themselves to him in a hierarchical relationship is similar to the logic behind local governments’ decision to surrender autonomy and authority to the federal government by subordinating themselves to the national government in a hierarchical relationship, or the logic behind individuals’ decision in the state of nature to surrender autonomy and authority to a government by subordinating themselves in a relationship that gives government hierarchical control. In each of these cases agents’ private interests frustrate cooperation. Also in each of them, agents overcome this problem and credibly commit themselves to cooperative behavior by surrendering

enforcement enables and, by organizing hierarchically through a firm, to do so while avoiding the potential losses that violent enforcement threatens. Organizational hierarchy is a technology for enforcing collusion and the hierarchical criminal firm is a cartel.

Since investments to prevent outsiders from entering are now the responsibility of a single actor who is also the residual claimant on such investments, under this hierarchical organizational arrangement there is an incentive to invest in blocking market access to outsiders and the free-rider problem is greatly ameliorated. Firm hierarchy also permits interfirm collusion. If in each relevant market territory criminal producers organize under the auspices of a single hierarchical firm, producer coordination across market territories becomes easier. Instead of, say, 200 individuals negotiating collusive agreements in two territories, which is required if there are 100 producers in each market territory and each producer operates independently, only two individuals must do so—the firm boss in each market territory. Thus firm-level hierarchy facilitates collusion between many more criminal producers than is possible without it.¹⁸

Firm-level hierarchy also contributes to industry level hierarchy. To create a third-party enforcer of *interfirm* collusive agreements, criminal firms require a “super boss” who wields power over multiple firms analogous to the ordinary boss who wields power over his employees inside the firm. In this way naturally high competitive pressures create hierarchically organized criminal firms that in turn form part of an industry-wide hierarchical organization.

Organizational hierarchy is an effective technology of criminal collusion. However, it also creates the specter of boss self-dealing and so is costly. The problems of corporate governance within legitimate firms are well known.¹⁹ Potential for related problems in hier-

part of their autonomy, decision-making rights, and ability to use coercion to a third party through a hierarchical relationship.

¹⁸ Firm-level hierarchy also assists criminals in their relations with government officials. Since the firm boss is a residual claimant of the firm’s investments, he has a strong incentive to negotiate security from government pressure by bribing corrupt officials. Further, firm-level hierarchy protects criminals from government prosecution by concentrating knowledge about the organization in the hands of the boss. For lower-level firm members, orders are taken and not given. Thus the majority of firm members lack intimate knowledge about the firm’s activities they have not directly participated in. If they are arrested, the information they can divulge to authorities is therefore limited, protecting the firm’s other criminals. For discussions of how such informational concerns influence criminal organizations, see Nuno Garoupa, *Optimal Law Enforcement and Criminal Organization*, 63 J L, Econ, & Org 461 (2007).

¹⁹ See, for instance, Michael C. Jensen and William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure*, 3 J Fin Econ 305

archical criminal organizations is equally severe. Firm bosses with the coercive authority required to enforce collusion, such as the power to control employees' output, monitor employees' activities, and punish noncompliant employees violently, may be tempted to use this authority against their employees for private gain. The law restricts the scope of boss self-dealing in legitimate firms.²⁰ But it is useless in controlling criminal bosses who wield violent power over their employees.

Hierarchical organization's benefit exceeds its cost when producers face naturally strong competitive pressures. Our theory therefore predicts that producers will organize hierarchically in criminal industries where competitive pressures are strong in the absence of such organization. This is likely to include criminal enterprises in which one or only a few individuals without significant capital can easily "set up shop" and in which by doing so they threaten the revenue-generating capacity of existing producers. Thus prostitution, the murder-for-hire industry, perhaps retail-level drug dealing for certain kinds of drugs, and, as we will see below, the private protection industry may be examples of criminal enterprises where we might expect comparatively hierarchical organization. Though whether such criminal industries confront strong or weak competitive pressures in a particular case will of course depend on the specific circumstances they confront in that case. The same criminal activity may face strong or weak competitive pressures in different contexts.

Things are different in criminal industries where competitive pressures are much weaker. Here hierarchical organization's benefit is low because collusion's benefit is low—lower than the cost associated with the potential for boss self-dealing, which hierarchical organization creates. Our theory therefore predicts that producers will organize flatly in criminal industries where competitive pressures are naturally weak. This is likely to include criminal enterprises in which production is only possible by a large team of criminals, production requires significant capital, or in which a paucity of existing production teams or an abundance of customers/prey means that a new production team's entry has little effect on the revenue-generating capacity of existing producers. Thus artifact thieves

(1976); Sanford J. Grossman and Oliver Hart, *One-Share-One-Vote and the Market for Corporate Control*, 20 *J Fin Econ* 175 (1988); Luigi Zingales, *The Value of the Voting Right: A Study of the Milan Stock Exchange*, 7 *Rev Fin Stud* 125 (1994); Oliver Hart, *Firms, Contracts, and Financial Structure* (Oxford 1995); Andrei Shleifer and Robert W. Vishny, *A Survey of Corporate Governance*, 52 *J Fin* 737 (1997).

²⁰ Simeon Djankov, et al, *The Law and Economics of Self-Dealing*, 88 *J Fin Econ* 430 (2008).

(so-called nighthawks) and, as we will see below, the production and wholesaling industry for certain kinds of drugs and the maritime marauding industry may be examples of criminal enterprises where we might expect comparatively flat organization. Though, as above, whether these criminal industries confront strong or weak competitive pressures in a particular case will again depend on the specific circumstances they face in that particular case. Nighthawking, piracy, and so on could face weaker competitive pressures in some cases and stronger competitive pressures in others.

Our theory's predictions apply only to criminal producers in illicit markets, not to legitimate producers in licit ones. The reason is straightforward. The former markets' criminality and the latter markets' legitimacy differentially influence their producers' incentive and ability to use organizational hierarchy at the firm and interfirm levels to facilitate collusion.

As noted above, producers in licit markets can use violence to enforce collusion only at great cost. Such behavior places them to varying degrees in the criminal realm. It subjects them to legal sanctions they are not subjected to if they do not engage in such behavior. For producers in illicit markets things are very different. Both colluding and using violence to enforce collusion is much cheaper. These producers are already subject to legal sanctions—depending on their particular illicit market, possibly the same ones—whether they collude and use violence to enforce collusion or not.

This difference has two important effects on how market contestability influences producers' organizational responses in licit and illicit markets. First, although producers in both licit and illicit markets will more strongly desire to collude when startup costs are lower and thus potential competitive pressures are stronger, producers in the latter markets will be more likely to attempt collusion. This is because criminal producers' cost of doing so is lower than legitimate producers'.

Second, and most important, although stronger contestability in illicit markets will result in hierarchical organization—in particular in a hierarchical criminal firm—stronger contestability in licit markets, even if producers do attempt to collude, need not, and in fact is unlikely to, result in hierarchical organization. This is because, as described above, unlike criminal producers, legitimate producers cannot capitalize on the violence-hierarchy complementarity that makes the hierarchical firm an effective means of enforcing criminal collusion.²¹

²¹ Thus for legitimate producers, the violence-hierarchy complementarity is irrelevant to the decision about how to organize collusion. Other factors influence that

The same startup costs that influence market contestability in illicit markets—physical capital requirements, labor requirements, and human capital requirements—influence contestability in licit ones. Thus contestability influences criminal and legitimate producers' desire to collude similarly. But because only criminal producers can exploit the hierarchy-violence complementarity, our theory only predicts a hierarchical organization in illicit markets when those markets are highly contestable. It predicts a criminal hierarchical firm in this case but not an otherwise similar licit one.

III. ORGANIZATIONAL HIERARCHY: THE SICILIAN MAFIA

A. The Sicilian Mafia and the Business of Private Protection

Competitive pressures in Sicily's private protection business are notoriously absent. To enter this industry a potential producer requires permission from at least one Mafia "boss" and possibly others.²² But it would be a mistake to conclude from the absence of competition in most of Sicily's private protection industry that competitive pressures in this industry are naturally weak. This interpretation has things backward. The low degree of contestability observed in this criminal industry is the *result* of producers' successful intervention to countermand strong competitive pressures that would prevail naturally in Sicily's private protection business in the absence of their intervention.

Strong competitive pressures prevail in Sicily's private protection industry because of naturally low barriers to entry that low startup costs create. Physical capital requirements for entering Sicily's private protection industry are low because protecting local residents and businesses from burglars, street hoods, and other petty thugs is not capital intensive. The technology of private protection in this market is simple and inexpensive. To enter the private protection industry the only physical capital one requires is a gun. If a would-be protector is strong enough (and the individuals who pose violent threats to his customers are weak enough), in some cases he may not even need this. His fists will do.²³

decision instead. For discussions of these factors, see Genesove and Mullin, 91 *Am Econ Rev* 379 (cited in note 14); Wayne E. Baker and Robert R. Faulkner, *The Social Organization of Conspiracy: Illegal Networks in the Heavy Electrical Equipment Industry*, 58 *Am J Sociology* 837 (1993).

²² Arlacchi, *Men of Dishonor* 35 (cited in note 1); Tim Shawcross and Martin Young, *Men of Honor: The Confessions of Tommaso Buscetta* 78 (Collins 1987).

²³ Alexander Stille, *Excellent Cadavers* 118 (Pantheon 1995).

Labor requirements also tend to be naturally low in Sicily's private protection industry. Unlike some criminal enterprises, supplying protection does not require team production. Single individuals can supply, and historically have supplied, private protection successfully.²⁴ Naturally low labor requirements indirectly increase potential competitive pressures in Sicily's private protection business by lowering the startup cost of entering this criminal industry. They also directly increase such pressures by increasing the number of potential competitors that can operate. If Sicily has 1,000 residents who would like to enter the private protection industry, because each of these residents can operate as a private producer on his own behalf, in principle as many as 1,000 producers may compete in this criminal business, reducing the returns available to each producer.

Finally, human capital requirements tend to be naturally low in Sicily's private protection business.²⁵ It requires little information to identify and locate one's customer base (or victim base if protection is really extortion—something we discuss below) in this market.²⁶ Since Sicily's private protection suppliers often provide a valued service—protection—would-be customers seek them out, identifying and locating themselves.²⁷ Even when protection becomes extortion, it remains relatively easy to identify and locate victims. Potential victims are the weaker individuals and businesses in one's immediate geographic neighborhood. As a protection supplier travels outside this neighborhood it becomes less obvious whom he can profitably extort. But because extortion is most effective when the

²⁴ Gambetta, *The Sicilian Mafia* at 17, 116 (cited in note 1).

²⁵ Gambetta notes that the Mafia "is heavily dependent on the local environment. Its initial costs can be met solely under a special combination of conditions since basic resources are expensive to produce in a void: information gathering and advertising, for instance, exploit independent networks of kinship, friendship, and ethnicity." Id at 123. However, as we show, these higher costs of entering Sicily's private protection industry are the *result* of the Mafia's emergence and existence. The Mafia creates a situation for would-be entrants into the private protection industry that requires them to be able to "exploit independent networks of kinship, friendship, and ethnicity" to get their foot in the door in the industry. It does this by making particular kinship, friendship, and ethnic network connections, which only its members have access to, requirements for access to the industry. This is true even within the industry for one *famiglia* vis-à-vis others. For instance, according to Sicilian Mafioso Tomasso Buscetta, the Mafia's hierarchical organization "guarantee[s] a very effective system for safeguarding the secrecy of mafia families, as contacts are limited to the essential, and one knows very little about other families." Id at 123, 251.

²⁶ See, for instance, id at 20–21; Arlacchi, *Men of Dishonor* at 187, 205 (cited in note 1).

²⁷ Arlacchi, *Men of Dishonor* at 187, 205 (cited in 1).

criminal can monitor his victim, victims tend to be local where it is easy to observe their and others' relative strength.²⁸

Further, unlike for the art thief discussed in Section II, the fruit Sicily's private protection suppliers (or extorters) enjoy is immediately forthcoming. Protection providers (or extorters) can select their form of pay, which will typically be cash. They have no need to resort to secondary markets to sell goods they receive from customers (or victims). So they require no specialized knowledge of such markets.

Because of the foregoing factors, in the Mafia's absence it takes relatively little to set up shop in Sicily's private protection business. The resulting strong threat of potential competition in this business gives Sicily's private protection producers a strong incentive to collude. In turn, the need to enforce collusive arrangements violently to maximize collusion's benefit gives them the incentive to organize hierarchically. Our theory of criminal organization therefore predicts a hierarchically organized Sicilian private protection industry and, in particular, hierarchically organized Sicilian private protection firms.

The Sicilian private protection industry's organizational structure is consistent with this prediction. It highlights how criminal producers in Sicily use organizational hierarchy to collude. "The Mafia" is a collection of some 100 or more criminal protection-providing firms throughout Sicily.²⁹ Each firm acts as a cartel composed of would-be independent producers in a given territory and has "a marked interest in controlling the number of members who can . . . provide . . . protection."³⁰ The organization of these potential competitors under the umbrella of a single hierarchically struc-

²⁸ There is one potentially significant human capital investment that would-be entrants into Sicily's private protection business may have to make—"threat capital" to build up their customers' trust or victims' fear. This investment will not be important where a private protector's (or extorter's) superior strength is obvious but may be important where it is not. Still, compared to the human capital required to entry Caribbean piracy, which we discuss below, this investment, even when required to enter the private protection industry, is small.

²⁹ Calderone suggests the number may be as large as 500. Arlacchi, *Men of Dishonor* at 5 (cited in note 1). Other estimates suggest that this number is overstated; the number of Sicilian families is closer to between 105 and 186. Gambetta suggests that even the 186 figure is likely overstated in that it probably "includes ad hoc protection organizations"—private protection suppliers temporarily competing with one another in a space the Mafia chose to vacate. According to our theory, many of these ad hoc producers should either cartelize under a hierarchical organization or be driven from the market if they are weaker. Gambetta, *The Sicilian Mafia* at 255 (cited in note 1).

³⁰ Gambetta, *The Sicilian Mafia* at 124 (cited in note 1).

tured protection firm, or *famiglia*, enforces the cartel. Gambetta's³¹ important work describes this organization most clearly.³²

Atop the organization is the "boss," or *capo famiglia*, who appoints his immediate underlings—the vice capo and one to three "counselors," or *consiglieri*.³³ Below the vice capo is one or more "captains," or *capidecina*, who report directly to the *capo famiglia*. Each captain oversees a small number of soldiers, or "men of honor." The *capo famiglia* directs the production of the soldiers who are immediately supervised by *capidecina* to ensure they limit their protection activities to those the boss specifies.³⁴ The *capo famiglia* uses the threat of violence to regulate his "employees'" behavior and violently punishes those who do not comply with his directions. For example, when Sicilian Mafioso Damiano Caruso "decided he did not want to obey anyone any longer" and began acting without his boss' permission, his boss ordered the death of Caruso, Caruso's mistress, and Caruso's fourteen-year old daughter.³⁵

³¹ Id at 111–14.

³² See Stille, *Excellent Cadavers* at 101 (cited in note 23); Arlacchi, *Men of Dishonor* at 33–34 (cited in note 1).

³³ According to Calderone, a family's men of honor elect the *consiglieri* rather than the family boss's appointing them. Arlacchi, *Men of Dishonor* at 25 (cited in note 1). However, in the light of Gambetta's description of Mafia boss "elections" more as rubber-stamping procedures for the strongest than genuine democratic elections, he and Arlacchi may not substantively disagree. Gambetta, *The Sicilian Mafia* at 111 (cited in note 1). Buscetta suggests that although *consiglieri* are normally boss-appointed, in very large families the men of honor elect them. Shawcross and Young, *Men of Honor* at 52 (cited in note 22).

³⁴ Arlacchi, *Men of Dishonor* at 33–34 (cited in note 1); Gambetta, *The Sicilian Mafia* at 111,123 (cited in note 1); Stille, *Excellent Cadavers* at 101, 115 (cited in note 23).

³⁵ Gambetta, *The Sicilian Mafia* at 174 (cited in note 1). The *capo famiglia's* employees are unable to wield similar coercive power over him for two reasons. First, what makes the *capo* the *capo* and distinguishes him from other firm members is the fact that he has the support and allegiance of the majority of the firm's members. Second, he's buffered from contact with his men of honor through his *capidencia*, who his men of honor must go through to even communicate with him. As Calderone put it, "It is not possible to have a direct relationship between the man of honor and the rappresentante unmediated by the intervention of the *capidecina*" (quoted in Gambetta, *The Sicilian Mafia* at 111(cited in note 1)). For instance, "If a man of honor had to ask for authorization from the head of the family, he would turn to his *decina* boss, who would forward the request to the representative, who would approve it or turn it down." Arlacchi, *Men of Dishonor* 34 (cited in note 1). Thus, while bosses can "reach out and touch" their men of honor, their men of honor cannot do the same going up the chain of command, giving bosses coercive authority their employees do not wield.

The *capo famiglia* regulates the entry of would-be criminal protection providers in his area.³⁶ He requires prospective protection suppliers to get a “license” from him to produce in his territory.³⁷ Under this system “a large protection family hands out portions of its territory or particular markets to its smaller colleagues.”³⁸ As Sicilian Mafioso Antonio Calderone put it, “A family is autonomous in its own territory. The power of the representative [*capo famiglia*] and *consiglieri* is autonomous too, but not in every case—the decision to kill someone, for instance,” may be under the control of the inter-*famiglia* “supercartel,” which we discuss below.³⁹ According to another Sicilian mobster, Tomasso Buscetta, “No murder . . . could have been committed in that [that is, the *famiglia*’s] area without the consent of the family.”⁴⁰ “[W]henever an entrepreneur had business in another family’s territory, he had to seek permission through his own family if he was a member of one, or from the boss acting as his protector if he was not.”⁴¹

Capi famiglia ruthlessly punish those who produce in their territories without permission. For example, according to Calderone, “Toward the end of the 1970s and in the early 1980s, the Costanzos opened a building site in Messina. After a while there was a demand for money from one or more of the Messinesi. . . . I asked him whether he had spoken to Nitto” Santapaola—the acting boss—“and he said he had. Subsequently one of the extortionists was killed in Messina.”⁴² In this way the *famiglia*’s hierarchy enables “Sicilian protection firms . . . to deter younger men from being too impatient to become independently established in the trade. When the exception . . . dares to mount a challenge, he pays a fearsome price. ‘Self-made men,’ as [Sicilian Mafioso] Stefano Calzetta explained, ‘don’t live long.’”⁴³

Contrary to popular perception, the *famiglia*, or private protection-producing firm in Sicily, is small. At its height the largest Sicilian

³⁶ Arlacchi, *Men of Dishonor* at 34 (cited in note 1); Gambetta, *The Sicilian Mafia* (cited in note 1); Shawcross and Young, *Men of Honor* at 78, 115 (cited in note 22); Stille, *Excellent Cadavers* at 115 (cited in note 23).

³⁷ Arlacchi, *Men of Dishonor* at 35 (cited in note 1); Gambetta, *The Sicilian Mafia* at 113–14 (cited in note 1); Shawcross and Young, *Men of Honor* 78, 115 (cited in note 22).

³⁸ Gambetta, *The Sicilian Mafia* 108 (cited in note 1).

³⁹ Quoted in Arlacchi, *Men of Dishonor* at 35 (cited in note 1).

⁴⁰ Quoted in Shawcross and Young, *Men of Honor* at 115 (cited in note 22).

⁴¹ Gambetta, *The Sicilian Mafia* at 113 (cited in note 1).

⁴² *Id.* at 175.

⁴³ *Id.* at 107.

firm, the Calderone family in Catania, had 214 members, only forty-four of whom were actual “men of honor.”⁴⁴ Other Sicilian protection firms are much smaller, most having some ten to thirty members. A few are smaller still.⁴⁵ Such smallness makes monitoring easier, which is important for enforcing collusion. It also rejects the hypothesis that a more severe monitoring or related agency problem is responsible for the Sicilian Mafia’s hierarchy.⁴⁶ Mafia firms are no larger, and their members no more dispersed, than the “small youth gangs” that Skaperdas notes organize flatly.⁴⁷ It follows that Mafia firms’ monitoring difficulties are no more severe than those of small youth gangs. Yet only the former organize hierarchically.

By reducing the number of decision makers (the *capi famiglia*) who must be monitored, negotiate, and agree on interfirm cartel agreements, Sicilian protection firms’ internal hierarchy also facilitates interfirm collusion. When Sicilian protection firms are at peace they have historically, albeit intermittently, used intrafirm hierarchy to form interfirm cartels at the local, provincial, and industry-wide levels.⁴⁸ Groups of typically three firms occupying contiguous territories that make up a district within a province were led by a boss called the *capo mandamento*—the boss of the strongest of the three firms. *Capi mandamento* in turn formed a *commissione*.⁴⁹ As Buscetta described the *commissione*, “Above the families and serv-

⁴⁴ The other members, called *avvicinati*, were noninitiated criminals who participated some of the firm’s illicit activities. Letizia Paoli, *Mafia Brotherhoods: Organized Crime, Italian Style* 27–28 (Oxford 2003).

⁴⁵ Arlacchi, *Men of Dishonor* at 5, 21 (cited in note 1); Gambetta, *The Sicilian Mafia* at 111–12 (cited in note 1)

⁴⁶ Also contrary to popular perception, the Mafia “family” rarely corresponds to the biological family. Salvatore Lupo, *History of the Mafia* 20 (Columbia 2009). Thus to the extent that biological families are thought to be naturally hierarchically organized, this cannot be the reason for Mafia *famiglia*’s hierarchical organization.

⁴⁷ Skaperdas, 2 *Econ of Governance* 184 (cited in note 5).

⁴⁸ Various parts of the Sicilian private protection industry’s “super-hierarchy” described below existed from the 1950s through the mid-1980s. Gambetta, *The Sicilian Mafia* 112–13 (cited in note 1). The first manifestation of the commission was in 1957 when provincial-level commissions were established in every province but Siracusa and Messina. A Mafia war in 1963 dissolved this system. However, it was revived after the war ended in 1969. In 1975 a national commission emerged, consisting of “elected” representatives from every province but Messina, Syracuse, and Regusa. A second Mafia war in 1978 dissolved this system, but it was revived again in 1981 when the war ended until the Maxi trial in 1984, since which time members of the Corleonesi faction have run the commission until Bernardo Provenzano’s arrest in 2006. Clare Longrigg, *Boss of Bosses: A Journey into the Heart of the Sicilian* 261 (St. Martin’s 2006).

⁴⁹ Arlacchi, *Men of Dishonor* at 35 (cited in note 1); Gambetta, *The Sicilian Mafia* at 112–14 (cited in note 1); Shawcross and Young, *Men of Honor* at 52 (cited in note 22); Stille, *Excellent Cadavers* at 101 (cited in note 23).

ing the purpose of coordinating the different groups is a collegial structure known as the Commission, made up of members each one of whom represents three families that are geographically close together. This member is one of the bosses of the three families, named by the bosses of those families."⁵⁰

According to Calderone, "If a man in the family's territory has to be killed as punishment . . . the representative [that is, *capo famiglia*] makes the decision, the *decina* boss [that is, *capodecina*] has it carried out, and the man is no more. The representative's only responsibility is to report to the district boss [*capo mandamento*]⁵¹—the boss of a territory that encompasses three families."⁵¹ "Permission had to be granted by the boss of the territory in which the murder was to take place, and the *commissione* was supposed to enforce this rule."⁵²

At the head of each *commissione* was a leader called the *rappresentante regionale* who was charged with organizing province-level meetings. In the late 1970s a *commissione interprovinciale* formed briefly, consisting of *rappresentanti di provincial*—provincial representatives—who oversaw the private protection business at the inter-province, or industry wide, level. As Buscetta described it, "if the entrepreneur of a province wanted to do some work in another province, permission depended on the decision of the *interprovinciale*."⁵³

The result of this organizational pyramiding was a "super-hierarchy" that attempted to enforce what Gambetta calls "supercartels"—interfirm collusive agreements at the local, province, and industry wide levels.⁵⁴ These supercartels worked only intermittently and thus met with sporadic success in cartelizing the industry. Conflicts between important families led the *commissione* and *commissione interprovinciale* to break down periodically. However, at other times, the Palermitan *commissione*, for instance, had the "power . . . to impose the will of its members on other families," facilitating effective interfirm collusion.⁵⁵

⁵⁰ Quoted in Shawcross and Young, *Men of Honor* at 52 (cited in note 22).

⁵¹ Quoted in Arlacchi, *Men of Dishonor* at 35 (cited in note 1). Even when Sicilian Mafiosi traveled to the United States they retained this practice. For example, "Buscetta points out that visiting members of the Sicilian Mafia could not engage in criminal activities without first seeking and receiving the approval of the American family in whose territory they wished to operate" Shawcross and Young, *Men of Honor* at 78 (cited in note 22).

⁵² Gambetta, *The Sicilian Mafia* at 114 (cited in note 1); see also Paoli, *Mafia Brotherhoods* at 53, 60–61 (cited in note 44).

⁵³ Quoted in Gambetta, *The Sicilian Mafia* at 113 (cited in note 1)

⁵⁴ *Id* at 113.

⁵⁵ *Id* at 116.

We have neglected the question whether the Sicilian Mafia is engaged in providing protection—an economic good—or is engaged in extortion. Gambetta suggests that at least some of what the Sicilian Mafia does constitutes genuine protection. As he puts it, “contrary to widespread belief, protection money may be *willingly* paid.” The Mafia’s “services are often useful to and,” thus, “actively sought by customers.”⁵⁶ For instance, according to Calderone, “[t]he Cosa Nostra’s protection was not just sought by the Costanzo’s and the other Catanian builders. Almost every Sicilian business of a certain size would [voluntarily] resort to the Mafiosi in order to work in peace and keep firms from the North out of their markets.”⁵⁷ Demsetz argues that, economically, the distinction between supplying a valued service such as protection, and extortion is overdrawn.

Whether private protection providers supply genuine protection or are extortionists (assuming this distinction is meaningful) turns out to be unimportant for our theory. Since genuine protection and extortion involve nearly identical activities and thus similar physical capital, labor, and human capital requirements, the startup cost in both industries, the relative lowness of natural barriers to entry in both industries, and consequently the need for collusion to preserve rents in the face of strong competitive pressures in both industries are nearly the same.⁵⁸

Competing private protection suppliers erode returns by driving the price of protection to its competitive level. Competing extortionists erode returns by “overfishing”—overexploiting their victims.⁵⁹ Competition for the resources of a given number of victims in their territory creates a criminal commons problem reminiscent of Olson’s “roving bandits.”⁶⁰ Whereas a single extortionist would exploit prey up to the point at which the marginal benefit of extortion equaled his share of the marginal deadweight loss of his extraction, competing extortionists exploit prey up to the point at which the average benefit of extortion equals their share of the marginal

⁵⁶ Gambetta, *The Sicilian Mafia* at 20, 187 (cited in note 1); see also *id.* at 21, 248.

⁵⁷ Quoted in Arlacchi, *Men of Dishonor* at 187, 205 (cited in note 1); Harold Demsetz, *When Does the Rule of Liability Matter?* 1 J Legal Stud 13 (1972); Harold Demsetz, *Wealth Distribution and the Ownership of Rights*, 1 J Legal Stud 223 (1972).

⁵⁸ We say “nearly identical” because there is one important startup cost difference between genuine private protection and extortion related to the human capital requirements in each industry. Because the former criminal business involves supplying a valued service while the other does not, as discussed above, search costs for customers/victims tend to be lower in the private protection industry than in the extortion industry.

⁵⁹ Philip A. Neher, *The Pure Theory of the Muggery*, 68 Am Econ Rev 437 (1978).

⁶⁰ Mancur Olson, *Dictatorship, Democracy, and Development*, 87 Am Polit Sci Rev 567 (1993).

deadweight loss of their extraction. Supra-optimally extorted victims yield extortionists less revenue than they could earn if they colluded to restrict their exploitation. Our theory therefore predicts similar incentives to organize hierarchically in the private protection and extortion industries.⁶¹

B. The Evolution of Organization in a Criminal Market: The Heroin Business and the Sicilian Mafia

To examine our theory of organizational hierarchy in the Sicilian Mafia more closely we would like to examine the evolution of organization in Sicily's private protection market over time. Unfortunately sufficiently detailed information about the Sicilian Mafia's emergence in the private protection industry is scant.⁶² However, because the criminal business the Sicilian Mafia engages in has changed recently to include the production and sale of heroin, we are able to glimpse how venturing into a market with a different degree of contestability has affected the Mafia's organizational structure. This organizational structure's evolution is consistent with our theory.

The Sicilian Mafia first became involved in the international heroin business in the late 1950s with the arrival of Lucky Luciano from the United States.⁶³ Years later, in the early 1970s, Mafiosi began engaging in the heroin trade on a large scale. Following a flurry of arrests in the 1960s the Mafia's financial situation suffered and did not improve until Mafiosi began smuggling tobacco and later trading in heroin. According to Calderone, "When I say there wasn't any money in those years, that the mafia had no money, I'm not just saying it to exaggerate. After the arrests of 1962–63 and the Catanzaro trial of 1968, everybody's money had run out. It had gone to lawyers, prison fees, and the like."⁶⁴ The enormous profit opportunities the heroin business offered prompted the Mafia to become seriously involved in the market shortly thereafter.

Compared to Sicily's private protection industry, its heroin industry involved significantly higher physical and human capital requirements and thus startup costs. Heroin production requires equipment and laboratories in which to process and prepare the drug. It

⁶¹ The difference in incentives to do so result from the difference in human capital requirements discussed in note 58.

⁶² However, what information is available is consistent with our theory. Individuals rather than hierarchically organized firms initially produced protection in Sicily.

⁶³ Shawcross and Young, *Men of Honor* at 46–47 (cited in note 22).

⁶⁴ Arlacchi, *Men of Dishonor* at 93 (cited in 1).

also requires individuals competent in chemistry and skilled in manufacturing the drug. Besides being very dangerous, the process is difficult and complex; consequently, few individuals had the necessary skills to process heroin. For instance, in the 1980s Sicilian heroin processor Francesco Marino Mannoia “was . . . very much sought after because of his chemical competencies.”⁶⁵ Shawcross and Young describe the high human capital requirements of participating in Sicily’s heroin market:

Although it is relatively easy to convert raw opium into morphine base, the chemical process of turning morphine base into heroin is considerably more complex. The technical name for heroin is diacetylmorphine: the morphine is acetylated by reacting it with acetic anhydride or acetyl chloride. The morphine base has to be heated to a precise temperature with acetic anhydride, then filtered through alcohol, charcoal and acetone. The final stage is the drying and crushing, using hydrochloric acid to make the hydrochloric salt of heroin. This makes it soluble in water—an important property as heroin cannot be used for injection until its salt has formed. A bad chemist with poor equipment could turn out heroin of such poor quality that there would be difficulty in selling it, and if he was a real amateur, then getting the temperature wrong by just a few degrees during the heating stage would result in a lethal explosion.⁶⁶

Heroin’s high human capital requirements generated high social capital requirements since one needed international connections with morphine-base exporters or connections with skilled chemists to produce morphine base. “Good chemists were at a premium. Although the Sicilians were skilled smugglers, for the most part they lacked the necessary expertise to run sophisticated refining laboratories. For those skills they had to turn to the chemists of the French connection based in Marseilles.”⁶⁷ High social capital requirements were not restricted to chemists. As one historian of the Sicilian Mafia described it, Sicilian “[d]rug trafficking is all about contacts, about bringing together a gallery of specialists: from investors, to the suppliers of morphine base, to technicians able to refine the drug, to transporters, to small-time dealers who put it on the streets, to financiers with the expertise required to launder the profits and keep

⁶⁵ Paoli, *Mafia Brotherhoods* 146 (cited in note 44); Shawcross and Young, *Men of Honor* at 47–48 (cited in note 22). See also Paoli, *Mafia Brotherhoods* at 146 (cited in note 44).

⁶⁶ Id. Shawcross and Young, *Men of Honor* at 47–48 (cited in note 22).

⁶⁷ Shawcross & Young, *Men of Honor* 48 (cited in note 22).

them out of the grasp of the Guardia di Finanza (the Italian tax police)."⁶⁸

The heroin business' higher physical and human capital requirements reduced potential competitive pressure in this industry.⁶⁹ Reduced competitive pressure reduced the need for collusion and with it organizational hierarchy. Thus, as our theory predicts, when Sicilian Mafiosi increasingly turned their attention to heroin production in the 1970s, they became less eager to employ hierarchical organization as a tool to promote collusion. This explains why since the 1970s "there has been . . . a clear trend toward the expansion of individual entrepreneurial autonomy" within the Sicilian Mafia's organization.⁷⁰

According to Buscetta, after the Mafia's entrance into the heroin business "the cleavages among different families were no longer respected, in the sense that everybody could associate with whoever they wanted."⁷¹ Many Mafiosi operated fully independently in the heroin business. "The freedom wielded by [its] participants was such that . . . whoever wanted to do so could pick up his share of the processed product in Sicily and arrange distribution independently."⁷²

Unlike when they operated in the private protection industry, Mafiosi weren't obliged to rely on fellow family members, or even other Mafiosi, to conduct business in the heroin industry. Mafiosi and non-Mafiosi alike operated freely in the heroin business. As Buscetta and fellow-Sicilian Mafioso Salvatore Contorno pointed out, in stark contrast to the private protection business, in the drug business "family boundaries were irrelevant: everybody was entitled to associate financially or otherwise with anyone else, whether Mafiosi or not." Involvement in the heroin business did not typically require

⁶⁸ Juno Dickie, *Cosa Nostra: A History of the Sicilian Mafia* 280 (Palgrave Macmillan 2004); see also Lupo, *History of the Mafia* at 220 (cited in note 46).

⁶⁹ Similar high capital requirements prevented entry into the tobacco-smuggling industry, which the Mafia engaged in before and then alongside heroin. According to Lupo, tobacco trafficking required the "availability of immense capital and considerable resources to purchase or lease ships . . . ; purchase or deploy in France and Italy clandestine radio transmitting equipment; arrange to pay for the tobacco embarked in Tangiers and Gibraltar (the cargo of a single ship generally cost the organizers of the traffic an average of forty thousand dollars); hire, pay and deploy in Italy and in other countries the officers and crews of the ships, and the radio operators; accept and absorb the eventual losses of men and vehicles; transfer sizable financial resources to Switzerland, Italy, France, and Malta." Lupo, *History of the Mafia* at 221–22 (cited in note 46).

⁷⁰ Paoli, *Mafia Brotherhoods* at 145 (cited in note 44).

⁷¹ *Id* at 95.

⁷² *Id* at 147.

a boss's permission. And "If a license was needed from the family at all, it concerned dealing in general and not how or with whom."⁷³

Interfirm-level organizational hierarchy in the Sicilian Mafia also waned after Mafiosi began devoting greater attention to heroin.⁷⁴ "As a matter of fact, the single mafia families—and . . . increasingly, even the single 'men of honor'—enjoy full entrepreneurial autonomy, and at the interfamily level, there is no obligation to share illicit proceeds either."⁷⁵ Further, since 1994 "the Palermitan provincial commission (undoubtedly Cosa Nostra's most consolidated collegial body) has not held full meetings. . . . According to some investigators, Cosa Nostra's strategic decisions are currently [as of 2006] made by a sort of directory, composed of [Bernardo] Provenzano and three other high-ranking 'men of honor,' who, however, meet rarely. As a result, the range and discretion of each family chief's power has grown considerably."⁷⁶ Heroin isn't the only contributor to waning interfirm organizational hierarchy in recent years. For instance, the Palermitan commission's operational absence may also reflect a submersion strategy following the Italian police's improved anti-Mafia efforts.⁷⁷ But heroin also played an important role and helps explain the pronounced post-1970s flattening of the Sicilian Mafia's organizational structure.⁷⁸

IV. ORGANIZATIONAL FLATNESS: CARIBBEAN PIRATES AND THE BUSINESS OF MARITIME MARAUDING

On the surface, entry into the sea banditry business in the eighteenth-century Caribbean was completely open.⁷⁹ There was no "pirate Ma-

⁷³ Gambetta, *The Sicilian Mafia* at 239 (cited in note 1).

⁷⁴ Although a national commission was formed in 1975, it regulated Mafiosi activities related to private protection, not other illicit activities, such as drug trafficking.

⁷⁵ Paoli, *Mafia Brotherhoods* at 148, 145 (cited in note 44).

⁷⁶ *Id* at 64.

⁷⁷ Longrigg, *Boss of Bosses* at 130 (cited in note 48).

⁷⁸ Further, to the extent that producers in the heroin industry rely on team production, the greater scope given to participants in this industry may also reflect the benefits of incentivizing individual producers in an environment in which measuring their contributions to heroin production is difficult.

⁷⁹ Use of the word "criminal" here is necessary because there was also a thriving, *legitimate* (that is, state-sanctioned) sea banditry business in the Caribbean and elsewhere in the early eighteenth century: privateering. On the organizational differences between pirate and privateer firms and the reasons for these differences, see Leeson, 115 *J Polit Econ* 1049 (cited in note 2). On the institutions of privateering, see Peter T. Leeson and Alex Nowrasteh, *Was Privateering Plunder Efficient?*, 79 *J Econ Behavior & Org* 303 (2011).

“pirate dons” one had to get permission from to take to the sea. And there was no pirate arrangement that divided the ocean into exclusive territories.

It is true that pirates did not take steps to regulate entry into their criminal industry. But that does not mean that pirates’ industry had no barriers to entry. Naturally high barriers to entry in their industry limited competitive pressures without their intervention. Pirates did not regulate entry into their industry because they did not need to.

In contrast to Sicily’s private protection industry, the Caribbean maritime plunder industry had high startup costs. Whereas the physical capital requirements of the former entailed only a gun, the technology of piracy required a ship and, what is more, a ship with more guns than potential victims’ ships. Most merchantmen in the early eighteenth-century carried several cannon.⁸⁰ To reliably overtake these targets, a pirate ship required at least as many.

Only one Caribbean pirate, Major Stede Bonnet, purchased his ship and cannon.⁸¹ Other pirates stole them. A would-be private protector in Sicily could obtain his guns (if he needed them) in the same way if this were cheaper than purchasing them. However, stealing an eighty-plus-ton ship and its associated ordnance was considerably costlier than stealing a handgun, machine gun, or even a small arsenal for that matter. Beside the fact that it is harder to conceal absconding with, and thus easier to detect the theft of, a stolen merchantman, although one person can steal a firearm, one person cannot steal a merchant vessel. To steal a vessel, a would-be pirate required at least enough sailors to sail away with the ship. If the vessel was small, so might be the number of sailors needed to steal it. But no vessel suitable for pirating could be stolen alone. And as the vessel’s size increased, so did the number of comrades a would-be sea dog needed to help him abscond with it.

Closely related to this was piracy’s substantially greater labor requirement. Unlike producing private protection, the technology of piracy required team production. A one-man pirate “crew” was not possible.⁸² Sailing the ship and operating its guns required multiple

⁸⁰ Leeson, *The Invisible Hook* 86 (cited in note 2).

⁸¹ *Id.* at 1064. Bonnet, the so-called gentleman pirate, was unusual in that he was a man of distinguished education and career—a wealthy man who decided to take up pirating. This explains why he, unlike most other pirates, who were dirt-poor sailors, was in a position to finance his own startup costs personally.

⁸² *Id.* at 4.

pirates. The average pirate ship had eighty crew members.⁸³ Smaller crews existed. But to pirate at all required at least five sailors. And in most cases it required many more. The most successful Caribbean pirate crew, the one Bartholomew Roberts captained, had more than 500 sailors at its peak. And crew sizes of 150–200 were not uncommon, suggesting a significantly larger optimal vessel size.⁸⁴

Piracy's team production requirement not only limited competition indirectly by raising the startup cost of pirating. It limited competition directly by reducing the number of potential competitors by a factor equal to the number of criminals needed to operate the pirate ship and its ordnance. For example, if there were 1,000 would-be criminal competitors in the pirate industry—1,000 individuals hoping to earn their income by maritime marauding—and sailing even the smallest vessel capable of piracy required five pirates, the number of potential competitors in the industry fell "automatically" from 1,000 to a maximum of 200. At its height the Caribbean pirate population reached about 2,400 swashbucklers.⁸⁵ However, since, to be successful, pirates organized into crews averaging eighty members, instead of 2,400 competitors, only thirty pirate firms competed.

Piracy's human capital requirement was also substantially greater than that of Sicily's private protection business. Unlike Sicily's private protection suppliers, pirates were in the business of "pure plunder." Far from seeking them out, pirates' revenue base—merchant-

⁸³ Marcus Rediker, *Between the Devil and the Deep Blue Sea: Merchant Seamen, Pirates and the Anglo-American Maritime World, 1700–1750*, 256 (Cambridge 1987).

⁸⁴ Unless otherwise noted, all depositions and examinations cited are reprinted in Jameson (1923). John Franklin Jameson, ed, *Privateering and Piracy in the Colonial Period: Illustrative Documents* (Macmillan 1923). See, for example, Snelgrave, *A New Account of Some Parts of Guinea and the Slave-Trade* ([1734]; Routledge 1971); Examination of John Brown, May 6, 1717, Suffolk Court Files, no. 11945, paper 5; Deposition of Theophilus Turner, June 8, 1699, Public Record Office, Colonial Office Papers 5: 714, no. 70 VI; Examination of John Dann, Augt 3, 1696, London, Public Record Office, Colonial Office Papers 323: 2, no. 25; Deposition of Adam Baldrige, May 5, 1699, Public Record Office, Colonial Office Papers 5: 1042, no. 30 II; Charles Johnson, *A General History of the Pyrates: From Their First Rise and Settlement in the Island of Providence, to the Present Time* ([1724]; Nabu 2010); David Cordingly, *Under the Black Flag* (Random 2006).

⁸⁵ See, for example, Johnson, *A General History of the Pyrates* at 28 (cited in note 84); Patrick Pringle, *Jolly Roger: The Story of the Great Age of Piracy* 185 (Norton 1953); Rediker, *Between the Devil and the Deep Blue Sea* at 256 (cited in note 83); Jennifer G. Marx, *The Golden Age of Piracy* in David Cordingly, ed, *Pirates: Terror on the High Seas, from the Caribbean to the South China Sea* 102, 111 (Turner 1996); Angus Konstam, *The History of Pirates* 6 (Lyons 2002).

men—sought to avoid them, thus increasing the information pirates required to identify and locate their prey.⁸⁶

Further, the field in which pirates might find victims was enormous. It included significant parts of the Caribbean, the Gulf of Mexico, North America's Atlantic coastal waters, Africa's western coastal waters, and portions of the Indian Ocean.⁸⁷ Merchantmen tended to follow specific routes, and pirates could count on natural choke points of trade to winnow the possibilities. Still, merchantmen traveled the vast expanse of the sea and pirates had to learn their traveling habits.

While plenty of rich prizes were sailing around, there was no way to establish when or where the next one might be sailing except to buy that information or invest in acquiring it, for example, by overtaking some other prey and extracting it from prisoners.⁸⁸ Even then pirates could not always rely on this information to yield them booty. Hunting prey was difficult and time-consuming, especially since prey were not just mobile but, by necessity, constantly on the move.

Pirates could not easily observe whether a ship they were bearing down on was a potential target—a weaker merchantman—or a much stronger government warship, perhaps hunting for pirates, which they should avoid.⁸⁹ Individuals with significant sailing experience who knew how to identify other vessels could avoid sailing into the Royal Navy's clutches. However, sea dogs without such human capital were more vulnerable to doing so. This is one reason piratical production was typically restricted to individuals with maritime backgrounds.⁹⁰

Finally, unlike private protectors (or extorters), pirates could not choose their form of revenue. Pirates did not control what the merchantmen they might encounter carried, which in many cases was goods instead of specie.⁹¹ Pirates could consume those goods, but to convert them to specie they had to sell the stolen wares on the black

⁸⁶ See, for instance, Leeson, *The Invisible Hook* at 82–106 (cited in note 2).

⁸⁷ Leeson, 76 *J Econ Behavior & Org* 497 (cited in note 7).

⁸⁸ Johnson, *A General History of the Pyrates* at 88 (cited in note 84); Leeson, *The Invisible Hook* 109–10 (cited in note 2); Charles Grey, *Pirates of the Eastern Seas* 317–18 (Kennikat 1971).

⁸⁹ See, for instance, Johnson, *A General History of the Pyrates* at 215, 299 (cited in note 84). On the difficulty that pirates and their prey faced in identifying others at sea and the strategies they devised to take advantage of that informational asymmetry, see Leeson, *The Invisible Hook* (cited in note 2); Leeson, 76 *J Econ Behavior & Org* 497 (cited in note 7).

⁹⁰ Leeson, 76 *J Econ Behavior & Org* 497 (cited in note 7).

⁹¹ See, for instance, Cordingly, *Under the Black Flag* at 107 (cited in note 84).

market. Finding buyers and identifying the most profitable market for pillaged goods required special knowledge.

Because of Caribbean piracy's greater physical capital, labor, and human capital requirements, the startup costs of entering this criminal industry were higher than those of entering Sicily's private protection business. This led to higher natural barriers to entry and a lower degree of contestability in the Caribbean piracy industry, which significantly reduced Caribbean pirates' benefit of collusion. Thus, in contrast to criminals engaged in Sicily's private production industry, Caribbean criminals engaged in maritime marauding had little incentive to organize hierarchically and could avoid the cost of hierarchical organization—the potential for boss predation—by organizing flatly instead.⁹² Our theory therefore predicts organizational flatness in the criminal industry of Caribbean maritime marauding.

Piracy's organizational structure supports this prediction. Caribbean pirates organized flatly (1) internally within the pirate firm and (2) industry wide. These manifestations of organizational flatness in Caribbean piracy correspond to those of organizational hierarchy in Sicily's private protection industry described in Section III.

Each piratical firm—the pirate crew—had a “leader,” the captain. However, unlike Mafia bosses, pirate captains wielded no more power than ordinary crew members in the criminal firm's everyday affairs. As Leeson points out, the captain assumed authority over his crew's behavior only in times of battle when immediate and unilateral decision making was indispensable.⁹³ At all other times the captain had the same authority as every other member of his crew.⁹⁴

Caribbean pirate firms made decisions democratically,⁹⁵ which included the selection of the firm leader—“the Rank of Captain being obtained by the Suffrage of the Majority”—and other crew officers, most notably the quartermaster, who was also “of the Men's own choosing.”⁹⁶ In this way pirates “only permit[ed] him to be Captain, on Condition, that they may be Captain over him.”⁹⁷

⁹² For a discussion of the ways in which pirates' flat organization prevented boss predation, see Leeson, 115 *J Polit Econ* 1049 (cited in note 2).

⁹³ *Id* at 1065–69.

⁹⁴ See, for instance, Johnson, *A General History of the Pyrates* at 213–14 (cited in note 84); Snelgrave, *A New Account of Some Parts of Guinea and the Slave-Trade* at 217 (cited in note 84); Jan Rogozinski, *Honor among Thieves: Captain Kidd, Henry Every, and the Pirate Democracy in the Indian Ocean 175* (Stackpole 2000).

⁹⁵ Leeson has identified only one exception to the “one pirate, one vote” rule, in a crew in which the captain had two votes instead of one. Leeson, *The Invisible Hook* (cited in note 2).

⁹⁶ Johnson, *A General History of the Pyrates* at 213–14 (cited in note 84).

⁹⁷ *Id* at 213.

Pirate crews endowed their quartermasters with the authority to perform essential firm tasks, such as resolving crew-member conflicts, dividing booty in accordance with the pay scheme crew members agreed on, and mustering pirate arms.⁹⁸ However, quartermasters' authority was not absolute, autocratic, or irrevocable, as a Sicilian Mafia boss's authority tends to be. Quartermasters' authority did not derive from, nor was it part of, an organizational hierarchy. Crew members democratically elected their quartermasters. They could and did popularly remove them from power just as they did their captains, "as suited Interest or Humour."⁹⁹

Further, pirates' firm organization permitted them to vote on important matters which, normally, when of more minor consequence, fell under the quartermaster's view. It also permitted pirates to override the quartermaster's authority if popular opinion supported this.¹⁰⁰ Thus, while the quartermaster had authority that other firm members did not, "ordinary" firm members checked, controlled, and ultimately directed this authority, continuously conditioning it on their will.

The average Caribbean pirate firm was large—some eighty crew members. Many other pirate firms were larger still. Pirate firms' larger size suggests that monitoring, which is crucial to successful collusion, was not an especially important concern for them. This makes sense since, unlike Sicilian private protection firms, Caribbean pirate firms were not cartels. It also rejects the hypothesis that a less severe monitoring or related agency problem was responsible for Caribbean pirates' flat organization.

The fact that pirates worked within the limited confines of their ships made intrafirm monitoring somewhat easier. However, the additional monitoring difficulties that pirate firms faced because of

⁹⁸ Id.

⁹⁹ Johnson, *A General History of the Pyrates* at 139, 194 (cited in note 84); John Edwards, *The Trials of Eight Persons Indited for Piracy etc of Whom Two Were Acquitted, and the Rest Found Guilty* 23 (1718) in Joel H. Baer, ed., 2 *British Piracy in the Golden Age: History and Interpretation, 1660–1730* (Pickering & Chatto 2007); Information of Richard Moore, High Court of Admiralty Papers 1724: 1/55, fol. 96; Rogozinski, *Honor among Thieves* 177 (cited in note 94); Burt Franklin, *An Account of the Conduct and Proceedings of the Pirate Gow: The Original of Sir Walter Scott's Captain Cleveland* 23 ([1725]; Franklin 1970).

¹⁰⁰ Chaloner Ogle, *A Full and Exact Account, of the Tryal of all the Pyrates, Lately Taken by Captain Ogle, on Board the Swallow Man of War, on the Coast of Guinea* (1723), reprinted in Joel H. Baer, ed., 3 *British Piracy in the Golden Age: History and Interpretation, 1660–1730* (Pickering & Chatto 2007). Newspaper articles cited are contained in Baer: *Boston News-Letter* Aug 1–8, 1723; *British Journal* Aug 22, 1724).

their much large size at least partly offset this, and probably more than offset it in crews that were too large to fit in one ship.

Most important, compared to the nature of the production activity that Sicilian private protection involves, the nature of the production activity that Caribbean piracy involved made pirate firms' internal monitoring problem significantly harder. The important labor tasks of private protection are relatively easy to meter. It is straightforward to determine whether a Mafioso is protecting the customers that he is directed to protect, collecting the fees he is directed to collect, and so on. The fact that these protection production activities are individually instead of jointly produced makes determining if a Mafioso is performing his duties easier still.

In contrast, the important labor tasks of piracy, those that involved overtaking potential prey, weren't easily metered. Even when standing right next to a pirate, it was not easy to determine whether he was "giving it his all" in battle, doing his best to appear menacing to potential targets, exerting his full effort in trying to extract loot from recalcitrant prisoners, and so on.¹⁰¹ The fact that important pirate production activities, such as sailing the ship and battling targets, were jointly produced compounded the difficulty of determining if a pirate was performing his duties.

Together with the much larger size of Caribbean pirate firms, the problematic nature of piratical production suggests that Caribbean pirate firms faced a harder monitoring problem internally than Sicilian Mafia firms do. Yet Caribbean pirate firms organized flatly and Sicilian Mafia firms organize hierarchically—the opposite of what the monitoring problem hypothesis predicts.

Maritime marauding was also organized flatly at the industry-wide level. Unlike Sicily's private protection firms, Caribbean pirate firms did not engage in industry-wide coordination. Independently operating pirate firms occasionally joined forces for multi-crew expeditions.¹⁰² Most such coordinated undertakings were spontaneous rather than preplanned, firms temporarily joining forces after happening on one another.¹⁰³ Most important, when two firms coordinated their activities they did so as a temporary "confederacy of equals" instead of through a coercive third-party enforcer with hierarchical control. Crews that sailed together did so as partners with a

¹⁰¹ Leeson, *The Invisible Hook* at 56 (cited in note 2).

¹⁰² *Id.* at 10.

¹⁰³ Marcus Rediker, *Villains of All Nations: Atlantic Pirates in the Golden Age* (Beacon 2004); Snelgrave, *A New Account of Some Parts of Guinea and the Slave Trade* at 1734 (cited in note 84); Johnson, *A General History of the Pyrates* at 319 (cited in note 84).

complete and unquestioned right to exit the partnership when they pleased.¹⁰⁴

Our theory suggests that Caribbean pirate firms did not collude across industry as Sicilian private protection firms do because pirates' benefit from such collusion was low given the naturally high barriers to entry that preserved their returns without it. A competing hypothesis is that Caribbean pirate firms did not collude because they could not. On the surface this hypothesis is plausible. Sicilian Mafia firms are stationary and geographically close. Pirate firms were mobile and often geographically distant. Thus, whereas private protection firms possess the communication ability, physical and social closeness, and frequency of interaction required to collude, pirate firms did not.

The evidence rejects this hypothesis. Although pirate firms were mobile and sometimes distant, they enjoyed the communication ability, physical and social closeness, and frequency of interaction needed to collude, if not over the entire industry, then at least between multiple pirate firms. In fact, in at least a few important ways, Caribbean pirates were in a better position to collude across industry than Sicilian private protectors are.

When they were not marauding, Caribbean pirates lived together in an isolated, close-knit community that included almost every producer in their industry. That pirates' den, or "nest of rogues," as Virginia governor Alexander Spotswood¹⁰⁵ styled it, was on the island of New Providence in the Bahamas.¹⁰⁶ Pirates inhabited, fraternized in, and plotted their expeditions from, this outlaw island, which, before British official Woodes Rogers' arrival, was nearly exclusively populated by pirates.¹⁰⁷

Pirates' landed community not only ensured that producers in the Caribbean piracy industry interacted frequently, spent time in close physical proximity to one another, and developed close social bonds despite their mobility and distance when marauding. It ensured low-cost producer communication and, better still from pirates'

¹⁰⁴ See, for instance, Johnson, *A General History of the Pyrates* at 175 (cited in note 84).

¹⁰⁵ Letter of July 3, 1716. Alexander Spotswood, 2 *The Official Letters of Alexander Spotswood* 168 (Va Historical Society 1882–85).

¹⁰⁶ In the first half of the seventeenth century the buccaneers had a similar landed home at Tortuga, off modern-day Haiti, and then Port Royal, Jamaica. In the second half of the seventeenth century the Red Sea Men set up a land base on the island of St. Mary's off Madagascar.

¹⁰⁷ The exceptions were suppliers of pirates' landed economy, who also called New Providence home, mainly alcohol purveyors and whores. Even after Rogers arrived, nearly all the islands' residents were pirates.

perspective, the totally unencumbered kind. Since pirates' land base was isolated and populated entirely by criminal producers, pirates could communicate without secrecy, opaqueness, or concern about authorities. Pirates could take as much time to plot, discuss, and hammer out the details of interfirm collusion agreements as they wanted and could do so totally transparently. Further, they could use the same unencumbered communication abilities to help them monitor and enforce these agreements. Intrafirm monitoring of crew-member effort was hard for pirates. Who can say if a crew member is giving his all? But interfirm monitoring of collusive agreements would have been much easier for pirates. It is straightforward to learn whether another pirate crew plundered more ships than its quota, especially when communication is unencumbered.

For example, pirates could undertake island-wide advertising campaigns to ensure that no profitable interfirm collusive arrangement went unarranged because the parties were unaware of each other or of their desire to collude. They could nail posters offering crew members from cheating crews rewards for tattling on their captains and colleagues to every palm tree, publicize the names of cheaters in the same way, and publicly execute chiselers before the entire industry once they were caught. Pirates could create a criminal Lloyd's of London to coordinate and handle interfirm collusion if they wanted.

The pirates' island was isolated, independent, and populated solely by sea dogs. So they were essentially unconstrained in how they used communication to them help create, monitor, and enforce interfirm collusion agreements. In this sense Caribbean pirates' ability to communicate for the purposes of establishing and sustaining interfirm collusion was superior to that of Sicilian private protectors who live among the members of legitimate society, under the watchful eye of government officials, and thus who are severely restricted in the extent to which and ways they can communicate to enable interfirm collusion.

Of course, pirates' communication, and thus monitoring and coordination, abilities were not superior to those of Sicilian private protectors on all dimensions. The eighteenth-century communication technology to which pirates had access is very much inferior to modern communication technology to which Sicilian private protectors have access. At least partly offsetting this communication advantage, however, is the considerably more difficult communication problem Sicilian private protection firms confront. There are many more firms in the Sicilian private protection industry than there were pirate firms in the Caribbean maritime marauding industry.

Sicily's private protection industry has more than 100 firms. In contrast, at its peak, the Caribbean maritime marauding industry had only thirty. The smaller number of pirate firms made it easy for each firm to know the others and for firms to coordinate if they desired.

Other factors also contributed to pirates' ability to collude. Since pirates lived together between expeditions and operated from the same base, over the course of their careers they came to work with many other members of the pirate community, teaming up with one assortment of pirates to form a crew for one expedition, another assortment of pirates to form a different crew for the next, and so on. In contrast to Sicilian private protection firms, where each producer is attached to one firm permanently, Caribbean pirate producers moved between firms much more frequently.

The fluidity of pirate firms' membership contributed to the frequency and breadth of pirate producer interactions. It also contributed to the ease of communication throughout the Caribbean marauding industry. Firm-member "mixing" tightened sea bandit bonds and strengthened connections between the industry's members as well. Because of it, more than 70 percent of Anglo-American pirates can be connected back to one of only three pirate captains, Benjamin Hornigold, George Lowther, and Edward Low.¹⁰⁸

Producers' social connectedness, physical closeness, frequency of interaction, and ease of communication in the Caribbean pirate industry rules out the suggestion that pirate firms did not collude because they could not. They clearly could.

V. CONCLUDING REMARKS

Our analysis of the industrial organization of criminal enterprise leads to several conclusions. First, producers in more contestable criminal industries, where natural barriers to entry are low, have an incentive to organize hierarchically. Strong competitive pressures that prevail in the absence of producer intervention threaten to erode producers' returns. But if producers can collude to regulate output and prevent new competitors from entering their market, they can preserve their returns.

However, collusion is difficult to maintain. Unlike members of cartels composed of legitimate producers, members of cartels composed of criminal producers can use violence to help them enforce collusive agreements, which helps them with this task. But when

¹⁰⁸ Rediker, *Between the Devil and the Deep Blue Sea* at 267 (cited in note 83).

every criminal cartel member has the power to punish cheating violently, mistakes impose large losses on cartel members. Cartel members can reduce these losses if instead each member, save one, surrenders his coercive power, leaving a single cartel member with the power to deal violently with the others: violent enforcement and hierarchy are complementary. Criminal producers for whom collusion is important create this arrangement by organizing under the auspices of a hierarchically structured firm controlled by a boss who uses coercive power to allocate and enforce production rights. The Sicilian Mafia, which producers in Sicily's private protection business use to cartelize this industry, is the classic case.

Alchian and Demsetz's theory of the legitimate firm is inadequate as a theory of the criminal firm.¹⁰⁹ The potential for coercive authority characterizes the criminal firm. Further, as the case of the Mafia illustrates, the criminal firm may emerge even when team production needs are absent. Our theory explains the importance of boss power to the hierarchical criminal firm and why this firm can emerge even when team production or other traditional forces of firm formation, such as scale economies, are unimportant. It also helps explain the marked movement toward organizational flatness in the Sicilian Mafia in recent years. As Mafiosi have become more active in the heroin industry and less active in the private protection industry since the 1970s, their benefit from collusion has become smaller. In response they have moved away from organizational hierarchy.

Second, our theory explains why less contestable criminal industries, which have high natural barriers to entry, tend to organize flatly. Because the benefit of collusion is low in such industries, the benefit of organizational hierarchy is low as well and not large enough to offset the cost associated with boss self-dealing, which hierarchy creates. In criminal industries where higher natural barriers to entry do the work of limiting competition for them, producers do better by organizing flatly instead. The classic case of this is Caribbean pirates who famously organized their firms as "workers' democracies."

Finally, our analysis highlights that the observed presence or absence of barriers to entry across criminal industries reflects the intervention, or lack of intervention, by producers in those industries to maximize their returns. The observed high barriers to entry in Sicily's private protection business result from its producers' intervention to countermand naturally low barriers to entry that would

¹⁰⁹ Alchian and Demsetz, 62 *Am Econ Rev* 777 (cited in note 11).

prevail and erode their returns without their intervention. Likewise, the observed freeness of entry into the Caribbean maritime plunder business reflects its producers' decision not to intervene in their criminal industry where naturally high barriers to entry prevailed and preserved their returns without their costly intervention.