Economic Origins of the Mafia and Patronage System in Sicily

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By

Jason Sardell

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Prof. Oleg Pavlov, Advisor

Abstract

Organized crime organizations arise to satisfy a demand for necessary social services in the absence of effective government institutions. This project examines the rise of the Sicilian mafia. Using system dynamics, I model this system and test various policies to determine what factors have the greatest impact on mafia power. Based on these experiments, the most effective policies for reducing mafia power are those that decrease the demand for private protection services by reducing the threat of banditry in society, and not those policies that act against the mafia directly. I also examine historical examples of other mafia-type organizations to show that these trends apply not just to Sicily, but also to other societies, including present-day Iraq and Afghanistan.

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Executive Summary

Organized crime is a problem faced by many types of societies in today's global economy. It is prevalent in both the poorest developing countries and the most developed nations (Milhaupt & West 2000). Acquiring an understanding of the dynamics that led to the formation of these organized criminal organizations is an important step in evaluating the effectiveness of policies that are intended to reduce their power. Recent studies of organized crime have focused on the observations that criminal syndicates often arise during times of political transition (Bandiera 2003, Milhaupt & West 2000). The states of lawlessness associated with these transitions can make personal property crimes more profitable for bandits or other criminals. However, organized crime groups tend to derive much of their power not by exploiting the opportunity for property crime, but by offering services such as property and personal protection that are normally provided by government institutions. In this way, these "mafias" initially gain much of their power by acting as a parallel or substitute legal system.

In this paper we examine the origins of one of the most famous organized crime syndicates: the Sicilian mafia. The mafia had its origins in the mid-1800s after Sicily abolished feudalism and joined the newly formed Italian state. As a consequence of the social upheaval associated with these political and economic changes and the resulting lack of an effective government police force, banditry reached extreme levels in much of rural Sicily during the 19th-century. Accordingly, a demand emerged for private property protection amongst peasants who lived in rural areas and earned most their income by sharecropping lands owned by absentee landowners. At the same time, these former feudal landowners sought a new mechanism to enforce the social status quo by

preventing peasants from demanding comprehensive land redistribution. The mafia came into existence to provide these services, and as a result, quickly became an important part of Sicilian society.

Using systems dynamics computer software, we developed a model of the societal dynamics in 19th-century Sicily to help gain insights into the factors that impact the power of the mafia and the effectiveness of policies that are intended to reduce its power. At its core lies a relationship between three population classes: the peasants, the bandits, and the mafia, with flows between each class. The peasants earn their income from farming, the bandits derive most of their income by robbing the peasants, and the mafia earns income by collecting tribute from both the peasants and the bandits. As banditry increases, peasants are willing to pay more for protection services, and as a result, the mafia is able to charge higher rates of tribute, thereby increasing its political and economic power.

We used our model to perform several numeric simulation experiments that test the effectiveness of various anti-mafia policies. In general, we found that the most important factor in determining the relative power of the mafia is the absence of effective government institutions. That is, the mafia is most powerful in societies where the government is not able to adequately control banditry. Furthermore, if the mafia is eliminated but the underlying problems facing society remain the same, then a replacement mafia will inevitably form, even if paying tribute to the mafia causes the peasants to be economically worse off than they would be under uncontrolled banditry.

Policies that increase the population in areas controlled by the mafia tend to reduce the relative power of the mafia in the short-term, but lead to a more powerful

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mafia in the long-term. In contrast, policies that cause the population of the areas controlled by the mafia to decrease are a means of effectively reducing mafia power in the long-term, although they result in a more powerful mafia in the short-term and, as a result, may be politically undesirable. We also note that policies that increase the productivity of peasants in lands controlled by the mafia have only minimal impacts on relative mafia power, and are not likely to be cost-effective. Finally, we use our model to demonstrate that, although the mafia can increase its relative power by increasing its tribute demands, doing so may not be economically optimal for the mafia's leaders. This observation provides further support for the theories that organized crime syndicates do not rely primarily on extortion for the basis of their power, but rather on the legitimacy that they gain from providing services desired by members of society.

In addition to the Sicilian mafia, we also examine the origins of several other mafia-like organizations, including the Japanese yakuza, Hong Kong triads, Russian mob, Shiite gangs in 19th-century Ottoman Iraq, and Ugandan drinking companies and vigilante groups. Each of these organizations shares similar traits with the Sicilian mafia. For example, they emerged during times of political and social change that were generally characterized by high levels of crime and a lack of necessary social institutions. Each organization also derived much of its power by acting as a substitute legal system that offered services normally provided by government institutions, such as property protection. As such, the lessons of our model apply to any lawless society characterized by conditions favorable for the formation of mafias, including present-day Iraq and Afghanistan. These lessons have important ramifications not only with regard to law-enforcement, but also on foreign policy and anti-terrorism efforts.

Chapter 1 - Introduction

Organized crime is a pervasive problem in much of today's global economy (Milhaupt & West 2000). Syndicates and cartels control much of the world's global narcotics trade, and also earn significant profits from illegal activities such as gambling, prostitution, smuggling, extortion, and racketeering. Of these global crime syndicates, perhaps the most famous is the Sicilian mafia. Although the modern perception of the mafia is based heavily on media portrayals such as the Godfather movies or The Sopranos television show, it is important to realize that the mafia's roots were not as a normal bandit gang that used the threat of violence and extortion to gain power through entirely illegitimate means. Rather, most organized crime syndicates, including the mafia, initially gained much of their power by acting as parallel or substitute legal system, taking advantage of high demands for services such as private protection during periods or places characterized by an absence of effective government institutions.

In this report, we examine the Sicilian mafia in an effort to better understand the dynamics associated with the formation of mafias. The Sicilian mafia came into existence during a time of transition in Sicily following the abolition of feudalism and the creation of the Italian state. Prior to the Italian revolutions of 1848 and 1860, land ownership in Sicily was based on a feudal system with peasants living on land owned by absentee landlords. To ensure that they maintained control of their property, these landlords would often rent their property to middle-class intermediaries, known as "gabelloti" who managed the estates and often coerced local peasants into working on the lands for low wages. The period following the abolition of feudalism saw not only an increase in the number of landowners with property to protect, but also in banditry and

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the associated threats to personal property. As a result of this breakdown in social structures and the inability of the absentee landowners to maintain the status quo by controlling the peasants, the influence of the gabelloti increased and they became the de facto agents of law and order in rural Sicily. In this manner, a system of patronage developed where the gabelloti received payments from the landowners in return for suppression of the peasantry and payments from the peasantry in return for the promise of protection and continued employment. These gabelloti and the soldiers they hired to enforce the system of patronage and control banditry were the genesis of today's modern Sicilian mafia (Blok 1966, Blok 1969, Bandiera 2003).

Chapter 2 below provides background discussion of the conditions in Sicily that led to the formation of the Sicilian mafia. Based on the understanding of the system obtained during our literature review, we developed a system dynamics computer model that describe the dynamics behind the landownership system in 19th-century Sicily and the conditions that led to the formation of the mafia. This model is heavily inspired by a generic system that Saeed and Pavlov (2008) developed for representing a system characterized by the presence of related social and asocial controls. Chapter 3 first provides an overview of the dynamics and relationships behind our model and then presents the mathematical equations that we use to represent these relationships.

In Chapter 4, we use our model to simulate the effects that changing various parameters has on the overall composition of the system in terms of the relative populations of peasants, bandits, and mafia, as well as on various social indices including lawlessness (i.e., the relative amount of banditry and mafia activities in society), economic integrity (i.e., the amount of production retained by the peasants), and the

relative political and economic power of the mafia. These experiments include modeling the results of policies that: increase the effectiveness of government institutions; temporarily eliminate the mafia; permanently eliminate the mafia; increase or decrease peasant population; and increase overall agricultural productivity. We also show that there are strong incentives for the mafia to maintain a perceived sense of legitimacy amongst the peasants rather than try to maximize its income by solely relying on the threat of violence to extort income from local peasants.

In Chapter 5, we take the lessons learned from our numeric simulation experiments specific to the Sicilian mafia and examine the conditions that led to the formation of five other historical mafia-type organizations. We discuss the similarities between these disparate mafias, demonstrating that the policy recommendations associated with our model apply not only to conditions in 19th-century Sicily, but also to almost any condition of lawlessness and lack of effective government institutions that are favorable to the formation of a mafia-type organization. These lessons are particularly relevant today when anticipating the likely results of rapid societal change in such global hotspots as Iraq and Afghanistan, as current conditions in both countries suggest the emergence of a market for services that have historically been provided by mafia-like organizations.

Chapter 2 - Mafia in Sicily: a Historical Perspective

Before creating a model, it is important to gain a sufficient understanding of the structure and dynamics of the system you are examining. In this chapter, I provide an overview of the conditions that led to the rise of the mafia in Sicily during the 19th century. I begin with a discussion of the structure of land ownership on the island prior to the abolishment of feudalism. I then discuss the attempts at land reform made during the 19th century, the resulting impacts on the landownership structure, and the emergence of the mafia that resulted from the introduction of a new type of middle-class landowner. The third section provides an overview of the role of bandits and mafia in Sicily, followed by a section that discusses the social conditions that have led to the continuing influence of the mafia in Sicilian society during the 20th century, despite its overall detriment to the well-being of society as a whole. Finally, I conclude this chapter by providing a brief description of an existing economic model of the origins of the Sicilian mafia.

2.1 Sicily under Feudalism

Prior to the 19th-century, the structure of society in Sicily was based on feudalism, or serfdom, similar to that of most of medieval Europe. A feudal society is one that is characterized by a dominant stratification between two classes: a small elite minority that own almost all of the land in rural areas while living in urban areas; and a large peasant population that lives in small villages and works the land for minimal compensation while passively accepting its subservient role (Blok 1966).

In Sicily, the feudal structure consisted of land that was divided into large estates, or *feudo*, owned by barons or other nobility (Blok 1966). These barons were granted their power by the foreign powers that historically ruled the island (e.g., the Spanish, the Austrian Hapsburgs, and the Bourbon kings of Naples), who relied on a few local noble families to manage public affairs. In return, these families were given control over lands encompassing three-quarters of the villages on the island (Bandiera 2003). Because the land-owning aristocrats tended to live in either Naples or Palermo, many of them leased their property to tenants known as *gabelloti* who managed the lands in their stead. The gabelloti agreed to pay a fixed annual sum to the owner, and acted as "substitute landlords who run the estates, live on them and conclude labour contracts with the peasants" (Blok 1966). Each baron also maintained a standing army that they used to protect their fields and police the peasants (Bandiera 2003).

Under the feudal system, peasants were obligated to work on the land owned by the ruling class in return for a small percentage of the food that they produced and the promise of protection from bandits and the armies of neighboring lords and barons. The landowners also granted certain minimal land rights to the peasants, including the rights to use the land for hunting, pasturing of livestock, and gleaning grain that was leftover from the harvest (Blok 1966). These agreements were arranged through the use of written charters, although encroachments on the rights of peasants "were the rule in this period, during which the lords, and gradually in their wake the great lease-holders (gabelloti), usurped the domanial and communal lands on which the peasants had various rights … fundamental for their livelihood" (Blok 1969).

2.2 Landownership Reforms in 19th-Century Sicily

The British gained control of Sicily during the Napoleonic Wars of the early 19th-century and officially abolished feudalism by law on the island in 1812 (Bandiera 2003). The Bourbon kings continued these reforms after regaining control of Sicily in 1816. These land reforms included:

- The abolition of primogeniture (i.e., the tradition of the first-born son inheriting all of his fathers' property to the exclusion of younger siblings) in 1820;

- The seizure of land in settlement of debts in 1824; and,

- An order giving peasants property rights over at least one-fifth of the land where common rights were enjoyed under feudalism (Bandiera 2003).

As a result, the number of large landowners in Sicily increased from 2,000 to 20,000 between 1812 and 1860 (Bandiera 2003). However, Blok notes that this attempt at landownership reform did not have any significant de facto consequences and, if anything, actually reinforced existing structures by weakening the position of the peasant class (Blok 1966, 1969). Specifically, although members of the peasant class were freed from their positions of servitude, the vast majority were still excluded from any forms of landownership while also losing their traditional rights under feudalism.

Instead of empowering the peasants, the land reforms initiated in Sicily during the 19th-century led to the creation of a new class of landowners comprised of the gabelloti. Although many of the large feudal estates were broken into small parcels following the abolition of feudalism, ownership of most of these properties was granted to their former stewards (i.e., gabelloti), rather than to peasants (Blok 1966). Often this occurred because the estate-owners anticipated the expropriation of their lands by the government

and were eager to sell them before they lost their ownership to anyone who would be willing to pay (Blok 1969). The gabelloti, in turn, used their new riches and power to acquire a position amongst the elite upper classes. Although reluctant to give up power, the old aristocracy found that they had a common interest with the gabelloti in terms of suppressing the peasantry at any price. Thus, as long as the gabelloti were able to continue the maintenance of a social structure built around quasi-feudalism, the aristocracy was willing to allow them into the system of landownership (Blok 1966).

The Italian Revolution of 1860 and the formation of the new Italian state (including Sicily and the former Papal States) had additional ramifications on the societal structure of Sicily. For example, from 1862-1863, the state confiscated a large share of public and church landholdings and redistributed them to the public (Bandiera 2003). This land distribution resulted in the creation of more than 20,000 private landowners (Blok 1969). However, most peasants were again excluded from this redistribution, as the vast majority of these properties were given to their former landlords, the gabelloti (Blok 1966, 1969). Moreover, those lands that were given to peasants tended to be very small (e.g. 4.5 hectares) and of the very lowest quality. As a result, their owners often had to earn their livelihood by continuing to work as share-croppers on their former masters lands (Blok 1966). Other peasants found that the land reform meant that they had lost access to the land for traditional uses granted to them by the church.[1] (Blok 1966)

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[1] Blok cites the example of a village in Sicily with 700 ha of wooded land confiscated from a local monastery in the 1860s. When this estate was under control of the church, peasants were allowed to use the land for such purposes as gathering firewood and pasturing livestock, and the monastery provided an important source of employment and alms. When the estate was confiscated, a local Mafioso used his influence to arrange an auction where a merchant from a lower social stratum gained ownership of the property for a very low price. This provided the Mafiosi with a loyal servant while keeping control of the land away from the peasantry. (Blok 1966)

The post-revolution land reform had additional unintended consequences that helped encourage the growth of the mafia. Notably, the confiscation of church lands led to a feeling of hostility amongst the Popes towards the Italian government, and because Sicily was a stronghold of Catholicism, its citizens were strongly influenced by the Popes' edicts that Catholics refuse to cooperate with the new state. As a result, the Italian government had very little social control over much of Sicily. For example, there were usually less than 350 policemen stationed in the entire island of Sicily (or one per 28 square miles) (Bandiera 2003).[2] Moreover, bandits exacerbated the sense of lawlessness by arguing that any peasant who sought the help of the police was going against the direct wishes of the Pope. In some communities, it was even considered a civic duty to keep the police out of local affairs (Brögger 1968). This power vacuum would be instrumental in the rise of the mafia.

2.3 The Role of Mafia and Bandits in Sicilian Society

As discussed in the previous section, the societal structure of mid-19th century Sicily was characterized by two major factors: a general sense of lawlessness due to the absence of an effective state police force, and a de facto feudal system where most of the land in rural areas was owned by a relatively small number of absentee landlords. These factors resulted in a peasantry that found itself beset by crime and looking for an organization that could provide a sense of order. The mafia stepped in to fill this role.

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[2] The government also instituted twenty-five "Companies at Arms" or "cavalry," comprised mainly of former bandits and criminals, to police the countryside. These companies would arrive in each town two or three times a year to round up a token number of criminals, followed by periods of months where all crime went unpunished by the state. In addition, these companies were notoriously susceptible to corruption and often colluded with the same bandits that they were intended to persecute. (Bandiera 2006)

Following the Italian revolution, bandits infested large areas of rural Sicily. Part of the increase in crime was directly caused by the confiscation of church estates and the sale of the land to private hands, as peasants who found that they no longer had access to traditional sources of income (i.e., firewood gathering, livestock grazing) turned to a life of banditry instead (Blok 1969). The extent of the lawlessness can be seen in a local report from rural Sicily in 1914: "Thefts of cattle and the killing of men and animals are such common occurrences that the papers do not even report them any more" (Blok 1966). A Sicilian magistrate noted in 1874 that "people in the countryside [are] more afraid of criminals than they are of the Law … [the] public force is completely overcome by the strength of the criminals" (Bandiera 2003). Farmlands and vineyards were particularly vulnerable to theft as local peasants chose to reside in small towns or villages rather than the countryside, both for reasons of safety (Blok 1966) and because farming techniques did not require permanent workers (Bandiera 2003).

Under feudalism, absentee landowners in Sicily used standing armies to protect their property from bandits and to control the peasantry. After the abolition of feudalism, the legal power of enforcement lay in control of the state police force. However, due to the ineffectiveness of the local police in controlling banditry, landowners were forced to obtain private protection. This was accomplished primarily through leasing the property to a gabelloto, who in turn hired a suite of retainers to act as a private police force (Blok 1969). These police forces consisted of two positions: a *soprastante*, or administrator of the estate; and the *campieri*, armed men on horseback who protected the estate from such transgressions as theft or abusive pasturage. Both positions were paid annually, and were peasants who were often recruited from the ranks of bandits or common criminals, as the

main criterion for their employment was the quality to make themselves respected by the local population (Blok 1969). Landowners "preferred to hire the best and most violent bandits as guardians of their properties, thus using the criminal reputation of one as a defense against the crimes of others …" (Bandiera 2003).

The mafia also played an important part in running the local economy, as many gabelloti acted as landlords for the absentee land owners. They would lease small plots of about five hectares to peasants for one year and provide seed for sowing. In return the peasants would be allowed to farm their plots, using their own equipment. At harvest time, the gabelloto would take the first sowing-seed from the crop and divided the remainder into three parts: two for the gabelloto and one for the sharecropper. The farmer would also be required to give 14 kg of his share to the campiere, although he would often give more than required in the hope of being considered for another contract in the following year (Blok 1966). This tribute was given in return for a promise by the campiere to guarantee the protection of the peasant's life and property. One report noted that, "Every peasant who wishes to avoid trouble has to pay a tribute to the *mala gente* (lit. 'bad people')" (Blok 1966). In the end, most sharecroppers were left with only one-quarter to one-fifth of their crops, and in years of drought or poor productivity, often were left in debt to the gabelloto. Such debtors were often forced to steal to make ends meet, thus exacerbating the problem of lawlessness (Blok 1966).

In this way, the gabelloti, soprastante, and campieri (i.e., the mafia) gained an enormous position of power in rural Sicily. They used the threat of uncontrolled banditry (often committed by the campieri themselves) to force their protection services on the absentee landlords and peasants. At the same time a combination of the promise of

rewards (e.g. favorable lands for farming) as well as a threat of violence and intimidation allowed the mafia to exploit the lower class. A positive feedback loop also existed which reinforced the growing strength of the mafia: as more people went to the mafia for ask for protection, the stronger it became with respect to legitimate enforcement, causing its political power to increase even further (Bandiera 2003). Moreover, the mafia recognized the source of their power and would occasionally allow bandits to operate with impunity in exchange for a share of the profits. For example, Blok (1966) noted that cattle-rustling was a common problem faced by peasants in mid-20th-century rural Sicily, although it would have been impossible for local bandits to steal cattle without the assistance of the local mafia who possessed the necessary knowledge of the village. However, once the mafia had become entrenched within the political landscape, it no longer needed to rely as much on the threat of banditry to give it legitimacy as it could retain its power by buying blocks of votes during elections instead. Indeed, the rate of banditry did in fact decline after it lost the protection of the mafia in the 20th-century (Blok 1969).

2.4 Mafia Entrenchment in Sicily

The mafia, as comprised of the gabelloti and campieri, derived much of their economic power in Sicily by virtue of the quasi-feudalistic land-ownership structure. Notably, they relied on tribute paid by peasant sharecroppers as their main source of income. As discussed in a previous section, any attempts at land reform would act to the detriment of the mafia as well as the land-owners, as it would eliminate their monopoly on arable land. If each peasant was given ownership of his own plot of land, then the gabelloto would no longer be able to charge extortionate tribute fees from the peasants in

return for the opportunity to work the lands he controls. As such, maintaining the status quo with regard the land-ownership structure was extremely important to the mafia, and we would expect them to use any means necessary to protect it.

In their book *Economic Origins of Dictatorship and Democracy* (2006), Acemoglu and Robinson discuss the factors that influence the political structures of different societies. They characterize societies as being comprised of two classes: a relatively small number of elites that hold much of the economic power, and a large, relatively poor peasant class. In general, the elites wish to maximize their political and economic power at the expense of the peasants. However, by virtue of their numbers, the peasants wield de facto political power in that they can incite a revolution to overthrow the elite class. The elites wish to avoid revolution at any cost, as a successful revolution would entail the loss of all of their economic and political power. Meanwhile, although a revolution may benefit the peasant class, it also entails many types of potential costs, including loss of earnings and lives, destruction of infrastructure, and the risks of reprisal by the elites following a failed revolution. Given this, peasants will only revolt if it is in their best economic interest, i.e., the expected benefits of revolution outweigh the expected costs.

According to Acemoglu and Robinson (2006), elites have two major options to decrease the risks of revolution in society: offering concessions to the peasant class, and using the threat of violence to actively suppress the peasantry. Typical concessions include the shift towards democracy, redistribution of wealth through social projects, and the institution of policies that are favorable to the majority. These actions are associated with net costs to the elites. However, they make the societal status quo more favorable to

the peasant class, thereby reducing the potential benefits and likelihood of revolution. Violent repression, such as that used in apartheid South Africa or by China during the Tiananmen Square uprising of 1989, is attractive to elites "because it allows them to maintain power without making any concessions to the disenfranchised" (Acemoglu and Robinson 2006). However, the use of force is still costly and risky to the elites as violence leads to the destruction of property, loss of life, reduced economic production, and greater desire for future revolution amongst the peasant class.

Several factors can increase the likelihood of revolution in society. One of the most important of these factors is the relative distribution of wealth in society. Acemoglu and Robinson (2006) define "inequality" as the fraction of the total production in society that accrues to the elite class. As inequality increases, the potential benefits of revolution for the peasants increase, thereby leading to an increased probability of the peasants revolting. Thus, in a society such as 19th-century Sicily where the elites have an economic incentive to increase the amount of total production that accrues to them, they must also be careful to not increase that share so much that the peasant class decides to revolt. Alternatively, by offering concessions that increase their legitimacy and support among the peasant class (e.g., by offering needed services or rewarding political supporters), the elites can increase both the costs of revolution and the threshold of inequality that will result in a revolution.

The history of Sicily shows that the elites were generally successful in suppressing the desire for revolution among the peasant class. Sicily does have a history of spontaneous uprisings by peasants to protest against abuses in the system. However, these protests, which were often instigated by crop failures or other times of extreme

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poverty, were not intended to change the system itself, and, as a result, never developed into a revolutionary movement (Blok 1969). Given the high amount of inequality between the elites and peasants in Sicily, we would expect a strong desire for revolution in the system, based on the theories of Acemoglu and Robinson (2006). The fact that there was never a strong revolutionary movement against the status quo strongly suggests that the elites were able to create a system where the expected benefits of revolution for the peasants did not exceed the expected costs.

As discussed in previous sections, the mafia in Sicily was a necessary institution for maintaining social order. Essentially, it acted as a "parallel or substitute legal system" that assumed the duties of the weak and ineffective state government (Blok 1966).   In addition to protecting peasants from bandits, the mafia also offered a means of mediating disputes (Blok 1969). Due to the respect and massive power that a Mafiosi would hold in a village, he was able to offer his services as an arbitrator when resolving local conflicts between peasants, disputes that otherwise would often lead to deadly feuds amongst villagers (Brögger 1968).   Thus, although the peasants had the choice to revolt against the status quo and overthrow the mafia's control of the land-ownership system, the resulting chaos and lack of police enforcement likely would have led to an anarchistic society with rampant banditry and crime.   That is, the potential costs of revolution were extremely high, leading to a system where the mafia could demand enormous amounts of tribute from the peasants without the risk of endangering the status quo.

By offering services to the local community, the tribute demanded by mafia became seen less as a system of blackmail and more as an unofficial "tax", or even a transaction used to purchase a Mafiosi's loyalty (Brögger 1968). A peasant who paid

tribute could expect to be rewarded with more favorable judgments in disputes where the Mafiosi acted as arbitrator (Brögger 1968). Furthermore, by controlling the land, the mafia could reward loyal peasants by giving them the best lands for sharecropping or by hiring them for employment. Blok (1969) notes that the general picture was "of a crowd of peasants who queued up at the entrance of the club of the [elite] in the village to apply humbly for a labour-contract." Those peasants who did not participate in the patronage system were often at a severe disadvantage to those who did. When the Communist Party tried to change the system of landownership in Sicily to one of peasant-owned co-operatives, its members and sympathizers were "denied access to the economic resources which the Mafiosi commanded" (Blok 1969). As a result, peasants had a strong incentive not to join the Communist Party, and the land reforms that it advocated never happened.

The mafia also reduced the risk of social revolution by offering concessions to the more powerful members of the peasant class who were most likely to be able to enact social change in the system. They purchased the obedience of these potential agitators by inviting them to join their organization, either as a soprastante or campieri, or by rigging property auctions so that the desired merchant or peasant was able to gain ownership of the land. As a result, the mafia became seen as the principle means of upward social mobility that was available to most peasants, who were otherwise excluded from most forms of land-ownership (Blok 1969). Success for a peasant meant that he would have to be recommended by his superiors, i.e., the gabelloti and campieri (Blok 1966). Thus, although the patronage system under the mafia harmed many peasants, it also offered them a possibility of advancement to a higher level of society that wouldn't have been available under a more traditional feudal arrangement. To many peasants the mafia

represented a darker, more sinister version of the "American Dream" of being able to rise from humble origins to positions of power and influence.

As discussed above, the patronage system in Sicilian society rewarded those who participated while punishing those who do not. As a result, individuals had little incentive to revolt against the system even though the peasant class may have been better off as a whole in a democratic society with a more equitable system of landownership. The major obstacle in achieving the necessary social change in the system is that it could have only occurred by means of a revolution where the peasants used the power of their numbers to overcome the entrenched power of the ruling elite. Acemoglu and Robinson (2006) call this the "collective action problem." At its heart is the notion that revolution is a public good with significant externalities; a peasant that chooses not to participate in a revolution will still benefit if the revolution is successful, although only the peasants who actually choose to revolt will bear most of the costs of a failed revolution. Moreover, a peasant who remains loyal to the ruling elite may even find that his situation has improved should the revolution fail. As a result, any successful revolution must overcome the collective action problem by eliminating the perverse incentive of peasants to free-ride on the revolutionary activities of others.

The collective action problem was especially influential in Sicily, not only because of the economic incentives for individual peasants to cooperate with the mafia, but also because of the clannish nature of Sicilian society. Blok (1966) notes, "it was primarily the fact that the peasants were virtually unable to form themselves into any permanent organization which stood in the way of an institutionalized protest." The peasants were not aware of their unity, nor did they have any sense of their solidarity

(Blok 1966). Part of the reason for this lack of cooperation is that the traditional methods of farming used in rural Sicily meant that there was no way for a peasant to increase the productivity of the land that he owned (Blok 1966). Accordingly, because arable land in the village was finite, the only means for the peasant to improve his position in the village were at the expense of others in the village (Blok 1966). Being friendly with your neighbor did not historically lead to an improvement of one's economic status, being friendly with the ruling elite and competing against your neighbor for their support did. Therefore, there was little precedent for cooperation amongst peasants, and a strong inclination to support the status quo in the hopes that their loyalty to elites would benefit them economically through the concessions that the mafia offered to their supporters.

Thus, by offering strong incentives for peasants to participate in the patronage system and by offering necessary social services (e.g., protection from crime, arbitrage, and employment opportunities) that had previously been provided by the feudal landowners and the Roman Catholic church prior to the land-reform efforts in Sicily during the 19th-century, the mafia became seen as a legitimate organization in the minds of the peasants. This perception was enhanced by a strong sense of Sicilian patriotism and disdain for the absentee, ineffective Italian government. This support was crucial to allowing for the sustainability of a social system characterized by high inequality. As long as individual peasants perceived that their expected benefits of revolution (i.e., abolition of the patronage system) were outweighed by the expected costs (i.e., risk of reprisal following failed revolution, reduced income, risk of death, abolition of services offered by the mafia, and transfer of political power from Sicilians to mainland Italians),

the mafia was able to maintain a system where they were able to benefit greatly at the expense of the peasants.

2.5 An Existing Economic Model of the Sicilian Mafia

Bandiera (2003) created a model that showed that the conditions in 19th-century Sicily were optimal for the rise of the mafia. Specifically, she concluded that it was possible to create a system where the decision of a landowner to purchase protection from the mafia was the economically optimum choice, even though it resulted in a worse equilibrium for the landowning class as a whole. This conclusion is consistent with the arguments presented by Acemoglu and Robinson (2006) that I discussed in the previous section. In addition, Bandiera (2003) noted "all other things equal, mafia profits are higher where land is more fragmented." This theory agrees with the observed reality where attempts at land-ownership reforms in Sicily coincided with the rise of the mafia to a position of influence.

Bandiera's model is based around game theory and assumes that landowners are faced with two choices: to purchase protection from the mafia, or to go without. Those who do not purchase protection are vulnerable to theft from bandits, while those who do, decrease their probability of being looted. Furthermore, landowners are economically better off if they are the only one to receive the protective services of the mafia. All else equal, bandits will always choose to loot an unprotected estate over one that is protected. Thus, as the number of unprotected estates increases, it becomes less likely that a bandit will choose to attack a land-owner who has hired the mafia. However, if all landowners decide to acquire the services of the mafia, then the effectiveness of the protection will be relatively low, such that the fees the landowners pay to the mafia for protection outweigh

the reduction in banditry compared to a system where none of the landowners had hired the mafia. In this sense, the model presented by Bandiera (2003) represents a classical basic prisoners dilemma where individuals do not take into account the negative externality in the system (i.e., the effect that choosing to hire protection has on the effectiveness of protection for other landowners), and, as a result, everyone winds up worse off than if they had cooperated and chosen not to buy protection at all.

In the next chapter, I present an alternative model of mafia in Sicily to that developed by Bandiera.

Chapter 3 - Model Description and Methodology

This chapter discusses the model that I developed to describe the dynamics behind the landownership system in 19th-century Sicily. As described in the previous chapter, Bandiera (2003) presented a model based on a game-theory optimization framework to analyze the system that led to the rise of the mafia in Sicily. In contrast, I use system dynamics theory as the basis for my model. System dynamics is based on pioneering work performed by Dr. Jay Forrester in the early 1960s (Forrester 1961). Over the last fifty years the field has evolved into a "methodology for studying and managing complex feedback systems" (System Dynamics Society, 2008). This methodology involves identifying a problem, developing a hypothesis that explains the cause of the problem, building a computer model to simulate the system involved, testing the model to ensure that it reflects real world behavior, and using numeric simulation experiments to evaluate policies that offer potential solutions to the problem (System Dynamics Society, 2008). A system dynamics model should incorporate stocks of populations, flows between stocks, and positive and negative feedback loops involving parameters in the system.

The theoretical framework of the computer model used in this project is based heavily on one developed by Saeed and Pavlov (2008) to simulate the historical rise and fall of political dynasties in the history of China. This latter model is built around three interconnected stocks: farmers who generate productivity, bandits who prey on farmers, and soldiers who protect the farmers from bandits and who are supported by taxes paid by the farmers. Because they found that the behavior of their model is typified by a

series of oscillations in the relative populations of the three stocks, Saeed and Pavlov termed it the "Dynastic Cycle Framework."

My model uses a modified version of the Dynastic Cycle Framework that is built around three interconnected population classes: peasants, bandits, and mafia. Below, I begin by using the information gathered during my literature review (as summarized in the previous chapter) to describe the relationships and feedback loops upon which my model of the social structure in 19th-century Sicily is based. After presenting this general framework, I then describe the numeric equations that the computer model uses to represent these relationships. In a subsequent chapter, I will use this model to perform numeric simulation experiments in order to test hypotheses related to the behavior of the system and evaluate the effectiveness of various policies designed to reduce the power of the mafia.

3.1 General Model Framework

As with the Dynastic Cycle Framework described by Saeed and Pavlov (2008), a basic relationship between peasants and bandits lies at the heart of my simplified model of the societal structure in 19th-century Sicily. This relationship assumes that peasants earn all of their income from sharecropping, a portion of which is lost to bandits (per Blok 1966). Bandits, in turn, consist of a disorganized group of criminals who derive a portion of their income from the loot they appropriate from peasants, as well as a portion from illegal activities (e.g., prostitution, smuggling, gambling) that do not directly impact the economic well being of the peasants. Because we assume that bandits and peasants are comprised of rational people who seek to maximize their total utility, we assume that peasants will choose to become bandits if they believe that their expected disposable

income from crime is greater than the disposable income they can expect to earn from farming. This behavior is demonstrated by historical example, as periods of high unemployment led to six major increases in banditry in Sicily during the 19th-century (Bandiera 2003). Similarly, bandits will take up farming if they believe that it is more profitable than banditry. Because neither the bandits nor the peasants have perfect knowledge, this simplified cost-benefit analysis is based on their perceptions of disposable income as influenced by the historical income earned by members of the two population classes during previous years.

In feudal Sicily, the number of bandits was kept in check by the standing armies owned by the feudal lords. Following the abolition of feudalism and the creation of the Italian state, Sicily fell into a state of disarray, with almost no police presence and a prevailing system of anarchy. Such a system can lead to societal collapse if banditry is considerably more profitable than farming. In this situation, peasants will turn to a life of crime because they will believe that it offers an opportunity to earn more disposable income than they would as farmers. This will increase the number of bandits in the system, as well as the total amount of crops looted from the peasants. With a greater threat of crime from bandits, peasants can therefore expect their income to decrease. (These feedback loops are illustrated in Figure 3.1.) Depending on the circumstances of the system, this decrease may be partly or wholly offset by an increase in per-capita disposable income caused by the decreased competition amongst peasants.[3] In contrast, if the increase in disposable income from reduced competition is less than the decrease in disposable income from increased banditry, then the ratio of disposable income per

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[3] Given a fixed amount of farmland, fewer peasants working as farmers leads to a situation where each peasant will be allotted a greater area of land to farm. This, in turn, results in an increase in farming output per peasant.

bandit to disposable income per peasant will increase and even more peasants will choose to become bandits. This feedback may continue until the number of bandits has grown so large that they loot 100 percent of the crops produced by the peasants, at which point all of the remaining peasants will give up farming and choose to earn income from illegal activities such as smuggling or robbing passing merchants. In this worst-case scenario, everyone in the system is worse off than they would be if banditry was regulated: bandits are no longer are able to earn disposable income from looting peasants as no peasant is willing to farm if he knows that he will be robbed of all of his potential income.

Figure 3.1: Simplified Feedback Structure of Model with No Mafia

Peasants have two incentives that cause them to be willing to pay for services that give them protection from bandits. On an individual level, peasants are willing to pay to reduce the likelihood that they will be looted of their income, as long as the reduction in

risk outweighs the value of the tax or fees that they must pay. In addition, on a societal level, the peasant class as a whole can be better off by supporting a system that offers protection services, as the introduction of enforcement can prevent a systematic collapse of the social structure. In many societies, this enforcement comes from police services offered by a government that is supported through taxes. However, the lack of an effective police presence in 19th-century Sicily, combined with the distrust that many Sicilians held towards the Italian government based in Rome, led to an opportunity for the emergence of an alternative legal system in lieu of a legitimate one. This void was filled by the mafia, which offered landowners and farmers protection from crime in exchange for high levels of tribute.

The mafia was an organization comprised of gabelloti who either were middle-class villagers appointed by absentee landowners to manage their lands or former land-managers who gained control of their own estates following the landownership reforms enacted in Sicily during the 19th-century. These gabelloti exercised political control over the peasants by deciding which farmers would be allowed to work on each plot of land and the terms that they would have to pay to do so. This relationship is shown in Figure 3.2 below. In order to gain the support of the mafia, a peasant would be expected to give them a large percentage of their income as tribute. This quasi-feudal system was built around exploitation of the peasants, and as such, it was critical for the gabelloti to suppress any desires for social change amongst the peasant class.
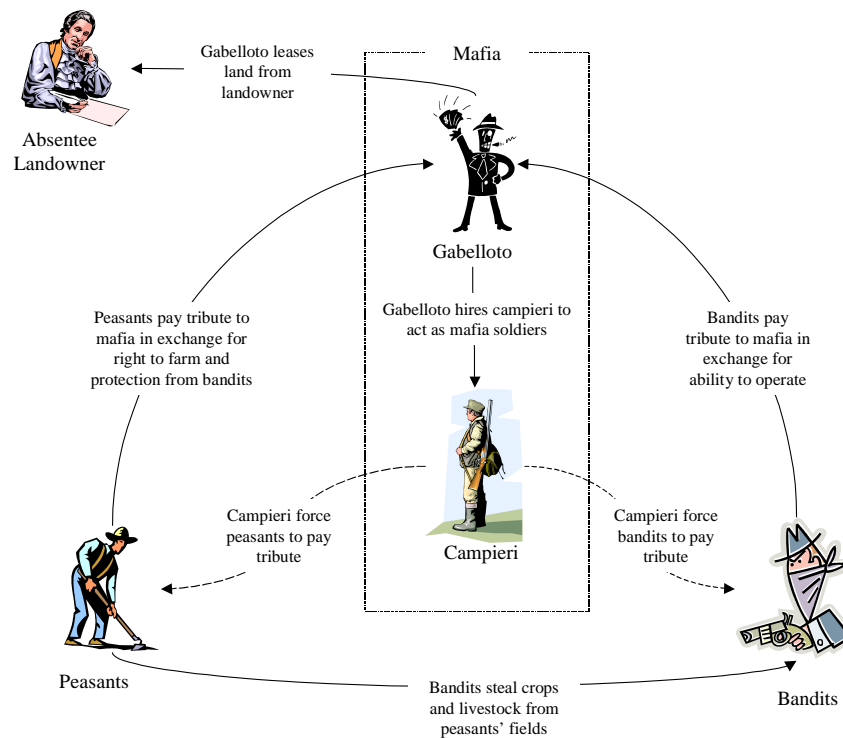
Figure 3.2: Structure of Society in 19th-Century Sicily

As discussed in Acemoglu and Robinson (2006), undemocratic societies tend to be sustainable in two general cases: when the status quo is maintained through the use of violent suppression of rebellion, or when the non-elite class perceives the status quo as legitimate and/or beneficial to their overall well-being by virtue of concessions granted to them by the elite. The former option means that the gabelloti could maintain the societal structure by hiring a relatively large number of campieri to use the threat of violence to enforce the obedience of the peasants. However, this option tends to be relatively costly, as it requires the gabelloti to pay their soldiers and also leaves them vulnerable to a potential coup. In contrast, if the peasant class perceives the mafia as a legitimate social agency, then they will be much more willing to pay tribute and will have less desire to change the social structure. In other words, as the importance of the services (e.g.,

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protection from bandits) that the mafia provides to the peasants increases, the costs to the peasants of changing the social structure to eliminate the mafia become greater (Acemoglu and Robinson 2006). As a result, the peasants will be more willing to accept the status quo without revolting or seeking social change. This option may be more attractive for the gabelloti as it allows him to hire fewer campieri to control the peasants, thereby decreasing his total costs and increasing his net profit.

In general, each village in Sicily had its own mafia group, which did not associate with the groups from neighboring villages (Bandiera 2003). Furthermore, the mafia fiercely protected its territory (Blok 1969). As such, we assume that the village in our model is governed by a single gabelloto (roughly equivalent to today's mafia dons). This gabelloto, in turn, hires campieri (e.g., mafia soldiers) to patrol his land and protect it from bandits while enforcing the system of tribute amongst the peasants. Although the campieri were sometimes recruited from the peasantry in Sicily (Blok 1969), the gabelloti most often chose to employ former bandits, especially ones who had a proven record of success and violence, as their reputation made them particularly suited to the requirements of the job (Bandiera 2003). The campieri receive fixed salaries from the gabelloto and also keep a portion of any tribute paid by the peasants to the mafia. Although data regarding the relative income of campieri is not available, the fact that the most successful bandits were willing to join the mafia suggests that they viewed it as a more profitable career, or at least a more stable one.

Unlike the flow between bandits and peasants, where individuals are essentially free to move between job classes based on their relative profitability, the flow of bandits to the mafia is tightly controlled by the gabelloti. A gabelloto's main desire is to

maximize his income (Bandiera 2003). As such, his decisions to increase and decrease the number of campieri he employs are based on the impact that he believes such decisions will have on his profits. Increasing the number of campieri has two effects on the power of the gabelloto: first it makes him more powerful with respect to peasants, allowing him to use intimidation to pressure them for tribute. Secondly, the size of the mafia relative to the number of bandits is important in determining the mafia's effectiveness in controlling its territory. Without campieri acting as guards, a gabelloto could expect a decrease in his overall profits due to theft. However, instead of putting bandits out of business, the history of Sicily shows that the mafia often assisted bandits in crime such as cattle-rustling (Blok 1966). In this way, the mafia also earns additional income from illegal activities, seen as a tribute paid to the gabelloto and campieri by bandits. Increasing the number of campieri with respect to the number of bandits increases the ability of the mafia to control its territory, catch bandits, and enforce the payment of tribute.

Although hiring campieri allows a gabelloto to increase the income he receives from tribute, he also faces direct and indirect costs associated with the hire. For example, the gabelloto must pay a fixed annual salary to every campiere in his employ, thereby decreasing his total profits. More indirectly, any tribute paid by bandits causes the income per bandit to decrease, possibly to the point where bandits will abandon crime and begin farming instead. The net result is a decrease in the amount of tribute the mafia receives from bandits (although this may be partly or wholly offset by an increase in the amount of tribute received from peasants).

Because they are profit-maximizing individuals, peasants would prefer not to pay any tribute to the mafia. However, the structure of the landownership system in Sicily forced peasants to pay for the privilege of being able to farm lands owned or managed by the gabelloto. If the peasants saw this system as illegitimate, they had the ability and numbers to revolt against the gabelloto. As such, it was in the gabelloto's favor to earn legitimacy amongst the peasants by offering them services such as protection from the threat of banditry. An increase in the relative abundance of bandits corresponds to an increase in the percent of the peasant's income that is lost to bandits. When the percent of income lost to bandits increases, more peasants are willing to pay for protection, and those that receive protection are willing to pay more in return. In such a case, a gabelloto can increase his income from tribute while at the same time maintaining the perceived "legitimacy" of his role in society. Increasing the amount of tribute paid by peasants increases the inequality in the system, leading to a greater risk of revolution and social change per the theories of Acemoglu and Robinson (2006). However, this increase in the desire amongst the peasants for the elimination of the mafia system will be partly or wholly offset by the increases in the value of the protection services that the mafia provides to the peasants and the corresponding increases in the costs to the peasants of any social change. In contrast, a gabelloto can also increase the amount of tribute paid to him by using the threat of violence from campieri to intimidate the peasants. However, doing so greatly reduces his perceived legitimacy and increases the desire for societal change amongst the peasantry.

In our model, we assume that the mafia wishes to maintain a minimum standard of legitimacy among the general population as a decrease in the perceived legitimacy of

the social system increases the risk of societal change (Acemoglu and Robinson 2006). A change in the quasi-feudal land ownership structure in Sicily would have been catastrophic to the gabelloti's ability to earn income and maintain his power (Blok 1969). If the desire for social change (i.e., the net benefits of eliminating the mafia system) became so great that the collective action problem against revolution was overcome and the peasants decided to eliminate the mafia either by using violence to seize the gabelloti's lands or by seeking the help of the Italian government, then the mafia would have lost all of its political and economic power. In addition, being perceived as a legitimate social construct by the average citizen was instrumental to the mafia's later ability to gain political power, expand its influence, and maintain its power in the face of efforts by the Italian government to eliminate the role of the mafia (Blok 1969, Brögger 1968). One proxy of legitimacy in the system is a ratio of the peasants' willingness to pay for protection to the tribute they are forced to pay to the mafia. When the tribute paid exceeds the peasants' willingness to pay, they will perceive the system as being unfair and the benefits of social change as being high, and the mafia will have to reduce its tribute demands in order to maintain the same level of legitimacy and decrease the risk of revolution. Similarly, when the peasants' willingness to pay increases due to an increase in the threat of crime, then the perceived benefits of the status quo increases and the mafia will be able to increase the amount of tribute it collects without having a negative impact on its perceived legitimacy. Tribute is paid based on a fixed percent of the total output of the peasants. Thus, if total output decreases, the income earned by the gabelloto also decreases.

Each year, we assume that a gabelloto must decide how many campieri he wishes to employ. A minimum number of campieri are necessary to enforce tribute and obedience amongst the peasants. This number is based on the total peasant population, as well as the desire for social change amongst the peasants (i.e., the perceived legitimacy of the system). In addition, the gabelloto must also hire campieri to police his lands and protect peasants from bandits. The number of campieri assigned to this task is based on the threat of crime. It is important to note that the campieri do not act as a normal police force and actively eliminate the bandits. Instead, they force the bandits to pay a portion of their income to the mafia as tribute. As the relative power of the mafia increases, the fraction of each bandit's income that he pays as tribute increases. This increase causes relative bandit income to decrease and drives some bandits to become peasants, thus indirectly resulting in the same type of dynamics as if the campieri had acted as a more conventional police force (see Saeed and Pavlov 2008).

The relationships between model parameters in the model with mafia are shown in the causal loop diagram in Figure 3.3 below.
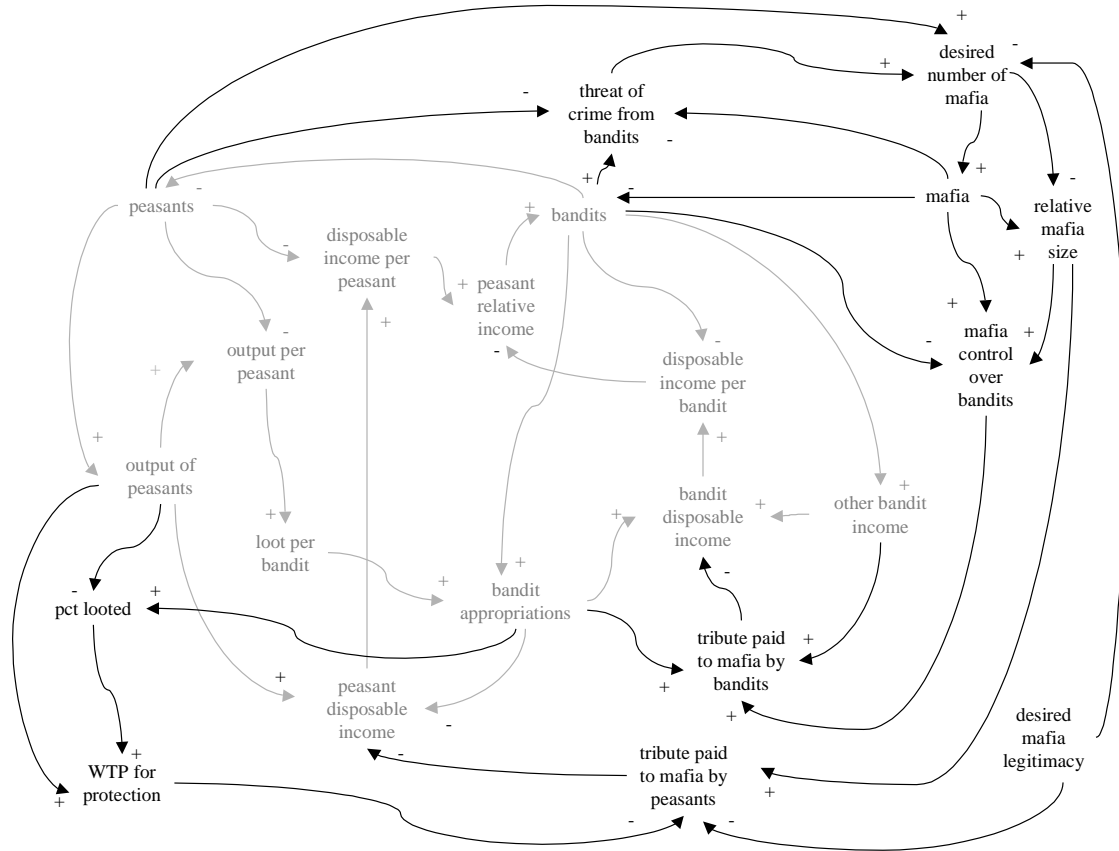
Figure 3.3: Simplified Feedback Structure of Model with Mafia
(Additions to model shown in darker font)

3.2 Model Equations

This section discusses the mathematical equations representing the relationships between the stocks of peasants, bandits, and Mafiosi, as outlined in the section above. I begin by describing the methodology for calculating the average income of peasants and bandits. I then describe the equations that the model uses to determine the flows between the population stocks. Finally, I describe the calculations that determine the size of the mafia and the amount of tribute paid to the mafia. Throughout this section, I use P to denote the stock of peasants, B to denote the stock of bandits, and M to denote the stock of Mafiosi. These equations are based on the stock and flow diagram shown in Figure 3.4 on the following page.

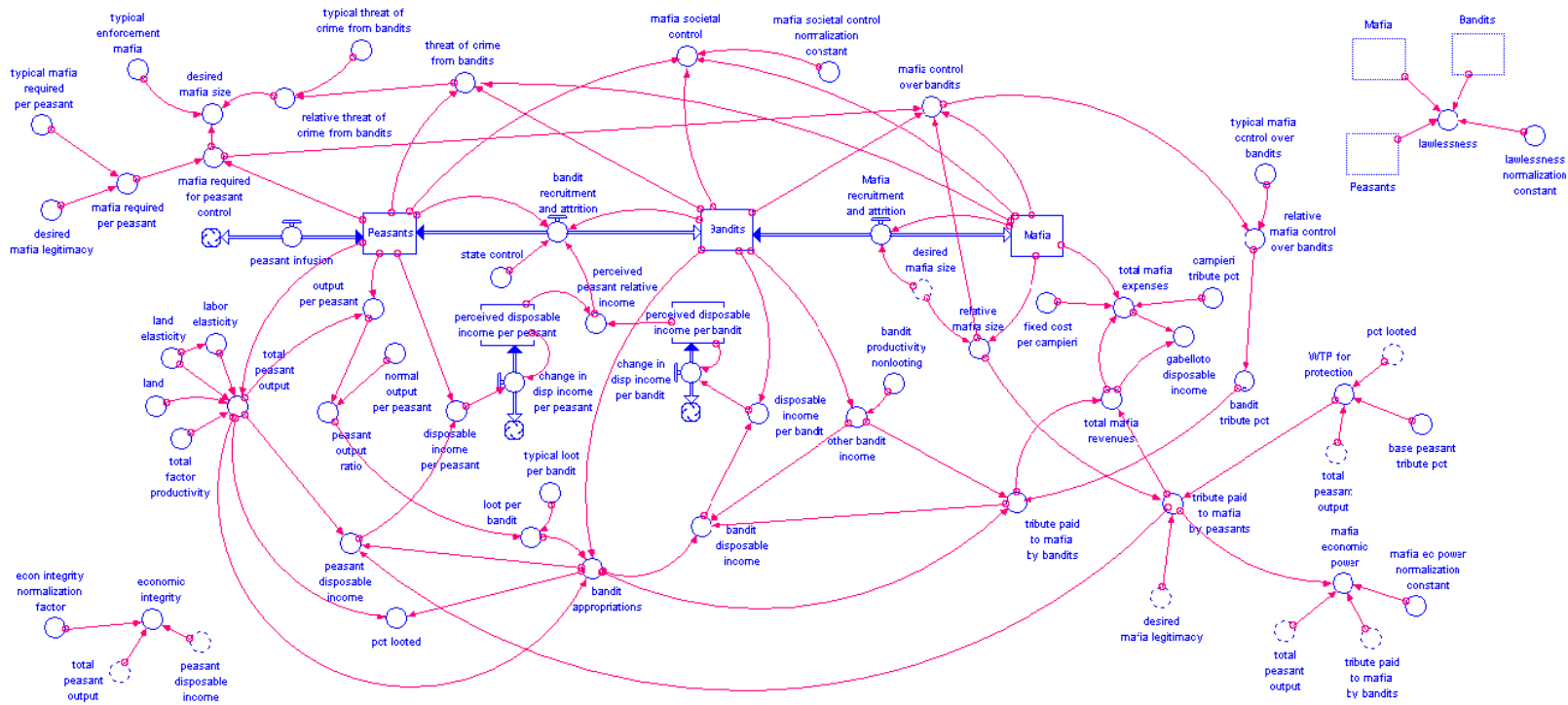**Figure 3.4: Stock and Flow Diagram for Mafia Model**

3.2.1 Peasant Income Calculations

For purposes of this model, we assume that peasants rely on sharecropping for all of their income (per Blok 1966). Bandiera (2003) assumed that total output of the system is fixed regardless of the number of peasants who are farming. In this model, we instead use a version of the Cobb-Douglas production function: $Y_P = A_P \cdot K^\alpha \cdot P^\beta$, where A_P is the total factor productivity of peasants (i.e., a variable representing the effects of external factors such as technology or climate), K is the total capital (i.e., land) in the system, P is the population of peasants (i.e., labor supply), and α and β are the elasticities of land and labor respectively, such that $\beta = 1 - \alpha$. In the Sicilian economy, land was the predominant factor in driving total output. Given the long history of settlement of the island, essentially all land in rural areas that could be farmed was being farmed extensively during the 19th-century (Bandiera 2003). As such, any increases in population resulted in only a negligible increase in total output (i.e., labor elasticity was very low), while the effects of splitting the profits from farming amongst additional peasants resulted in an overall decrease in the average standard of living.

This model also assumes that the total factor productivity is not affected by other variables in the model. This reflects the situation in Sicily. Because both the gabelloti who leased and managed the estates and the peasants who worked the land as sharecroppers were only appointed by the landowners for a temporary period of time, they had no incentive to reinvest their own earnings into increasing the total productivity of the land. For example, even though simple improvements such as irrigation and fertilization would have increased total output by up to 20 times, tenants were unwilling

to invest in these improvements as they would not likely to be the same person who received the benefits from the investments (Bandiera 2003).

Aggregate peasant disposable income in the model is equal to total output less total tribute paid to the mafia (T_P) and bandit appropriations (*L*): $I_P = Y_P - T_P - L$. Per-capita disposable income is calculated by dividing peasant disposable income by the population of peasants: $i_P = I_P / P$. Peasants decide to become bandits if they believe that their expected income from banditry (i_B) would be greater than their expected income as peasants. However, as in all economic systems, the peasants would not have perfect information regarding the exact income they would stand to earn. To model this situation, I use a stock representing the perceived disposable income for a peasant ($\overline{i_P}$) which is adjusted using a two-year averaging function:

$$\frac{d\overline{i_P}}{dt} = \frac{i_p - \overline{i_P}}{2}$$

The net effect of the above equation is to introduce a delay into the system where peasants are basing their decisions in part on the previous years' disposable income rather than the actual disposable income that they will earn.

3.2.2 Bandit Income Calculations

Bandits are former peasants who have resorted to a life of crime. They earn part of their income by looting a portion of the produce generated by peasants. This model assumes that each bandit is able to loot an equal amount (*l*) in a given time period. The loot per bandit is in turn based upon the average output generated by a peasant: if average per-peasant output increases, then a bandit can expect to earn more by robbing a peasant. Similarly, when peasants are relatively poor, a bandit's expected income from looting is

also lower than average. This relationship is governed by the equation: $l = \tilde{l} \cdot e$, where e is a ratio of actual per-peasant output ($y_P = Y_P / P$) to a typical per-peasant output level ($\tilde{y}_P$), and $\tilde{l}$ is the loot earned per bandit when per-peasant output equals $\tilde{y}_P$. This equation ensures that bandits will earn nothing from looting if total peasant output is zero. Note also that this model assumes the amount looted is based on the total output of peasants prior to paying tribute to the mafia. That is, it assumes that the bandits loot the peasants before they have made their annual payments to the local Mafiosi (e.g., while the crops are being harvested). Finally, this method of calculating bandit appropriations assumes that the amount looted per bandit does not vary with the number of bandits. For example, the addition of a bandit to the system does not result in any diminishing returns with regard to total bandit appropriations.

The total amount of income that bandits earn from looting (i.e., bandit appropriations) is simply the loot per bandit times the number of bandits: $L = l \cdot B$. However, this equation only holds as long as $l \cdot B$ is less than or equal to total peasant output. Because it is not possible for bandits to loot more than the peasants are able to produce, the model will set $L = Y_P$ if $l \cdot B > Y_P$.

Bandits can also earn income from a variety of additional activities, including prostitution, gambling, and robbing merchants who are traveling through the lands farmed by the peasants.   These activities do not directly affect the income of peasants, although they do result in an increase in total bandit income. This model assumes that

each bandit generates a fixed amount a_B from these activities during a given time period.[4]

Thus, the total amount earned by bandits from these secondary activities is $A_B = a_B \cdot B$.

Finally, we assume that bandits must pay tribute to the local Mafiosi in order to be allowed to operate with impunity. This model assumes that the peasants pay tribute to the mafia in return for protection services. However, as discussed in the previous chapter, the history of Sicily shows that the mafia often worked in concert with bandits to earn income from such sources as cattle rustling, prostitution, and gambling (Blok 1966, Blok 1969, Brögger 1968). Thus, instead of modeling the mafia as an institution analogous to a police force which directly acts to decrease the prevalence of banditry, we model it as an organization that earns revenue from illegal activities by forcing any criminals to share a portion of their profits. This "tax" in turn makes it less profitable for bandits to operate, and thereby reduces the number of peasants who will choose to become bandits. In such a system, the peasants would be satisfied that the mafia is having a positive impact on the level of crime, even though that is not the direct intention of the mafia itself. In this model we use T_B to denote the total amount of tribute paid to the mafia during a given time period.

Total bandit income is governed by the equation $I_B = L + A_B - T_B$, and per-capita bandit income is $i_B = I_B / B$. As with peasant income, we use a stock to denote perceived per-capita bandit income ($\overline{i_B}$). This perception changes based on historical earnings, using a time constant of two years:

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[4] Note that this method also assumes that there is no competitive effect between bandits with regard to sources of additional income. That is, the addition of an extra bandit to the system has no impact on the amount of income each bandit earns from sources other than looting.

$$\frac{d\overline{i_B}}{dt} = \frac{i_B - \overline{i_B}}{2}$$

3.2.3 Flows Between Peasants and Bandits

Bandits are peasants who have chosen to live a life of crime rather than generate income as a shareholder. For most untrained peasants in Sicily, banditry was the only option for earning income other than farming (Blok 1969). This model assumes that peasants decide to become bandits if they perceive that the disposable income they stand to gain from banditry is greater than their perception of their future disposable income as a sharecropper. Similarly, bandits will abandon their criminal activities if they believe that their expected disposable income from farming is greater than their expected disposable income from banditry. This cost-benefit analysis is reflected in the model by the ratio of perceived disposable income per peasant to perceived disposable income per bandit: $i_{PB} = \overline{i_P} / \overline{i_B}$. In addition, we assume that there are some normal flows between the population of peasants and farmers: some bandits will tire of the risks associated with their lifestyle and retire to a life of farming, while some peasants will seek the adventure and prestige associated with banditry even if it is not necessarily more profitable for them to switch occupations. In a steady-state equilibrium these two flows will be equal. The formulations used in the model to reflect this dynamic is:

$$\frac{dP}{dT} = -r_P$$

$$r_P = a_P^{out} \cdot P \cdot \frac{(1-\sigma)}{i_{PB}} - a_P^{in} \cdot B \cdot \frac{i_{PB}}{(1-\sigma)}$$

The first element of r_P represents the flow of peasants who decide to become bandits, while the second element represents the flow of bandits who decide to leave their life of crime by becoming farmers. An increase in the ratio of peasant to bandit income (i_{PB}) implies that the relative profitability of sharecropping compared to banditry has increased. Using the equation above, this leads to a decrease in the number of peasants who decide to become bandits, as well as an increase in the number of bandits who begin sharecropping. The factor σ in the above equation represents an index of government control with regard to policing. When $\sigma = 0$, the system is characterized by a complete lack of state control, and bandits do not need to worry about being captured by the police. When $\sigma = 1$, crime is completely unprofitable, as the model assumes that every bandit will be captured by the police. This equation assumes that peasants and bandits will take into consideration their likelihood of being captured by government police when calculating their expected income from banditry.[5] Finally, a_P^{in} and a_P^{out} are constants that balance the flows in the steady state.

3.2.4 Determination of Mafia Size

In this model, the mafia stock represents the number of campieri who have been hired by the gabelloto to maintain social order amongst the peasants and to police his property. As discussed in the background chapter, the mafia in Sicily preferred to recruit

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[5] If a bandit knows that the probability that he will be captured by the government police is σ, then his perceived expected income is equal to a weighted average of his probability of being captured and earning zero income and his probability of not being captured and earning the normal amount of bandit income:

$$\hat{i}_B = 0 \cdot \sigma + \overline{i_B} \cdot (1 - \sigma)$$

Thus, the modified expression for the ratio of perceived peasant to bandit income is:

$$\hat{i}_{PB} = \frac{\overline{i_P}}{\overline{i_B} \cdot (1 - \sigma)} = i_{PB} / (1 - \sigma)$$

from the ranks of local bandits, as they relied on their reputation for ruthlessness and violence to intimidate peasants and bandits alike (Blok 1969, Bandiera 2003). In the model, this relationship is represented by a flow between the population of bandits and Mafiosi. As discussed earlier in this chapter, this flow is very different from the flow between peasants and bandits. The latter assumes that there are no obstacles that prevent a peasant or bandit from switching professions, and therefore, they will generally choose the profession that they believe is more profitable. In contrast, the flow between bandits and campieri is controlled entirely by the gabelloto who holds a monopoly over the protection racket in his village and therefore determines how many campieri will be employed each year. Because historical evidence suggests that even the most successful bandits chose to join the mafia when given the option, the model assumes that the gabelloto will always be able to employ the number of campieri that he desires.

A gabelloto must hire campieri for two reasons. First, campieri enforce the system of tribute amongst the peasants and use violence to suppress any desires for social change away from the status quo. Second, the campieri patrol the lands managed by the gabelloto and act as a control on the level of banditry by demanding a significant portion of the bandits' revenues. Thus, the desired number of campieri employed by the gabelloto (M_D) is dependent on both the number of peasants in the population and the relative threat of crime. This model calculates the number of mafia necessary for peasant control as: $M_{PC} = m_{pc} \cdot P$, where m_{pc} is the mafia required per peasant as calculated by the equation:

$$m_{pc} = \tilde{m}_{pc} / (\tau_D)^c$$

The index τ_D is used to represent the gabelloto's desired level of legitimacy amongst the peasants, the derivation of which is discussed in a later section. In general, a system where the mafia has a high level of legitimacy is one where the peasants see the mafia as a legitimate organization that provides important services, and therefore they have little desire for social change. Similarly, a system where the legitimacy index is low is one where the peasants believe that the mafia is an oppressive, illegitimate organization, and as a consequence, they are much more likely to organize and demand fundamental changes in the social order. The number of campieri that are needed to control the peasants depends on the desire for social change among the peasant class, as reflected in the legitimacy index. Furthermore, we assume that the number of mafia needed to control the peasants grows exponentially by a factor c. Setting an exponential factor greater than one assumes that there is a "snowball effect" in the amount of violent resistance or active disobedience towards the mafia as the "collective action problem" against societal revolution is overcome (see the discussion in the previous chapter of Acemoglu and Robinson (2006)). This is reflected in the notion discussed earlier that the gabelloto can enforce a system of tribute in excess of the amount that peasants are willing to pay, but only if he hires a relatively large number of campieri to use violence to suppress any desire for revolution or social change amongst the peasant class. Finally, in the equation above, $\tilde{m}_{pc}$ is the number of campieri required to enforce a system of tribute amongst the peasants when $\tau_D = 1$.

The number of campieri that the gabelloto hires to police the bandits is dependent on the threat of crime from bandits. As this threat of crime increases, peasants will demand that the gabelloto provide more protection from bandits (in exchange for higher

levels of tribute). In addition, the gabelloto may wish to increase the number of campieri in his employ, both to protect his personal property and to maintain his status and position of power. To model the relative threat of crime from bandits (γ), we use an equation that reflects the ratio of bandits to peasants and mafia, based on the approach used in the Dynastic Cycle Framework (Saeed and Pavlov 2008):

$$\gamma = b_\gamma \frac{B}{P + M}$$

For a given threat of crime, the number of campieri that the gabelloto will choose to hire is expressed by the equation:

$$M_{BC} = \tilde{m}_{bc} \cdot \gamma^2$$

where $\tilde{m}_{bc}$ is the number of campieri required for bandit control when the threat of crime from bandits equals one. That this desired mafia size is proportional to the square of the threat of crime index reflects the nature of the system. The effect of banditry on the peasants (i.e., bandit appropriations) is directly proportional to the number of bandits in the system. However, as described in the next section, there are diminishing rates of return when hiring additional campiere to police the bandits. As such, the number of mafia that is required to control the bandits increases exponentially with the number of bandits. In real world terms, this reflects the notion that a larger population of bandits will make the task of maintaining order more difficult as the armed bandits will be able to better coordinate activities and more effectively resist the campieri's demands of tribute.

The total amount of campieri that the gabelloto wishes to employ is equal to the sum of the amount required for the control of peasants and bandits ($M_D = M_{PC} + M_{BC}$).

Thus, the change in the stock of campieri employed by the mafia during each cycle is equal to the difference between the desired and actual amounts:

$$\frac{dM}{dt} = M_D - M$$

Similarly, we define a variable called relative mafia size (m) as the ratio of the actual number of campieri employed to the desired number of campieri: $m = M / M_D$.

3.2.5 Mafia Income Calculations

The gabelloto earns his income from two sources: tribute paid by peasants who farm the lands he manages and tribute paid by bandits who operate within the territory he controls. In addition, the gabelloto incurs costs related to employing of campieri. Based on Blok (1969), we assume that each campiere receives a fixed annual salary (i_c) from the gabelloto and also receives a certain percentage (λ_c) of the total tribute paid by the peasants and bandits. Thus, the total disposable income earned by the gabelloto is:

$$I_M = T_P + T_B - (i_c \cdot M) - [\lambda_c \cdot (T_P + T_B) \cdot M]$$

3.2.6 Tribute Paid by Peasants

The amount of tribute paid by peasants is based on a percentage of the total output generated by the peasants. For example, a Mafioso will give a peasant a plot of land in return for a fee representing a percentage of the crops produced. If the peasant is robbed by bandits, he will still need to pay the same fee that he agreed on when given the plot of land. As such, it is theoretically possible for a sharecropper to have negative income. This reflects the actual situation in 19th-century Sicily. Blok (1966) noted that in times of drought or poor productivity, peasants often had entire years with negative income where

they ended up in debt to the gabelloti. In this model, we denote the percentage of total peasant output that is given as tribute to the mafia as λ_P.

The percentage of output paid as tribute by peasants is dependent on the effect that banditry has on their disposable income. As discussed in the previous section, peasants are willing to pay tribute in return for perceived services rendered by the mafia, including protection from banditry. We assume that the maximum amount that they will be willing to pay for protection services is equal to the amount looted. The percentage of peasant output lost to looting is given by the equation: $q = L/Y_p$. This model expresses the maximum willingness to pay for enforcement (WTP) amongst peasants as total peasant production multiplied by a percentage based on the percent looted. When peasants lose 100 percent of their income to bandits, they will be willing to pay up to 100 percent of their income as tribute. Similarly, when there is no banditry, peasants will be willing to pay some base percentage (WTP_0) of their income as tribute. This base percentage reflects the notion that the mafia provides services other than enforcement in return for tribute, including acting as an arbitrator in civil disputes (Brögger 1968) and providing more favorable plots of farmland to those peasants who are willing to pay for it.[6] We then use a linear interpolation between these two points to calculate the peasants' willingness to pay tribute in cases where the percent looted is greater than zero and less than 100 percent:

$$WTP = Y_P \cdot (WTP_0 + (1 - WTP_0) \cdot q)$$

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[6] In a system where the sole services provided by the mafia are related to protection, WTP_0 is equal to zero, and the willingness of peasants to pay tribute in a system with no banditry is also zero.

The main desire of the mafia was to maximize its own profits (see Bandiera 2003). As such, when banditry increases, they will recognize that peasants will be willing to pay more for protection, and the percentage of output that the mafia demands as tribute will increase correspondingly.[7] In addition, the mafia has the option to demand a tribute percentage that is either greater than or less than the amount that the peasants are willing to pay. As discussed earlier in this chapter, demanding a tribute in excess of WTP would cause discontentment among the peasants and an increased demand for change in the social structure. In contrast, demanding a level of tribute that is less than WTP will make the peasants view the mafia in a more favorable light, as they will be receiving protection at a cost that is less than their maximum willingness to pay for such services. We use an index of "legitimacy" to denote the relative social legitimacy of the mafia as perceived by the peasants, where legitimacy (τ) is defined as the ratio of the peasants' willingness to pay tribute compared to the actual level of tribute charged by the mafia ($\tau = WTP/T_P$). When willingness to pay is greater than the tribute demanded, then we say that the system has high legitimacy. When the amount of tribute demanded exceeds willingness to pay, we say that the system has low legitimacy.

This model is based on the assumption that the amount of legitimacy is the system is set by the gabelloto when he determines the level of tribute he demands from the peasants, such that: $T_P = (WTP/\tau_D) \cdot m^{1/c}$, where τ_D is the mafia's desired level of legitimacy, m is the relative mafia size, and c is the constant used to represent the exponential effect of the desired level of mafia legitimacy on the number of campieri

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[7] We can also consider the increase in tribute percentage as representing a system where the mafia demands a fixed percentage of a peasant's income in return for protection, with not all peasants choosing to pay for protection. As the threat of crime increases, the number of peasants who are willing to pay for protection would also increase. This would in turn correspond to an increase in the total percentage of peasant productivity that is given as tribute to the mafia.

needed to control a given number of peasants (see discussion in the previous section) .

By default, we assume that $\tau_D = 1$, meaning that the mafia will charge a level of tribute that is equal to the maximum amount that peasants are willing to pay. Charging less than this amount would mean that the gabelloto would be foregoing potential revenues that he could gain with relatively little protest from the peasants, although it would allow him to gain increased social support amongst the peasantry. Charging more than this amount increases the level of inequality in the system and greatly increases the level of discontentment amongst the peasantry, thereby incurring a strong risk that the peasants will demand social change either by appealing to the Italian government for help or by actively revolting against the gabelloto and seizing lands for themselves.

Relative mafia size is included in the equation for peasant tribute to model the effect of the size of the mafia on the mafia's ability to collect tribute from the peasants. As discussed in the previous section, the gabelloto must employ a desired number of campieri in order to ensure that he can adequately control the peasants. In addition, a certain number of campieri are also need to control the threat of crime from bandits. However, because of a delay in the system caused by imperfect knowledge on the part of the gabelloto, the number of campieri employed is based on the number that would be needed to maintain order given the threat of crime from bandits and peasant population size during the previous and not the current time period. As such, the number of campieri employed may not be equal to the actual number of campieri needed to maintain order. If the actual number of campieri employed is less than the desired mafia size, then the gabelloto will not have sufficient power to collect the total amount of tribute that corresponds to the desired level of mafia legitimacy. Furthermore, as noted in the

previous section, the number of mafia needed to control the peasants (M_{PC}) is inversely proportional to the level of mafia legitimacy in the system (τ) taken to a power c. Since the level of mafia legitimacy is equal to the ratio of willingness-to-pay to the actual tribute paid (T_P), we can derive the following relationship:

$$M_{PC} \propto 1/\tau^c \propto (T_P/WTP)^c \propto (T_P)^c$$

If the total number of campieri employed (M) is equal to m times the necessary number of campieri ($M_D = M_{PC} + M_{BC}$), then we assume that the number of campieri assigned to control the peasants (M_{PC}) is equal to $m \cdot M_{PC}$ (i.e., we assume that campieri are assigned proportionally to peasant and bandit control based on need). Thus, based on the above relationship, if the amount of tribute that corresponds to a desired level of legitimacy is WTP/τ_D, then $(WTP/\tau_D) \cdot m^{1/c}$ is the amount of tribute paid when the size of the mafia is equal to m times the number of campieri needed to maintain the desired level of legitimacy.

3.2.7 Tribute Paid by Bandits

The second component of mafia income, tribute from bandits, is based on the assumption that bandits will be forced to pay a certain percentage of their profits to the mafia in return for being allowed to operate in the territory that the mafia controls. If bandits are unwilling to pay this tribute, then the mafia will not allow them to operate. The model assumes that the amount that bandits pay in tribute is based on the relative power of the mafia (ψ) expressed as a ratio of mafia population to the population of bandits:

$$\psi = b_\psi \frac{M - M_{PC} \cdot m}{B}$$

where b_ψ is a constant representing the marginal mafia control associated with each new Mafioso. As mafia control increases they will have a greater ability to police their territories, and will therefore be able to demand a greater share of the revenue from bandits' criminal activities.[8] However, when calculating the proportion of mafia to bandits it is important to include only those mafia who are available for bandit control and exclude those that are used to control the peasants. As discussed in a previous section, we assume that campieri are assigned to bandit or peasant control based on proportional need. Therefore, the number of campieri who are assigned to peasant control is equal to the number of bandits desired for peasant control times the relative size of the mafia (i.e., the ratio of actual mafia size to desired mafia size).

As the relative mafia control increases, the percentage of bandit income that they are able to demand as tribute increases. This occurs because a greater number of campieri would be better able to patrol the gabelloto's land and use the threat of force to fight any bandits who are unwilling to pay tribute. However, there are diminishing returns with regard to the hiring of an additional campiere. For example, while it may be relatively easy for a proportionally small number of campiere to demand tribute from the least intelligent or violent bandits, it will take proportionately more campiere to police those bandits who are particularly wily and can evade capture or who are more willing to use violence to resist the tribute demands of the campieri. Furthermore, it is impossible

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[8] We can also think of mafia control (ψ) as being a factor that represents the percentage of bandits that are captured by mafia patrols. In this system, the mafia will earn income by confiscating all of the illegal income generated by these captured bandits. An increase in mafia control would be equivalent to an increase in policing effectiveness. This, in turn, corresponds to an increase in the percentage of bandits captured (i.e., a higher ψ) and a higher percentage of total bandit income appropriated by the mafia.

for the campiere to demand tribute in excess of 100 percent of total bandit income. For

these reasons, we use a graphical function of relative mafia control to model the percent

of bandit income given as tribute (λ_B).   This function is characterized by diminishing

scales of return that ensure that the percent of income paid as tribute never exceeds 100

percent (see Figure 3.5).   Finally, total tribute paid by bandits is calculated by

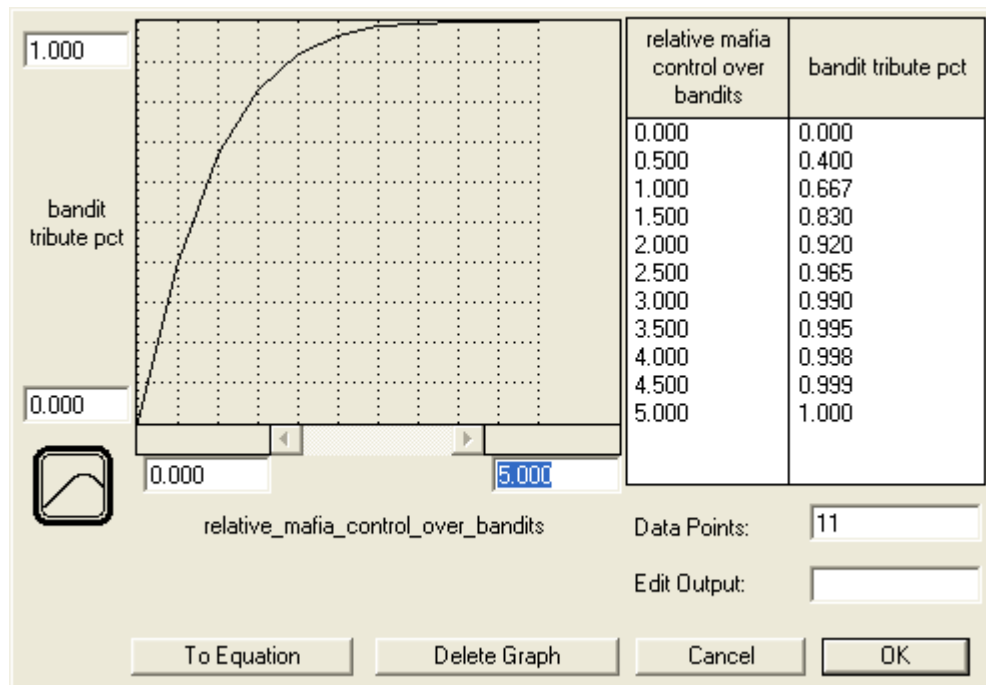multiplying total bandit income by the bandit tribute percent: $T_B = (L + A_B) \cdot \lambda_B$

	relative mafia control over bandits	bandit tribute pct
1.000	0.000	0.000
	0.500	0.400
	1.000	0.667
bandit tribute pct	1.500	0.830
	2.000	0.920
	2.500	0.965
	3.000	0.990
	3.500	0.995
	4.000	0.998
	4.500	0.999
0.000	5.000	1.000

0.000   5.000

relative_mafia_control_over_bandits   Data Points: 11

Edit Output:

To Equation   Delete Graph   Cancel   OK

Figure 3.5: Graphical Function for Percent of Bandit Income Paid as Tribute
We assume diminishing returns with regard to bandit control from adding additional campieri to the
system. Therefore, we represent this relationship in the model by expressing the percentage of income that
bandits pay in tribute as a graphical function of relative mafia control over bandits. This ensures that the
tribute paid can never exceed 100 percent of total bandit revenues.

Chapter 4 - Numeric Simulation Experiments

In this chapter I discuss the dynamics associated with the model of mafia in Sicily. I begin by setting the parameters of the model so that it is in equilibrium. I then perform several numeric simulation experiments by changing certain parameters and looking at the net impact of those changes on the system. These experiments are intended to either simulate actual historical events in the history of Sicily or to test policies that could have been enacted to limit the influence of the mafia. They include:

- Adding government control to the model to test whether the state of lawlessness in Sicily was important to the establishment of the mafia;

- Setting the population of Mafiosi to zero to test whether the formation of mafia was inevitable given the conditions in Sicily during the 19th-century;

- Increasing and decreasing the population of peasants to simulate the effects of population growth and emigration on the behavior of the system;

- Simulating the effects of increased productivity from capital and technological investment on the relative influence of the mafia; and,

- Examining the effects of changes in the desired level of mafia legitimacy on the system.

4.1 Definition of Model Indices

Throughout this chapter, we use four parameters to describe the state of the system. The first two of these indices are used to model the economic and political health of the peasants. "Lawlessness" is used to denote the relative power of mafia and

bandits compared to the peasants.[9] This parameter is based on the assumption that peasants are better off in a system where they are not looted by bandits and do not have to pay tribute to the mafia. It is defined as: $\phi = b_\phi \cdot (M + B)/P$, where b_ϕ is a normalization constant that ensures that $\phi = 1$ in the steady state. "Economic integrity" is used to denote the percentage of peasant output that is kept by the peasants as income and not lost to bandits or the mafia. It is defined as: $\eta = b_\eta \cdot I_P / Y_p$, where b_η is a constant that ensures that the index equals one in the steady state.

The second two indices are used to model the economic and political health of the mafia. The index "mafia societal control" is an indicator of the relative power of the mafia, based on the relative size of the mafia population compared to the populations they control: $\chi = b_\chi \cdot M /(B + P)$, where b_χ is a normalization constant that ensures that the index equals one in the steady state. The final index, "mafia economic power" represents the relative size of mafia income compared to total peasant productivity. It is calculated as $v = b_v \cdot I_M / Y_P$, with b_v being a normalization constant that sets the value of mafia economic power to one when the model is in equilibrium. A system with large values for the mafia control and mafia economic power indices represents a society where the mafia is a dominant political and economic force.

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[9] Note that there is a fundamental difference between the indices of "lawlessness" and "threat of crime from bandits" in this model. The latter represents the relative impact of banditry on the population, and the peasants in particular. In contrast, "lawlessness" represents the view of the Italian government who are concerned not only about banditry, but also about the mafia, as they view the latter as an organization outside of the law.

4.2 Equilibrium Conditions

The first step of the experiments is to initialize the model so that it is in equilibrium. These equilibrium values are summarized in Table 4.1 below. I assume an initial population of peasants (100) that is much greater than the population of bandits (10), which is in turn greater than the population of Mafiosi (5).

Table 4.1 – Equilibrium Values

Parameter	Definition	Value
P	Peasants	100
B	Bandits	10
M	Mafia (Campieri)	5
K	Land	100
α	Land elasticity	0.7
A_P	Total factor productivity	2.5
$\tilde{y}_P$	Normal output per peasant	2.5
a_B	Bandit productivity (non-looting)	0.5
$\tilde{l}$	Typical loot per bandit	2.5
WTP_0	Base peasant tribute percentage	4/9
σ	Government control	0
$\overline{i_P}$	Perceived disposable income per peasant	1
$\overline{i_B}$	Perceived disposable income per bandit	1
a_P^{out}	Normalization constant – peasant to bandit flow	0.01
a_P^{in}	Normalization constant – bandit to peasant flow	0.1
$\tilde{m}_{pc}$	Typical mafia required per peasant	1/50
$\tilde{m}_{bc}$	Typical enforcement mafia	3
τ_D	Desired mafia legitimacy	1
i_c	Fixed cost per campieri	10
λ_c	Campieri tribute percentage	0.02
b_γ	Normalization constant – threat of crime from bandits -- $(P_0 + M_0)/B_0$	105/10
b_ψ	Normalization constant – mafia control over bandits -- M_0/B_0	10/3
b_ϕ	Normalization constant – lawlessness -- $P_0/(M_0 + B_0)$	100/15
b_η	Normalization constant – economic integrity -- $(\tilde{y}_P \cdot P_0)/i_{P_0}$	250/100
b_χ	Normalization constant – mafia societal control -- $(P_0 + B_0)/M_0$	110/5
b_ν	Normalization constant – mafia economic power -- $(\tilde{y}_P \cdot P_0)/i_{M_0}$	250/145

4.3 Experiment 1: Adding Government Control

As discussed in a previous chapter, the state of lawlessness in 19th-century Sicily is believed to be one of the major factors that enabled the mafia to become established. A high crime rate and an absence of state enforcement agencies led to a willingness amongst the general populace to accept the mafia's role as a substitute legal system. In this model, the mafia helps reduce crime by imposing a "tax" on the bandits and reducing their expected income. As a result, fewer peasants are willing to become bandits than they would in absence of the mafia.

I hypothesize that modifying the system to include the presence of state enforcement will lead to conditions that are less favorable for the mafia. State enforcement agencies will act to control the level of banditry, decreasing the benefits to the peasants of the substitute legal system offered by the mafia. This in turn will cause a decrease in the amount of tribute that the mafia can demand without losing legitimacy. With less demand for its services, the gabelloto will react by hiring fewer campieri, thereby reducing the relative size of the mafia. Figure 4.1 below show the effects on class populations after adding low ($\sigma = 0.1$), medium ($\sigma = 0.4$), and high ($\sigma = 0.7$) level of government control to the model.
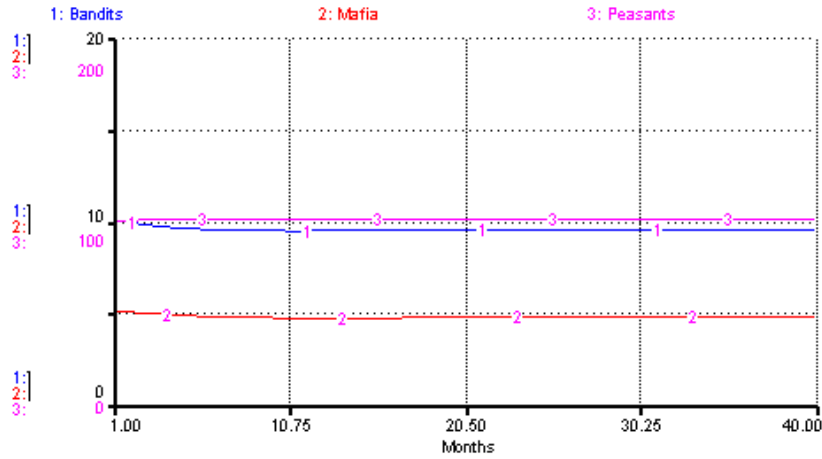
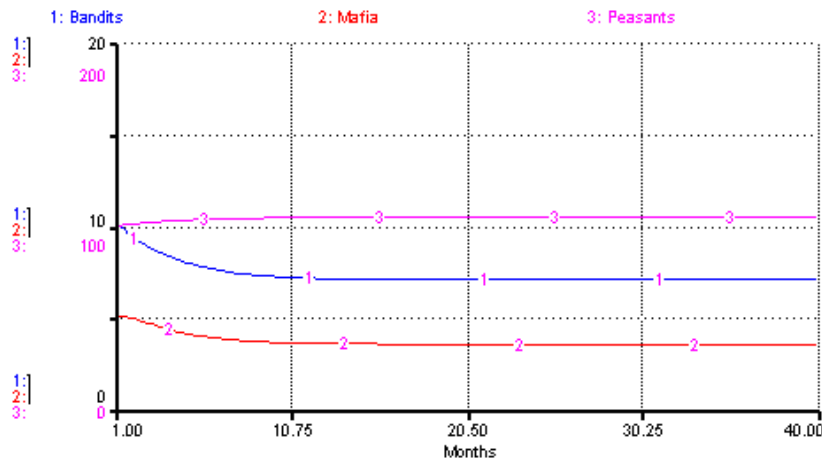Figure 4.1a: Relative Populations with Government Control = 0.1

Figure 4.1b: Relative Populations with Government Control = 0.4
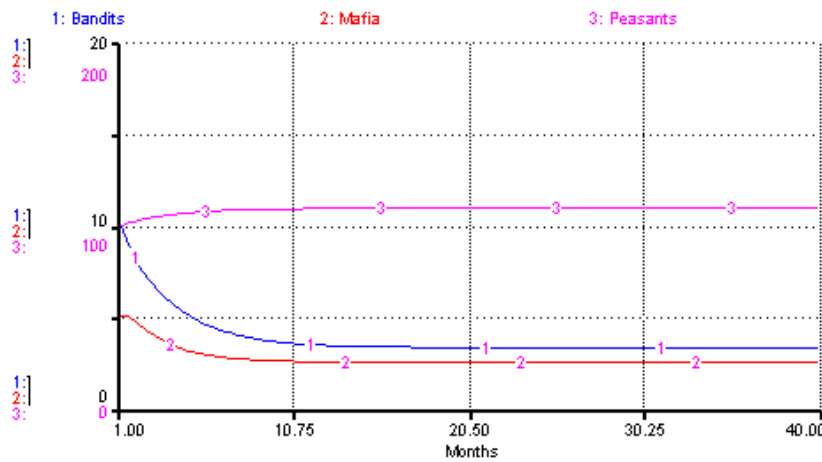

Figure 4.1c: Relative Populations with Government Control = 0.7

Figure 4.1: Relative Populations with Varying Degrees of Government Control (σ)

Increasing the effectiveness of government actions to fight banditry causes both the populations of bandits and mafia to decrease, even if the government takes no direct action against the mafia itself.

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As shown in these graphs, adding government control to the system results in a steady-state equilibrium with a higher population of peasants and lower populations of bandits and mafia than the equilibrium for a system without government control. Furthermore, an increase in government control results in a decrease in the equilibrium populations of both bandits and mafia. This relationship can also be seen in the phase diagrams in Figure 4.2 below.
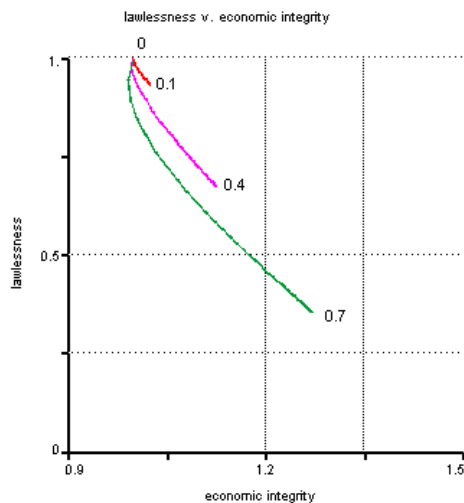

Figure 4.2a - Characteristics of Society Under Varying Degrees of Government Control
Figure 4.2b - Mafia Power Under Varying Degree of Government Control
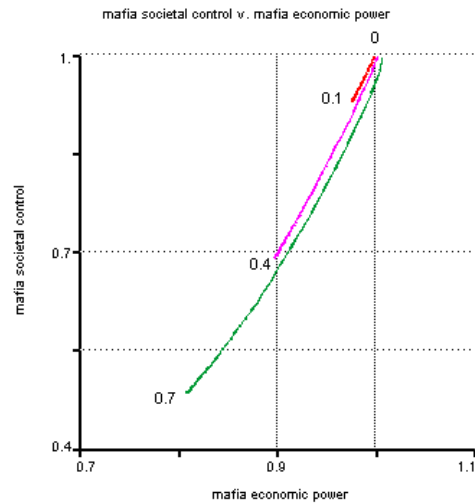
Figure 4.2: Effects of Government Control (σ) on a Mafia-based Society

Increasing the effectiveness of government control of bandits is an effective tool for decreasing the lawlessness of society, increasing the amount of output retained by the peasants (i.e., economic integrity) and reducing the economic and social power of the mafia

As shown above, increasing the effectiveness of government police forces is a very effective tool for decreasing the influence of the mafia in our model, even though the police focus all of their efforts on reducing banditry rather than taking direct action against the gabelloto. This occurs because the high threat of banditry is what allows the

mafia to maintain its power. When peasants do not need to rely on the mafia for protection services, the peasants' willingness to pay for protection and the costs to the peasants of eliminating the mafia decrease. As a result, the gabelloto must decrease the amount of tribute he demands, or risk increasing the demand for social change in the system. This results in a net decrease in the mafia's political and economic influence, although it is still preferable to a change in the social structure where the peasants gain control of the gabelloto's land. Furthermore, we note that an increase in the presence of government police could have a negative effect on the gabelloto's ability to use the threat of violence to keep the peasants in line, especially if the government wishes to reduce the influence of the mafia. The increased costs of using repression gives the gabelloto even more incentive to use concessions such as lowering tribute percentages as a means of preventing social change, although this latter relationship is not reflected in our model.

The results of this experiment suggest that a government that wishes to eliminate the influence of a mafia-like organization should take steps to reduce the level of banditry in society. Furthermore, these steps should have relatively quick impacts on the system: in the experiments above, the system reached its new equilibrium in less than 20 months. History shows that the influence of the mafia in Sicily did indeed decrease under strong governments. For example, during the 1920s and 1930s, the advent of Fascism in Italy under Mussolini saw a marked decrease in the power of the existing mafia. Blok (1969) notes that under Fascism "the rural mafia as a parallel-structure which functioned alongside and intermingled with the formal framework of economic and political power in the interests of the large landowners, became substituted by individuals who represented the Fascist party." Because the mafia did little to change the underlying land

ownership system, once the Fascists were overthrown during World War II, the mafia was quickly able to reassume its former role in society (Blok 1969).

4.4 Experiment 2: Setting Mafia to Zero

As discussed above, Mussolini and the Fascists were able to greatly reduce the power of the mafia in Sicily during the 1920s and 1930s. However, in the chaos following World War II, a new mafia rapidly came into existence to fill the power void that was created after the overthrow of the Fascist government. The lack of a functioning public force and the failure of the Fascists to change the underlying land-ownership structure meant that societal conditions rapidly returned to those of the 19th-century, with both new and old figures taking the mafia's role as a mediator between peasants and landowners (Blok 1969). Because the landowners gave full control of the lands to the new gabelloti, the mafia was able to use its former practices of rewarding loyal peasants with prime farmland (i.e., concessions) and intimidating dissenters (i.e., repression) to reduce the demand for social change that had become more widespread as a result of Communist Party efforts immediately after the war.

In this experiment, we change the initial stock settings to M=0 and B=15. This is intended to represent a situation where the government has been able to eliminate the role of the mafia in society, forcing all former campieri to return to a life of common banditry. If we run the model under these initial conditions without making any other changes, we find that it rapidly moves toward the original equilibrium of P=100, B=10, and M=5, with a very small dampened oscillation due to delays in the system (see Figure 4.3).
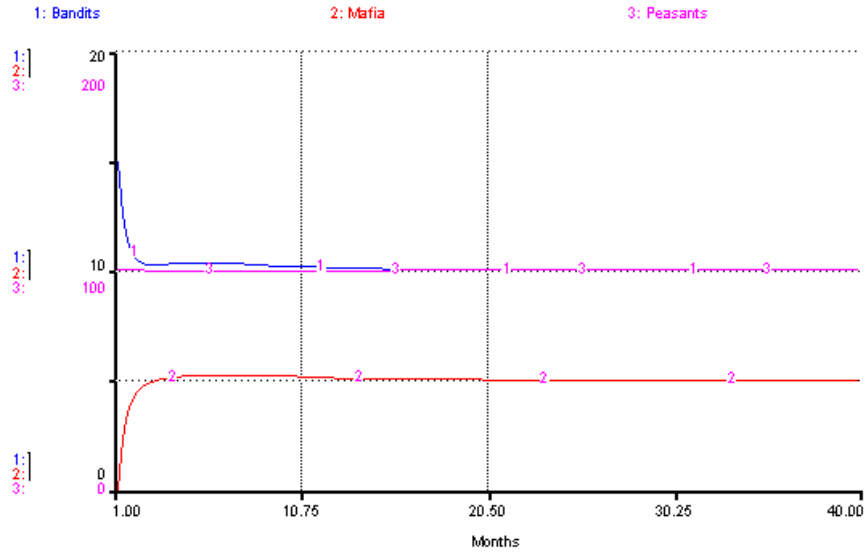
Figure 4.3: Model Run With Zero Initial Mafia Population (M = 0)

Even if the mafia is eliminated temporarily, barring a change in the underlying structure of the land-ownership system, it will quickly reform in the absence of effective government institutions.

One interesting aspect of this result is that it, in this case, it occurs even though the peasants would be better off in a situation with no mafia. In the model that allows for the creation of a mafia, the equilibrium disposable income for both bandits and peasants is 1.0. However, if we rerun the model under the initial conditions above (P=100, B=15, M=0), and eliminate the potential flow of bandits to the mafia, then we see that the bandit population will grow without the control of the mafia, but that it will eventually reach a stable equilibrium (see Figure 4.4a). This resulting society is characterized by a state of lawlessness that is much greater than the level under mafia, but where the economic integrity index is also much greater (see Figure 4.4b). That is, the peasants are able to keep a greater percentage of their income than they would in a society with the mafia.

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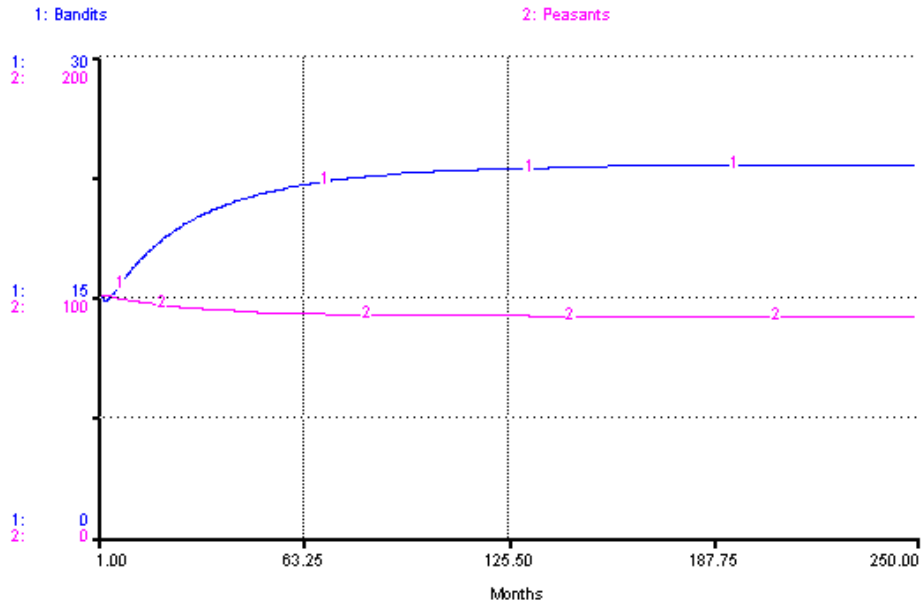
Figure 4.4a: Changes in Bandit and Peasant Population with no Mafia
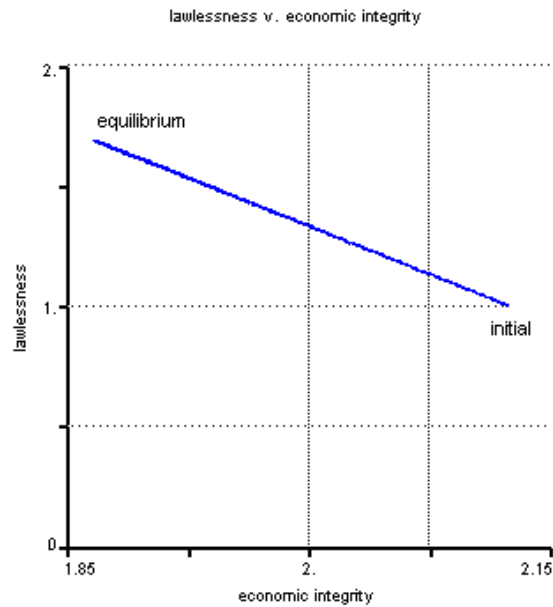
Figure 4.4b: Characteristics of Society with no Mafia

Figure 4.4: Model Run without Presence of Mafia

Although banditry is more prevalent in a system without mafia, the percent of output that peasants keep as disposable income is greater than in a system where the peasants pay tribute to the mafia in exchange for protection from crime. This illustrates the notion that the mafia continues to exist even though it has the net effect of making the other members of society worse off (see Bandiera 2003).

The results of this experiment are surprising in that they show that, in this case, the peasants are supporting an organization that makes them worse off. One of the keys to the mafia gaining legitimacy among the peasants is that it offers the service of protection from bandits. However, the amount of tribute that the peasants pay to the mafia is greater than the total amount that they would lose to the bandits in a society with no mafia. This would provide an incentive for the peasants to act to change the social structure to eliminate the tribute system. There are several potential reasons to explain why this did not happen in Sicily:

- First, the peasants do not have perfect knowledge and may not have realized that the benefits of the mafia's protection services did not outweigh the costs. This would have been particularly so if the mafia led the peasants to believe that their services were more effective than they actually were.

- Second, as explained in an earlier chapter, the collective action problem was particularly prevalent in rural Sicily, with several factors preventing the peasants from organizing an effective rebellion.

- Third, our model does not quantify the value of non-protection services provided by the mafia, including its role as an arbitrator of disputes and its function as a potential means of upward social mobility for the peasant class. If the value of these services exceeds the difference in peasant disposable income in systems with and without mafia, then the peasants would have a disincentive to change the social structure.

- Finally, our experiment may not completely reflect the state of society if the peasants were to act to eliminate the mafia. The mafia would not have been

willing to give up all of its economic and political power without using any means necessary, including violence, to prevent an overthrow of the social structure. Acemoglu and Robinson (2006) notes that violent revolutions often are associated with significant costs, including the loss of life, lost productivity, and the destruction of important infrastructure. Thus, peasants will not demand social change if the expected costs of revolution exceed the potential benefits shown in this experiment. For example, we can rerun our experiment by removing mafia from our model and decreasing total factor productivity (A_P) by 25 percent to reflect a decrease in total productivity resulting from a revolution. As shown in Figure 4.5 below, running this model results in a total collapse of the system, as the level of banditry grows so large that it ends up overwhelming the peasants. Because this scenario results in a system where everyone is worse off (per capita disposable income = 0.5, the productivity of bandits from non-looting sources such as smuggling), the peasants have a strong economic incentive to accept the status quo.
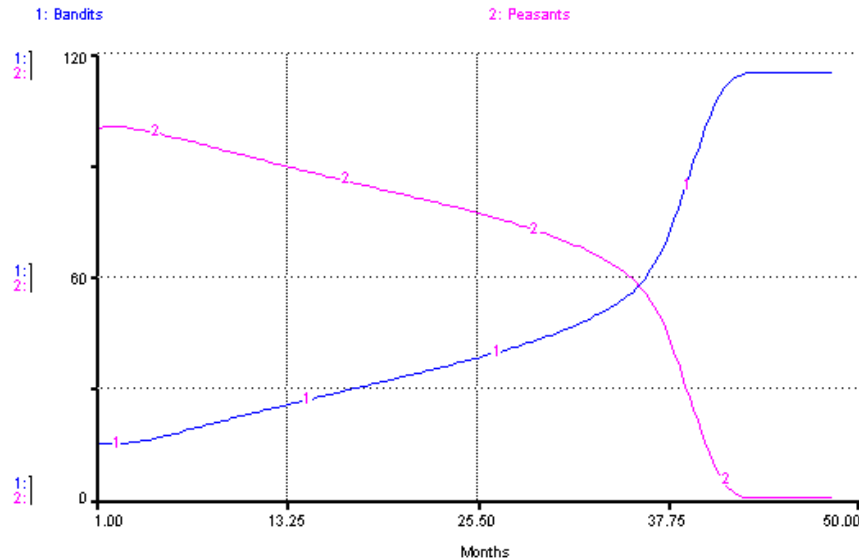
Figure 4.5: Changes in Populations with no Mafia and 25-Percent Reduction in Peasant Productivity ($A_P = 1.875$)

A revolution that eliminates the mafia without allowing for the formation of an alternative mechanism to police banditry can lead to the collapse of the system, particularly if the revolution causes a decrease in productivity. The result is a system where the only viable source of income is from illegal activities such as smuggling and robbing travelers, as any peasant who tries to farm will lose all of his income to bandits.

Bandiera (2003) also demonstrated that the mafia could exist in a system even if the people who support the mafia would be economically better off without it. In her model, this occurs because there is an economic incentive to be the first peasant to purchase protection from the mafia, as bandits are much more likely to rob someone who is not protected. However, as more people choose to purchase protection, the effectiveness of protection decreases to the point where all of the purchasers would have been better off if none of them had chosen to purchase it. At the same time, if the majority of people have purchased protection from the mafia, then anyone who chooses not to purchase it will almost definitely be targeted by bandits and will find himself economically worse off than if he had chosen to purchase. Thus, although the economic well being of the peasants will be better off if none of them choose to participate in the

mafia system (see Figure 4.4), it is an unstable equilibrium. As soon as one peasant decides to improve his situation at the expense of others by paying tribute to the mafia in exchange for protection and other services, then society will rapidly move to the stable equilibrium we derive above, even though all of the peasants are economically worse off than before. Thus, the results of our system dynamics model closely mirror the dynamics predicted by Bandiera's game-theory optimization model.

4.5 Experiment 3: Changing Peasant Population

The population of Sicily grew dramatically during the first half of the 19th-century, increasing by 0.4 million between 1798 and 1861 (Bandiera 2003). Because the productivity of the system was relatively fixed, this resulted in a society where more peasants were forced to compete for the same amount of land. In economic terms, this means that the disposable income per peasant would decrease, and some peasants would have desired an alternative means to earn income or, at least held a stronger desire for social change. However, those peasants who opted not to participate in the system of patronage were left with little opportunity to earn a living. During the mid-19th century, they often had no alternative other than to turn to banditry (Blok 1969). This was the situation in Sicily until the turn of the century, when emigration to the United States became an available option for peasant wishing to escape the sphere of influence of the mafia (Blok 1966, 1969).

In this experiment, we first increase the peasant population by 20 percent and observe the resulting dynamics. This simulation is designed to represent the effects that increasing population had on the establishment of the mafia in Sicily during the 18th century. Figure 4.6 shows that the initial increase in population initially causes the

relative lawlessness in society and the economic integrity of the system to decrease and increase, respectively. At the same time, the relative political and economic power of the mafia decreases. However, these changes are short-lived, as the increased competition between peasants and the corresponding decrease in peasant disposable income cause some of the peasants to choose to become bandits. This change, in turn, increases the threat of banditry in the system such that the demand for mafia protection services also increases. The net result is an equilibrium population of peasants that is less than the population after the initial infusion, as well as equilibrium populations of bandits and mafia that are both greater than the populations prior to the increase in the number of peasants. Thus, the net effect of increasing population is an increase in relative lawlessness, a decrease in economic integrity, and an increase in the political and economic power of the mafia. In this manner, the population increases in Sicily during the 19th century were an important factor in contributing to the rise of the mafia.
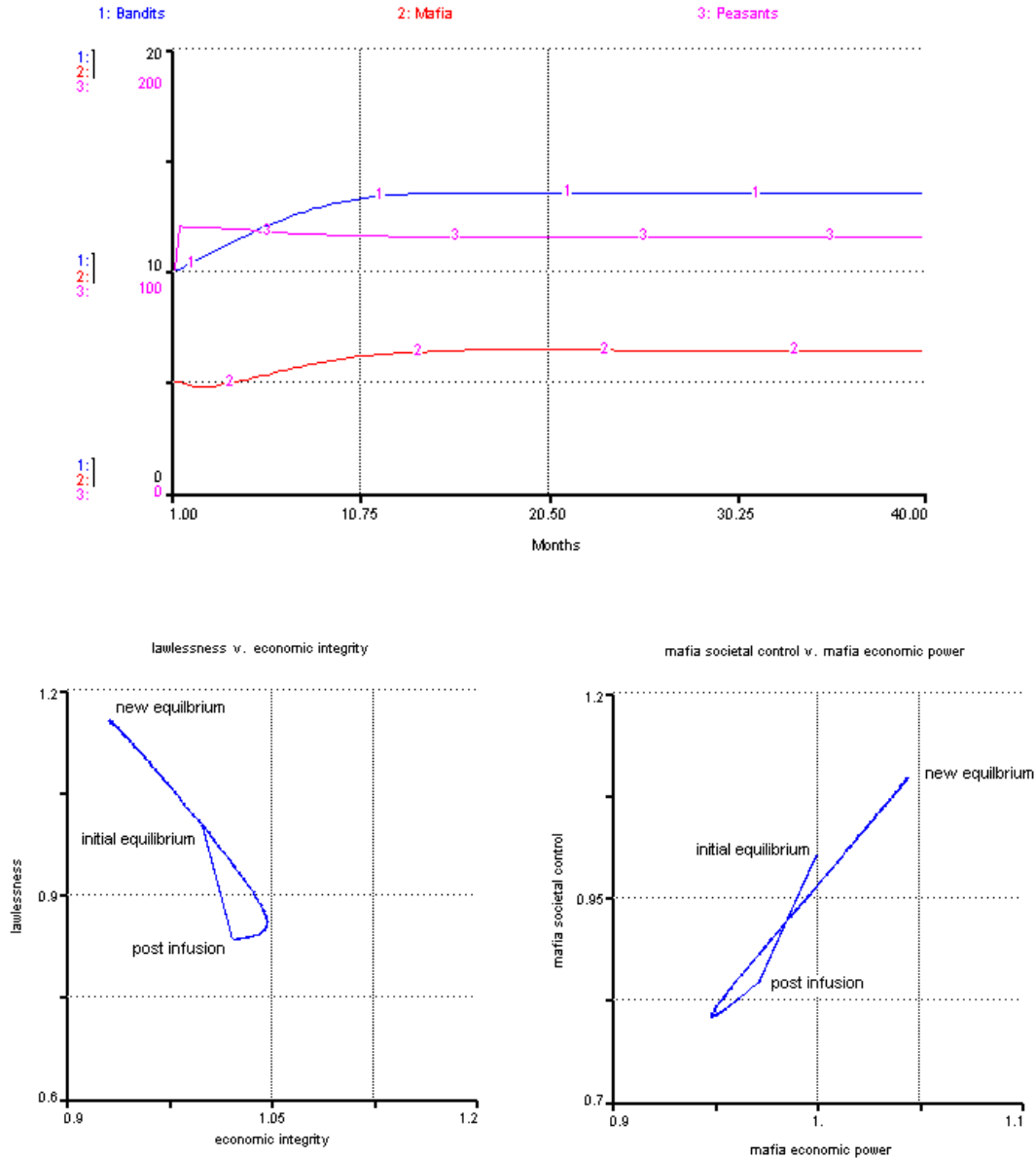
Figure 4.6: Effects of a One-Time Increase in Peasant Population (P = 120)

A one-time increase in peasant population results in a new equilibrium where a portion of the new peasants have become bandits along with a corresponding increase in the mafia needed to provide protection against the increased bandit population. Although the initial results of the population infusion are a decrease in lawlessness and mafia power and an increase in economic legitimacy, in the long-run the new equilibrium conditions result in a system with a net increase in lawlessness, a decrease in the percent of output retained by the peasants, and an overall increase in the political and economic power of the mafia as compared to before.

Next, we rerun this experiment, except this time we decrease the population of peasants by 20 percent in order to model the effects that emigration has on the system. The results of this experiment are shown in Figure 4.7. The immediate effects of a decrease in peasant population are an increase in the relative lawlessness in society and a decrease in economic integrity, as the proportion of bandits to peasants increases. As a result, the demand for mafia protection initially increases. However, because there is less competition among peasants, the disposable income per peasant increases despite the increased threat of banditry. As a result, some bandits choose to become farmers, especially as the increasing mafia presence makes banditry less profitable. In the long-term, as the bandit population decreases, the demand for mafia protection also decreases. The net result is a system with lower overall lawlessness, higher economic integrity, and a mafia with reduced economic and political power.

Figure 4.7: Effects of One-Time Decrease in Peasant Population (P = 80)

A one-time decrease in peasant population due to emigration results in a new equilibrium where some former bandits have become farmers and the size of the mafia has decreased to reflect the decreased demand for protection services. Although the initial results of emigration are an increase in lawlessness and mafia power and a decrease in economic legitimacy, in the long-run the new equilibrium conditions result in a system with a net decrease in lawlessness, increase in the percent of output retained by the peasants, and an overall decrease in the political and economic power of the mafia as compared to before.

The results of this experiment suggest that a government that wishes to reduce the overall power of the mafia should enact policies to minimize the size of the population of lands controlled by the mafia. For example, given the mafia's power base in rural areas of Sicily, then the Italian government should have enacted policies that encouraged peasants to move to urban areas such as Palermo or to peninsular Italy. In the short-term these policies would actually empower the mafia both politically and economically, and may therefore have been politically undesirable. However, in the long-term, they should lead to conditions that are less favorable to the mafia. Similarly, although any policies that encourage migration to lands controlled by the mafia would have positive effects in terms of reducing the mafia's overall power in the short-term, they would backfire in the long-term and actually make the mafia more powerful than it was before.

This experiment also demonstrates that open immigration policies can be detrimental to non-democratic institutions such as the mafia system in Sicily. Without emigration, the only options to peasants are to participate in the status quo, become bandits, or participate in a revolution. A peasant who emigrates will incur costs associated with rebuilding his life in a new place, although these costs will likely be significantly less than the costs of revolution. Thus, the introduction of open immigration policies increases the likelihood that peasants will choose to move from a non-democratic society characterized by high economic inequality to a more democratic one with higher equality. As shown in this experiment, emigration can have negative long-term impacts on the power of the elites in a non-democratic society. Accordingly, they may be more willing to offer concessions (such as lower levels of tribute) in order to discourage

emigration, as long as the costs of these concessions is less than the costs to their political and economic power that arise from a decrease in peasant population.

4.6 Experiment 4: Increasing Total Factor Productivity

As discussed in Chapter 3, total productivity of peasants in Sicily remained relatively constant throughout the 19th century, as neither sharecroppers nor gabelloti had much incentive to reinvest their earnings into land improvements. Because peasants typically used traditional methods to farm, improvements such as irrigation and fertilization or shifting crops from grains to something more profitable such as vineyards or oranges would have increased the value of the land by up to 20 times (Bandiera 2003). Still, any peasant who invested in these improvements could not be assured that he would be allowed to reap the benefits of his investment by farming the same plot of land in the following year. Similarly, a gabelloto who leased his land from a landowner based in Palermo could not be assured that the landowner would not later lease the lands to someone else.

In this experiment, we increase the total factor productivity (A_P) of the system by varying amounts to determine the impacts of improved farming techniques on the system. Increasing total factor productivity increases peasant disposable income. However, it also has a positive impact on the amount that the bandits can loot. As a result, although investing in improvements such as irrigation or new technology improves the standard of living of the peasants, it has relatively little effect on the structure of society. For example, as shown in Figure 4.8, even a twenty-fold increase in total factor productivity results in only a small decrease in the number of bandits and the size of the mafia. Furthermore, the economic and political power of the mafia decreases by only eleven and

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five percent, respectively, and the economic integrity of society increases by a mere four percent. Considering the expenses associated with improving productivity, this does not seem to be a cost-effective option to reduce the relative power of the mafia. If anything, government programs that increase the productivity of farming in areas controlled by the mafia only serve to enrich the mafia at the expense of other areas of the country. For example, a twenty-fold increase in total factor productivity will result in a nineteen-fold increase in the total amount of tribute that the peasants and bandits pay to the mafia.

Change in Populations Following 2,000 Percent Increase in Total Factor Productivity

lawlessness v. economic integrity

mafia societal control v. mafia economic power

Figure 4.8: Impacts of Increasing Total Factor Productivity (A_P)

Investments in farming technology that cause a twenty-fold increase in total factor productivity (from 2.5 to 50) result in a relatively small movement of the population from banditry to farming and a corresponding small decrease in the size of the mafia. Similarly, as total factor productivity becomes progressively larger, the new equilibrium results in a system with small decreases in lawlessness, increases in economic integrity and decreases in the power of the mafia. However, because the effects are quite small relative to the likely costs of technological investments, policies that are intended to increase total factor productivity are not likely to be a cost-effective means of combating mafia influence.

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4.7 Experiment 5: Changing Desired Level of Mafia Legitimacy

As discussed in the last two chapters, a gabelloto who wishes to retain his position of power in society must take into account the perception of his legitimacy amongst the peasant population. If the gabelloto forces peasants to pay tribute in excess of the amount that they are willing to pay for the services he provides, then he increases the risk that the collective action problem will be overcome and the peasants will take action to demand social change in the system. For this reason, the model assumes that the gabelloto will adjust his tribute demands based on the peasants' willingness to pay for protection, with the goal of maximizing his income while maintaining a relatively low risk of social change. The legitimacy and loyalty that the mafia gained amongst the peasants this way later helped it gain political power through democratic elections and also hampered the Italian government's efforts to combat its growing influence (Blok 1969, Brögger 1968). In contrast, the mafia could have increased its tribute demands by using violence to suppress the peasants' demands for social change. However, doing so would require that the gabelloto incur the costs of hiring additional campieri to police the peasants.

In this experiment, we vary the desired level of mafia legitimacy (τ_D) to test whether our hypothesis that reducing tribute demands in order to decrease the desire for social change is an economically optimal strategy for the gabelloto. As shown in Figure 4.9, increasing the desired level of mafia legitimacy causes the populations to shift to a new equilibrium. Because peasants are paying less tribute to the mafia, farming becomes more profitable with respect to bandits, resulting in a net flow from bandits to peasants. The size of the mafia also decreases as the decrease in bandit populations causes the demand for mafia enforcement services decreases. In addition, increases in mafia

legitimacy means that there is less desire for social change amongst the peasants. As a result, fewer campieri are needed to control the peasants. Decreasing the level of desired legitimacy has the opposite impact. With higher tribute demands, relative peasant income decreases and more peasants choose to become bandits, leading to a greater demand for mafia enforcement services. In addition, the size of the mafia grows because the increased tribute demands means that the gabelloto must hire more campieri to keep the increasingly unhappy peasants from revolting or refusing to pay tribute.
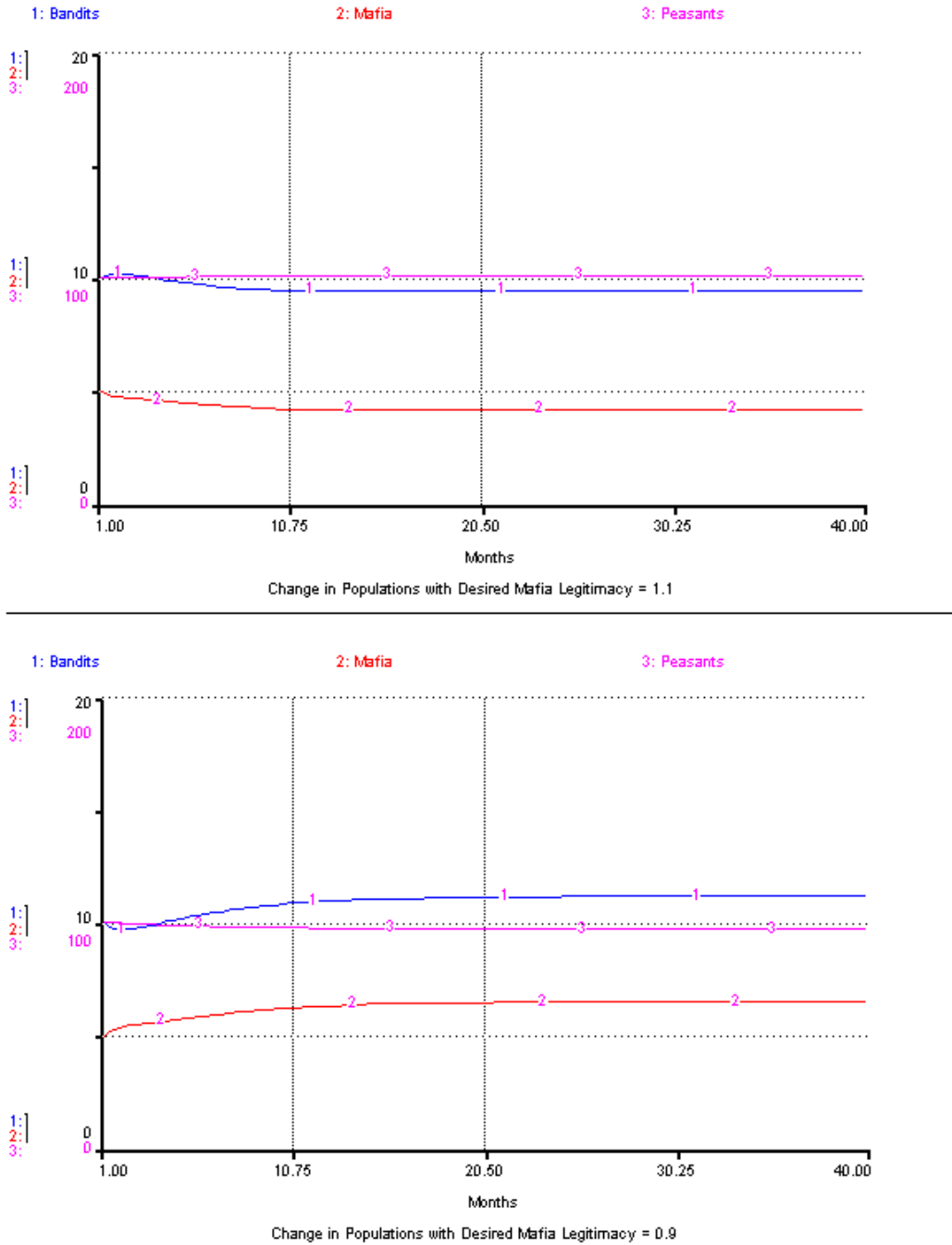
Figure 4.9: Changes in Populations Resulting from Changes in Desired Mafia Legitimacy (τ_D)

A desired level of legitimacy greater than one indicates that the mafia is demanding less tribute than the peasants are willing to pay. The result is a system with an equilibrium where farming is relatively more attractive than banditry and fewer campieri are needed to control both peasants and bandits. A desired level of legitimacy less than one represents a system where the mafia's tribute demands are relatively high and cause discontentment among the peasants. As a result, more peasants choose to become bandits and more campieri are needed to police the bandits and to keep the peasants from demanding social change.

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As expected from the population dynamics and shown in Figure 4.10 below, decreasing the level of desired mafia legitimacy results in an increased level of lawlessness in society (due to both a shift from peasants to bandits and an increase in the size of the mafia needed to control peasants and bandits) and a decreased level of economic integrity (as peasants must pay a percentage of their output to the mafia as tribute). Furthermore, by decreasing their desired level of legitimacy, the mafia can increase their relative political and economic power.
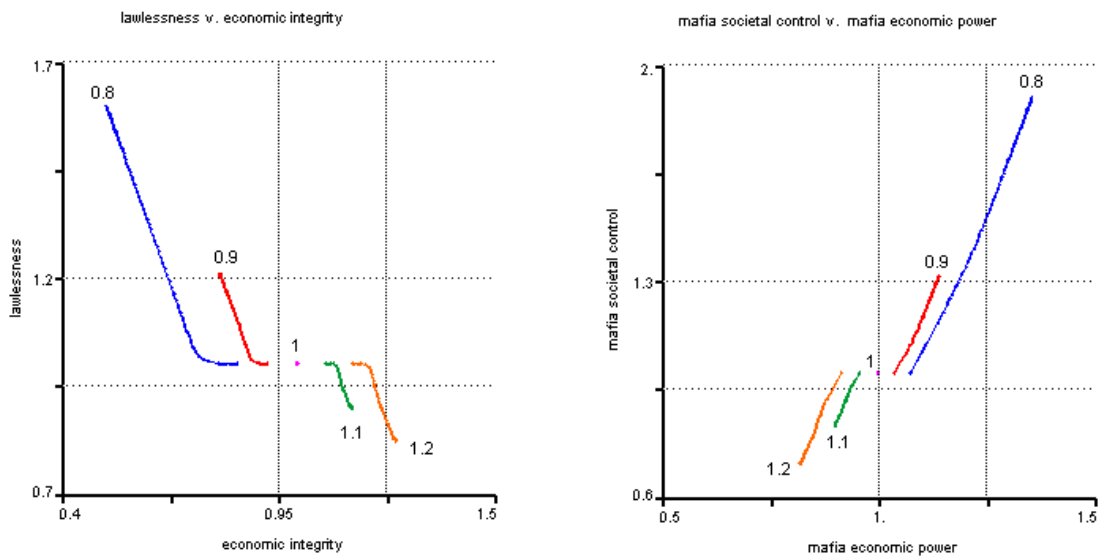

Figure 4.10: Effects of Level of Desired Mafia Legitimacy (τ_D) on Society

The mafia can increase its relative power by charging tribute percentages that result in a lower level of legitimacy. Doing so also increases the amount of lawlessness in society (due to increases in banditry and mafia size) and to decreases in the percent of output that peasants keep for themselves.

At first, the results of this experiment suggest that the mafia should want to decrease its desired level of legitimacy, as doing so increases its relative political and economic power. However, as discussed in previous chapters, there are several reasons why the mafia may want to maintain a greater level of legitimacy by not charging exorbitant tribute percentages. For example, charging tribute percentages that correspond

to a low level of legitimacy would cause a large amount of discontentment among the peasants. As a result, the potential benefits of social change for the peasants become much greater, increasing the probability that they will overcome the collective action problem and demand social change, either by refusing to pay tribute or by violently trying to seize the lands controlled by the mafia. Maintaining a level of legitimacy among the peasants was also key to later efforts of the mafia to retain its power despite efforts by the Italian government to reduce its influence, as peasants were less likely to cooperate with the government instead of the mafia and the mafia was able to use its support amongst the peasants to gain political power through democratic elections.

This experiment suggests another reason why the mafia would choose not to decrease its desired level of legitimacy: an increase in discontentment amongst the peasants forces the gabelloto to hire additional campieri to keep the peasants in line. Because hiring the peasants results in costs to the gabelloto and because there are diminishing returns in the additional amount of tribute that can be collected with each campieri hired, decreasing the level of desired mafia legitimacy can actually result in lower net disposable income for the gabelloto. Figure 4.11 below shows that, for these reasons, the gabelloto's income is maximized at the level of legitimacy that we have set equal to one under equilibrium conditions in our model.
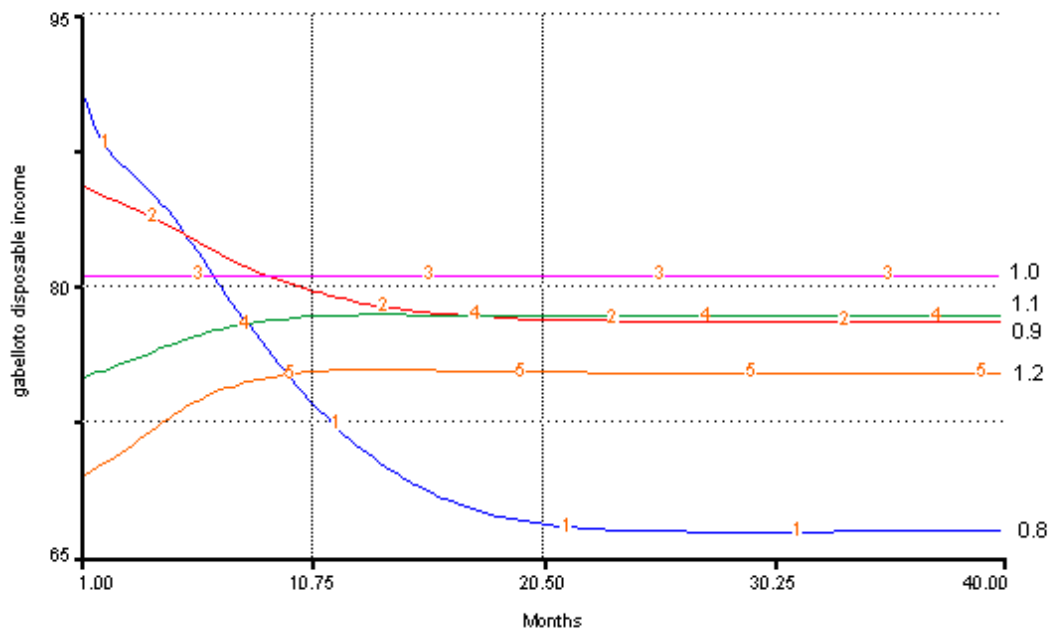
Figure 4.11: Gabelloto Disposable Income with Various Levels of Desired Mafia Legitimacy (τ_D)

Under the equilibrium conditions specified in our model, gabelloto income is maximized when desired mafia legitimacy equals one. Although decreasing mafia legitimacy increases the amount of income that the gabelloto receives in tribute from the peasants, he incurs costs of hiring additional campieri to control the increasingly discontent peasants. Under the conditions of our model, due to diminishing returns from hiring additional campieri, these costs outweigh the increase in revenues from increased tribute demands

4.8 Summary of Experiment Results

The results of the experiments conducted in this experiment are summarized in Table 4.2. As hypothesized, the most important factor determining the relative power of the mafia is the extent of government control. A mafia-like organization is much more likely to persist in a society with a weak government that is not able to provide stability or safety to its citizens. As such, a government that wishes to reduce the power of the mafia should seek to change the factors that led to the formation of the mafia in the first place (e.g., high levels of banditry and an absence of effective government institutions).

Table 4.2 – Summary of Experiment Results								
	Effect on Equilibrium Values for:							
Experiment	Peasants (P)	Bandits (B)	Mafia (M)	Lawlessness (ϕ)	Economic Integrity (η)	Mafia Societal Control (χ)	Mafia Economic Power (ν)	Notes
1 Increasing government control (σ)	+	-	-	-	+	-	-	
2 Temporary elimination of mafia (P=100, M=0, B=15)	stable	stable	stable	stable	stable	stable	stable	Mafia reforms and system returns to previous equilibrium
Removing mafia from model	-	+	n/a	+	+	n/a	n/a	Disposable income per peasant is greater than in system with mafia
Removing mafia and reducing peasant productivity ($A_P = 1.875$)	-	+	n/a	+	-	n/a	n/a	System crashes as all peasants become bandits
3 One-time increase in peasant population (P)	+	+	+	+	-	+	+	Immediate decreases in ϕ, χ, and ν and increase in η following initial population infusion
One-time decrease in peasant population (P)	-	-	-	-	+	-	-	Immediate increases in ϕ, χ, and ν and decrease in η following initial population decrease
4 Increasing total factor productivity (A_P)	+	-	-	-	+	-	-	Impacts are minimal
5 Increasing desired mafia legitimacy (τ_D)	+	-	-	-	+	-	-	Gabelloto income less than when $\tau_D = 1$
Decreasing desired mafia legitimacy (τ_D)	-	+	+	+	-	+	+	Gabelloto income less than when $\tau_D = 1$

Otherwise, as shown in experiment two, taking action to eliminate the mafia is not a viable solution, as a mafia will inevitably reform unless effective government institutions are able to assume the mafia's role in society. This also may partly explain why peasants never acted in concert to eliminate the mafia system despite the high level of tribute they had to pay. Revolutions are costly, so a revolution to overthrow one mafia may not be productive if it merely results in the formation of a new mafia. Furthermore, as shown in the second part of experiment two, even though peasants may be economically better off without a mafia, a violent revolution to overthrow the mafia may result in reduced productivity that makes them worse off than before. In fact, under some conditions, absence of a mafia can even lead to systematic collapse if banditry becomes too prevalent.

The size of the population can also affect the relative power of the mafia. In general, an increase in peasant population has the effect of decreasing the relative power of the mafia in the short-term. As such, a government may be tempted to institute policies that encourage immigration to areas controlled by the mafia. However, as shown in Experiment 3, these policies will be counter-productive, as an increase in population will lead to a more powerful mafia in the long-term. Instead, a government that wishes to reduce the power of a mafia should encourage emigration away from the area controlled by the mafia even though these policies would lead to a stronger mafia in the short-term. We also note that programs designed to improve the productivity of peasants by encouraging investment in new farming technology or land improvements have only a minimal effect when it comes to reducing mafia power, and as such, are not a cost-effective tool for combating the influence of the mafia.

Finally, we showed in Experiment 5 that even though the mafia can increase its power by demanding higher levels of tribute, doing so may not be economically optimal for the gabelloto, as the costs associated with increased discontentment among the peasants may not be offset by the increased revenues.

4.9 Suggestions for Future Improvements to the Model

Our model suggests that a government can effectively reduce the power of the mafia in a region by maintaining a strong presence and lessening the need for peasants to turn to the mafia for necessary services such as private protection. However, we note that there are several factors not currently included in our model that may prevent a government from being able to effectively reduce the power of the existing mafia by taking action against bandits. Most notably, if the mafia sees the government police as a threat to their political and economic power, they may use any means necessary, including violence, to hamper the efforts of the government to police crime. This resistance could help destabilize the entire economy, as violence tends to incur costs associated with the destruction of infrastructure and reduced productivity (Acemoglu and Robinson 2006). Moreover, if the peasants had been relatively satisfied with the old status quo, then they may see the government troops as even less legitimate than the mafia, particularly if feelings of xenophobia lead them to distrust a non-locally based government (e.g., Sicilian distrust of the Italian government based in Rome). In such a case, the peasants may side with the mafia in their struggles against the government, possibly leading to all out revolution against the legitimate government. For this reason, it very important for a government to make early efforts to address the conditions of

lawlessness that enable a mafia-type organization to develop, as it may be much more difficult to eliminate the mafia once it has become an established part of society.

We can model these factors in future versions of the model through the use of additional feedback loops. For example, we could create a variable for "violence" in the system which reflects both violent resistance by the mafia against a government that seeks to reduce its power as well as violent resistance by peasants against the mafia when the level of mafia legitimacy sinks low enough that the collective action problem against revolution. Any violence will likely have a negative impact on the total productivity of the system due to loss of life and destruction of property. Although we model this relationship in Experiment 2 by permanently reducing total factor productivity, we could also add a feedback loop that adjusts for it automatically. As shown in Experiment 4, any reductions in total factor productivity will result in an increase in lawlessness and the relative power of the mafia and a decrease in the economic integrity of the system. In addition, as shown in Experiment 5, a decrease in the level of mafia legitimacy already can result in decreased income for the gabelloto. This result may be intensified if a decrease in legitimacy results in violent clashes between the peasants and the mafia, as decreases in peasant production will further decrease the amount of tribute that the mafia can collect.

Finally, because the effectiveness of government control will be influenced by the willingness of citizens to cooperate with the government rather than the mafia, we can add a link that adjusts the effectiveness of government control based on the level of mafia legitimacy. If the mafia is seen as illegitimate due to excessively high tribute levels, then the peasants will be more willing to help the government than if they perceive the mafia

as a legitimate, local institution. In addition, as currently constructed, the model assumes that the peasants do not incur any costs associated with government control. In reality, the peasants would likely have to pay taxes to help fund the government enforcement actions against the bandits.   These costs would reduce the overall benefits to the peasants of an elimination of the mafia in favor of a traditional police force, and makes them less likely to cooperate with the government. Furthermore, because the elites in the system (i.e., the gabelloto and landowners) would likely share the highest burdens of the taxes associated with a strong government, they would strongly resist any efforts by the government to change the structure of society (see Acemoglu and Robinson 2006). Their resistance to change would be particularly effective if the mafia was able to use its influence among the peasants to gain political power through democratic elections and influence government policy from within (Blok 1969). All of these factors combine to make it more difficult for a government to eliminate an existing mafia organization than it is to prevent the formation of a mafia in the first place.

Chapter 5 – Examples of Other Mafia-Like Organizations

In this report, we have examined a model built around the nominate mafia – the Sicilian mafia. However, throughout history there are numerous examples of mafia-like organizations that built their power by exploiting a need for protection services during times of lawlessness. Some of these organizations later became influential organized major global crime syndicates as happened with the Sicilian mafia. Others remained relatively local and little known. Table 5.5 below lists some examples of other mafia-like organizations. Like the Sicilian mafia, each of these organizations came to power during times of extensive social change characterized by a lack of effective government controls and high levels of crime or other threats to personal property. In addition, each offered important services to the typical citizens of the society, with most demanding tribute in exchange for these services, sometimes voluntarily, sometimes through the use of extortion.   Below, we briefly discuss each of these organizations, highlighting any significant differences or similarities between them and the Sicilian mafia, in an effort to demonstrate that lessons of our model apply not just to 19th-century Sicily but also to any conditions that lead to the formation of a mafia.

Table 5.1 – Historical Examples of Mafia-type Organizations

Mafia-like Organization	Approx. Date of Formation	Social Change Leading to Formation of Organization	Early Mafia Constituents	Lack of Effective State Control?	High Threat of Crime?	Income Through Tribute / Extortion?	Services Offered by Organization	Main Sources
Sicilian Mafia	Mid 19th-century	End of feudalism	Gabelloti and feudal guards	Yes	Yes	Yes	> Protection from bandits > Dispute mediation > Enforcement of status quo for landowners	Bandiera (2003), Blok (1966, 1969)
Japanese Yakuza	Late 19th-century	Industrialization and end of feudalism	Unemployed samurais	Yes	No	Yes	> Property protection > Dispute mediation > Real estate foreclosure > Debt collection	Milhaupt & West (2000)
Hong Kong Triads	1840s	English acquisition of Hong Kong	Criminals from mainland China	Yes	Yes	Yes	> Labor security > Protecting monopolies > Property protection	Chu (2000)
Russian Mob	1990s	Collapse of the U.S.S.R. and end of communism	Ex-KGB officers and unemployed soldiers	Yes	Yes	Yes	> Property protection > Enforcement of contracts	Varese (1997) Bandiera (2003)
Karbala Shiite gangs in Ottoman Iraq	Early 19th-century	Expulsion of Sunni elites and end of Mamluk rule	Local toughs, fugitives and military deserters	Yes	Yes	Yes	> Property protection > Protection of pilgrims > Collection of religious taxes > Regional autonomy from Sunni control	Cole & Momen (1986)
Ugandan drinking companies and vigilante groups	Mid-1960s	Ugandan independence and abolition of district autonomy	Local tribesmen and former soldiers	Yes	Yes	No	> Maintaining discipline in social situations > Property protection > Prosecution of thieves and witches	Heald (1986)

5.1 Japanese Yakuza

The Japanese yakuza is one of the most well-studied and well-known mafias (Milhaupt & West 2000). Like the mafia in Sicily, the Yakuza had its origins during a period of societal change away from a traditional feudal system. In the late 19th-century, Japanese society made a rapid shift from a predominantly agricultural society to a modern industrial one. However, unlike the situation in Sicily that led to the formation of the mafia, the yakuza did not form to primarily provide protection against rampant banditry. Instead, its main role derives from the lax nature of Japan's laws governing property rights. For example, Japan does not have the types of bankruptcy laws or mechanisms that are prevalent in the United States. As a result, companies and individuals are often left with few legal options to collect debts in the case of default. Similarly, Japanese law strongly emphasizes the rights of tenants over the rights of property owners, making it very difficult for a landlord to evict a delinquent tenant using formal methods. In absence of a legal framework to deal with these situations, individuals and companies have little choice but to employ the services of a Yakuza firm to perform important tasks such as debt collection or real estate foreclosures. Although in many cases, creditors and landlords are unable to use the threat of the law to force the cooperation of their debtors and tenants, they are able to use the threat of yakuza violence and intimidation as a viable alternative. In this manner, the existence of the yakuza, like that of the Sicilian mafia, is directly dependent on the absence of effective government institutions.

Milhaupt & West (2000) performed a regression analysis on data related to yakuza activities and enforcement and found that government actions that tried to use

anti-crime law-enforcement initiatives against organized-crime groups tended to fail to reduce the power of the yakuza. Instead, their results suggest that institutional engineering policies that reduce the incentives for the formation of non-government rights-enforcement agents are the most effective tool for reducing yakuza power. These conclusions are similar to the results of our experiments that demonstrated that the power of the Sicilian mafia is based on the need for a substitute legal system to provide protection services, and that the government can effectively reduce the power of the mafia by targeting the societal problems (e.g., high levels of banditry) that the mafia grew to address.

5.2 Hong Kong Triads

Another major modern organized-crime syndicate is the Triads of Hong Kong (Chu 2000). After the British gained control of Hong Kong in 1842, they rapidly changed what was a small fishing village into a major commercial trading port. The result was a mass immigration of workers from various areas of China, many of whom worked as dock laborers. Less than three years after the founding of Hong Kong, the British passed an ordinance to deal with the emerging threats of Triads and organized criminal gangs.

The Triads grew to exploit a need for protection amongst the different groups of Chinese laborers (Chu 2000). In an effort to maximize their profits and reduce labor costs, the British enacted legislation that prevented the formation of trade unions among the dock laborers. Thus, an incentive was created for the formation of groups that acted to protect the business interests of various labor groups. In general, Triads emerged that were based around different groups of immigrants, many of whom came from different

parts of China and spoke different dialects. The Triads used intimidation and violence against rival ethnic groups to prevent competition for various labor contracts. This, in turn, gave incentive for these other groups of laborers to pay tribute to one of the many Triad organizations in order to protect their own interests, as they could not turn to the colonial government for help. Thus, by banning traditional labor unions, enacting legislation that greatly restricted workers' rights, and failing to provide adequate personal protection for Chinese laborers, the British inadvertently created the absence of adequate government institutions that was necessary for the growth of organized crime.

5.3 Russian Mob

The formation of the modern Russian mob is highly analogous to the situation the led to the formation of the Sicilian Mafia (Bandiera 2003). Upon the dissolution of the U.S.S.R. in 1991, the Russian economy rapidly moved from state-sponsored communism to a capitalistic free-market society. However, this change occurred before many necessary mechanisms and regulations governing the protection of property rights could be created (Varese 1997). At the same time, a lack of adequate enforcement agencies and corruption in an underpaid police force, led to an immense increase in crime. For example, the total number of reported crimes in Russia grew by 70.5 percent between 1989 and 1992 (Varese 1997). The result was an extremely high demand for private protection services, which led to the growth of various mob organizations providing such services. This growth was so dramatic that, by the turn of the century, it was estimated that organized criminal groups controlled up to 40 percent of the Russian economy (Milhaupt & West 2000).

5.4 Karbala Shiite Gangs

During the early 19th-century, a number of mafias formed in what is now modern-day Iraq in territory that was then controlled by the Ottoman Empire based in Constantinople. One notable example of these mafias arose in the city of Karbala, an important religious center populated primarily by members of the Shiite branch of Islam (Cole & Momen 1986). Beginning in 1750, the weak Ottoman government allowed a corps of Mamluks (servant-slaves) based in Baghdad to govern Iraq. However, these Mamluks were ineffective leaders. Moreover, they were of the Sunni branch of Islam, which made them highly undesirable as leaders from the perspective of the Shiite citizens of Karbala. During the early 19th-century, local Shiite religious leaders who were angered by their treatment under the Sunni government began to stir up a desire for Karbalan autonomy amongst their followers, and the Mamluks were expelled in the 1820s with local Shiite elites assuming power in their place. However, these elites had little experience governing, had no tradition of legitimate rule, and lacked a disciplined armed force. As a result, they were unable to maintain order, and crime in the city soon reached untenable levels.

The economy of Karbala was based primarily around its role as a destination for pilgrims who wished to visit the Shrine of the Imam Husaym, one of the holiest figures in Shiite Islam. As a result, the elites had a high incentive to ensure the safety of pilgrims in order to protect their chief source of income. Thus, when their control of Karbala deteriorated to the point where crime was rampant and pilgrims faced a severe risk of robbery or murder, they turned to an emerging mafia of local toughs and former soldiers to provide the necessary protection services. These gangs also allied themselves with

local religious leaders, and provided a means to enforce their edicts, collect religious taxes, and agitate in their favor. Moreover, because the gangs were Shiite, they derived legitimacy amongst locals by protecting the city from foreign Sunni powers, as demonstrated when they successfully helped fend off a Mamluk siege of the city in 1824. In this manner, we see many similarities with the Sicilian mafia that emerged to protect against high levels of crime, provided valuable services to those who agreed to pay tribute, and which was seen as a local organization that was preferable to a government based in a far-off city.

The Karbalan gangs controlled the city until the 1840s. At that time, the new Ottoman ruler in Iraq decided that he did not want to have an Iranian-dominated city controlled by criminals and rebels in his empire, so he launched a military offensive against Karbala. When the Ottomans successfully retook Karbala in 1843, they responded by massacring 15-percent of the cities population, appointing a hard-line Sunni governor, and instituting highly restrictive policies that eliminated all Shiite autonomy. As a result, the power of the gangs was eliminated and many of the city's Shiite inhabitants fled to Iran. With martial law in the city and their power base dissolved, the Karbalan gangs were eliminated.

Although the history of Karbala shows that it is possible to eliminate a mafia, the steps that the Ottomans took to do so are not a viable option for most governments. For example, the Italian government is not likely to take military action in Sicily, massacre a great portion of the population, and institute martial law. Doing so is highly costly and would rightly result in condemnation by the rest of the world. However, it does demonstrate that eliminating a mafia is not enough on its own, as active steps must be

taken to reduce the likelihood of the mafia reforming. In Karbala, this meant increasing the perceived legitimacy of the government by targeting those agents who were more likely to seek an alternative form of government. However, even these efforts did not end the threat of organized crime completely, as the Iraq War and the resulting lack of government control in the region has seen the reemergence of criminal gangs in Karbala two centuries after they became a problem in Ottoman times (Farrell 2007, Mite 2007).

5.5 Drinking Companies and Vigilante Groups in Bugisu, Uganda

Uganda gained its independence from the United Kingdom in 1962, an event that led to conditions that were optimal for the emergence of mafia groups (Heald 1986). Traditionally, rural Ugandan villages had been governed by tribal chiefs who used their power to maintain order and justice in their communities, with much business being conducted at regular "beer parties" which were instrumental in fostering a sense of community between neighbors. In contrast, under the new constitution, power was removed from the chiefs and centered on a federal level with a uniform national judiciary. This new government was often perceived as not representing the interests of local rural people, and because the tribal court was replaced by a magistrate who was often not from the community or even of the same ethnic group, villagers were usually less willing to use the judicial system to settle disputes. Without a strong local government authority or effective judicial system, rural Ugandan society soon became characterized by extreme lawlessness. In Bugisu district in southeastern Uganda, crime increased by 322 percent between 1961 and 1968, with personal crimes such as assault and murder comprising the bulk of the increase (Heald 1986). When disputes arose between neighbors, individuals often used violence to settle them, as they could not go to

the courts or the chief instead. The result was a society where individuals tended to distrust and avoid interacting with anyone outside their household,

The anarchy in the Bugisu District during post-independence Uganda led to the rise of two types of groups offering protection services, both of which were intended to supplement the existing administration rather than replace it. Drinking companies provided safe environments for the "beer parties" that helped foster relationships between neighbors, and also acted as a rotating credit association in the community. Meanwhile, illegal vigilante groups were comprised of villagers who maintained a sense of order by arresting and prosecuting people accused of crimes such as theft or witchcraft. In some areas vigilante groups were closely associated with individual drinking groups and shared many of the same members. Because these groups existed outside the law and came into being to act as a parallel legal system they share much in common with the Sicilian mafia and the other mafias examined in this chapter. However, they differ from these groups in that they were not created with the explicit intention of earning profits at the expense of peasants. Rather, they were formed by the peasants themselves to address the lack of adequate government institutions. Still, in later years, vigilante groups strayed from their original intention when they became allied with political parties and began using their power to intimidate and terrorize rival candidates. In this manner, the leaders of these groups were able to earning income through patronage as large sums of money became available through party sponsorship of development projects.

Chapter 6 - Discussion and Conclusions

As can be shown from the case studies in Chapter 5, most mafias have much in common with the Sicilian mafia. All are formed in societies that lack key government institutions governing the enforcement of property rights and/or ensuring personal safety. Many of these situations arose during a rapid change in society, including major shifts in political or economic structures. Moreover, most mafias recognize a demand for services not provided by governments and are able to establish a quasi-legitimate role in society by fulfilling this demand. Sometimes, these services are necessary because the government is weak or ineffective (e.g., Russia), or because of political upheaval (e.g., Sicily). Other times, ethnic or cultural differences may lead to a government that neglects certain areas or people (e.g., Uganda, Hong Kong). Finally, mafias often arise to protect property-rights in markets that are outside the law. For example, many organized crime syndicates in the United States offer market protection services to traders of illegal drugs, prostitution, and gambling, as people who earn their living in these areas cannot rely on the government or legal system to protect their property or enforce their business contracts (Anderson & Bandiera 2006).

Given the similarity between mafias, the lessons of our model will apply to most cases where mafias exist, as long as the mafias earn their income by charging tribute from the people or organizations that they protect. In general, the most effective method for combating mafias is to try to remedy the institutional flaws that led people to seek an alternate enforcement mechanism in the first place. This usually means creating and

maintaining strong government structures that provide adequate protection of property rights and personal safety.

We can also use the lessons of our model to predict when mafias will form. Two examples of such societies are modern-day Iraq and Afghanistan. Both countries have seen political upheaval following wars that ended the rule of their powerful leaders (e.g., Saddam Hussein and the Taliban, respectively). Because an effective leader or government was not able to immediately assume control of society, each country fell into a state of anarchy characterized by high crime, violence, and a lack of order: conditions that have often led to the growth of mafias in the past. Indeed, recent years have seen the emergence of criminal gangs in Iraq (Farrell 2007, Mite 2007) and mafia-syndicates in Afghanistan (Laughlin 2009, Irvine 2007), many of which have ended up funding terrorists or fighting against the United States and its allies. However, the rise of these mafias was not necessarily inevitable. For example, after deposing Saddam Hussein, the United States and its allies chose to disband the army and government of Iraq, which directly contributed to the state of lawlessness in the country, as no alternative government existed that could quickly assume power and maintain order (Kaplan 2007). Had the United States and its allies chosen a different policy or if they had stationed a substantially greater number of ground troops in the country, then they may have been able to prevent lawlessness, maintain order, and avoid the types of conditions favorable to the growth of mafias. Furthermore, now that Iraq relies to a great extent on U.S. and British soldiers to maintain order in many parts of the country, we could expect that the Iraqi mafias will gain significant power after the U.S. withdraws its troops, unless the

new Iraqi government exhibits the stability, legitimacy, and effective police force that are necessary to protect its citizens and discourage lawlessness.

Based on our model and case studies, we could predict similar situations to occur if the United States were to act to overthrow other world leaders in troublesome areas of the world, such as Kim Jong-il in North Korea, Robert Mugabe in Zimbabwe, or the Sudanese government in Khartoum. Without providing an alternative government that has the legitimacy and strength to assume power upon the overthrow of the old, or committing U.S. soldiers to stay in the country to act as agents of order, we should expect the rapid formation of mafias offering alternative sources of protection. Because these mafias would then wield enormous amounts of political and economic power, we could also predict that when a government does form, it will likely be comprised of the leaders of the strongest mafias. Given these realities, models and studies that examine the dynamics of mafias and mafia formations will have important future ramifications not only on the field of law enforcement, but on foreign policy as well.

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