

THREE ESSAYS ON POLITICAL ECONOMY OF ORGANIZED CRIME

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To my parents, Uncle Bob, Aunt Sungja,

and

To my dear friends.

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INTRODUCTION

This dissertation examines the political and violent consequences of organized crime. The first dissertation essay, titled “Does ‘Green Gold’ Breed Bloody Violence? The Effect of Export Shocks on Criminal Violence in Mexico,” examines how export shocks on the avocado industry affect criminal violence in Mexico. In recent decades, Mexico, the top global avocado producer, has experienced a dramatic upsurge in avocado exports, driven by an increase in international demand. This period of export growth also has seen a record-high homicide rate attributable to violent drug trafficking organizations. To empirically investigate whether increasing avocado exports is indeed a contributing factor to the increasing homicide rate, I tested two competing hypotheses – the opportunity cost effect (Becker-style explanation) versus predation effect. In doing so, I employed an instrumental variable approach where I exploit exogenous variations in climatic conditions that affect agricultural crop yields. Contrary to the macro trend on violence, I find that an increase in avocado production has a crime-reducing effect, which lends support to the opportunity cost effect theory. Limitations and future research avenues are discussed in the essay.

The second dissertation essay, titled “A Model of State-Crime Relations: Theory and Case Study,” aims to answer the research question of “when does the government tolerate organized crime groups (referred to as OCGs) and when does it not?” I argue that the government’s approach to OCGs is swayed by its chances of survival and the costs involved in turning a blind eye to OCGs. My main focus is on the “illicit benefits” that ordinary citizens receive from OCGs, and I demonstrate how changes in these benefits can influence the government’s response to OCGs. Using a formal model, I explain the mechanism behind how shifts in illicit benefits prompt changes in government response. To support these theoretical predictions, I analyze the history of the Shanghai Green Gang and a Yakuza Gang in post-war Japan.

The third dissertation essay, titled “A Model of State-Crime Relations: Evidence from Canada,” empirically tests the theoretical predictions put forth in the second essay. Specifically, I focus on the circumstances under which the government’s response manifests as collusion and aim to examine the effect of illicit benefits on inter-cartel violence and the likelihood of government re-election. To do so, I select the Canadian construction industry as an empirical test setting due to its well-documented infiltration by the mafia and the noted collusion between this criminal organization and politicians. I use the performance of the mafia-infiltrated construction industry to measure the varying size of the prize that the criminal groups desire to control, which in turn determines the size of the illicit benefit. Consistent with the theoretical predictions, my analysis demonstrates a correlation between improvements in the performance of the mafia-infiltrated economy and a decrease in violent crime rates, particularly in regions where the mafia is active. I also find that an increase in violent crime escalates the risk of mayoral re-election failure. Finally, I explore the effect of the

mafia-infiltrated economy on political contributions made to incumbent mayors and provincial politicians. The implications of these findings, as well as the limitations of the study, are discussed in detail within the essay.

ESSAY 1

Does “Green Gold” Breed Bloody Violence? The Effect of Export Shocks on Criminal Violence in Mexico

This essay was previously published by *Social Science Quarterly* (Yoo, 2022).

1.1 Introduction

Do export shocks affect criminal violence? In exploring the association between export shocks and violence, current scholarship has proposed two competing mechanisms: Predation effect and opportunity cost effect. The predation mechanism predicts that increasing export revenue generates a larger contested resource, and it prompts more violence by increasing the expected benefit of expropriation (e.g., Hirshleifer, 1991; Fearon, 2005; Angrist and Kugler, 2008). On the other hand, the opportunity cost mechanism argues that an increase in exports raises labor demand in the formal labor market and results in higher wages and more legitimate job opportunities; this, in turn, may deter individuals from engaging in criminal activity (e.g., Becker, 1968; Grossman, 1991; Dell et al., 2019). The opportunity cost effect is more pronounced when the affected sector is labor-intensive (e.g., Dal Bó and Dal Bó, 2011; Dube and Vargas, 2013).

Based on these theoretical frameworks, this study seeks to assess the effect of export shocks on criminal violence by analyzing the avocado industry in Mexico. Existing theories generate opposite predictions on the relationship between Mexico’s avocado exports and its criminal violence. Considering Mexico’s weak state capacity, positive export shocks in the avocado industry may increase the return from predation with a low likelihood of being caught, thereby facilitating greater expropriation. In contrast, as the avocado industry is labor-intensive, an export boom may invigorate the formal labor market, increase the opportunity cost of illicit activities, and thus reduce the individual’s incentive to engage in crime.

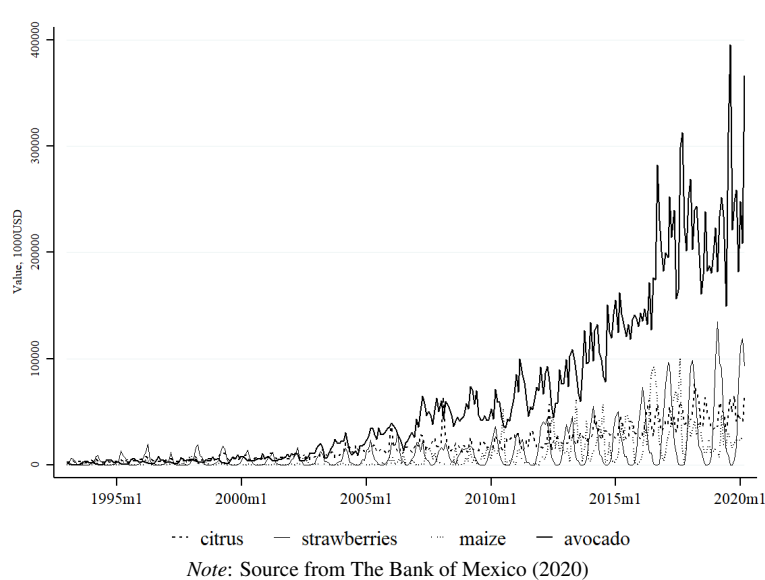
In fact, there is indirect evidence for both sides, one consistent with the predation mechanism and the other with the opportunity cost mechanism. In avocado-growing regions in Mexico, farmers and agricultural businesses have increasingly become targets of extortion and kidnappings by drug trafficking organizations as the avocado business becomes ever more lucrative (Ornelas, 2018). Meanwhile, according to the National Service for Agrifood Health, Safety and Quality (SENASICA, 2020), avocado cultivation created 310,000 direct and 78,000 indirect jobs in Michoacán, documenting a significant increase in formal employment. Given that both accounts seem equally plausible, the impact of avocado exports on criminal violence becomes an empirical question.

To estimate the effect of income shocks ¹, previous studies often have taken advantage of the changes in international commodity prices as exogenous shocks (e.g., Dube and Vargas, 2013; Dube et al., 2016); yet, this approach may generate an endogeneity issue in the context of this study, as Mexico’s avocado production leads global production by a large margin that affects the international price significantly. Instead, I use fluctuations in monthly avocado production as a proxy for export shocks. In addition, I employ an instrumental variable strategy, exploiting the climate shocks in Mexican avocado-growing states. Using this approach with 2010-2017 data, I show that an increase in avocado production lowers the homicide rate. Moving from the lowest to the highest level of monthly production, this positive shock reduces the homicide rate by 0.65 per hundred thousand relative to the average monthly rate of 2.02.

This result lends support to the opportunity cost mechanism. This finding is valuable, as it shows the opportunity cost mechanism’s applicability to a new context. However, I also speculate about the potential for another interpretation consistent with the predation effect. Given that predation is executed through regular taxation on the revenue, i.e., the fixed quota, the positive income shock may increase an individuals’ ability to pay extortion fees, and increase their compliance with extortion demands and lower the occurrence of retribution thereby. While qualitative evidence suggests this possibility, future research needs to provide empirical evidence of these mechanisms.

1.2 Background

Figure 1.1: National Agricultural Export by Crops, 1993-2020



¹I use the terms “income shocks” and “export shocks” interchangeably. Specifically, I view export shocks as a special case of income shocks.

Mexico's total avocado production has increased substantially over the past two decades. Export demand, rather than domestic consumption, determines this remarkable increase in production, with a particularly strong demand on the part of the United States.² Specifically, the complete elimination of restrictions under the 2007 North American Free Trade Agreement (NAFTA) that prevented agricultural imports from Mexico into the United States previously has contributed enormously to the increase in Mexican avocado exports.³ As the figure 1.1 shows, avocados, the export revenue of which has skyrocketed recently, are unquestionably the most profitable crop in Mexico.

1.2.1 Dual labor market in avocado growing states

Most Mexican avocados are grown in the country's south-western regions such as Jalisco, Michoacán, Morelos, Nayarit and the State of Mexico. In addition to avocado and other crops' production, these regions have long been known for growing opium poppies and cannabis, both of which have provided a sizeable income for the farmers in this area. Marijuana is widely cultivated in Michoacán, Jalisco, and Nayarit, while northern Nayarit is one of the principal opium poppy growing areas. Thus, these regions' economies exhibit a considerable mixture of legal and illegal activities, in which organized crime groups are involved heavily.

For example, Michoacán is an important exporter of legal cash crops, such as strawberries and citrus fruits, in addition to avocados, and the packing and shipping industry associated with these crops employs a significant portion of the local population; according to the Mexican economic census conducted in 2014, these agricultural and food manufacturing sectors combined together account for approximately 5 percent of economic units in Michoacán (National Institute of Statistics and Geography (INEGI), 2014). Further, mining is a crucial economic activity that takes advantage of its geographical proximity to the Pacific ports, through which massive amounts of iron and other ores extracted both legally and illegally are exported.

Yet, the states' economies still rely considerably on cultivating and trafficking plant-derived and synthetic drugs. For those peasants living in poor rural Mexico, small-scale marijuana cultivation is their only way to maintain their precarious living conditions when they cannot survive on agricultural labor alone (Aranda, 2013). Geography and road transportation is another set of factors that facilitates the states' involvement in drug trafficking. For example, drug trafficking in this region is operated through the north-south highway that runs through Nayarit, Jalisco, Michoacán, and the State of Mexico, and through the seaports on the Pacific coast—Lázaro Cárdenas and Manzanillo—near Michoacán and Jalisco. The Mexican Federal Highway 15 route, in particular, is a major shipping route for drugs and avocados to the United States via the Port of Nogales. The dual labor market setting in these regions allows the workers to shift their employment between

²Nearly 80 percent of Mexico's avocados are exported to the United States (UN COMTRADE, 2017).

³In the early 1900s, the United States restricted the import of Mexican-grown avocados because of the possibility of introducing harmful pests and diseases into domestic avocado fields. This regulation was partially relaxed in 1997 under NAFTA (Animal and Plant Health Inspection Service, 1997a) and lifted entirely in 2007. (Animal and Plant Health Inspection Service, 1997b; Morse et al., 2009)

the formal and criminal economy when needed, helping them adapt to changing economic environments.

1.2.2 Violence in Mexico

Violent crime in Mexico, particularly homicide, has been on the rise in the early 2000s, since the long-standing “political-criminal nexus” between drug traffickers and the state apparatus collapsed after the major political turnover (Osorio, 2015; Shirk and Wallman, 2015; Asmann, 2018). Dismantling the patron-client relationship gave rise to a power vacuum and thus enhanced turf wars among drug trafficking organizations (DTOs) (Shirk and Wallman, 2015; Dell, 2015; Dube et al., 2016). In addition, President Calderón’s military-led crackdowns fueled the violence further and resulted in an alarmingly high homicide rate in Mexico.

Like other states, avocado growing areas have seen the homicide rate spike in recent years. This increase can be attributed to three sources of violence: armed confrontation between rival DTOs; drug cartels’ violent extortion of communities in which they operate; and clashes between drug cartels and self-defense groups.

1.2.3 Armed confrontation between rival DTOs

The cartel landscape in the south-western region has undergone several transformations. This region was a particular hotbed of conflicts because of its value in producing drugs and as a transportation route. From the beginning of 2011, in particular, a newly emerging cartel, the Jalisco New Generation Cartel (CJNG), expanded its presence in the region rapidly and destabilized the existing power dynamics. Until the advent of this new cartel, Michoacán was a stronghold of La Familia Michoacána and its offshoot, the Knights Templar, while the Sinaloa cartel controlled Nayarit and Jalisco. As of 2015, the CJNG ultimately became one of the dominant cartels in this region. During this process, territorial competition among different cartels generated massive numbers of murders. Meanwhile, the fragmented control on the part of multiple cartels in the state of Mexico and Morelos has led to a continuous conflict that caused a devastatingly high number of deaths between 2010 and 2017.

1.2.4 Drug cartels’ violent extortion of communities

In the midst of inter-cartel conflicts, civilians in this region, in particular, agricultural farmers and local business owners, increasingly have become the main targets of extortion, as DTOs have diversified their activities into street crimes, including extortion, kidnapping, thefts and other illicit enterprises.⁴ For example, in Uruapan, a city of Michoacán, where majority of avocado orchards are located, the dominant crime cartels at the time – the La Familia Michoacána and the Knights Templar – invaded the fields, and displaced growers

⁴Magaloni et al. (2020b) suggested that DTOs are more likely to use violent extortion when they are uncertain about controlling the territory in the future, and can buy the protection from the state that allows them to avoid legal sanctions. In addition to these factors, they argued that decentralized leadership and the lack of necessity for local community assistance in carrying out their criminal activity may lead to unconstrained predatory behaviors.

from their own land, and demanded a share of revenue through extortion and physical assault (Pérez, 2019). They also adopted the same approach with the mine owners. One businessman who owns an iron mine stated that Knights Templar emissaries began to charge him a quota in 2009, but when they saw the profits begin to soar, the cartel began to force people to sell or give them the mines (Grillo, 2014).

Extortion is not only limited to the primary sectors, but occurs nearly everywhere and is entrenched deeply in people's lives in Mexico; small shops, gas stations and transportation companies are all forced to make extortion payments. The Knights Templars even attempted to extort money from a company building a federal prison in Michoacán, where the cartel operates, and demanded approximately \$1.5 million to allow the company to work in the area. When the company refused to pay, the group began to terrorize employees, which caused the workers to abandon the site and stopped the construction (Cawley, 2013). In Acapulco, buses were torched if owners refused to pay extortion fees, and further, several cabdrivers were killed for refusing to pay protection money to gangs (Pérez, 2018).

1.2.5 Clashes between drug cartels and self-defense groups

The clash between vigilante forces and drug trafficking organizations is the type of violence that emerged in reaction to the extensive extortion of the civilians. Frustrated by the state authority's inability to ensure security, civilians in western Michoacán have formed self-defense militias, known as autodefensas, to drive the Knights Templar out of the region.⁵ The vigilante movement seemed to work in its early phase, as the militias managed to reclaim hundreds of properties, businesses, and agricultural lands from the cartels and have restored them to their former owners by battling with the Knights Templar (Watt, 2014). However, these militia groups soon became a concern for the government, as they challenged the government monopoly on violence, and they began to abuse their authority and legitimacy by beating, expelling, and detaining soldiers, as well as municipal police officers. Further, some feared that organized crime groups may have penetrated some of the self-defense militias, which may empower the drug cartels again and cause the violence to escalate further (Felbab-Brown, 2016). In 2014, federal government and self-defense groups in Michoacán reached an agreement in which the groups would be absorbed into the state security apparatus under the military's command.

1.3 Research Design

This paper attempts to estimate the causal effect of export shocks on violence. Typically, when a country is a price taker, scholars have used the international commodity price that is exogenous to the domestic production (Bazzi and Blattman, 2014). By contrast, if the nation is a price setter, some authors have instrumented the

⁵This appeared first in 2011 to combat the La Familia Michoacána's illegal logging.

internal commodity price that domestic producers face with competitors' export volume. Moreover, the competitor's export volume has even been instrumented by the competing country's climate conditions. All of these efforts are intended to capture the movement of the price driven by the external supply factors (Dube and Vargas, 2013; Dube et al., 2016).

Moreover, previous studies have proposed several strategies to measure export shocks, given the fact that they hit some areas harder than others, depending on the significance of the commodity in question as an income source. For example, Dube et al. (2016) estimated the differential effect of maize price shocks on drug production and drug-related killings that varies by the area's maize suitability. Similarly, Guardado (2018) employed the interaction between international coffee price and the level of coffee production to capture the heterogeneous effect of price shocks that domestic coffee producers in Peru face.

1.3.1 Measuring income shocks

This study's unique setting – the Mexican avocado industry – poses an empirical challenge. Mexico is the leading global producer of avocados by a large margin, which affects the international price significantly, thus preventing us from simply using the international price to measure export shocks. In this study, I make an assumption that without price measures, the domestic avocado production itself can sufficiently measure the income shocks driven by avocado exports. This assumption implies that the growers' income moves in the same direction with the avocado production. In other words, when avocado production increases, the growers' income is expected to increase accordingly, and vice versa.

Aside from the statistical reason why we can't use either domestic or international commodity price, it is worthwhile to consider from the theoretical standpoint: what measure will best align with the theories to be tested. In both of existing theories - predation effect and opportunity cost effect-, farmers(growers) are central actors who are directly influenced by the income shock. It suggests that we need to consider the "field price" that the farmers obtain, not the price at which avocados are traded in the market. Using an incorrect measure can yield misleading results, particularly when the price that the farmers are paid and the export price differ significantly. Thus, we need to take a careful look at the context under study.

In Mexico, avocados are a perennial crop that can be harvested year-round. Farmers and packers are two different agents in the avocado export process.⁶ Generally, farmers do not harvest or pack their own product but sell their avocados to the packers.⁷ Farmers and packers negotiate on-tree price for their fruit every week, based on the field price set by avocado trade organization, the Association of Producers and Packers,

⁶As of March 2022, 30,000 growers, 42,000 orchards, and 74 packers in Michoacán are represented by APEAM (Avocado Institute of Mexico, 2022). These are the lower bound estimates for the entire country of Mexico

⁷Usually, the packers conduct the harvesting after the pre-harvesting inspection that checks whether the fruit meets phytosanitary and quality requirements for US export.

Exporters of Avocado of Mexico (APEAM). Typically, the farmers comply with the field price, while the price fluctuates each week without any floor-price.⁸

Although the APEAM indicates that they consider all factors, including the supply and demand at play in the market, as well as exporters' costs and margin when setting the price, in reality, there is a high likelihood that the field price and market price may differ greatly. This conjecture is supported by the fact that the disgruntled avocado growers in Mexico went on strike because of the low field price relative to the export price (Linden, 2016; Mexico News Daily, 2018).

The problem is that official data of weekly field price are lacking, which poses a challenge to the analysis. However, despite the data's limitation, I argue that, to some extent, avocado production alone can capture the income shocks that the growers experience. This is because the field price may not affect the weekly amount of avocado production substantially, as the growers cannot predict the price, which changes every week; thus, they have little ability to manipulate their production in accordance with the field price.⁹ Further, as a price taker, growers may find themselves better off earning more revenue by selling more. In fact, looking at the long-term trend, avocado production in Mexico is increasing continuously, as Mexico has an eminent comparative advantage in growing avocados because of its climate conditions and proximity to the largest export market, which provides the growers a stable, lucrative source of income.

Based on this assumption, I estimate the relation between avocado production and the homicide rate in Mexico between 2010 and 2017 in five major avocado growing states – Jalisco, State of Mexico, Michoacán, Morelos, and Nayarit– which account for more than 90 percent of local production. The homicide rate is an effective measure with which to assess the prevalence of violence because of its low likelihood to be underreported compared with other types of crimes (Buvinic and Morrison, 1999). The time frame (2010-2017) chosen serves to capture the avocado industry's expansion after the US import restrictions were lifted completely in 2007, while I chose the period after the Great Recession (2008-2009), which might have affected the global demand for avocados, as well as the economic incentive to engage in criminal violence during economic recession.¹⁰ Further, given that avocado production is a weekly business and constant

⁸In the case of the lime market, another lucrative cash crop in Mexico, the Knights Templar tried to directly control and manipulate the supply beyond illegally taxing farmers (García-Ponce and Lajous, 2014). Similarly, people speculate that the drug cartels attempt to control the avocado market; the connection between the then-president of the APEAM and the leader of the Knights Templar was revealed in 2014, which led the president to step down from the position (Pérez, 2019). However, to my knowledge, there is no substantive evidence of supply manipulation of avocado or field price distortion that can back up the speculation, except that for extortion.

⁹The strikes are an exception that can disrupt production. However, they do not occur particularly often, and thus I believe they are of less concern.

¹⁰Dell et al. (2019) also avoided this time period for the same reason. However, I also run the analysis with the extended time period between 2007 and 2017, and obtained a qualitatively similar result with a slightly attenuated magnitude and statistical significance. See the Panel C in Table 1.4.

throughout the year, I examine the monthly, rather than the annual variations, in five states.¹¹ The analysis includes month and year fixed effects.

1.3.2 Instrumental variable approach to address endogeneity issue

The endogeneity problem is a central issue in estimating a causal relation. Avocado production may be correlated with local unobservable characteristics that affect the homicide rate, and the reverse causality is another issue that leads to biased estimates. For example, the incidence of crimes may affect production significantly by causing farmers to discontinue farming or migrate.

To address the former, I control for the state fixed effects, and to address the latter, I employ exogenous climatic fluctuations to instrument avocado production. Climatic characteristics, such as adequate moisture and temperature, determine the yield largely, while variations in climate are random and exogenous, and thus, climate may not have a direct effect on the incidence of violence. Specifically, the instruments that this study adopts are the average weather conditions for the past 8 months before harvesting, as it usually requires 8 months for avocados to progress from bloom to harvest. I argue that the variations in this instrument would explain the homicide rate only for avocado productions but not for the other crops' productions, such as marijuana, maize, or strawberries harvested during the same months. This is because the time that a crop needs to be ready for harvest differs by crops, and the 8-month period that this study employs applies exclusively to avocados. In addition, the analysis controls for the production of lemons and strawberries, which are also well-known cash crops popular in these five avocado growing areas. Yet, there is one limitation in this analysis, in that, because data for illegal crops are unavailable, the regressions do not include the controls for marijuana and opium poppy production, which are two of the profitable crops in these regions.

The independent variable is the log-transformed volume of avocado production measured in metric tons (MT), and I use data the Agricultural and Fisheries Information Service (Servicio de Información Agroalimentaria y Pesquera, SIAP) publishes. The dependent variable is the monthly homicide rate per hundred thousand population, and the data derive from the National Institute of Statistics and Geography (INEGI). I use temperature and precipitation obtained from the Mexican national meteorological agency (Servicio Meteorológico Nacional, SMN) as instrumental variables. These climate variables are constructed by averaging the records over the past eight months before harvesting, which determines the avocado yield in a given month. The unit of analysis is state by month. In addition to these main variables, I control for state GDP (per capita, annually), state export revenue (per capita, quarterly), and unemployment rate (national, monthly)¹²

¹¹We may be able to estimate a precise effect by using more fine-grained, municipality-level data. However, there was a challenge with the climate data set. While this study employs Mexico's climate conditions as instruments for domestic avocado production, available municipality-month climate data involve too many missing observations. I considered the data set that the Mexican national meteorological agency published and that Willmot and Matsuura published, but both suffered from the same problem. Thus, I chose the state-month data set that has no missing observation despite the higher level of spatial disaggregation.

¹²State-month data for these control variables were not available publicly.

as well as the production of other cash crops, and state and time fixed effects. Table 1.1 provides summary statistics for key variables.

Table 1.1: Summary Statistics, State by Month, 2010-2017

Variable	Obs	Mean	SD	Min	Max
Homicide (per 100,000 ppl)	480	2.02	1.04	0.46	8.38
Avocado Production (MT)	480	24305	42815	0	204791
Avocado Production (Logged)	480	7.19	3.85	0	12.23
Lemon Production (Logged)	480	6.43	3.40	0	11.62
Strawberry Production (Logged)	480	3.12	3.95	0	11.65
Average 8-month Temperature ($^{\circ}C$)	480	20.66	3.71	12.95	28.14
Average 8-month Precipitation (mm)	480	87.43	45.94	1.21	243.69

1.4 Results

Table 1.2: First Stage Estimates

VARIABLES	<i>Monthly Avocado Production(Logged)</i>		
	(1)	(2)	(3)
Temperature (mean 8 months prior to harvest)	-4.48*** (0.70)	-4.52*** (0.72)	-4.76*** (0.68)
Temperature sq ($^{\circ}C$)	0.12*** (0.015)	0.12*** (0.015)	0.12*** (0.014)
Precipitation (mean 8 months prior to harvest)	0.04*** (0.014)	0.04*** (0.014)	0.024* (0.014)
Precipitation sq (mm)	-0.0001*** (0.00005)	-0.0001** (0.00005)	-0.00003 (0.0004)
Other Crops	N	N	Y
Controls	N	Y	Y
Observations	480	480	480
Number of States	5	5	5
Cragg-Donald Wald F statistic	20.58	20.33	24.15
Stock-Yogo Critical Value (5% max bias)	16.85	16.85	16.85
Stock-Yogo Critical Value (10% max bias)	10.27	10.27	10.27

Note: All specifications include a year-, month- and state fixed effect. Other crops indicate controlling for production of other profitable crops (log transformed) such as lemons and strawberries that also grow in some of the major avocado growing areas. Controls include state GDP pc and its square (1000USD, annual), state export revenue pc (1000USD, quarterly) and national unemployment rate (percent, monthly). Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 1.2 documents a strong first stage relation with the F-statistic of 20.33. It exceeds the Stock-Yogo critical value of 16.85, indicating that instruments in this study passed the weak instrument test. Individually, all four climate variables are statistically significant, and substantively, temperature and precipitation exhibit

a U-shaped and an inverted U-shaped relation with avocado production, respectively. A mean temperature higher than 20 °C is conducive to avocado production, and more rainfall also leads to a higher yield, while excessive rainfall (>200mm) causes a loss.

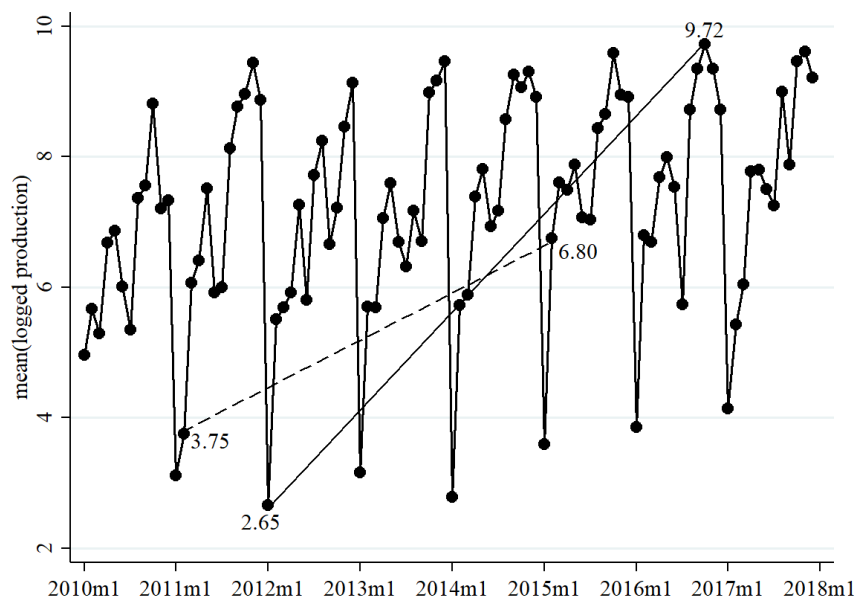
Table 1.3: Monthly Avocado Production and Homicide, 2010-2017

VARIABLES	<i>Homicide (per 100,000 ppl)</i>				
	OLS		2SLS		
	(1)	(2)	(3)	(4)	(5)
Production(Logged)	0.015 (0.017)	0.018 (0.016)	-0.132*** (0.046)	-0.092** (0.042)	-0.070* (0.040)
Other crops	N	N	N	N	Y
Controls	N	Y	N	Y	Y
Observations	480	480	480	480	480
Number of States	5	5	5	5	5

Note: All specifications include a year-, month- and state fixed effect. A set of control variables is illustrated in Table 1.2. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 1.3 shows the main results. Columns (1) and (2) report the ordinary least squares (OLS) estimates, and columns (3) through (5) report the two-stage least squares (2SLS) estimates with different sets of control variables. While the OLS are not statistically significant, the IV regression model shows the statistically significant result that positive production shock is associated with *less* violence. A one standard deviation increase in avocado production decreases the monthly homicide rate by 0.213 per hundred thousand (Column4) relative to the average homicide rate of 2.02. Including more control variables attenuates the coefficients' magnitudes slightly, but the coefficient in Column 5 that controls for other crops remains statistically significant.

Figure 1.2: Average avocado production, 2010-2017



When moving from the lowest to highest level of monthly avocado production, the homicide rate decreased by 0.65 per hundred thousand, nearly two-thirds of one standard deviation of the monthly homicide rate (See the figure 1.2).¹³ If we compare the same month across multiple years, February production shows the largest variation over time. The effect of moving from a low to high year results in 0.28 fewer homicides. This indicates that a positive export shock may determine a 13 percent reduction in the homicide rate.

Table 1.4 presents additional analyses that assess the main result's robustness. Panel A tests whether the main result is robust to a different functional form of the dependent variable. Even when estimating elasticity, the result is statistically significant and consistent with the main result. In Panel B, I run a sub-group analysis that focuses on military-age males (20-49 years), in anticipation that the effect will be significantly larger among this group than overall population if the theories hold. In fact, the result in Panel B shows a statistically significant and greater magnitude of negative coefficients consistent with expectation and the main result. In Panel C, I extend the time frame from 2010-2017 to 2007-2017, which includes the economic recession period. Even after including this period, the result holds, although the coefficients are attenuated slightly.

¹³Based on the estimate in Column 4.

Table 1.4: Robustness Checks

	OLS		2SLS		
	(1)	(2)	(3)	(4)	(5)
Panel A: ln(homicide), 2010-2017					
Production(Logged)	0.006 (0.007)	0.007 (0.007)	-0.068*** (0.019)	-0.053*** (0.018)	-0.045*** (0.017)
Observations	480	480	480	480	480
Panel B: Military-age males' (20 to 49 years) homicide rate, 2010-2017					
Production(Logged)	-0.002 (0.012)	-0.000076 (0.011)	-0.15*** (0.034)	-0.12*** (0.031)	-0.092*** (0.029)
Observations	480	480	480	480	480
Panel C: Homicide rate (per 100,000ppl), 2007-2017					
Production(Logged)	0.009 (0.012)	0.006 (0.008)	-0.065** (0.031)	-0.06** (0.03)	-0.055* (0.03)
Observations	660	660	660	660	660
Other crops	N	N	N	N	Y
Controls	N	Y	N	Y	Y
Number of States	5	5	5	5	5

Note: All specifications include a year-, month- and state fixed effect. A set of control variables is illustrated in Table 1.2. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Taken together, these results lend support to the opportunity cost effect. This finding confirms the earlier works, and is particularly consistent with Dell et al. (2019)'s recent finding, which documents the declines in criminal employment's opportunity cost— increasing unemployment in the manufacturing sector affected by trade competition with China— leads to increased violence. Extending the conventional Becker model, they offer a novel mechanism that links unemployment and violence through the channel of criminal groups' turf wars. They view that the cost of recruiting low-level members with local knowledge determines incentives to compete over the region. In the presence of negative trade shocks, drug trafficking groups can pay lower wages to recruit low-level members and thus, it becomes less expensive for the cartels to operate in the affected territory, and results in more territorial competition and violence. Applying this theory to this study's empirical finding, the avocado boom increases the wages and job opportunities in the formal labor sector, which increases the cost of hiring local agents and lowers the value of gaining control over the territory simultaneously. This is one possible explanation that can account for the reduction in violence.

1.5 Discussion

The intriguing connection between avocado and cartel violence in Mexico has garnered unusually extensive—mostly worrying—media coverage over the past decade. In addition, public attention was recently brought again to this subject by the incident where the inspector working for the U.S. department of agriculture received a death threat from the Mexican cartel (Stevenson, 2022). Amid the growing public interest, scholars have a part to play in providing a systematic and rigorous analysis of the phenomenon. Situating this study within political economy scholarship on income shocks and violence, I test the relationship between avocado production and homicide rates in Mexico from 2010 to 2017. Using the instrumental variable approach with climatic conditions as instruments—shown to be strong predictors of the variations in monthly avocado production—I find that the positive export shocks, measured by increased production, are associated with lower homicide rates. This finding is consistent with the existing body of empirical evidence supporting the dominance of the opportunity cost effect (e.g., Ciccone, 2018; Dube and Vargas, 2013; Fjelde, 2015; Wischnath and Buhaug, 2014), extending a context to which the opportunity cost mechanism may apply.

Of course, this study is not without limitations. First, since the analysis was conducted at the state level, violence dynamics occurring at the municipal level were not captured. I do not exclude the possibility that the empirical result at the municipal level may contradict the state-level result presented in this article. As noted by (Rigterink, 2020), the mechanisms through which the natural resource under investigation is associated with conflict may vary across geographical levels of analysis, and “different theoretical effects may dominate at different levels.” Future studies using more geographically granular data may be able to reveal further nuanced patterns at the municipal level—whether they be consistent or inconsistent with the state-level result.

Second, while this study uses the homicide rate as a measure of violence, homicide may not be “the only or main manifestation of violence” in Mexico (Martínez et al., 2021). Depending on the specific mechanism to be tested, there could be a better measure of violence than the homicide rate. For example, the extortion or kidnapping rate might better represent the concept of predation if predation is theoretically conceptualized as aggression against civilian communities instead of rival organizations. Yet, non-lethal violence (e.g., extortion, kidnapping) has been relatively understudied in Latin America (Moncada, 2022), partly due to data caveats—underreporting in official police statistics because of the fear of reprisal (Estévez-Soto, 2021) and limitations of victimization surveys (UNODC/UNECE, 2010). However, their impact on society is ever-growing. DTOs’ criminal diversification in recent years has made the non-lethal violence, targeting civilians and local businesses, more prevalent and sophisticated. Extortion on the avocado farmers is one example. Given that extortion and intimidation have become pressing issues for Mexican civilians, more studies are needed in this area to improve the understanding of, and to better respond to, the evolving threat.

Finally, while this study took existing generic theories as a starting point and tested them in the new context, future research may benefit from developing a micro-level, contextualized mechanism. Related to the previous point, in Mexico, there are multiple sources of violence that involve different dyads of actors (e.g., inter-cartel, state-cartel, cartel-self-defense group, cartel-civilians). Given the complexity of violence, generic theories are likely to leave these complex dynamics unexplained and lead the empirical analysis to be disconnected from reality. To address these issues, it seems necessary to translate the generic theory to Mexico-specific mechanisms that would account for ongoing violence dynamics. By doing so, researchers will be able to devise more specific hypotheses and more apt empirical strategies.

ESSAY 2

A Model of State-Crime Relations: Theory and Case Study

2.1 Introduction

A government's response toward organized crime can be diverse, ranging from crackdown to hands-off and even collusion, and it may undergo several shifts from one kind to another over time. Many historical cases document this pattern: Governments in Italy (Blok, 1975), Mexico, Japan (Hill, 2003), Myanmar (Koivu, 2018), China (Martin, 1991), and South Korea (Porteux, 2013), at one point, had built a deep friendly connection with organized crime groups (hereafter, OCGs) operating within their territory, but later, these governments decided to launch a crackdown on them. When does the state-crime collusion sustain, and when does it not? When does a government shift its response from one to another?

While the existing literature focuses primarily on explaining criminal groups' behaviors, we know little about under what conditions governments choose to combat or accommodate criminal groups and how they come to such decisions. Especially, the government's crackdown decision has often been treated as exogenous and non-strategic, and thus the explanation behind the such decision has been under-developed¹. Departing from the previous approach, this paper sets out with the notion that a government is a strategic actor and explores the incentives driving a government to adopt a certain response to criminal groups.

Based on the central premise that governments are revenue-maximizing entities (Levi, 1988), I theorize how a government balances between the incentive to minimize governance costs and the incentive to survive in office, which ultimately shapes the relationship between a government and criminal groups. I posit that governments face a dilemma when deciding whether to tolerate organized crime groups. On the one hand, tolerating these groups can be economically advantageous as it avoids the high costs of crackdowns, enables the collection of bribes, and allows for leveraging public goods provision by criminal groups. However, this approach carries the risk of the government being removed from office if the violent competition among criminal groups becomes too intense and disruptive to citizens, leading to public blame on the government's lenient crime policy.

This dilemma suggests that a government's concern for survival is a mechanism that connects the government, OCGs, and citizens. While prior studies tend to examine bilateral relations among these actors

¹While a few studies have looked at the motivations behind the government's crime policy, the majority of research has focused on examining the effect of different crackdown tactics on reducing violence: conditional versus unconditional repression (Lessing, 2015), beheading strategy (Calderón et al., 2015; Phillips, 2015), or drug interdiction (Castillo and Kronick, 2020).

separately², this paper takes a comprehensive approach by looking at these relationships through the lens of a political survival perspective. To systematically study their relationship, I construct a formal model that captures the intertwined trade-offs faced by citizens, the government, and criminal groups in the presence of the survival constraint as well as criminal groups' operations.

At the core of these trade-offs is the concept of "illicit benefits," which refers to the benefits citizens gain from the illicit economy or public goods provided by criminal groups. In settings with limited state capacity, OCGs often act as a parallel government, filling the void left by the state and providing social services and job opportunities that yield illicit benefits (Leeds, 1996; Goldstein, 2003, p.207-209). In contexts with high state capacity, however, illicit benefits may take the form of economic advantages granted to business people collaborating with OCGs. This can happen through the OCGs' infiltration of the legitimate economic sector and partnerships with ordinary businesspeople³.

Citizens' trade-off is that they may enjoy these illicit benefits provided by organized crime groups, but their presence poses a security risk. Citizens may experience reduced welfare, such as fear and insecurity of crime (Dolan et al., 2005; Dolan and Peasgood, 2007), hindered economic growth (Robles et al., 2013), and loss of education (Jarillo et al., 2016), caused by violent competition between these groups vying for contested territories or illicit markets. Similarly, the government's trade-off is that it may benefit from tolerating criminal groups, but at the same time, it may face the heightened risk of public's sanctions if competition between these groups intensifies. Finally, the model accounts for the trade-offs faced by criminal groups, where employing extreme violence may increase their chances of success in competition but also raises the risk of pushback from citizens and the government, potentially leading to a crackdown (Durán-Martínez, 2017, p.38-39).

This paper presents the key insights obtained from the comparative statics analysis of the model, with a particular emphasis on how variations in illicit benefits affect the intensity of violence and the government's approach towards OCGs. I find that as the amount of illicit benefits increases, criminal groups become more likely to restrain violence. They do so because the greater the illicit benefits, the larger the opportunity cost associated with employing the high intensity of violence. Higher illicit benefits lead to more certain and extended survival for both incumbents and criminal groups, allowing them to maintain their revenue streams longer. This, however, is contingent on violence being kept at a moderate intensity. Since criminal groups stand to lose all potential revenue and certainty derived from the illicit benefits if they resort to high levels

²See the papers focusing on OCG-state relations (e.g., Lessing, 2015; Alesina et al., 2019; Trejo and Ley, 2021; Snyder and Duran-Martinez, 2009; Acemoglu et al., 2013), on OCG-Society (e.g., Lessing, 2020; Magaloni et al., 2020a), and on inter-OCG (e.g., Osorio, 2015; Castillo and Kronick, 2020). Arias (2006) is one exception that identified intertwined *quid pro quo* relationships among these three actors.

³The primary distinction between these two cases is the extent to which OCG operations benefit the general population, with the former benefiting a broader group and the latter benefiting a narrower scope of business people. However, this difference was not taken into account in the baseline model.

of violence, they are incentivized to limit the levels of violence. While reducing violence may decrease the damage to citizens, it perpetuates the government's policy of non-crackdown by increasing its incentive to maintain the status quo.

In the case study section, I discuss the cases of the Shanghai Green Gang in the 1920s and the Japanese Yakuza in the post-war period. In each example, I illustrate how an exogenous change in the parameters that compose illicit benefits can influence the authorities' response. The final section provides a conclusion.

2.2 Related Literature

There is a growing body of literature that examines the collusive relationship between the state and criminal organizations. Arias (2006) suggests that criminal groups' main survival strategy is to establish illegal social networks and contacts with civic actors and state officials, as it can help them avoid repression and garner public support. Snyder and Duran-Martinez (2009) describes the state-crime relation as more of an institutionalized transaction. The authors particularly focus on the context of local-level cooperation where the public officials exercise "non-enforcement" of the law within their jurisdiction in exchange for a share of the profit generated by criminal organizations. By contrast, focusing on state-level collusion, Koivu (2018) suggests that the state-OCG partnership can be an intentional decision of a government to achieve the economic or political developmental goal. My paper substantively builds on these previous studies that highlight different incentives and modes of state-crime collusion, but at the same time, attempts to overcome their common limitation where the analysis is limited to a pair-wise relationship such as inter-OCG, state-OCG, and OCG-society.

In my model, accountability is the mechanism that connects the body of citizens to state-crime relations. The presence of organized crime groups creates two critical issues that citizens should consider when deciding whether to sanction or not sanction the incumbent government: corruption and violence.

Collusion or corruption by the government with organized crime groups yields negative social effects such as erosion of institutional trust (e.g., Chang and Chu, 2006; Morris and Klesner, 2010) and economic inefficiency. Despite these adverse effects, previous studies on corruption and voting behavior indicate that voters sometimes tolerate the politicians involved in corruption. Past empirical research has identified various factors that can cause voters to overlook corruption, including the incumbent's delivery of economic prosperity (e.g., Klašnja and Tucker, 2013; Zechmeister and Zizumbo-Colunga, 2013), the provision of public good (e.g., Winters and Weitz-Shapiro, 2013; Pereira and Melo, 2015), particularistic benefits such as job creation and material benefits (e.g., Chang and Kerr, 2017; Bauhr and Charron, 2018; Klašnja et al., 2021), lack of information and partisanship (e.g., Winters and Weitz-Shapiro, 2013; Anduiza et al., 2013; Weitz-Shapiro and Winters, 2017; Klašnja, 2017), and prevalence of corruption (e.g., Klašnja and Tucker, 2013; Pavão, 2018).

This paper builds on the trade-off argument where the voters condone corruption in exchange for economic benefit and particularistic benefits. It focuses specifically on the context where the government's corrupt partner is an organized crime group that significantly contributes to the economic benefits to citizens (e.g., licit or illicit revenue, job creation, public goods provision). If citizens are beneficiaries of these economic benefits (which I refer to as the "illicit benefit"), they would have a greater incentive to tolerate corrupt politicians having a friendly relationship with an organized crime group. Broadly speaking, this narrative is similar to the "insider-outsider" framework proposed by Chang and Kerr (2017), which argues that voters who receive either material or identity benefits from the incumbent will be more tolerant of the politician's venality. However, my model slightly differs from their framework in that the citizens in my model derive their benefits directly from the business and social services of the organized crime group, rather than from government-provided spoils. Instead, my model concurs with Bauhr and Charron (2018) which operationalizes insiders as individuals "who potentially have something to lose politically and economically by a political change resulting from an election" (p.429). In my model, citizens may back the corrupt incumbent government, because it protects the organized crime groups, making sure that citizens' benefits remain undisrupted.

However, the use of violence by these groups creates a dilemma for citizens. As specialists in violence, organized crime groups' penchant for violence disrupts citizens' security and welfare. Though organized crime groups' violence can be directed at any actors, my model specifically focuses on violent competition *among* organized crime groups, and considers its collateral impact on civilians. Unlike the issue of corruption, citizens may have the incentive to sanction politicians who do not effectively keep these organized crime groups at bay.

The ways and circumstances in which civilians respond to insecurity and victimization have been studied extensively in the conflict literature, and the findings are rich and varied. For instance, studies on civil conflicts show that civilians tend to punish belligerents for their civilian-targeted violence by switching their support to the opposition, providing assistance, or voting for them (Balcells and Stanton, 2021, p.59). Yet, in identifying whom and how much to punish, people display diverse patterns of blame attribution. These patterns can be influenced by in-group bias (Lyal et al., 2013) and whether one has been directly or indirectly exposed to the violence (Pechenkina et al., 2019). Also, there is a tendency to place more extensive blame on the incumbent government than on the insurgent counterpart, which can create a disadvantage for the former in elections (Birnie and Gohdes, 2018)⁴. Civilians also tend to punish belligerents for collateral damage, such as unintended civilian casualties, although the effect is moderated by preexisting political preferences in the

⁴Daly (2019) argues that voters in the post-war election may not necessarily punish the belligerents for their past victimization experiences (vengeful voting), but vote based on prospective credibility and competence on security issues (security voting) which is signaled by belligerents' relative military strength at war's end.

area (Condra and Shapiro, 2012). My model focuses on citizens' responses to collateral damage instead of civilian-targeted violence.

In the context of state repression, civilians often react through collective dissents, such as protests and revolts. Among the rich and complex literature on when the repression emboldens or demobilizes the dissent (e.g., Lichbach, 1987; Carey, 2006), backlash argument suggests that the high levels of coercion intensify protests rather than deter them (Francisco, 1995, 1996). For example, Francisco (2004) investigated the aftermath of massacres in autocratic regimes and found that there was significant backlash following the massacres, which represents an extreme form of violent repression. In other studies as well, many authors have noted that harsh and severe repression serves as a critical tipping point that mobilizes even more dissidents and accelerates the protest (e.g., Karklins and Petersen, 1993; Lohmann, 1994).

While there are some contextual differences between my model and the backlash argument in terms of the type of violence citizens experience (state repression/collateral damage from OCGs' violence), regime types (autocracy/democracy), and the form of the reaction (protest participation/voting), the idea that the level of violence matters in civilians' response can still apply. Even though the civilians in my model may tolerate some degree of violence due to economic benefits, the extreme level of crime and violence can have a critical impact on their lives, becoming a "focal event" that triggers a response. In such cases, citizens may hold the incumbent government accountable for colluding with organized crime groups and failing to effectively control crime and violence levels. When this happens, citizens may choose to express their outrage through voting, given the democratic context.

There exists some empirical evidence showing the impact of crime and victimization experiences on voting choices and political attitudes⁵. Ley (2017) suggests that voters do hold politicians accountable for the deteriorating security and increasing violent crime, but only when there is a clear attribution of responsibility, where there is a partisan alignment across different levels of government. García-Ponce et al. (2023) show that criminal violence against innocent people can trigger citizens' anger and lead to support for harsh punishment and retribution at the expense of the rule of law. Additionally, Abadeer et al. (2022) provide evidence from Egypt that exposure to the rising crime rate can prompt voters to support the authoritarian "strongman" candidate who can implement tough measures to address crime. These studies suggest that in contexts where the public perceives the incumbent government's crime control policies as ineffective, political challengers

⁵Related to the relationship between violence experience and citizens' electoral participation, previous empirical research has shown mixed results. Blattman (2009) and Bateson (2012) found that victimization experiences increase electoral participation, providing evidence from Uganda and a cross-country survey of 70 countries. Berens and Dallendörfer (2019) also found that in Latin America and the Caribbean countries, violent crime victimization did not necessarily lead to apathy towards politics and did not discourage participation in voting. However, Ley (2018) found that when criminal organizations intentionally target government officials during election times, it effectively demotivates voters from turning up to the polls in Mexico. Similarly, Albarracín (2018) argues that if criminal groups are hired or allied with politicians, they can coerce voters to select specific candidates, which undermines electoral accountability.

who promise a hard-line approach may be able to sway the public and overturn the government. My model builds on this notion of accountability on the issue of crime and insecurity, while also incorporating the issue of corruption and economic benefits at the same time.

The last strand of related studies concerns OCG-society relations, specifically on the public good provision by organized crime groups. Studies in state formation and organized crime literature have long noted that OCGs ironically can be a contributor to order, security, contract enforcement, dispute resolution, and even social services for the population (Tilly, 1985; Olson, 1993; Gambetta, 1996; Skaperdas, 2001). Some scholars, particularly Mafia scholars, view public services as a commodity that can be sold to people in need by organized crime groups. They take this perspective to explain the variation in the emergence and activities of OCGs, particularly through the demand and supply logic of privately-provided public services. For example, OCGs emerge and thrive in places where gang-provided services are deemed valuable and highly demanded, such as in an illicit market where the law can't be reached, or in a booming market where the state apparatus can't promptly respond to the excessive needs of the services (Varese, 2011).

On the other hand, some scholars emphasize the "governance" aspect of public good provision over economic purposes. Lessing (2020) perceives criminal governance to be a parallel government that maintains a symbiotic relationship with the state. Lessing further suggests that citizens may not be directly charged for the public services that they received, but instead, their "lives, routines, and activities . . . are impinged on by rules or codes imposed by a criminal organization" in an indirect way. Similarly, with the exemplary case of Rio de Janeiro, Magaloni et al. (2020a) suggest that OCGs develop state-like governance in the territory that they control, where they provide conflict resolution, policing, delivery of welfare benefits, and taxation.

The model's concept of "illicit benefit" is not biased towards either view, but instead was constructed by drawing from both lines of scholarship.

2.3 Model

The model is a single shot game with three players - the incumbent government G , $OCG1$, $OCG2$ - where G seeks to politically survive while minimizing the cost of governance, and $OCG1$ and $OCG2$ are rival criminal groups that compete over the contested prize, for example, territorial control or the criminal market. Citizens are not being explicitly considered as strategic actors, but instead, their preference is embedded in G 's political survival prospect⁶.

Unlike the standard setting of a single period game, I assume that actors' payoffs combine a current payoff and a discounted future payoff equivalent to the current payoff. The discount factor δ ranges between $[0, 1]$.

⁶The political survival probability reflects that citizens are significantly less likely to re-select the incumbent government when they observe an excessive level of inter-cartel violence, as they attribute excessive violence to the incumbent government's inept handling.

Whether actors can obtain this future payoff or not is contingent on the incumbent G 's political survival, the probability of which varies depending on the outcome of the game. Specifically, if G 's political survival is certain, all players can retain their current payoffs in the future period. However, if G fails to survive, both G and OCGs are left with nothing in the future round; it not only unseats the incumbent G but also eradicates OCGs⁷. To summarize, the total payoff of each actor is a discounted sum of the current and future payoff, where the latter depends on G 's political survival prospect.

The interaction proceeds as follows.

(1) The government G faces three choices: whether to crack down on OCGs, or to engage in collusion with the ally OCG that I will specify as OCG1, or take a hands-off approach toward OCGs. If G chooses a crackdown among these three options, the game immediately ends.

(2)-1. If G chooses collusion, G proceeds to demand a bribe $k \geq 0$. The designated ally, OCG1, decides whether to acquiesce or resist to pay the bribe. If OCG1 rejects to pay the bribe, G will immediately crack down on OCGs, and the game ends. If OCG1 agrees to pay the bribe in exchange for collusion, it leads OCG1 to employ a high level of violence, denoted by \bar{m} , to fight with its rival OCG2.

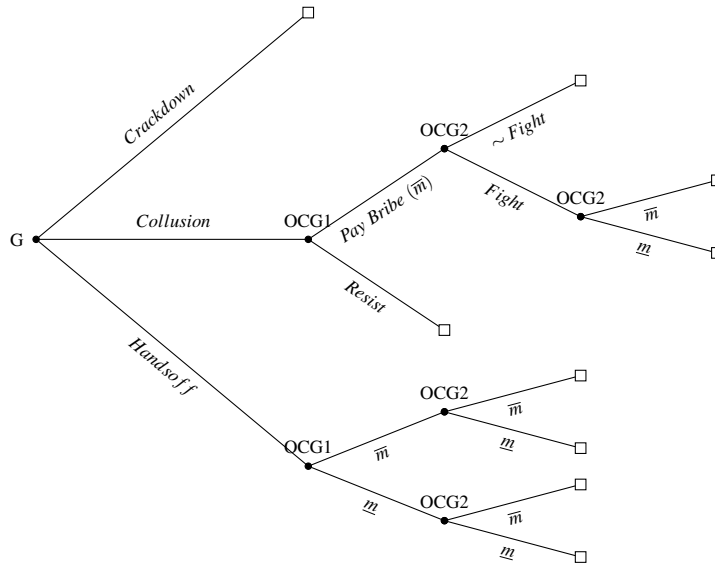
(3) If OCG1 accepts to pay the bribe, OCG2 chooses whether to fight against OCG1 or back down. If OCG2 chooses not to fight, the game ends. If OCG2 chooses to fight, they must decide the level of violence to exert towards their opponent, either low (\underline{m}) or high (\bar{m}), and the conflict proceeds accordingly. The game ends.

(2)-2. If G chooses hands-off (HO), OCG1 chooses the level of violence to exert towards their opponent, either low (\underline{m}) or high (\bar{m}). Upon witnessing OCG1's choice of violence, OCG2 subsequently decides on the level of violence, either low or high. Conflict proceeds accordingly. The game ends.

To simplify notations, I define $m_i \in \{\underline{m}, \bar{m}\}$ to be the level of violence selected by OCG _{i} , $i \in \{1, 2\}$. The extensive form game is given in Figure 2.1.

⁷It means that if the incumbent G is replaced, then the newly-elected government will attempt to eliminate the OCGs immediately as they enter the office. It is consistent with the observations in reality that a new government prefers to overturn the policy of the previous government. Also, this assumption yields another implication that the OCGs are hoping for the incumbent G to survive. For this relationship to hold in reality, several social conditions are needed. For example, the new government must have a higher capacity to repress OCGs or have a far lower cost of providing public good on their own, all of which incentivize the new government to implement the crackdown. Another possibility is that the new government may seek to ally with new OCGs possibly due to economic, political, and strategic reasons.

Figure 2.1: The Sequence of the Play



There are four possible outcomes to occur: (1) Crackdown (CD) (2) Peaceful Collusion (PC) (3) Violent Collusion (VC) (4) Hands-off (HO). First, Crackdown occurs when G chooses crackdown, or when G chooses collusion but the agreement breaks down as OCG1 refuses to pay the bribe. Second, peaceful collusion (PC) is an outcome where G chooses collusion, OCG1 accepts the demand, and such successful collusion induces OCG2 to back down. Inter-OCG violence never arises in this outcome. Third, violent collusion (VC) is the opposite outcome of peaceful collusion where OCG2 still chooses to fight despite the successful collusion. Lastly, hands-off (HO) is an outcome where G chooses hands-off and never intervenes in inter-OCG violence.

The survival likelihood is a major component of the players' payoff. It is determined by the utility of citizens under the realized outcome, which can be broken down into three parts. (1) The size of illicit benefit stemming from criminal group's presence; (2) intensity of inter-OCG violence in three different degrees - high, moderate, and low ⁸; (3) the social cost of collusion. First, the existence of OCGs in society offers citizens the opportunity to participate in informal economic activities associated with the OCG's business or benefit from public goods provided by the OCG. The more benefits citizens could get from the OCGs, the happier and therefore more tolerant they become of the presence of OCGs. I assume that the benefits originate from the OCGs' contested prize, denoted as $V \geq 0$, and that the amount of benefits is determined by the exogenously given fraction $t \in [0, 1]$ of V . A higher value of t means that a greater share of their prize is dedicated to the citizens and yields a higher citizen utility. Taken together, the size of the illicit benefit is

⁸By intensity of violence, I mean the aggregate level of violence chosen by two OCGs. To avoid confusion, I consistently use the term 'intensity' to refer to the aggregate level, which is distinct from the 'level' of violence that each OCG adopts. I define the low-intensity of violence as both OCGs select \underline{m} , moderate-intensity as one OCG chooses \underline{m} while the other chooses \bar{m} , and high-intensity as both OCGs select \bar{m} .

denoted by $tV \geq 0$. Second, aside from such benefits, citizens may experience property damage and security threats caused by OCGs' contests over the prize. The higher intensity of violence employed by OCGs, the larger the citizen's disutility from violence will be generated. Lastly, I incorporate the fact that collusion between G and OCG1 will generate the negative social costs that accrue to the citizens due to the existence of explicit corruption, the value of which is denoted by $s \geq 0$. On the other hand, a hands-off approach does not incur these costs associated with collusion.

The citizens' utility is translated to the political survival probability in the following way. At one end of the violence spectrum, for those outcomes absent inter-OCG violence – crackdown (CD) and peaceful collusion (PC) –, G's political survival would be guaranteed. At the other end, for those outcomes accompanying the highest intensity of violence where both OCGs choose the high level of violence, the political survival likelihood is fixed at the minimum level, denoted by $\varepsilon \in [0, 1)$.⁹ Meanwhile, for those outcomes with the low or moderate intensity of OCGs' violence, the political survival probability is determined by the size of illicit benefit tV and the cost of collusion s , on top of the minimum political survival probability. Lastly, I restrict the parameter range under investigation to $tV + \varepsilon \in [0, 1)$ to reduce the possible cases.

The probability of survival associated with each outcome is formally represented below:

$$Pr(Reselect|CD) = 1$$

$$Pr(Reselect|PC) = 1$$

$$Pr(Reselect|HO, m_1, m_2) = \begin{cases} \varepsilon \in [0, 1) & \text{if } (m_1, m_2) = (\bar{m}, \bar{m}) \\ tV + \varepsilon & \text{Otherwise} \end{cases}$$

$$Pr(Reselect|VC, \bar{m}_1, m_2) = \begin{cases} \varepsilon - s \in [0, 1) & \text{if } (m_1, m_2) = (\bar{m}, \bar{m}) \\ tV + \varepsilon - s & \text{Otherwise} \end{cases}$$

2.3.1 Payoffs

In crackdown, both OCGs receive zero payoffs as they both get eliminated by G. In peaceful collusion (PC), OCG1 pays the bribe k to G in exchange for the entire contested prize V peacefully conceded to OCG1. OCG2 receives zero payoff as it chooses not to fight. Since there is no violence occurred, peaceful collusion guarantees the survival of G. OCG1's utility of peaceful collusion is given by:

$$U_{ocg1}^{PC} = (1 + \delta)(1 - t)V - k$$

Conversely, OCG1 and OCG2 have a contest over V in hands-off (HO) or violent collusion (VC). Recall

⁹A technical assumption that $\varepsilon \geq s$ is needed to obtain a non-negative political survival likelihood.

that $m_i \in \{\underline{m}, \bar{m}\}$ is a level of violence selected by OCG_i $i \in \{1, 2\}$. The probability of winning this contest, $p_i(m_i, m_{-i})$, is simply determined by the magnitude of violence chosen by OCGs relative to their opponents. It is formally stated below.

$$p_i(m_i, m_{-i}) = \begin{cases} q > 0.5 & \text{if } m_i = \bar{m}, m_{-i} = \underline{m} \\ 0.5 & \text{if } m_i = m_{-i} \\ 1 - q & \text{if } m_i = \underline{m}, m_{-i} = \bar{m} \end{cases}$$

Also, employing violence incurs a direct cost to OCGs. For the sake of simplicity, I denote the cost for OCGs associated with using violence as the level of violence they choose, which is represented by m_i .

In hands-off, OCGs fight over the contested prize, and G does not intervene in their confrontation. OCGs' utility of hands-off is given by:

$$U_{ocgi}^{HO} = \begin{cases} p_i(1 + \delta)(1 - t)V - m_i & \text{if G is reselected} \\ p_i(1 - t)V - m_i & \text{if G is not reselected} \end{cases} \quad \text{where } i \in \{1, 2\}$$

In violent collusion, OCG1 pays a bribe k while its military expense, \bar{m} , will be covered by G under the banner of collusion. On the other hand, OCG2, excluded from the alliance, has to pay not only the cost of violence but also an additional cost, $r \geq 0$. r is derived from G's attack on OCG2, launched to support its ally OCG1. OCGs' utility of violent collusion is given by:

$$U_{ocg1}^{VC} = \begin{cases} p_1(1 + \delta)(1 - t)V - k & \text{if G is reselected} \\ p_1(1 - t)V - k & \text{if G is not reselected} \end{cases}$$

$$U_{ocg2}^{VC} = \begin{cases} p_2(1 + \delta)(1 - t)V - r - m_2 & \text{if G is reselected} \\ p_2(1 - t)V - r - m_2 & \text{if G is not reselected} \end{cases}$$

The core part of the government's payoff revolves around the benefit of staying in office, denoted α . By assumption, G's crackdown ensures the regime's political survival; yet, since there is no other entity to supply public goods than G, G should pay the cost of public good provision, labeled b , in every period and with one-time crackdown cost, labeled τ . G's utility of crackdown is given by:

$$U_g^{CD} = (1 + \delta)(\alpha - b) - \tau$$

In hands-off, G free-rides on the supply of public goods, which is provided by OCGs instead and saves the cost of the crackdown.

$$U_g^{HO} = \begin{cases} (1 + \delta)\alpha & \text{if G is reselected} \\ \alpha & \text{if G is not reselected} \end{cases}$$

In peaceful collusion, G receives the bribe from OCGs, k , along with free-riding on the supply of public goods and saving the cost of the crackdown. G's utility of peaceful collusion is given by:

$$U_g^{PC} = (1 + \delta)\alpha + k$$

In violent collusion, G has to bear a cost, C , associated with supporting its ally OCG1. This is in return for the bribe k that G receives. The cost entails the military expense that G covers for OCG1 and G's attacks targeted to OCG2 to help defend the ally OCG1.

$$U_g^{VC} = \begin{cases} (1 + \delta)\alpha + k - C & \text{if G is reselected} \\ \alpha + k - C & \text{if G is not reselected} \end{cases}$$

2.4 Analysis

Throughout the analysis, I look at the pure strategy subgame perfect equilibria (SPE). Among multiple equilibria with different intensity of violence, I will mostly focus on violent collusion and hands-off which involve some degree of inter-OCG violence. Proposition 1 below summarizes the condition under which the high intensity of violence is observed if G chooses collusion and hands-off. The model is solved by backward induction. Please see the appendix for the proof of the propositions presented below.

Proposition 1. *In any equilibrium where G colludes, there is a high intensity of violence iff*

- $\bar{m} - \underline{m} < \frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1 - t)V - (1 - q)\{1 + (tV + \varepsilon - s)\delta\}(1 - t)V \equiv m_H^*$,
- $r \leq \frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1 - t)V - \bar{m}$
- $k \leq \frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1 - t)V$

In any equilibrium where G chooses a hands-off approach, there is a high intensity of violence iff

$$\bar{m} - \underline{m} < \frac{1}{2}(1 + \varepsilon\delta)(1 - t)V - (1 - q)\{1 + (tV + \varepsilon)\delta\}(1 - t)V \equiv m_M^*$$

OCG1 and OCG2's choice of violence critically depends on the cost difference between using high and low violence, $\bar{m} - \underline{m}$. The logic is simple. For both hands-off and violent collusion, high-intensity violence

occurs when both OCGs assess that employment of high violence is not so expensive relative to the employment of low violence. An OCG weighs between two options: one option gives him the comparable military capability to its rival OCG at the expense of the high-violence cost and the lower survival likelihood¹⁰, while the other option gives him the low-violence cost and the higher survival likelihood at the expense of the weaker capability. When the former outweighs the latter, both OCGs will not hold back using high violence, resulting in a high intensity of violence.

The same intuition holds for both violent collusion and hands-off. However, the thresholds for the high-intensity violence attached to each outcome differ slightly, as the threshold attached to violent collusion (m_H^*) is lower than that of hands-off (m_M^*). It means that the parameter range where the high intensity of violence is observed is *wider* under hands-off than violent collusion. It is because the social cost of corruption (s) that is present in violent collusion but not in hands-off *lowers* the survival likelihood of OCGs under collusion, making them act more cautiously and conservatively when it comes to using high violence. Thus, for the OCGs to be willing to use high violence under violent collusion, the cost difference should be smaller enough to compensate for the lower survival likelihood.

When G chooses to collude, a few more conditions are required for high-intensity violence to occur. OCG2 must choose to fight against OCG1 rather than back down. Fighting occurs when the OCG2's expected payoff of fighting outweighs its expected cost that includes the damage r inflicted by G. Then, OCG2's choice of fighting and the chosen level of violence are altogether factored into the OCG1's choice of whether to accept to pay a bribe k . k is the reservation price of the bribe that OCG1 is willing to pay, and in order for OCG1 to agree to pay the bribe and reach collusion with G, k should be lower than OCG1's expected payoff of fighting.

Likewise, proposition 2 below presents the condition under which the moderate intensity of violence is observed if G chooses collusion and hands-off.

Proposition 2. *In any equilibrium where G colludes, there is a moderate intensity of violence iff*

- $m_H^* \leq \bar{m} - \underline{m}$
- $r \leq (1 - q)\{1 + (tV + \varepsilon - s)\delta\}(1 - t)V - \underline{m}$
- $k \leq q\{1 + (tV + \varepsilon - s)\delta\}(1 - t)V$

In any equilibrium where G chooses a hands-off approach, there is a moderate intensity of violence iff

$$m_M^* \leq \bar{m} - \underline{m} < (q - \frac{1}{2})\{1 + (tV + \varepsilon)\delta\}(1 - t)V \equiv m_L^*$$

¹⁰The term, OCGs' survival likelihood and G's survival likelihood, will be interchangeably used.

If G colludes, OCG1 is bound (by the assumption) to choose high violence. Then, OCG2, who makes the last decision, faces the same two options mentioned above. For the moderate intensity of violence to occur, OCG2 must choose low violence. They do so when OCG2 finds the option that gives them the low-violence cost and the higher survival likelihood, at the expense of the weaker capability, more profitable than the other option that gives OCG2 the comparable capability to fight, at the expense of the high-violence cost and the lower survival likelihood. In other words, OCG2 will end up choosing the low violence when they find the high-violence cost and the short survival likelihood combined too costly.

On the other hand, if G adopts a hands-off approach, OCG1 and OCG2 have two options each. Under these circumstances, moderate-intensity violence will occur when the cost difference between using high and low violence is significant, but not excessive. This situation arises when OCG1, the first mover, selects high violence, and OCG2, the second mover, chooses low violence, or alternatively, when OCG1 chooses low violence and OCG2 subsequently selects high violence. This intuition is reflected in the formal notation of the condition, $m_M^* \leq \bar{m} - \underline{m} < (q - \frac{1}{2})\{1 + (tV + \epsilon)\delta\}(1 - t)V \equiv m_L^*$.

One thing to note from Proposition 1 and 2 is that different G's choice can lead to different intensities of equilibrium violence. Specifically, I find that under certain conditions, collusion can result in moderate-intensity violence, whereas a hands-off approach can lead to high-intensity violence. Proposition 3 outlines the specific conditions that determine the divergence in equilibrium violence depending on G's choice.

Proposition 3. *There is less violence in equilibrium after the government colludes than after the government takes a hands-off approach iff $\bar{m} - \underline{m} \in [m_H^*, m_M^*]$.*

I noted earlier that the threshold attached to violent collusion (m_H^*) is lower than that of hands-off (m_M^*). For the parameter values falling between the two thresholds, the intensity of violence can vary depending on G's decision; collusion leads to moderate intensity, while hands-off leads to high intensity of violence. The reason for the divergence in violence intensity between collusion and hands-off is the social cost of corruption (s) associated with the former. In particular, violent collusion is associated with a slightly lower likelihood of survival compared to hands-off due to the presence of this cost. When $\bar{m} - \underline{m} \in [m_H^*, m_M^*]$, OCGs operating under collusion feel compelled to limit the violence they use in order to offset the lower likelihood of survival. Conversely, OCGs operating under a hands-off approach have no incentive to do so, which results in a difference in violence intensity depending on G's choice.

2.4.1 Comparative Statics

I have so far examined the conditions that determine a certain government response and violence intensity. Now turning our attention to the comparative statics, I focus on examining under what conditions the equi-

librium intensity of violence increases or decreases, and under what circumstances the government response can shift from one to another. In doing so, I take the comparative statics on the thresholds m_H^* and m_M^* with respect to the two parameters t and V .

Under violent collusion, there is a threshold m_H^* , where violence intensity is high below this threshold and moderate above it. If this threshold decreases, we may observe an equilibrium transition from high to moderate violence for certain parameter values. Conversely, if m_H^* increases, the opposite transition may occur. The threshold m_M^* , associated with the hands-off approach, follows a similar pattern to m_H^* . It undergoes analogous adjustments as m_H^* .

Here, t is a fraction of the contested prize that OCGs allocate to ordinary citizens to provide illicit benefits. Increasing t means that OCGs devote more resources to ordinary citizens at the expense of their own income, and decreasing t means otherwise. From the perspective of ordinary citizens, increasing t means that they can earn higher illicit benefits from the OCGs. The higher illicit benefits lead to a higher willingness for ordinary citizens to tolerate OCGs. Yet, I assume that a higher level of illicit benefit will not impact an OCG's survival in the face of the high intensity of violence. It can affect their survival likelihood only when the violence is managed at a moderate or low intensity.

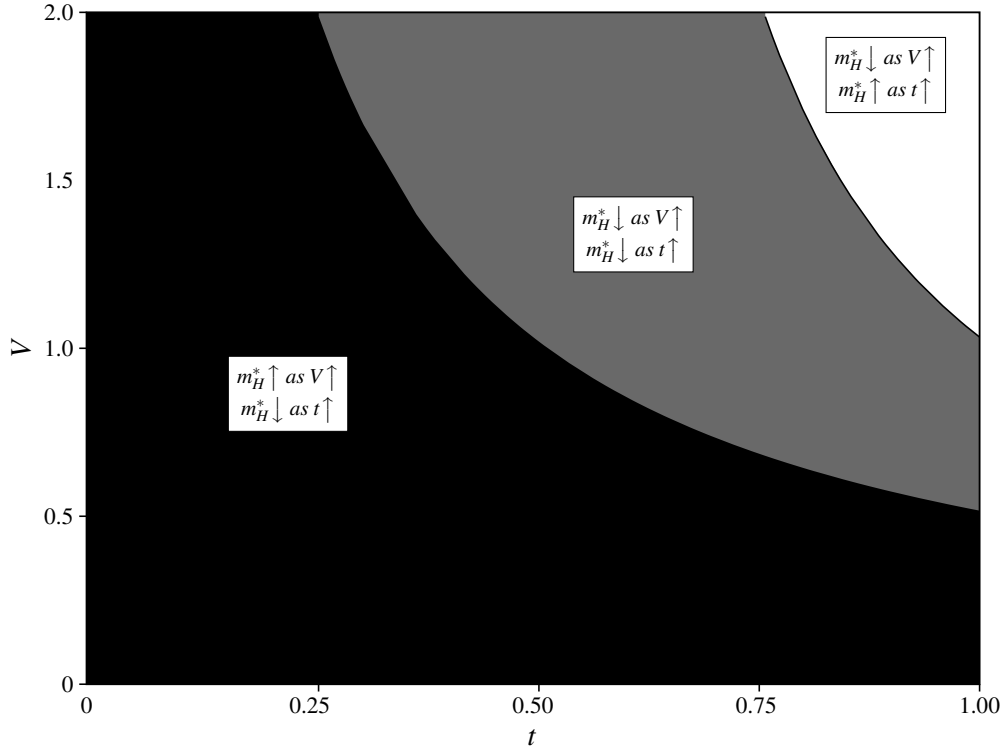
Meanwhile, V is the size of the contested prize, which is the source of revenue for both OCGs and ordinary citizens. Other things being constant, increasing V means not only higher revenue for OCGs, but also the higher illicit benefit for ordinary citizens. Even when the fraction t stays the same, increasing the entire size of V will increase the size of the allocated revenue to the ordinary citizens. In this case, the higher illicit benefit does not come at the expense of OCGs' income.

Proposition 4 summarizes the effect of increasing t and V on the threshold m_H^* and its implication on the intensity of equilibrium violence. It also presents a set of conditions required to sustain the reduced equilibrium violence in the event of changing m_H^* .

Proposition 4. *Holding all else constant, m_H^* decreases as t increases until $t^* \equiv \frac{(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}}{2(1-q)V\delta} + \frac{1}{2}$. Similarly, all else equal, m_H^* decreases as V increases beyond $V^* \equiv \frac{(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}}{2(1-q)r\delta}$. The shift in the threshold creates a parameter space wherein, assuming government collusion, the equilibrium violence can decrease from a high to moderate intensity. The parameters falling within this intervening parameter space must satisfy the following conditions for violence reduction to occur:*

- $r \leq (1-q)\{1+(tV+\varepsilon-s)\delta\}(1-t)V - \underline{m}$
- $k \leq q\{1+(tV+\varepsilon-s)\delta\}(1-t)V$

Figure 2.2: Comparative Statics of m_H^*



Note: Comparative Statics of m_H^* as fraction of the prize to be provided to the ordinary citizens (x-axis) and size of the prize (y-axis) vary; The black region depicts the parameters where the threshold m_H^* increases as V increases when other parameters are being kept constant; on the other hand, the same threshold m_H^* decreases as t increases, with other parameters being constant. The dark gray region represents the parameters where the threshold m_H^* decreases as V increases; in this region, the threshold m_H^* consistently decreases as t increases. The white region represents the parameters where the threshold m_H^* decreases as V increases, while the threshold m_H^* increases as t increases. Other parameters are fixed as following: $\varepsilon = 0.4$, $s = 0.1$, $\delta = 0.8$, $q = 0.7$

Figure 2 illustrates the comparative statics analysis results where two parameters, t and V , are varied while holding other parameters constant at reasonable values. The figure categorizes parameter ranges based on the direction of movement in the threshold m_H^* . The black and white regions show that an increase in t and V has opposite effects on m_H^* , while the dark gray region shows that an increase in both parameters leads to a decrease in the threshold m_H^* .

Proposition 4: The effect of Increasing t on m_H^* .

I begin with discussing the effect of increasing t on equilibrium violence, and further, I will examine its chain effect on G's response. Increasing t up to t^* pushes the threshold m_H^* downward. The threshold shift creates the parameter space between the prior threshold and the new threshold. For this intervening parameter space, OCG2 that used to choose the high level of violence now alters its choice to the low level, conditional on G choosing to collude.

OCG2 reduces the level of violence due to the increasing cost associated with using high violence as t increases. Recall that high intensity violence significantly harms citizens' welfare, ultimately compromising

the survival prospects of both the government and OCGs. This corresponds to the opportunity cost of using high violence, the size of which increases as t increases.

When t increases within the range of $t \leq t^*$, the illicit benefit that citizens receive rises, leading to a higher survival likelihood for both OCGs and the government. In this scenario, the cost of employing high violence escalates due to the potential loss of strong citizen support (and thereby survival likelihood). As a result of this heightened cost, OCG2 ultimately decides to lower the level of violence. However, it's crucial to note that within the interval $t < t^*$, as t rises, the illicit benefit available to citizens increases, while the prize available to OCGs shrinks. The rate of increase in illicit benefit initially outpaces the rate of decrease in the prize, rendering the use of high violence expensive for OCGs. But over time, the growth rate of the illicit benefit slows, and the decline rate of the prize accelerates. Once the rate of prize decrease catches up with the illicit benefit increase, OCGs cease to reduce their violence level.

When t surpasses a certain threshold t^* , increasing t will rather push the threshold m_H^* upward. Note that the value of t^* is greater than one-half, which indicates that OCGs allocate more than half of their revenue to the citizens' welfare, while shrinking their own share. Once t crosses this threshold, OCGs find that their own share diminishes at a rate faster than they gain citizen support. In the extreme high t value, OCGs drain so much of their income for citizens that they leave a minimal share for themselves. In this situation, employing high violence becomes less costly, given the OCGs' prize is significantly reduced. Consequently, an increase in t beyond the threshold t^* creates a parameter space in which the equilibrium intensity of violence initially escalates from a moderate to high intensity, even if the government opts to collude.

In the following discussion, I focus on the range $t \leq t^*$ and examine the effect of increasing t on G's response in detail.¹¹ As previously mentioned, an increase in t lowers the threshold m_H^* and reduces the equilibrium intensity of violence for certain parameters, provided that G chooses to collude. Anticipating this shift, G adjusts its policy accordingly. Three potential scenarios might arise: (1) If G had initially chosen collusion before this change, it may continue with the collusion. (2) If G had chosen a different policy prior to this change, G might alter its response, shifting from either a crackdown or hands-off approach to collusion.

Consider the case where the status quo was collusion with the high intensity of violence. With increasing t , the equilibrium violence will reduce from the high intensity to moderate intensity, and in such a case, G will adhere to collusion. G does so because by just adhering to collusion, the equilibrium violence will subside, which makes all other conditions that support the violent collusion easier to be satisfied. The moderate

¹¹The effect of increasing t in the range of $t > t^*$ will be opposite from the $t \leq t^*$ case. As discussed previously, increasing t beyond t^* can increase the equilibrium violence for some parameter space. If G initially chose collusion, it may stick with it despite the change, or G may adjust its policy in response to this shift. The former outcome can occur when the bribe, denoted by k , is considerably high. Should G modify its policy, it could shift from collusion to either a crackdown or a hands-off. Opting for a crackdown occurs when the value of office, represented by α , is significant. Given the significant value at stake, G aims to avoid the bleak survival prospect. On the other hand, a hands-off approach is chosen when G wants to dodge the worst survival scenario but the costs associated with a crackdown (denoted by τ) or public goods provision (denoted by b) are excessively high.

intensity of violence is not only beneficial to G but also to OCGs; it increases OCGs' expected payoff of fighting by extending the survival likelihood. In turn, it eases the conditions for OCGs to accept to pay the bribe and choose to fight. Also, the government will find collusion even more appealing than the other options as they can achieve a higher likelihood of survival under collusion due to the mitigated intensity of violence. Taken together, OCGs and G will not find any incentive to deviate from collusion, and therefore, G's collusion will be reinforced.

Next, let's consider the cases involving a switch in response. An increase in t might prompt G to shift its choice from a hands-off or crackdown approach to collusion. As t increases, G anticipates a decrease in OCGs' violence under collusion, leading to a higher likelihood of survival. Prior to the change in t , G might have preferred crackdown or hands-off due to the lower survival likelihood associated with collusion. However, with the escalation in t resulting in a reduction of OCG violence, G might now find collusion more advantageous under certain parameters and thus, pivot its choice towards collusion.

In summary, the impact of increasing t can be characterized as follows: when OCGs invest more in ordinary citizens' welfare ($t \uparrow$), these citizens reap higher illicit benefits from the OCGs and thus become more tolerant of them, as well as the government that has endorsed their presence. This, in turn, boosts the survival prospects of both the OCGs and the government, enabling them to benefit from an extended payoff stream. Acknowledging that excessive violence will be counterproductive and prevent them from benefiting from extended survival, OCGs will opt to decrease their violence from a high to a moderate intensity. With the intensity of violence lessened under collusion, the government will view collusion as more advantageous than any other alternatives considering the expected likelihood of survival and the associated bribe. Therefore, G will either solidify or shift its policy to collusion with OCGs.

Proposition 4: The effect of Increasing V on m_H^* .

Proceeding to the parameter V , in the following discussion, I will explore the effect of increasing V on equilibrium violence, and further, I will examine its chain effect on G's response. When V is below the threshold V^* , increasing V up to V^* pushes the threshold m_H^* upward. In this case, increasing V will create a parameter space where OCG2 alters its choice from a low to high violence even when G chooses collusion. The condition $V < V^*$ suggests that both the illicit benefit and the magnitude of the prize for OCG are not sufficiently sizable. As V increases initially within these parameters, the potential loss OCGs face by adopting high violence — namely, the reduction in citizen support leading to a lower survival probability — also grows, though only slightly. This is offset by the growing benefit from fighting hard and claiming the prize, even when the survival likelihood is compromised. OCG2, in this context, prioritizes immediate victory, instead of ensuring long-term access to the prize. Consequently, when V is increased within the $V < V^*$ range, it

solely incentivizes OCG2 to secure the prize through escalated violence, thereby heightening the intensity of violence from a moderate to high level. Yet, as V approaches V^* , the growth rate of the prize decelerates, while the potential loss from a decreased survival likelihood sharpens. Once the rate of the latter equals that of the former, OCGs cease escalating their violence level.

Once V surpasses V^* , escalating V beyond V^* pushes the threshold m_H^* downward. The threshold shift creates the parameter space between the prior threshold and the new threshold, where OCG2 modifies its violence level from a high to low level, conditional on G choosing to collude. In contrast to the prior case, V is now sufficiently large, implying a larger prize and illicit benefit. OCG2 reduces its violence level because high violence becomes considerably costly as V increases. The cost of engaging in high violence, manifested in the loss of a high survival likelihood, is very high when V is large. Furthermore, the magnitude of the loss stemming from sacrificing the high survival likelihood escalates even more when the size of the contested prize at stake V is large. Collectively, these costs drive OCG2 to lower its level of violence, offering extended survival to both OCGs, albeit at the expense of its relative power against OCG1.

In the following, I discuss the impact of increasing V on G's response when $V < V^*$. This effect parallels that of increasing t when $t > t^*$. As mentioned earlier, increasing V under the condition $V < V^*$ can intensify equilibrium violence for certain parameters, even when G opts for collusion. If G initially chose collusion, it may stick with it despite the change, or G may adjust its policy in response to this shift. The ultimate outcome hinges on other parameters. The former scenario can occur when the bribe, denoted by k , is substantial. Should G modify its policy, it could shift from collusion to either a crackdown or a hands-off strategy. Opting for a crackdown occurs when the value of office, represented by α , is significant. Faced with high stakes, G seeks to evade a grim survival prospect. Conversely, a hands-off approach is adopted when G aims to steer clear of the worst survival outcome but the costs associated with a crackdown (denoted by τ) or public goods provision (denoted by b) are excessively high.

When $V \geq V^*$, the effect of increasing V on G's response choice is equivalent to that of increasing t when $t \leq t^*$. Under $V \geq V^*$, increasing V decreases the threshold m_H^* , and reduces the equilibrium intensity of violence for some parameters, provided that collusion is chosen. A reduction in violence leads to an increase in G's survival probability under collusion. Expecting this change, G reinforces or revises its policy accordingly. If G initially chose collusion, G can solidify its position with collusion. If G chose else, it can shift its stance from a crackdown or hands-off approach to collusion. Consequently, G's response can align with collusion in all three different cases of status quo.

Now, I turn to the comparative statics result on m_M^* . Proposition 5 summarizes the effect of increasing t and V on the threshold m_M^* and its implication on the intensity of equilibrium violence.

Proposition 5. *Holding all else constant, m_M^* decreases as t increases until $t^\dagger \equiv \frac{(q-\frac{1}{2})\{1+\varepsilon\delta\}}{2(1-q)V\delta} + \frac{1}{2}$. Similarly, all else equal, m_M^* decreases as V increases beyond $V^\dagger \equiv \frac{(q-\frac{1}{2})\{1+\varepsilon\delta\}}{2(1-q)t\delta}$. The shift in the threshold creates a parameter space wherein, assuming government taking a hands-off, the equilibrium violence can decrease from a high to moderate intensity.*

It's easy to notice that m_M^* and m_H^* have similar structures, with the only difference being the subtraction of s in the survival probability represented in m_H^* . Proposition 5 follows a pattern akin to the comparative statics result in Proposition 4, albeit with slightly higher threshold values for t and V . As in the case of G choosing collusion, when G opts for a hands-off approach, the equilibrium violence can decline from a high to moderate intensity as t increases within the range $t \leq t^\dagger$ and V increases within $V \geq V^\dagger$. Analogous to the previous proposition, the equilibrium violence can escalate from a moderate to high intensity when t increases for $t > t^\dagger$ and V increases under $V < V^\dagger$. The rationale for such shifts in equilibrium violence with an increase in these parameters is consistent with the discussion pertaining to Proposition 4.

The alteration in G's response is also analogous to the previous discussion. When violence decreases from a high to a moderate intensity under a hands-off approach, G, who previously chose a hands-off policy, will solidify its stance. G, who used to choose a crackdown prior to the change, may shift its choice to a hands-off approach as the violence level has been mitigated and G's survival probability enhanced. Similarly, G, who previously chose collusion, can switch to a hands-off because collusion no longer results in lower violence levels, as both collusion and hands-off lead to the same intensity of violence after the change.

On the flip side, when violence increases from a moderate to high intensity under a hands-off approach, the opposite can be expected. If G previously pursued a hands-off policy, it might persist with this approach if C , the cost linked with collusion (namely, the expense of protecting its ally, OCG1), is excessively high, or if the costs related to a crackdown, denoted by τ or b , are considerable. In other scenarios, G may shift towards a crackdown or collusion strategy as a means to enhance its chances of survival.

The key takeaway from both Proposition 4 and Proposition 5 is the following: under certain conditions¹², an exogenous increase in parameters t and V , respectively, boosts the illicit benefit, effectively encouraging OCG2 to reduce the level of violence when G either colludes (as per Proposition 4) or adopts a hands-off approach (as per Proposition 5). The reduction in violence by OCGs consequently increases the survival likelihood of G. This impact is significant: it encourages G to maintain or switch to either collusion (Proposition 4) or a hands-off stance (Proposition 5). This logic will henceforth be referred to as the "illicit benefit thesis", and the theoretical predictions derived from this comparative result will be documented in the following case study and also be empirically tested in the Essay 3.

¹²The gray area in the Figure 2.2.

2.5 Case Study

2.5.1 Shanghai Green Gang

The Shanghai Green Gang, particularly those operating in the French Concession, present a unique case where the governing authority colluded with an organized crime group. This case allows us to trace how the parameter V changed, and to observe the effect of this change on the criminal groups' violence when the government engaged in collusion. Additionally, we can examine how the altered activities of these criminal groups influenced the governing authority's responses.

In what follows, I establish the mapping of players in the theoretical game setup to the real-world entities in the case study. The governing authority that colluded with the Green Gang, denoted as 'G' in the game, underwent a transition over time, shifting from the French government to the Kuomintang government (KMT). I will demonstrate that despite this alteration in governance, the collusion was maintained. The opposition faced by the Green Gang, represented as 'OCG2' in our game setup, can vary across different episodes. One type of opposition is the Gentry-Councilor Clique, which, despite being a political faction rather than an organized crime group, competed with the Green Gang for political influence within the French Concession. Additionally, the Chinese Communist Party (CCP) represents another type of OCG2, a political entity with military capabilities that coexisted with the Green Gang. As the interests of the Green Gang did not align with those of the CCP, I consider the CCP as a rival to the Green Gang within this context.

The main argument I aim to present based on this case study is summarized as follows: I begin by showing that the size of the contested prize, denoted as V , increased within the range of $V \geq V^*$. The contested prize, V , is represented by the value of the opium business in Shanghai, specifically within the French Concession, which experienced expansion during the period under study. Specifically, the exogenous increase in V can be traced to the surge in opium trade in the French Concession, fueled by the police crackdown in the neighboring concession in the 1920s.¹³

This increase in the size of the prize is expected to lead to a rise in illicit benefits. In support of the illicit benefit thesis, a surge in illicit benefits, or increased survival likelihood, would act as an incentive for OCGs to regulate their level of violence.¹⁴ In the case study, I provide evidence that the increased size of opium trade and revenue compelled the Green Gang to control their level of violence, which could have spiraled out of control otherwise. This control is demonstrated through the Green Gang's intentional conflict management with their rival, namely The Gentry-Councilor Clique, and their efforts to eliminate the potential threat of the CCP, which could have incited more extensive conflicts in the future.

¹³Additionally, the parameter t is linked to the degree to which citizens benefited from the presence of the Shanghai Green Gang, specifically regarding the provision of public goods by the gang. Further relevant details regarding this parameter can be found in the model relevance section below.

¹⁴One key difference between the model and the case study is that in the case study, the Green Gang (referred to as OCG1) takes the initiative to control the violence, whereas in the model, OCG2 is assumed to fulfill that role.

Finally, it is expected that the government, observing the restrained behavior of the organized crime groups (OCGs), would continue their collusion with the Green Gang. Supporting this expectation, I present evidence demonstrating the consistent trust placed by the French authority in the Green Gang. Furthermore, I illustrate that this trust persisted even after the reins of authority changed hands, with the succeeding colluding authority, the Kuomintang government, maintaining the enduring partnership with the Green Gang.

Before showing these evidence, I start with a historical background, and then I show how this case satisfies the following scope conditions of the theory: (1) the government's incentive to reduce the cost of governance; (2) citizen's high demand for OCG-provided public goods; (3) existence of sizable illicit economy. Lastly, I provide the evidence from this case that is consistent with the illicit benefit thesis, specifically, the effect of exogenous changes in illicit benefit (driven by an increase in V) on violent collusion equilibrium.

Historical Background

Shanghai Green Gang is a criminal organization that actively operated and gained prominence in early 20th century Shanghai. The context in which it thrived, early 20th century Shanghai, plays a crucial role in understanding the development and growth of the Green Gangs. The First Opium War (1839-1842) is a major event that transformed Shanghai in many ways; especially, the war brought about multiple foreign concessions within Shanghai, and it created a distinctive governing structure, yielding unintended consequences from it. As a result of the defeat of the Qing dynasty in the First Opium War, the then-Chinese government had to sign the unequal treaties, Treaty of Nanjing and Shanghai, which required five Chinese cities including Shanghai to open to British consuls, merchants, and their families. Since then, the merchants from other colonial powers including France, the US, and Germany also moved into Shanghai, establishing sovereign concessions with their own police force and legal jurisdictions with their separate laws. By the 1910s, Shanghai became divided into three discrete cities –the Chinese City, the International Settlement, and the French Concession – with its own administrative, legal, and police systems. The divided jurisdictions and police systems created a challenge in coordination among the agencies in each settlement, and therefore, facilitated gangsters' operations as they could easily avoid the punishment of their criminal activities by moving between the jurisdictions (Martin, 1991, p.38).

Meanwhile, the city faced a massive influx of migrants in the 19th century, especially after the Taiping Rebellion, which brought around 1 million refugees into all parts of Shanghai. In addition to the political refugees, Shanghai attracted the population from rural hinterlands seeking for economic opportunities, as it was home to more than 100 industrial enterprises as well as the world's narco-capital in the 1920s. The demand for public goods was extremely high due to an outpouring of migrants into Shanghai, while foreign concession authorities barely met the demand. This stark gap created a favorable environment for the Green

Gangs to play an important role as a public good provider for migrants and allowed the gangs to become more powerful in Shanghai.

Figure 2.3: Historical map of Shanghai circa 1935



Note: From *Warfare History Network*, By Niderost (2015)

Relevance to the Model Setup

First, the foreign authorities governing the French Concession and International Settlements were motivated by the same incentive structure as seen in the theoretical model – they aimed *to reduce the cost of governance*. Given that migrants had come from many different regions, Shanghai was a place with numerous languages – Guangdong, Ningbo, Jiangsu people’s speech, Northern speech, and Shanghai local’s speech – where “distinct and frequently mutually unintelligible dialects made communication among different immigrant groups uncomfortable at best and often impossible”(Goodman, 1995). Foreign officials, apparently, were the ones with the most difficulty. Lack of understanding of language and culture made them difficult to respond to rapidly growing Chinese migrants¹⁵ and its attendant social unrest including increasing crime (Wang, 2017, p.32)¹⁶. Instead of directly ruling over the Chinese residents, two foreign jurisdictions decided to delegate the policing to the powerful gangsters by recognizing their authority to control this population and tacitly allowing them to operate illicit business in their territory¹⁷, while their own police forces and law enforcement agencies aimed to protect the lives and property of their French citizens. To summarize, the foreign

¹⁵Martin (1991, p.126) noted that according to Consul Naggiar’s figures in 1926, the Concession had a population of 308,000, with 300,000 Chinese, 7,000 non-French foreigners, and only 1,000 French residents.

¹⁶Wakeman (1996) states that “in 1922 there were 47 armed robberies reported in the International Settlement. Two years later the number had increased more than fourfold to 204 armed robberies, and by 1926 there were 448 instances of this felony— an increase of more than 950 percent within five years.”

¹⁷The chief of the Chinese Detective Squad of the Shanghai Municipal Police (SMP), Shen Xingshan, was the head of the gangster organization known as the Big Eight Mob, a part of the Green Gang initially. Similarly, in the French Concession, the Chief of the Chinese Detective Squad of the French Police, Huang Jinrong, was the leader of the French Concession Green Gang (Martin, 1991, p.39)

authority's motive behind empowering the Green Gang was supposed to lower their cost of governance and to steer clear of the troubles that can come from different languages and cultures, and it bears a resemblance to the government's objective assumed in the model (Wakeman and Yeh, 1992, p.7).¹⁸

Second, the community of Shanghai, the migrant population, in particular, exhibited a *high demand for OCG-provided public good*, and the Green Gang played the demanded role in exchange for legitimacy. This aligns with the assumption of the model, which posits that OCGs that sufficiently provide illicit benefits to the population - such as maintaining order and governance in this context - would gain tolerance without eliciting significant resistance.

As I described above, the high demand for gang-provided public goods was partly due to the unwillingness of the foreign authority to govern. Green Gangs, on behalf of the foreign authority, provided the protection and legal services for the needy Chinese population in the concessions, and they often served as a mediator between the colonial authority and the indigenous Chinese population (Martin, 1991, p.40). The bosses of Green Gangs sought to legitimize themselves even further among the population, for example, by funding Shanghai's tutelary deity to appeal to the small business owners¹⁹ and by engaging in philanthropic activities such as funding for the refugee relief during the Sino-Japanese conflict in 1932 and for the victims of Yangtze floods in 1931, setting up Zhenshi Middle School, and providing the free education (Martin, 2008, pp. 69-70). These actions collectively suggest a case in the model where the parameter 't', representing the portion of benefits accessible to citizens, remained high.

The high demand for gang-provided public goods can also be attributed to the Shanghai's unique trait, a city densely populated by immigrants and characterized by weak social cohesion. The only force that could unify the community was the 'native-place associations' (Ma and Xiang, 1998)²⁰. The Green Gang, composed primarily of migrants, strategically exploited these native-place networks. They harnessed the power of these networks to orchestrate protection rackets and secure control over domestic migrant workers. As gangs expanded their influence over immigrant society through these networks - the sole institutional support system available - the population became increasingly reliant on the public services provided by the Green Gang.

Third, Shanghai had a *sizeable, lucrative illicit economy* that could produce enough profit worth fighting for, which is in line with the model's assumption. In the early 20th-century, Shanghai saw the largest illicit

¹⁸In fact, the French concession throughout the early 1920s had to work within a stringent budgetary constraint that was "difficult to maintain the strength of the police force at levels adequate even for regular policing functions", which presumably incentivized the French authority to increase reliance on Green Gang's policing (Martin, 1991, p.111).

¹⁹Many small businesses in the Chinese City were established around the City God's Temple.

²⁰Native-place network refers to an association of individuals who come from the same hometown. These ties were most frequently economic as well as sentimental, for local communities assisted and sponsored individual sojourners, viewing them as economic investments for the community (Goodman, 1995, p.5). Immigrants utilized this network as a channel to get job opportunities and gang leaders also recruited their gang members through the native place network. As a result, gangs were mostly organized along the line of native place (Martin, 1991, p.36).

drug market against the backdrop of the national opium ban in 1906, and the opium economy constituted the main source of economic revenue for many ordinary people from all walks of life. According to the 1929 National Anti-Opium Association survey, the merchants, civil servants, soldiers, and individuals, who were involved in organized crime, accounted for 70 percent of the people surveyed (Slack, 2000, p.17). Also, opium trafficking was the economic backbone of the Green Gangs among many other sources of revenue including protection rackets, labor rackets, and running gambling dens.

In fact, opium cultivation and consumption had not been considered 'illicit' until the Qing government's decree in 1906, which provided for the gradual prohibition of opium-related activities. Despite the national attempt to suppress opium, this decree rather prompted the Chinese equivalent of bootlegging during the Prohibition era, triggering the opium price to skyrocket and the contraband opium smuggling to expand (Wakeman, 1988).²¹ In the early 1920s, China produced 30 million pounds of opium a year, far exceeding the combined amount of opium production by India, the Far East, and the near East. The widespread renewal of opium cultivation was facilitated by the political chaos in the 1920s. The provincial warlords, which emerged after the collapse of the national government, sought to finance their armies by land taxes and thus compelled the peasants to grow the profitable cash crop, namely opium (Marshall, 1976). This massive volume of Chinese opium flooded into Shanghai, and it became the world's narco-capital, where drug trafficking activities were estimated to bring in \$6 million per month to whoever controlled the drug racket. The size of the illicit economy attracted warlords and criminal organizations to vie for the control of drug trafficking in Shanghai (Wakeman, 1988).

Evidence

Now I turn to the illustration of historical evidence that corroborates the illicit benefit thesis. In doing so, I focus on the activities of the French Concession Green Gang that engaged in collusion with the French authority in the 1920s and that sustained alliance with the Kuomintang (KMT) party in the late 1920s.

Status Quo: Violent Collusion The collusion had been a status quo form of the French Concession-Green Gang relations since the early 1920s. By the late 1910s and early 1920s, the French concession was mired in complex security concerns compounded by external and internal factors: (1) the large reduction of the French police forces in the wake of World War I, (2) the Concession's budgetary constraints, (3) the perceived threat from the neighboring International Settlement, and (4) rapidly expanding Chinese and non-

²¹With respect to the scale of nationwide opium economy, Slack (2000) noted,

In 1926, Tang Shaoyi, honorary chairman of the National Anti-Opium Association, stated, "China spends yearly \$800,000,000 in locally produced opium and \$200,000,000 in imported opium and other narcotics." In 1933, another Chinese source estimated the opium traffic at \$2billion annually. ... [T]hen conservatively speaking, the opium business accounted for approximately 5.2 percent of China's gross domestic product (pp.32-33).

French foreign population which accompanied crime in their territory.

The growing anxiety about their vulnerabilities prompted the French officials to ally with Huang Jinrong, who was a member of the police detective in the French Concession as well as a Green Gang boss. The French authorities gave the Chinese members of the police force greater responsibilities and promoted Huang Jinrong to the Chief of the Chinese detectives (Martin, 1991, p.111). While the Green Gangs became in charge of policing the Chinese population through Huang Jinrong²², they also strove to reach a secret negotiation with the French officials over the endorsement of opium monopoly in the French Concession; in June 1925, the contract that guaranteed the protection of Green Gang's opium business finally came into effect (Martin, 1991, p.121).

There is clear evidence that the French authorities gave favors to the Green Gangs as a result of the collusion. A case in point is a series of raids by the French Concession Police on opium traffickers in early August 1925. Although the local press described this raid as 'a determined campaign against opium traffickers', and it seemed to indiscriminately target the gangs and opium traffickers, Martin (1991) suggests the possibility of the selective crackdown given the terms of the agreement between the gangsters and the French authorities:

It is possible that the raids were carried out against rival opium traffickers with the agreement of the Green Gang leadership, and that the raid on the premises in Wei Xiang Lane was merely a 'blind' to distract public attention away from the true purposes of this activity. ... Added weight is given to this conclusion by the fact that the major opium trafficking organization hit by the raids was the Guobaofeng Company and not the Three Prosperities Company (p.123).

An Exogenous Increase in Contested Prize, V In the mid-1920s, there was an exogenous increase in the contested prize, specifically, a surge in revenue from the drug market in the French Concession. This change was triggered by the Shanghai Municipal Police's crackdown on drug trafficking in the International Settlement, pushing the distribution network into the neighboring French Concession (Wakeman, 1988)²³. The opium eradication efforts in the International Settlement were extremely intensive, taking place over a three-year period from 1924 to 1926. During this time, prosecutions for opium trafficking made up over 46 percent of the total number of prosecutions in the ten-year period from 1918 to 1928 (Martin, 1991, p.86). As a result, the French Concession witnessed a significant increase in drug trafficking.

I would like to take a moment here to highlight that the increase in drug economy revenue occurred within the context of $V \geq V^*$. In the mid-1920s, the opium market was substantial; as noted previously, it was

²²Huang Jinrong's Green Gang dominated the Chinese rank-and-file of the police force.

²³It's important to note that in the early 20th century, Shanghai was divided into three districts: the French Concession, the International Settlement, and the Chinese city.

estimated that the drug trafficking activities generated around \$6 million per month for those controlling the drug racket. It is worth considering a comparison with the period when Mao came to power and implemented a strict policy prohibiting opium production and consumption (Meyer and Parssinen, 2002, pp.276-281). Mao's policy resulted in a significant reduction in the market volume, falling below the threshold scale. In contrast, the early 20th century can be characterized by an opium market that was considered to be above the threshold scale.

With the burgeoning volume of opium trafficking, the Green Gang's ambition to enlarge the areas of their interests and the degree of their influence over the French administration had grown over time. As predicted, it led the French Concession Green Gangs to engage in both covert and overt conflict for power with its rival, the Chinese Catholic 'Gentry-Councillor Clique' (Martin, 1991, pp.115-117).

Controlled Gang Violence Although some competition took place between the Green Gang and the Gentry-Councilor Clique over the power and influence in the French Concession, it appears that the violence itself didn't go too far. Presumably, Huang Jinrong, who was chief of detectives as well as a boss of the Green Gang, played a huge role in preventing gang violence from escalating. As maintaining the social order was a pivotal part that upheld the implicit deal with the French Concession, Huang is known to have "kept violent crime, or at least crime against the social elite, at a level low enough to satisfy the French" (Fewsmith, 2021, p.115). In fact, making this small group of the French residents content was effective enough to maintain the collusion, for the French residents and social elites were the ones held accountable by the French authorities, at least until 1927²⁴. This suggests that Huang kept the violence under control so as not to disturb the population and ultimately to maintain the Green Gang's survival, as predicted by the theory.

There is another historical event that can be interpreted through the concept of controlled gang violence—the Green Gang's decision to ally with Chiang Kai-Shek, joining in his coup of April 1927 that purged the members of the Chinese Communist Party (CCP).

In the mid-1920s when the French Concession saw the upswing of opium trafficking, Shanghai became engulfed by the May Thirtieth Movement, a wave of nationwide anti-imperialist labor movements, initiated by the killing of 13 labor demonstrators by British police in 1925. Most of these strikes and violent demonstrations were organized by the CCP which mobilized the public hostility toward the foreign concessions

²⁴The government of the French Concession was highly centralized around the French Consul-General, whose power can be limited only by the French Minister and the French Government, while the Municipal Council, technically the representative governing body, remained as a purely advisory capacity (Johnstone, 1937, p.113). Originally, four French and four foreign councilors constituted the Municipal Council, which was chosen for a two-year term; Property qualifications were stipulated both for voters and councilors (Johnstone, 1937, p.103). Despite the overwhelmingly large Chinese population, it was not until 1927 that Chinese representatives gained full rights of participation in the council's affairs; yet these five Chinese councilors were 'appointed' by the Consul-General. Throughout the latter half of 1927, the French Concession Chinese Ratepayers' Association (CRA), established in early 1927 and controlled by Du Yuesheng, a Green Gang boss, put pressure on the French Concession, demanding that the Chinese representative members should be elected by the CRA instead of appointment by the Consul-General (Martin, 1991, p.217). As this demand was accepted by Consul Koechlin in the late 1930s, the CRA won the right to elect the nine Chinese advisors to the Provision Committee, which consolidated the power of the Green Gang in the representative governing body (Martin, 1991, p.222).

(Martin, 1991, p.150)²⁵. The CCP'S ultimate aim was to recover the foreign settlements (Fewsmith, 2021, p.136). Such attempts imposed an immense threat on the standing of both foreign concessions and the Green Gang²⁶. For the Green Gangs whose central goal was to preserve collusion with the French authority and the opium monopoly in the Concession, the CCP was a dangerous and capable opponent that could potentially hamper the Green Gang's economic interest given its political ambition and capability. This is supposedly one of the motivations that drove the Green Gangs to aid Chiang Kai Shek's plan to suppress the CCP members and related labor strikes²⁷.

The Green Gang's move to preemptively remove the potential threat, CCP, meets two criteria for controlled violence. First, their move was conducive to controlling the violence in the long run, because if the Green Gangs had not dealt with the CCP in its nascent stage, the scale of conflicts could have become much more extensive, incurring greater cost and damage to the French Concession. Second, theoretically, the reason why controlled violence emerges is that OCGs should take into account the welfare of the electorates or politically powerful groups for their own survival. In fact, the Green Gang's decision to combat the CCP was also in accordance with the core electorate's interest in the French Concession and that of influential Chinese merchants. The French or foreign merchants, who may constitute the majority of eligible voters, did not want to give in to the labor movements²⁸, and many of the Chinese elite merchants, who were once the major players in the labor movements, also turned to the side of Chiang Kai-Shek (Fewsmith, 2021, p.117). In addition, the Green Gangs seem to have avoided using indiscriminate violence against the merchants, as Fewsmith (2021, p.138) noted that "the role of the Green Gang in intimidating merchants was limited and selective...none [of shanghai elite merchants] was ever arrested, kidnapped, or otherwise terrorized; on the contrary, many of them continued to call for merchant support of the Nationalists(the side of Chiang Kai-Shek) even at the height of the terror".

Consolidated Collusion with the French Concession After the purge of 1927, the collusion between the French authorities and the Green Gangs became even more consolidated. The accord reached in 1927

²⁵There seem to have been hostility toward the French Concession, in particular, among some Chinese population, because of France's laissez-faire policy that allowed the gambling houses, opium dens, and other vices in the Concession, as opposed to the international settlement that (relatively) strictly restricted such illicit activities. People believed that France was to blame, which made Chinese people degrade and demoralize (Han, 1932). The International Anti-Opium Association, organized by Protestant missionaries, was one of the prominent anti-opium voluntary associations that mobilized, domestic and international, anti-opium public opinion.

²⁶However, Johnstone (1937) pointed out that the French Concession experienced very few strikes and labor disputes because of its lack of industry on any large scale. Nevertheless, the Concession was not completely insulated from the labor movements, as the "trouble in the International Settlement or the Chinese territory often brings repercussions among the Chinese population of The Concession." (Johnstone, 1937, p.110)

²⁷However, it should be noted that as the CCP, Chiang Kai Shek's nationalist party (KMT) was not greatly favorable toward the foreign settlements (Martin, 1991, p.218), so later we observed the Chinese nationalist government actively demand the complete rendition of foreign settlements and concessions (Johnstone, 1937, p.293). Yet, a critical factor that made the Green Gangs side with Chiang Kai-Shek, aside from preventing further social disturbance, was "the Guomindang's attitude to their monopoly of the opium traffic in Shanghai". As Martin (1991, p.154) notes, "There are strong indications that the agreement reached between Jiang Jieshi and the Green Gang bosses contained a provision for Green Gang control of any future Guomindang opium monopoly."

²⁸There is a good amount of evidence that the French authorities indeed supported the execution of anti-communist coup in mid-April 1927, for example, by providing arms (Martin, 1991, p.211).

between Du Yuesheng, the Green Gang boss who followed Huang Jinrong, and Captain Fiori, the representative of the French Concession, was a “reaffirmation of the 1925 agreement on opium trafficking and the extension of the narcotics distribution network within the Concession”, which they even referred to as official monopoly (Martin, 1991, p.213). The collusion equilibrium was maintained until 1931 when the French authorities finally recognized that Du Yuesheng’s organization was in control of the local labor unions²⁹ as well as the representative governing body “had become a formidable power in its own right, and one which sought to take over the Concession’s administration and to substitute itself”, which triggered the French Concession’s move against Du Yuesheng in the wake of the outbreak of conflict between Chinese and Japanese forces (Martin, 1991, p.244).

Extended Collusion with Chiang Kai-Shek’s Nationalist Party It is interesting to see that even after the Green Gang’s collusion with the French Concession authorities fell apart in 1932, they were still able to survive and continue their illicit business through the new collusion with the Chinese government. Initially, during the Northern expedition, Chiang Kai-Shek’s Nanjing government attempted to establish a state monopoly of opium to finance the regime, which infringed the entrenched interest of the Green Gang. It in turn resulted in the retail war between the official monopolists and the green gangs as well as the assassination attempt of T.V.Soong, the minister of finance, who continuously promoted the official opium monopoly. After all, Chiang Kai-shek decided to stop competing with the Green Gangs, but instead, appointed Du Yuesheng to the newly created Shanghai Opium Suppression Committee in 1935, leveraging collusion with the gangs to increase the control over the opium trade, while allowing the Green Gangs to continue their business (Slack, 2000, p.111).

2.5.2 Post-War Yakuza, 1945-1963

The origin of the Yakuza syndicate dates back to the Tokugawa Period (1600-1876). Since then, the yakuza has been deeply embedded within Japanese society, persisting till today. In this section, I will focus on the activities of the Yakuza and its relationship with the governing authorities during the post-war period (1945-1964), a period that witnessed a transition from what my model defines as a hands-off approach to a crackdown.

This case effectively illuminates why such a transition occurred in accordance with the logic of illicit benefit thesis, particularly triggered by an exogenous decrease in t within the bounds of $t \leq t^\dagger$.

Here, I will delineate how the roles of players within the theoretical game setup correspond to real-world entities within this context. The governing authority, represented as ‘G’ in the game, experienced a transition

²⁹Du Yuesheng attempted (and succeeded) to establish the independent influence in the Concession by gaining control of industrial labor, such as the French Tramways Union (Fadian Gonghui-FTU), to prevent the French officials from capitulating to the pressure from the International Settlement, which demanded the coordination of the policy regarding the crackdown of gambling-racket.

over time, shifting from the Allied Occupation forces to the Japanese national government. Similarly, the opposition to the Yakuza group, denoted as ‘OCG2’ in our model, varied at different points in time. One form of OCG2, in the aftermath of World War II, was the *sangokujin*. *Sangokujin*, or “People of Three Countries,” were individuals brought into Japan for forced labor from China, Korea, and Taiwan. Societal exclusion led many of them into the criminal underworld (Huang and Vaughn, 1992). Their violence was likely exacerbated by pent-up frustration from years of prejudice and wartime exploitation (Kaplan and Dubro, 2012, p.35). Another manifestation of OCG2 during the 1960s was the various internal factions of the yakuza, a period marked by an upswing in inter-gang conflicts.

The central argument of this case study revolves around the evolving dynamics between the yakuza group and governing authorities, such as the post-war occupation forces and the later Japanese government. In the immediate aftermath of the war, the occupying authorities maintained a hands-off stance towards the yakuza, refraining from interfering in the contest between the yakuza and the *sangokujin*.

As the governing authority transitioned to a national Japanese government, there was an exogenous decrease in t —the portion of illicit prize accessible to ordinary citizens. Specifically, I contend that this reduction in t was manifested through the altered nature of the prize contested by the yakuza, a shift closely associated with Japan’s rapid economic recovery. In the early post-war period, yakuza’s sought-after prize was control over the black market for necessities. Given the nature of this prize, t was high, as the yakuza benefited a wide populace by providing essential goods through the black market when the official rationing system operated unpredictably and inefficiently, leading to severe starvation.³⁰

However, by the 1960s, with the flourish of Japan’s economy and the government’s increasing role in providing public goods, the yakuza’s role in the black markets for necessities diminished. The type of illicit economy they controlled became narrower and more self-serving, benefiting only the yakuza group. This economy encompassed entertainment sectors like pachinko, public gambling, prostitution, and protection rackets aimed at hospitality businesses. While the value of the contested prize V remained substantial, there was a marked decrease in t .

I would like to point out that the value of t , even at its peak during the occupation period, did not exceed t^\dagger . The value of t^\dagger is at least greater than one half, implying that the yakuza should have allocated more than a majority of their resources for ordinary citizens. Although the yakuza’s services benefitted ordinary citizens at the time, all black market activities and policing were aimed at increasing their wealth and their legitimacy, making it clear that they did not sacrifice their wealth for the citizens’ benefit.

Following a plunge in t , I illustrate how the decline in t resulted in escalated violence in 1960s, evidenced

³⁰Dower (2000, p.96) noted that “Tokyo residents failed to receive a full month’s ration in six out of twelve months of 1946. Despite a normal harvest, deliveries in 1947 were worse. In both years, deliveries were commonly a week or two late nationwide, and the allotment of rice dropped off drastically between late spring and early fall, with various kinds of flour being increased in compensation.”

by increased internal factional conflict within the yakuza. With this surge in violence, the government is predicted to switch from a passive stance to a crackdown, especially when the costs of a crackdown, represented by τ , and public good provision, b , are low enough. I document that this scenario indeed occurred in the 1960s in Japan, when the more capable Japanese government initiated a crackdown on the yakuza group.

Before presenting this evidence, I will first illustrate how the yakuza case aligns with the model setup, specifically regarding the hands-off approach. I will focus on two vital aspects - (1) the government's motivation to decrease the cost of governance; (2) citizens' high demand for public goods provided by OCG. Then, leveraging this case study, I will provide suggestive evidence that supports the illicit benefit thesis, especially triggered by a decrease in t .

Relevance to the Model Setup

Following Japan's defeat in World War II, the country was under U.S. occupation from 1945 to 1952. In the immediate aftermath of the war, neither the Japanese government nor the U.S. occupation forces fulfilled the conventional state roles, leaving the yakuza to step in and play a significant part in post-war Japanese society. The U.S. forces' passive approach to governance and tolerance of the yakuza's role may seem puzzling, but it can be attributed to *their incentive to reduce the cost of governance*. Specifically, two incentives are prominent: the desire to minimize the cost of providing social order and the desire to reduce the expense of quelling the perceived threat of burgeoning communism (Gragert, 1997, p.157).

Similar to how the French Concession authorities in the previous case were reluctant to provide public goods due to budget constraints, the U.S. occupation forces found themselves in a similar situation (Huang and Vaughn, 1992). In terms of security provisions, they were inclined to let the yakuza enforce public order since they couldn't strengthen the Japanese police forces due to the ongoing demilitarization reforms. For instance, when the *sangokujin*, a faction of non-traditional Japanese gangsters, emerged and unleashed extensive violence against both the police force and Japanese citizens, the authorities permitted or even encouraged the traditional yakuza to combat the *sangokujin*. This approach was expected to curb further threats to public safety.

Moreover, the U.S. occupation forces leveraged the coercive capabilities of the yakuza to counteract the threat of communism. Overwhelmed by the dread of a communist revolution, the governing body in Japan - the Supreme Commander for the Allied Power (SCAP) and Japanese conservatives - sought to suppress the Japanese Communist Party (JCP) and leftist labor unions without directly getting their hands dirty. In this context, the yakuza, with their capacity to exercise extrajudicial violence, emerged as the ideal partners who could achieve their goal on their behalf. Furthermore, convincing the yakuza to play this role was straightforward, as the newly formed yakuza factions also harbored ultra-nationalist and anti-communist

ideologies (Kaplan and Dubro, 2012, p.48). Without any explicit promise of favors from the U.S., the yakuza willingly stepped in as executors. Even though the G-2 unit—an intelligence division of the U.S. Army—was charged with preventing such ultra-nationalist activities, attacks on leftists and labor unions by thugs and gangsters were largely unchecked. Indeed, the G-2 was later accused of employing these gangs to carry out its own missions to surveil and disrupt the left (Kaplan and Dubro, 2012, p.49). Collectively, these factors constituted the governing authority’s incentive to reduce the cost of governance.

Another aspect that aligns well with the model setup in the post-war Japanese yakuza case is the existence of a *high demand for OCG-provided public goods*. The background for this high demand is as follows. Following the demilitarization and reform process after surrender, the Allied Occupation forces disarmed, purged, and discredited Japan’s police, rendering them unable to effectively enforce public order. Additionally, as mentioned earlier, the occupying US authorities were not particularly inclined to provide social order to Japanese society (Hill, 2003, p.57). These combined factors created a significant demand for private protection and security offered by the yakuza. The yakuza also held considerable economic influence as they exerted control over the black markets. The lack of economic opportunities in the aftermath of the war resulted in the extensive spread of black markets throughout the country, which became a vital means of survival for ordinary people (Hill, 2003, p.45). In this context, the yakuza assumed a quasi-governmental role in the market where the occupation forces hesitated to intervene. These specific political and economic circumstances during that period positioned the yakuza as an essential provider of public goods.

Evidence

I will now discuss the evidence demonstrating the shift in the government’s response from a hands-off approach to a crackdown, following a significant decrease in t . This decrease is evidenced by a change in the type of illicit business in which the yakuza were involved.

Hands-off (1945-1950) The yakuza at the time was tolerated by most of the existing authorities in Japan, including US occupation forces, Japanese right-wing politicians, and the disarmed civil police due to their versatile armed forces and manpower, which were helpful instruments for governing. Japanese native, yakuza gangs presented themselves as “defenders of common people against the foreign hoodlums”(Hill, 2003, p.45). With the emergence of the common enemy that united the yakuza, the Japanese population, and the police, yakuza’s violence became largely justified or even supported by the general public as long as it was directed at the common enemy, *sangokujin*.

An Exogenous Decrease in Citizens’ Share, t While the post-war black market significantly benefited the yakuza in the late 1940s, a distinct economic opportunity arose during the phase of Japan’s economic recovery in the 1950s. However, the nature of this opportunity was quite different, with the economic benefits

of the illicit business accruing almost exclusively to the yakuza, indicating a low t . In contrast, their earlier involvement in the essential black market benefitted a wider population, signifying a high t .

The shift occurred as the state started to reassert itself following the end of the U.S. occupation, causing the yakuza's business interests to significantly transition from necessities to luxury and entertainment, which required higher thresholds for entry. The economic recovery of the 1950s saw a rise in the entertainment industry, encompassing activities such as pachinko, public gambling, and nighttime entertainment businesses like bars, restaurants, and prostitution (Hill, 2014, p.240). This boom substantially increased the demand for private protection services provided by the yakuza, bringing them considerable profits. While the size of the illicit economy (V) may not have changed substantially, the share of the illicit prize available to the citizens (t) dramatically reduced due to the changed nature of the yakuza's illicit economy.

Enhanced Competition (1951-1963) As predicted by the model, the increase in market opportunities led to intensified competition among different factions in their pursuit of controlling new revenue streams (Hill, 2003, p.47). This escalation in inter-gang conflicts reached an unprecedented level, with nearly half of the arrests made on organized crime group members being related to assault, bodily harm, or even murder (Hanzai Hakusho, 1989).

Equilibrium Shift to Crackdown (1964) As opposed to the previous post-war period where the hands-off policy was sustained robustly, tolerance during this period kept faltering. Finally, in 1964, the government turned to the anti-crime campaign, called a summit strategy, that involved the mass arrests of gang members, particularly high-ranking personnel.

The equilibrium shift can be attributed to the intensification of violence and conflicts among yakuza to the point where the public can not tolerate it. The uncontrolled violence may be largely due to the changing income source in the 1950s. Up until the late 1940s when the yakuza dealt with the necessary goods, and their income was dependent upon the general public, the yakuza strictly adhered to their code of ethics to avoid inconvenience to the general public as much as possible. This provided them with some sort of respectability and allowed peaceful coexistence with the authority as well as the population. However, the introduction of new income sources - luxury and entertainment- altered the incentive of the yakuza to fight. This new income source that only accrued to the yakuza detached them from the population, making them more aggressive to win the prize while making them less careful in using violence.

With the increasing public discontent, the unfettered gang feuds significantly undermined the public's tolerance toward the yakuza to the point where the elected politicians can no longer neglect the population's grievance. It was a moment where the pressure from the population outweighed the benefit of acquiescing to the yakuza group, altering the national policy from collusion to crackdown.

2.6 Conclusion

This paper advances a unified theoretical framework to illuminate the intricate logic behind state counter-crime policies. This study reveals the following: (1) certain conditions may lead to a situation where the government's collusion results in a lesser degree of OCG violence compared to any other government response. (2) In scenarios where the government adopts a non-crackdown policy, such as collusion or a hands-off approach, an increase in illicit benefits, thereby enhancing survival probability, may incentivize OCGs to reduce violence. (3) A decrease in violence has the potential to strengthen the established non-crackdown policy. These findings reveal the paradox associated with increased illicit benefits: while they can potentially mitigate OCG violence, they may inadvertently encourage governmental passivity or collusion with OCGs.

This paper's principal contribution lies in enriching the understanding of the state-crime dynamics by considering the interplay among all involved actors. Furthermore, the paper delves into the understudied realm of organized crime in Canada, while also offering a unique case study focusing on the Shanghai Green Gang and the Japanese Yakuza.

ESSAY 3

A Model of State-Crime Relations: Evidence from Canada

3.1 Introduction

In my previous paper, I have constructed a formal model to capture the complex trade-offs faced by citizens and the government in a society permeated by organized crime groups. This model considers “illicit benefits,” defined as advantages citizens might derive from the presence of organized crime groups, either through participation in the illicit economy or via the receipt of public goods provided by these groups. Nonetheless, despite these illicit benefits, citizens may experience a decrease in welfare owing to the violent competition among criminal groups vying for a contested prize. This trade-off similarly applies to the government, which can potentially reap benefits from the presence of criminal organizations but also risks losing power if competition escalates. Moreover, even the criminal groups themselves grapple with a dilemma concerning use of violence: heightened violence could boost their chances of winning competitions, but it concurrently intensifies the threat of governmental repression. The previous paper highlighted the illicit benefit thesis – theoretical results that emerge under specific conditions ($V \geq V^*$ or $t \leq t^*$) – relating to the effect of illicit benefits on the dynamics of violence among criminal groups and the ensuing government response.

While the full model encompasses the government’s optimal response to address criminal groups, this essay limits its scope to the sub-game where collusion is already selected as the government’s response. The aim of this essay is to test part of the illicit benefit thesis, investigating how variations in illicit benefits influence the levels of violence among criminal groups and citizens’ support for the incumbent government, presuming that the government’s response is fixed at collusion.¹

To do so, I examine the case of Canada, specifically highlighting the construction industry - a sector infiltrated by the mafia - as the contextual backdrop for this examination. Although relatively little known, organized crime in Canada dates back to the 1960s and remains a significant threat today, with thousands of organized crime groups currently operating. Particularly, the corruption scandal in 2009 revealed that Canada’s construction industry is severely infiltrated by the Italian mafia. The subsequent public inquiry in Quebec, initiated by this scandal, discovered evidence of the mafia’s connection with local politicians, as well as collusion between ordinary businesspeople in the construction industry and the mafia (Charbonneau and Lachance, 2015). This particular context provides a prime example of an instance where collusion between politicians and an organized crime group is evident, and where ordinary businesspeople find themselves finan-

¹In this paper, the term ‘incumbent government’ refers to either the municipal or provincial government. This is because there have been testimonies indicating corruption at both municipal and provincial levels. Analogously, ‘incumbent politicians’ denote the incumbent mayors or representatives of the provincial government.

cially entangled in illicit activities, thereby generating illicit benefits. Consequently, it offers an opportunity to examine how changes in illicit benefits, under collusion, can influence the dynamics of mafia violence and the incumbent politicians' reelection likelihood.

In examining this Canadian case, I interpret the size of the mafia-infiltrated economy – specifically, the construction economy – as representative of the size of the contested prize V in my theory. The performance of this economy, whether it booms or fails, serves as an indicator of how the size of the contested prize V changes, which in turn influences the magnitude of the illicit benefit. Furthermore, I presume that this Canadian context aligns with the scenario where $V \geq V^*$ a condition necessary for the illicit benefit thesis to hold.

With this context in mind, I conducted three distinct empirical analyses, each corresponding to a specific component of my illicit benefit thesis. First, I investigated the correlation between the size of a mafia-infiltrated economy and violent crime, examining how this relationship shifts based on the presence of the Italian mafia. To do this, I utilized the context of Canada's construction economy, infiltrated by the mafia. I used the values of building permits as a measure for the performance of construction economy, which represents the size of the contested prize V . The period of my study spans from 2003 to 2020, a time when building permit values witnessed a significant increase compared to the previous 25 years (Statistics Canada, 2018), hence can be considered as $V \geq V^*$. Next, due to the lack of sufficient granularity in the available dataset detailing violence perpetrated by organized crime groups, I utilized the violent crime rate from Canada's Uniform Crime Report (UCR) as a measure of the violence instigated by the mafia. In the Canadian context, while the Italian mafia doesn't have a formidable rival within its territory, internal factional competition and violence by street-level gangs – which often act as outsourced enforcers for mafia violence – are indeed prevalent. The violent crime rate adeptly captures these forms of conflict.

In my second analysis, I sought to determine the relationship between violent crime and the re-election chances of incumbent politicians. This relationship might seem apparent without the need for a theory, yet I aimed to verify one component of my causal chain, suggesting that reduced violent crime contributes to the extended tenure of incumbent politicians. To evaluate this claim, I utilized the violent crime data from the UCR and the Canadian Municipal Election database (CMED) to perform a simple survival analysis, investigating the effect of violent crime rate on incumbent mayors' tenure.

Lastly, I explored the correlation between a mafia-infiltrated economy and the public's political support for incumbent politicians. The theory suggests that we should observe an increase in support for incumbent politicians when the mafia-infiltrated economy thrives, as a certain group of ordinary people may benefit from this. I hypothesized that one active way this certain group might express their support for these politicians is through political donations. With this in mind, I used building permits and political donations data from Que-

bec to determine the relationship between the performance of the construction sector and political donations to incumbent politicians. I expected areas with a notable mafia presence to demonstrate a more significant effect.

Consistent with my theory, I found that an expanding mafia-infiltrated economy corresponds with a decrease in violent crime. This effect is particularly pronounced in areas where the mafia is present. I also discovered that an uptick in violent crime tends to increase the hazard of a mayor's reelection failure, regardless of mafia presence. Lastly, the results from the final test deviated from expectations, indicating that a thriving construction economy actually reduced political contributions in municipalities where the mafia is present. However, this appears to be largely due to the fallout from the corruption scandal. Taken together, these findings provide suggestive evidence in support of my theory.

In Section 3.2, I offer the rationale for my case selection and outline the plan for empirical testing. In Section 3.3, I provide background information on the case, with each piece of information underscoring the validity of the case selection. Section 3.4 is dedicated to explaining the data that I used for empirical testing. In Section 3.5, I present the results of the analysis. Finally, Section 3.6 contains the concluding remarks.

3.2 Testing the observable implications

As stated in the introduction, I start with the assumption that the aspect of the theory we're examining is a situation where the government's response is fixed at collusion. The illicit benefit thesis proposes that under collusion, the intensity of violence can decrease in two scenarios: either a fraction t of the contested prize increases, or the size of the contested prize itself, V , increases. I center my attention on changes in V to test the theoretical prediction, as t represents an internal decision made by criminal groups and is difficult to observe.

To reiterate, my thesis operates as follows: As the size of the contested prize (V) grows, so does the illicit benefit for ordinary citizens, which subsequently results in a decrease in violence by organized criminal groups. As the security and welfare of citizens improve, support for incumbent politicians increases, thus helping these incumbents in extending their tenure in office.

To effectively test these predictions, we require a case that allows us to accurately characterize the relationship between the political authority and criminal groups as collusion. Furthermore, the case should provide some evidence that an increase in the value of the contested prize indeed results in greater illicit benefits for ordinary citizens, such as a boost in income for those engaged in economic activities linked to organized crime. However, it's typically challenging to find a suitable case that fulfills these criteria, given that corruption and collusion are often clandestine activities.

Fortunately, I have identified the construction sector in Canada as a suitable case that meets the two pre-

viously mentioned conditions, thanks to the comprehensive public inquiry conducted in Quebec. Known as the Charbonneau Commission, this inquiry delved into the mafia's political connections with bureaucrats and elected officials, the potential distortion of the public procurement process, and their tactics and relationships with industry players such as construction businesses, contractors, suppliers, and engineering firms. The investigation uncovered suggestive evidence of the organized crime group offering bribes and political financing to gain advantages in procurement tenders, observations which resonate with the concepts of bribery and collusion as outlined in my theory.²

The investigation also illuminated the complicit relationship between the mafia and ordinary industry entrepreneurs (corresponding to the existence of illicit benefits). However, the entrepreneurs' testimonies were diverse in their revelations and denials, with many contending that they had been coerced or intimidated into compliance. While it is difficult to ignore the component of coercion, I maintain that illicit benefits were present because when these businesspeople colluded with the mafia, the mafia helped reduce market competition and provided exclusive access to public tenders to those within their inner circle. As a result, these individuals likely benefited from the mafia's presence and operations. The intricate tactics employed by the mafia to infiltrate industries will be detailed in the subsequent section. I anticipate that doing so will help substantiate my argument that those insiders involved in the collusion may have profited from the mafia's activities and arguably acted as stakeholders.

Turning to the outline of the empirical test, in the context of the Canadian case, the observable implications of my thesis can be adapted as follows:

1. As the mafia-infiltrated economic sector expands (i.e., the size of contested prizes increases), we would anticipate a decrease in the level of violence.
2. Subsequently, as the level of violence decreases, we would anticipate an increased probability of the incumbent politicians' re-election.
3. As the mafia-infiltrated economic sector expands, we would anticipate a greater level of support for the incumbent politicians.

As previously noted in the introduction, construction industry's performance serves as an indicator of the size of the contested prize (V). Strong performance in the construction sector suggests an enlargement of the prize, while a weaker performance suggests a reduction. Although challenging to observe, entrepreneurs colluding within the industry are likely to benefit more from an enhanced performance of the construction sector, as a greater share of the prize money will be channeled into providing illicit benefits for these individuals.

²Beyond this, the selected case adheres to many other scope conditions of the theory, such as (1) violence should be visible and cause collateral damage to society, (2) voters can punish (or reward) politicians for worsening (or improving) security and economic situations. These rationales will be further substantiated in the subsequent section.

Such an increase in illicit benefits should prompt a reduction in violence if my theory holds. I will test this prediction by examining whether a robust performance in the construction sector is statistically associated with a decrease in violent crime, particularly in municipalities where the mafia is present. Next, I will evaluate whether a decrease in violence contributes to the extended tenure of incumbent politicians. Finally, I will assess whether an improved economy infiltrated by the mafia induces greater support for incumbent politicians by examining the association between the economic performance of the construction sector and political donations to the incumbent.

3.3 Background

3.3.1 Corruption Scandal in Construction Industry and Investigation

From 2009 to 2015, both the media and the government conducted an extensive investigation into the corruption linked to the mafia in Quebec's construction industry. The investigation was sparked by a news report in October 2009 that uncovered purported collusion and corruption within Montreal's construction sector. In response to this report, the police formed Opération Marteau, an anti-corruption task force that began investigating bid-rigging, market segmentation, complementary bidding, and bribes to bureaucrats and politicians, all of which were allegedly orchestrated by the Italian mafia group (Clark et al., 2018). After two years of the police investigation which yielded several arrests, the province of Quebec extended the investigation by appointing Justice France Charbonneau to lead a public inquiry on 19 October 2011.³

This public inquiry is formally called "Commission of Inquiry on the Awarding and Management of Public Contracts in the Construction Industry (hereafter Charbonneau Commission)". It examined the existence of systematic corruption and mafia infiltration in the awarding and management of public construction contracts that occurred over the past 15 years (i.e. from 1996, when the Parti Québécois was in power). The Charbonneau Commission has made its final report publicly available in 2015, which sums up the expert and public consultations, and the testimonies of 189 factual witnesses and nearly 300 witnesses, gathered during 261 days of hearings over the two years of public inquiries. In its final report, the Charbonneau Commission concluded that the extent of corruption and collusion with organized crime groups was 'far more widespread than originally believed (CBC News, 2015).

This report serves as a credible and powerful source of information that documents the existence of mafia infiltration in the legitimate economic sector. It should be noted that the Commission was granted extensive powers, including the ability to subpoena witnesses and compel testimony under immunity from criminal charges. This enabled them to gather substantive evidence that might not have been available through a purely academic interview process. Given the criminal nature of the matter and the fact that witnesses would

³For more details on the development of the investigation, see Gyulai (2015).

have no incentive to reveal the truth in a non-compelled interview setting, it is unlikely that a similar level of evidence could have been gathered without the Commission's powers.

3.3.2 Presence of Organized Crime in Canada

The information in this section is gathered from several Annual Reports on Organized Crime in Canada from 2003 to 2010, and 2019 and 2020, published by Criminal Intelligence Service Canada. While organized crime in Canada may not be widely recognized globally, such groups have been widespread across the country since the 1920s and continue to be prevalent today. They operate not only in major urban centers but also in small rural areas. As noted by Assistant Commissioner, Steve Graham, Commanding Officer in New Brunswick Division, "Few communities realize how pervasive organized crime can be. Organized crime can be found in communities of all sizes, and its impact in the smaller, rural areas is often far more devastating than it is in the large urban centers" (Criminal Intelligence Service Canada, 2007, p.13).

Over the last two decades, five prominent organized crime groups have operated in Canada: Aboriginal-based, Asian-based, Eastern European-based, Outlaw Motorcycle Gangs (OMG), and Italian-based criminal groups.⁴ As can be inferred by its name, these criminal groups used to be based on ethnicity or the origin of the country, but over time, the internal composition of many organized crime groups has become multi-ethnic. The overall number of organized crime groups identified by the criminal intelligence community has been on the rise every year, increasing from 800 OCGs in 2006 to more than 2,000 OCGs in 2020.⁵ While some organized crime groups' presence is more diffuse across the country than the others, they tend to have their own geographical territory and stronghold.⁶

The *Rizzuto crime group*, alleged to be involved in the construction corruption scandal, is based in Quebec and Ontario, and is arguably the largest Italian-based criminal group in Canada.⁷ Violence and intimidation are common instruments for criminal groups of all levels of sophistication, as the evidence shows that 73 percent of the assessed OCGs in 2020 are believed to be involved in violent activities, ranging from assaults and extortion to shootings and homicides (Criminal Intelligence Service Canada, 2020, p.7).

According to Criminal Intelligence Service Canada (2007), the illicit drug market is the most extensive and important criminal market in Canada considering the number of participating organized crime groups and consumers, and the size of the illicit revenue it generates. Approximately 80 percent of all crime groups

⁴The Italian-based criminal group is also referred to as the 'Traditional Organized Crime' (TOC) group. To avoid confusion with terminology, I will consistently use the term 'Italian-based' group.

⁵However, the criminal intelligence authority argues that the increased number of organized crime groups can be largely attributed to enhanced reporting and efforts of the intelligence community to provide an accurate assessment of organized crime, not necessarily the indication of the growing prevalence of organized crime in Canada.

⁶Of course, like other countries, there has been the rise and fall of the group and geographical fluidity over time, which is largely dependent on the government's crackdown.

⁷Italian-based criminal group comprises three main strands: the Sicilian mafia, the 'Ndrangheta (Calabrese), and La Cosa Nostra based in the US. Rizzuto Crime Family, which was at the center of Montreal Construction scandal, comes from a part of the Sicilian faction.

in Canada are involved in this market but their role in the supply chain may differ: myriads of street-level traffickers are at the operational level while a smaller proportion of crime groups are capable of more sophisticated operations such as wholesale distribution, importation and domestic production. No single organized crime group monopolizes any specific illicit drug market, either national or regional. Due to the existence of numerous players, violent competition over the control of the market often takes place. However, rivalries do not necessarily dominate. Temporary alliances between crime groups are often created to pool resources necessary for the success of specific criminal ventures. For example, Italian-based criminal group is in a symbiotic relationship with the Hells Angels in British Columbia.

While almost every criminal group, however small or large, is involved in drug trafficking, only a handful of sophisticated criminal groups are able to pursue their business in the legitimate sector using corruption and infiltration. The Italian-based criminal group is well-known for its involvement in public sector infiltration, as well as in some private sector industries, including accommodation and food services, retail trade, transportation and warehousing, construction, and various other services. These private businesses are often targeted because they provide OCGs with the opportunity to collect protection money, evade taxes, and launder the proceeds of criminal activities (Criminal Intelligence Service Canada, 2020, p.7).

3.3.3 Mafia Infiltration in Construction Industry

Among several businesses in Canada under the control of the Italian-based mafia, this paper's empirical analysis centers on the construction industry. Here I show how the mafia manipulates the industry and in what ways ordinary entrepreneurs are involved in the mafia's construction business. By doing so, I substantiate the theory's key assumption that some ordinary entrepreneurs and business people are also the beneficiaries of the mafia's infiltration.

According to the report of the Charbonneau Commission, organized crime groups use manipulative tactics to obstruct the competition, namely, bid-rigging and entry deterrence (closing the market). Bid-rigging is defined as "a particular form of collusive price-fixing behavior by which firms coordinate their bids on procurement or project contracts"(OECD, 1993). The organized crime group assumes the role of colluding the firms and bribing the official; specifically, OCGs help coordinate which firm will submit the lowest bid ⁸, enforce and monitor the process so that no individual firm deviates. They do so in exchange for a *pizzo* (protection fee) or a cut of any contract as part of the bid-rigging collusion system. In some cases, they directly partake themselves in the bid through founding, investing in, and taking over the companies. Bid-rigging results in hampering the price competition and inflating the cost of the public contracts, which will be passed

⁸Charbonneau Commission (2015) presents four specific schemes by which to coordinate and determine the winner - (1) Rotation of winners with submission of bids of convenience. The cartel members agree to take turns presenting the best offer.; (2) Rotation of winners with abstention from bidding; (3) Compensation of subcontracts or money to those companies that withdraw from the tendering process ;(4) Market sharing by type of work, customer, or geographical area.

on to the taxpayers ultimately ⁹.

While bid-rigging is a way of price-fixing, entry deterrence is to block a new entrant in the market so the small number of the companies can dominate the entire market. In doing so, the colluded firms employ the following schemes: (1) intimidation (verbal or physical threats), (2) vandalism or sabotage on the competitor's job sites (damaging machinery or vehicles), (3) multiple complaints against the competitor to the administrative agencies in order to embroil the company in administrative procedures, (4) making the competitor unable to submit a bid or unable to bid at a competitive price by disrupting their supply chain - e.g., refusing to sell the materials (or lease the equipment) or offering them at an exorbitant price (Charbonneau Commission, 2015). Mafias get involved in this process, especially when using coercion, and they likewise take a cut from the contract.

Obstructing market competition is a crucial strategy for the mafia to gain control of the market. This not only benefits the mafia but also the firms that collude with them, which is why these firms likely acquiesced to the mafia's practices. Some may argue that the colluded firms had no choice but to comply with the mafia's coercion. However, given the long-standing collusion dating back to 1996 or even earlier, it is unlikely that coercion alone sustained the enduring collusion between business and the mafia. It is more plausible that the colluding businesses gained significant benefits from obstructed market competition, allowing their collusion to continue.

3.3.4 Collusion between Politicians and OCGs

The mafia and corrupt firms strove to make connections with politicians to win contracts. The administrative officials or local politicians have been the main target for corruption because the management of the construction projects, ranging from procuring the public contracts to establishing and enforcing the regulation, is often conducted at the local level.¹⁰

Especially, one common form of kickback given to the elected officials was the organization and financing of their election campaign. According to one witness who testified in the investigation, 60 turnkey elections¹¹ were organized by the engineering firm between 1997 and 2007, particularly in municipalities on the outskirts of Montreal. In addition, bribes can be given in the form of political contributions or party financing. Ac-

⁹CBC News (2012) reports that "The corruption inquiry has been shedding light on collusion tactics that raised the cost of Quebec projects by as much as 35 percent — as the Mafia, certain political parties, construction companies, and corrupt city officials all cashed in on the illicit spoils."

¹⁰The procurement bidding takes place at the municipality level. The provinces establish regulations in construction, including building, fire, plumbing, and electrical codes. They also manage health and safety regulations, wages, and labor practices. However, the enforcement of these codes remains the responsibility of local authorities. It implies that the regulation and enforcement vary across the provinces and municipalities, which facilitates criminal entities to exploit regions with less effective code enforcement or lower standards with regard to certification.

¹¹The "turnkey" election approach exemplifies political corruption at its core. In this method, an engineering company, often in tandem with other professional entities, funds the electoral campaign of a mayoral candidate. In return, they anticipate a preferential treatment, verging on exclusivity, for municipal contracts if their candidate wins. Occasionally, these firms even coordinate entire election campaigns using specialized political organizers, leading to the term "turnkey" elections (Charbonneau Commission, 2015).

According to Lino Zambito, a former Montreal construction boss, “Three percent of city contracts’ value went through a middleman to Mayor Tremblay’s Union Montréal party, and the other one percent was considered a “tax” by the city engineer who drew up the public-works contracts.”(Spencer, 2019, p.42)

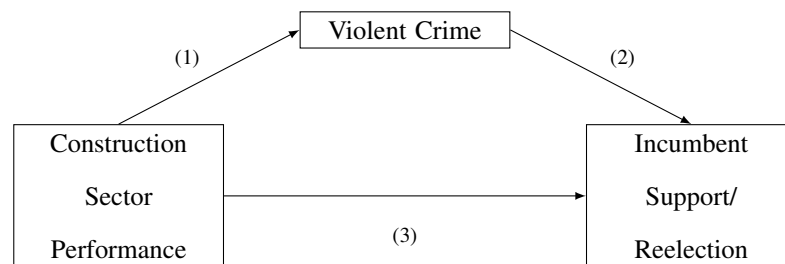
The testimony from Charbonneau Commission (2015, p.14) reveals that they even hired straw donors to deliver the political contribution:

Political contributions were often paid with cash that was used to reimburse straw donors. Business leaders used false invoicing schemes to obtain that cash. In some cases, they used criminal networks for false invoicing. Witnesses from both engineering firms and contractors reported paying political contributions and reimbursing straw donors with money obtained by charging the municipality for false extras.

In exchange for party financing, the colluded firms and the mafia can obtain quasi-exclusivity on municipal contracts following the election by making a mayor on their side. Specifically, the engineering firm hands the “model tender calls” to the municipality that indicates the selection criteria built to maximize the chance of their selection. They even manipulate the composition of selection committees by seating people who are in favor of the colluded firms.

3.4 Data

Based on the background information previously provided, I expect to see three broad patterns in Canada, consistent with the general observable implications discussed above. (1) Violent crime should decrease when the construction sector is booming. (2) If violent crime decreases, incumbent official should be more likely to stay in office. (3) There will be higher incumbent support when construction is booming. The posited association (1) and (3) should be more pronounced in those areas where the Italian mafia is operating.



Construction Sector Performance To measure the economic performance of the construction industry, I use the 2003-2020 annual building permit data. Building permit is a key indicator of the performance of the construction industry. In particular, I use the value of building permits, which indicates the aggregate expenditure on materials, labour, profit and overhead needed for building construction (Statistics Canada, 2001).

This municipality-level dataset is available upon the request to Statistics Canada. The agency constructed the dataset by compiling the monthly survey of building permits issued by Canadian municipalities.

(Italian) Mafia Presence I construct the Italian mafia presence variable based on the intelligence reports. Although it is possible that other OCGs also have been involved in construction corruption, I only focus on the Italian mafia, whose infiltration into the construction industry is confirmed by the public inquiry. Different types of OCGs are spread across Canada, but there is no precise, official data for the presence of each organization. As an alternative, I refer to the annual reports on organized crime by criminal intelligence service Canada that have been published over the years (2003 through 2010, and 2019 - present) and construct the Italian Mafia Presence variable. According to the reports, their main operating areas are Greater Montreal in Quebec and Greater Toronto and Hamilton Area (GTHA) in Ontario, which remains quite constant throughout the years. Based on this information, I create a binary presence variable that indicates if a given municipality is within the main operating areas.

Violent Crime In measuring the violent crime conducted by organized crime groups, it would be ideal to use the OCG-related crime data, but due to the limited granularity on the current police-reported organized crime data, I instead use the 2003-2020 municipal-level, violent crime rate (per 100,000 population). The data comes from incident-based crime statistics from the Uniform Crime Reporting Survey (UCR), the publicly available dataset from the Statistics Canada.¹² The measure entails total violent criminal code violations, including the incidence of Homicide, Level 1 Assault such as robbery, abduction, extortion, criminal harassment, total other violations causing death, attempted murder, sexual assault (Level1-3), and total sexual violations against children. While the original data source is available from 1998, I opt to focus on the period since 2003 because of the extensive municipality reorganization that occurred in Quebec in the early 2000s, especially in 2002.¹³

Electoral Outcomes I took municipal election results from the Canadian Municipal Election database (CMED). Although the original dataset includes all elections for all types of municipal government positions, I primarily focus on the mayoral elections, which elects a single mayor per municipality, though there are some exceptions. As our interest lies in examining the incumbent's performance, the sample has been further refined to focus on the subset of mayoral elections where the incumbent is running for re-election. Notably, there are no term limits for mayors in Canada, allowing incumbents the opportunity to run for re-election

¹²It is important to note that the original dataset is broken down by police service jurisdiction, which does not necessarily correspond to the municipal boundary (census subdivision) or census division boundaries. As a result, geographic identifiers had to be manually coded to match the unit of analysis in other datasets.

¹³In 2002, small cities were amalgamated into larger ones, resulting in significant changes to police service jurisdictions and the format of police-reported crime data. However, there is limited information available on the police jurisdiction changes, which makes it difficult to transform pre-2002 data into the post-2002 format without making arbitrary choices that could distort the data. Therefore, I have decided not to use data from before the 2002 reform to avoid potential data distortion.

indefinitely.¹⁴

I consider mayors in office from 2004 to 2020 and analyze length of the time each mayor occupied an office, rather than the incumbent party did, as mayors in this context typically do not have affiliations with political parties.

Incumbent Support I consider a behavioral measure of incumbent support, measured by the amount of campaign contribution to the incumbent. As elaborated above, political contribution is a channel through which colluded business people can support, without much effort, the official who endorsed the corruption. Focusing on Quebec province, I exploit the records of political donors that are available on the Élections Québec website. I gather various information from donors, such as their name, postal code, city, the amount and the number of payments, and the political entity to which the contribution was made. Using the donors' geographic location, I aggregate the individual-level contribution data to the municipal level. Then, I obtain data on the political party in power in a particular electoral district during a given year. Using the incumbency information, I calculate the total contributions given to an incumbent in each municipality and year. I construct the dataset at both the provincial and municipal (mayoral) election levels.¹⁵ The contribution data for the provincial election covers the period from 2011 to 2021, and those for the municipal election from 2013 to 2021. Note that this period is after the corruption scandal.

Before May 2011, donor's geographic location was not subject to disclosure requirement, but after revision of the Election Act, Article 93.1, the disclosure of the contributor's name and postal code became an requirement regardless of the contribution amount. This new mandate allows me to harness the donor information on the website and to estimate the total contribution of each municipality. Since the sample is only concerned with Quebec's election, the analysis using this variable will also be restricted to Quebec.

Controls As controls, I included annual consumer price index (CPI)¹⁶ and unemployment rate of the census metropolitan areas (CMA)¹⁷, proxying for the region's economic characteristics, and median individual income and population of a municipality, taken from the 2001, 2006, 2011, 2016 census survey. Data of CPI and unemployment are from Statistics Canada.

The unit of analysis is municipality-year for the test (1), mayor-election cycle for test (2), municipality-election cycle for the test (3). Table 3.1 below shows the descriptive statistics for the sample.

¹⁴In essence, my study focuses on races where (1) there is only one contested seat for mayor; (2) the incumbent can be identified; and (3) the incumbent is running for re-election.

¹⁵For the municipal races, I consider the sum of political donations instead of the donations given to the incumbent. Most municipal elections are not affiliated with political parties. There was no feasible way to isolate the donation directed to the incumbent candidate.

¹⁶CPI signifies the inflation rate over time of a region and also indicates the different living expense across the regions.

¹⁷It includes some metropolitan areas with a population more than 100,000 in Provinces and Territories.

Table 3.1: Descriptive Statistics

	All	Presence=0	Presence=1
Mafia Presence (Binary)	0.12 (0.32)	0.00 (0.00)	1.00 (0.00)
Building Permit (Value, mil CAD)	59.81 (335.09)	46.45 (233.40)	160.18 (731.80)
Building Permit (Value, logged)	8.97 (1.85)	8.85 (1.82)	9.84 (1.84)
Violent Crime (per 100,100ppl)	1,283.50 (1,214.32)	1,340.72 (1,274.20)	853.51 (381.27)
Median Individual Income (CAD)	28507.21 (7,384.42)	28058.36 (7,346.34)	31880.36 (6,773.01)
Consumer Price Index (Annual)	120.81 (9.84)	120.93 (9.97)	119.98 (8.76)
Unemployment rate (Annual)	7.13 (1.71)	7.09 (1.78)	7.43 (1.06)
Sexual Violence	53.68 (27.61)	55.36 (28.63)	46.28 (21.03)
Municipal Electoral Outcome (Incumbent-running races)			
Mafia Presence (Binary)	0.16 (0.37)	0.00 (0.00)	1.00 (0.00)
Incumbent Reelection (Binary)	0.76 (0.43)	0.76 (0.43)	0.76 (0.43)
Municipal Election Contributions (Quebec only)			
Mafia Presence (Binary)	0.19 (0.39)	0.00 (0.00)	1.00 (0.00)
Number of Payments	17.37 (179.35)	8.34 (51.99)	55.08 (392.03)
Amount of Contributions (CAD)	4,125.30 (38485.43)	2,093.69 (10932.06)	12603.15 (84199.23)
Provincial Election Contributions (Quebec only)			
Mafia Presence (Binary)	0.23 (0.42)	0.00 (0.00)	1.00 (0.00)
Amount of Contributions	5,528.23 (19381.42)	3,592.44 (18750.73)	11918.75 (20062.35)
Number of Payments	51.92 (163.41)	34.03 (160.30)	110.99 (159.74)
Amount of Contributions (to incumbents)	3,044.94 (10590.01)	1,950.66 (9,523.97)	6,657.44 (12891.47)
Number of Payments (to incumbents)	28.48 (88.26)	18.19 (76.71)	61.25 (111.64)
Share of Contributions (to incumbents)	0.58 (0.26)	0.58 (0.27)	0.56 (0.22)

Note: Entries represent means, with standard deviations in parentheses.

3.5 Analysis

3.5.1 The Effect of Construction Sector Performance on Violent Crime

First, I perform the test to see the association between the construction economy and violent crime. I estimate the below equation (3.1), with violent crime as a dependent variable.

$$VC_{m,y} = \alpha_m + \gamma_y + \lambda BP_{m,y} + \eta BP_{m,y} \times Presence_m + \Gamma X_{m,y} + \varepsilon_{m,y} \quad (3.1)$$

Here, time y denotes a year. The outcome variable, $VC_{m,y}$, is violent crime rate of a municipality m in a given year y . $BP_{m,y}$ is the municipality m 's value of the building permit (log-transformed) in a year y . The term $BP_{m,y} \times Presence_m$ is a variable of interest, and I expect η to be negative. $X_{m,y}$ is a vector of covariates including CPI, unemployment, and median income. I also include a lagged dependent variable, since violent crime rate in a year y typically depends on its previous year, and previous year's crime rate may also be one of the factors that affect the municipality's construction economy of the current year, as a record of high crime rate may discourage new construction investment into the municipality.

As a placebo test, I experimented with running the analysis with sexual assault, which is typically not related with the mafia's activity and interest. The sample for the placebo test is restricted to Quebec. For better comparison, I provide the reference result next to it that estimates the same specification using the same sample, but with violent crime as a dependent variable. As another placebo test, I experimented with using province dummies in lieu of mafia presence variable. Since the Italian mafia do not operate in any other province except Quebec and Ontario, we should find no effect or opposite effect from the interaction term with the province dummies, except Quebec and Ontario. Even with these two provinces, we do not necessarily expect the result consistent with what we would get with the mafia presence variable, since not all of the municipalities within these provinces are mafia-present.

First, the main result is reported in Table 3.2. Column 1-2 use a level measure of violent crime while column 3-4 use a logged-transformed measure, which will create a slight difference in interpreting the result. Column 5-6 compare the effect of building permit on violent crime versus on sexual assault, employing the Quebec sample. Consistent with the main prediction, Column 1-4 show that there is a robust negative relationship between construction economy and violent crime in the mafia-present areas, while there is no or marginal positive effect in the mafia-absent areas. Specifically, Column 2 reports that one percent increase in building permit is associated with 29.59 less violent crime in the mafia-present areas, which is around 3.5 percent of average violent crime rate in the mafia-present areas. Column 4 similarly reports that one percent increase in building permits leads to 0.026 percent decrease in crime rate in the mafia-present areas.

The estimates from Column 5 and 6 also confirm the expectation. From Column 5 with the restricted

Table 3.2: Effect of Construction Economy on Violent Crime

VARIABLES	DV: Violent Crime (per 100,000ppl) 2003-2020				Comparison - Quebec only 2003-2020	
	level		logged		Violent Crime	Sexual Assault Level1
	(1)	(2)	(3)	(4)		
Building Permit (CAD, logged)	4.148 (7.696)	-2.574 (6.818)	0.00512 (0.00264)	-0.0006 (0.00287)	-1.993 (8.30)	0.707 (0.458)
Presence x Building Permit	-13.27 (12.00)	-29.49** (10.93)	-0.0206* (0.0100)	-0.0226* (0.00956)	-29.57** (14.60)	-0.390 (0.751)
Observations	20,044	18,820	20,044	18,820	10,812	10,643
Number of Municipality	1,335	1,310	1,335	1,310	679	679
Controls	N	Y	N	Y	N	N
Year, Municipality FE	Y	Y	Y	Y	Y	Y
Lagged DV	Y	Y	Y	Y	N	N

Note: *** p<0.01, ** p<0.05, * p<0.1, Standard errors are clustered at the Municipality level.

Controls include CPI, unemployment, median income, population. Column 5 and 6 use the same unit: the number of incidents per 100,000 ppl (level). Sexual Assault Level is defined by an assault where the sexual integrity of the victim is violated. It involves minor physical injuries or no injuries to the victim.

sample of Quebec, I found a similar violence-reducing effect of the construction economy in the mafia-present areas, as consistent with Columns 1 and 2. By contrast, when it comes to the sexual assault in Column 6, I found no moderation effect by mafia presence, as expected. The main impact of building permits is not statistically significant, and there is no significant difference in the main effect depending on the mafia's presence.

Moving on to the next placebo test, the result is reported in Table 3.3. As expected, the effect of the building permits is not statistically different from one province to another in most of the models, and as shown in Column 2 and Column 7, some provinces even exhibit the positive and statistically significant effects of building permits. One exception is Column 6, where the Ontario dummy is interacted with the building permit. It shows a similar result consistent with the main result (4). It is not a surprising result, as Ontario is one of two provinces where the mafia is operating. We can speculate that it is either because the mafia's presence is even more widespread in Ontario than specified, or there could be an additional channel through which improving the construction economy drives down the violent crime in Ontario besides the posited channel.

Due to the concern that the observations of Ontario could have driven the main result in Table 3.2, I ran an additional analysis, re-estimating the model 1 through 4 of Table 3.2 with the sample where Ontario observations are dropped. I found the robust results consistent with those in Table 3.2, without losing any statistical

significance or the effect being attenuated, thus confirming the concern is not significant. Meanwhile, as shown in Column 5 of Table 3.3, I do not find a statistically significant, moderation effect in Quebec, which is another mafia-present province. Overall, Table 3.3 demonstrates that the posited effect does not appear in any other province than mafia-present areas, confirming that mafia presence plays a crucial role in explaining the violence-reducing effect of the construction economy.

Table 3.3: Effect of Construction Economy on Violent Crime - Province Dummy

	Violent Crime(logged), 2003-2020									
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Building Permit (CAD, logged)	-0.00249 (0.00278)	-0.00268 (0.00277)	-0.00265 (0.00278)	-0.00259 (0.00278)	-0.00392 (0.00360)	-0.000236 (0.00296)	-0.00312 (0.00283)	-0.00320 (0.00283)	-0.00208 (0.00297)	-0.00195 (0.00293)
1.Newfoundland and Labrador x BP	0.00220 (0.0188)									
1.Prince Edward Island x BP		0.0281* (0.0117)								
1.Nova Scotia x BP			0.00930 (0.0177)							
1.New Brunswick x BP				0.00882 (0.0228)						
1.Quebec x BP					0.00379 (0.00540)					
1.Ontario x BP						-0.0201* (0.00808)				
1.Manitoba x BP							0.0178 (0.0110)			
1.Saskatchewan x BP								0.00594 (0.00990)		
1.Alberta x BP									-0.00202 (0.00788)	
1.British Columbia x BP										-0.00538 (0.00762)
Observations	18820	18820	18820	18820	18820	18820	18820	18820	18820	18820
Number of Municipality	1310	1310	1310	1310	1310	1310	1310	1310	1310	1310
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year, Municipality FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Lagged DV	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: *** p<0.01, ** p<0.05, *p<0.1, Standard errors clustered at the Municipality level. Controls include CPI, unemployment, and median income. Results including interaction with some province dummies such as Yukon, Nuvavut, and Northwest Territories are not presented here, as the those interaction terms were dropped during the regression due to collinearity.

3.5.2 The Effect of Violent Crime on Incumbent's Reelection

I estimate the effect of violent crime on the likelihood of incumbent officials' re-election in mayoral elections (municipal elections). In doing so, I model the duration of each individual mayor's tenure in office using a Cox proportional hazards model. Event history analysis allows us to estimate the probability that individual mayors will fail to be re-elected at a specific election term.¹⁸, accounting for censored observations as well as time-varying covariates¹⁹, with the violent crime rate being particularly significant in this case.

My dataset includes 1,304 mayors who held the position from 2004 to 2020. Within this time-frame, 429 mayors failed to be re-elected, while 875 mayors were censored. In this context, a censored observation refers to incumbent mayors who chose not to run for re-election and thus no longer appear in the CMED dataset.

The first model I estimated is a Cox model that includes the binary mafia presence variable (a fixed covariate), violent crime (time-dependent), an interaction term between mafia presence and violent crime (time-dependent), and two control variables. The second model is a stratified Cox model, which allows me to estimate the impact of the violent crime rate on the risk of re-election failure, using two different baseline hazard functions depending on mafia presence. This second model incorporates the violent crime rate and two control variables.

I also tested the proportionality assumption of the Cox model using the Schoenfeld Residuals test. If the proportionality assumption is satisfied, we would expect to see null results in both individual and grand tests. Such null results suggest that we cannot reject the null hypothesis of the hazards being proportional in this model.

Table 3.4 presents the coefficients of the estimated Cox model. Examining column (1), I found that in mafia-absent areas, an increase in violent crime by 1000 cases is associated with a hazard ratio of $e^{0.171}$, which equals 1.186. This suggests that such an increase in violent crime escalates the risk of re-election failure by 17 percent.

when comparing two groups with the same violent crime rate, mafia-present areas show a hazard ratio of $e^{0.809}$, which equals 2.241. This implies that transitioning from a mafia-absent to a mafia-present area is associated with an increased risk of re-election failure by 124 percent. When considering the combined effects of an increase in the violent crime rate and mafia presence, an increase in the violent crime rate by 1000 cases in a mafia-present area corresponds to $e^{0.809+0.171-0.847} = e^{0.133}$, which equals 1.142. Although the effect of violent crime is notably mitigated in mafia-present areas, the data still shows that an increase in

¹⁸ T is our time variable. For example, if an incumbent mayor failed their second-term reelection, it means the mayor failed at $T=1$, surviving only their first term. Similarly, if they succeeded their second term reelection, but failed the third term reelection, then the mayor failed at $T=2$. Mayoral elections occur in different years across provinces and territories, typically taking place every four years.

¹⁹This covariate is an annual measure at the municipal level, averaged over the years of the mayor's tenure. For example, if a mayor fails to be re-elected at $T=1$, then the covariate will reflect records from his or her first term. If a mayor fails at $T=2$, there will be two observations: the first will include records from the initial term when the mayor was successfully re-elected, and the second will involve records from the subsequent term when the mayor failed re-election.

violent crime in mafia-present areas heightens the risk of re-election failure by 14.2 percent, compared to the risk in mafia-absent areas with a base violent crime rate.

Turning to column (2) of Table 3.4, I evaluate the effect of the violent crime rate on re-election failure, taking into account the different baseline hazard functions for the two distinct groups stratified by mafia presence. This yields consistent results with column (1), indicating that an increase in the violent crime rate by 1000 cases corresponds to a hazard ratio of $e^{0.159}$, or 1.17. In other words, there is a 17 percent increase in the risk of re-election failure associated with an increase in violent crime, which holds true for both mafia-present and absent areas. In summary, the results from both columns (1) and (2) corroborate the prediction that a rise in violent crime shortens the tenure of mayors.

Table 3.4: Proportional Hazard Models of Mayor's Duration

	Event: Reelection Failure	
	(1) All Mayors	(2) Stratified by Presence
Presence	0.809*** (0.312)	
Violent Crime (per 100,000ppl, level)	0.000171*** (0.0000243)	0.000159*** (0.0000242)
Presence x Violent Crime	-0.000847** (0.000336)	
Wald χ^2	60.2372	49.0387
Observations	1791	1791
Subjects (Mayors)	1304	1304
Failure	429	429

Note: *** p<0.01, ** p<0.05, *p<0.1

Standard errors in parentheses are clustered at the Municipality level. Controls include unemployment and CPI rate. Failure is defined as failure to be reelected. Column 2 presents the estimates coming from stratified cox model stratified by mafia presence(binary). All entries are coefficient, not hazard ratio. Please see the main text for interpretation.

Table 3.5: Schoenfeld Residuals Test to Check Proportionality Assumption

	rho	chi2	df	Prob>chi2
Presence	-0.00929	0.03	1	0.8584
Violent Crime	0.04316	0.21	1	0.6432
Presence x Violent Crime	-0.00443	0.01	1	0.9362
Unemployment	-0.02925	0.33	1	0.5648
CPI	-0.01478	0.08	1	0.7841
Global Test		1.37	5	0.9275

Table 3.5 displays null results for both the individual and global tests, thereby proving the proportionality

assumption.

3.5.3 The Effect of Construction Sector Performance on Incumbent Support

Finally, I examine the relationship between the performance of the construction economy and incumbent support, as measured by political donations towards the incumbent. As mentioned in the previous section, the current analysis is limited to Quebec, and the data is currently only available after 2011.²⁰ I investigated political donations in both provincial and municipal elections in Quebec. Analogous to equation (3.1), I use a basic panel data model, merely replacing the outcome variable with political donations.

$$PD_{m,t} = \beta_m + \tau_t + \psi BP_{m,t} + \zeta BP_{m,t} \times Presence_m + \Pi X_{m,t} + u_{m,t} \quad (3.2)$$

Time t is defined as an election cycle. In the municipal election panel, $PD_{m,t}$ is the average annual political donations received in municipality m over the election cycle t . In the provincial election panel, $PD_{m,t}$ is the average annual political donations given to the incumbent party of the municipality m over the election cycle t . β_m and τ_t denote a municipality- and election-fixed effect. $BP_{m,t}$ is the average value of the building permit (log-transformed) over the election cycle t . $Presence_m$ denotes whether municipality m is within the Italian-mafia presence area. The term $BP_{m,t} \times Presence_m$ estimates the differential effect of construction economy depending on the mafia presence in m . ζ is a coefficient of interest, which I expect to be positive. $X_{m,t}$ is a vector of covariates including CPI and unemployment.

The result is reported in Table 3.6 and 3.7. Table 3.6 reports the result concerning the municipal election donations and table 3.7 concerning the provincial election donations. Both panels report both amount and the number of payments (frequencies) measures. For the municipal election, I use a donation measure that aggregates all donations given to all political entities running for office in a given municipality, including positions such as mayor and councilors.²¹ For the provincial election, donations to incumbents as well as donations to all candidates are analyzed. In provincial elections, candidates with party affiliations run for office to become members of the National Assembly of Quebec. Each electoral district, mostly aligned with municipal boundaries²², elects one member. When I refer to the incumbent's donation, I mean the donation given to the party currently in power in that municipality. The tables below all include time and unit fixed effects, and thus, coefficients indicate the within-unit effect.

Tables show the robust, positive baseline effect of building permit on political donation and the negative

²⁰I requested party finance records from 2002 to 2010 from Élections Québec and obtained the information. However, an analysis including this time frame is beyond the scope of this dissertation project and will be conducted as part of post-dissertation research.

²¹The analysis could be enhanced by improving the working dataset. This could be achieved by identifying whether the recipient of the donation was a candidate for a mayoral or council seat, and whether the recipient was an incumbent. However, to accomplish this would necessitate gathering individual politicians' information and conducting a match at the individual level.

²²I made adjustments when the electoral boundaries did not align with the municipal boundaries

interaction effect between building permit and mafia presence. The latter is with a greater magnitude than the former. The positive baseline effect indicates that improving construction economy increases the political donations in the mafia-absent areas. On the other hand, the negative interaction effect, with a greater magnitude, suggests that improving construction economy rather decreases the political donation in the mafia-present areas. This result conflicts with our expectation. Below I will present the potential explanation for this discrepancy.

Table 3.6: Effect of Construction Economy on Political Donation - Municipal Elections

Panel A: Municipal Election Donation in Quebec, 2013-2020		
	(1) Amount	(2) Freq
Building Permit (CAD, logged)	1045.9** (457.7)	2.912* (1.488)
Presence x Building Permit	-12259.7 (9424.1)	-43.61 (36.20)
Observations	1914	1914
Number of Municipality	668	668
Controls	N	N
Time, Municipality FE	Y	Y

Note: *** p<0.01, ** p<0.05, *p<0.1 Standard errors in parentheses are clustered at the Municipality level. Both analyses include an acclamation (elected without ballot) variable. Time unit is election cycle. Considered election cycles are 2013, 2017 and 2021.

Table 3.7: Effect of Construction Economy on Political Donation - Provincial Elections

Panel B: Provincial Election Donation in Quebec, 2011-2020					
	Incumbent			All Candidates	
	(1) Amount	(2) Share (0-1)	(3) Freq	(4) Amount	(5) Freq
Building Permit (CAD, logged)	273.2** (134.2)	0.0366** (0.0169)	0.941 (0.626)	402.6* (239.2)	1.063 (0.812)
Presence x Building Permit	-1526.3** (757.6)	-0.0526* (0.0295)	-3.374 (3.756)	-2740.2** (1316.0)	-9.960** (4.722)
Observations	2413	2413	2310	2413	2413
Number of Municipality	641	641	636	641	641
Controls	Y	Y	Y	Y	Y
Time, Municipality FE	Y	Y	Y	Y	Y

Note: *** p<0.01, ** p<0.05, *p<0.1 Standard errors in parentheses are clustered at the Municipality level. Time unit is election cycle. Controls include unemployment and CPI. Considered election cycles are 2012, 2014, 2018, 2022.

In terms of statistical significance, the estimated interaction coefficient is not statistically significant in

the Panel A where the municipal election donations are considered. However, they are statistically significant in most cases of Panel B (except column 3) when provincial election donations are considered.

In column (1) of table 3.7, we can find that the estimates for the building permit and its interaction term are both statistically significant. I will use them as a basis for substantive interpretation. Column (1) tells us that a one percent increase in building permit values will increase the donation directed to an incumbent by 273.2 Canadian dollars, on average, in the mafia-absent areas of Quebec. However, the same change will decrease the donation to the incumbent by 1253.1 Canadian dollars in the mafia-present areas. Similarly, Column (2) indicates that a one percent increase in building permit values will increase the share of donations directed to the incumbent by 3.66 percentage points in the mafia-absent areas while the same change will decrease it by 0.16 percentage points in the mafia-present areas. Column (4) suggests that the effect is not restricted to the donations directed at the incumbent, but generally applies to the total amount of donations. The total amount of political donations increases by 402.6 Canadian dollars in the mafia-absent areas, while it decreases by 2337.6 Canadian dollars in the mafia-present areas, when one percent of building permit values increases.

I interpret this result as a consequence of the 2009 construction scandal and the related official probes that followed. I speculate that they have significantly changed the individual's political contribution behaviors, thus yielding a result that deviates from our expectations. Note that the sample used in Table, corresponds to the "Post" construction scandal period.

To be specific, I suppose that the 2009 scandal has affected both groups of people – those who are involved in the mafia's business and those who are not – in the mafia-present areas. First, the scandal likely prompted the mafia and individuals colluding with them to either lie low or cease their activities. Especially given that the investigation discovered that political donations were exploited as a bribing tool, the mafia and colluded individuals must have stopped donating to the incumbent politician to hide. Moreover, as the public inquiry wasn't closed until 2015, and more offshoot investigations emerged thereafter as well, I presume that they could not resume their practice while under investigation. In addition, triggered by the scandal, the then-government of Quebec amended the election law (Bill2, 2012, Chapter 26), which took effect from the first day of 2013, to lower the limit of individual donations from \$1000 to \$100 per year to the provincial party.²³ This law change may also have demotivated the mafia's corrupt donations.

Meanwhile, the scandal's impact may not be restricted to those involved in collusion. The scandal must have disappointed the general electorate, especially in the mafia-present areas, who politically supported the incumbent party. In fact, the scandal's impact on election was acute: in the closest election after the scandal, Quebec Liberal Party (QLP) under Jean Charlest, which had steadily secured the plurality of the seats in

²³I ran the same analysis with the sample restricted to post-2013 and obtained the qualitatively similar results but with the smaller effect size, as the donation limit dropped to the one-tenth of what it was.

the provincial government since 2003, lost a considerable number of seats in the post-scandal election and got defeated by Parti Québécois (PQ). The mafia-present areas, namely, the Greater Montreal Area, have been a long-time stronghold of the Liberal Party (QLP) since 1998. In 2012 election, many of these mafia-present areas (Greater Montreal Area) still reelected their incumbent despite the scandal, but the incumbents apparently did not get as many popular votes as they did in the past and, incumbents were voted out in some districts. Given these circumstances, I suspect that voters' donation activity may have been weakened in general due to distrust and disappointment after the scandal. In fact, the number of donation payments has been on the decline every election since 2012, and to a greater extent in the mafia present areas.

In summary, while it is not a comprehensive explanation, the negative correlation between construction activity and political donations in mafia-active regions may be due to a combination of reduced mafia influence and apathy among voters, resulting in a decline in political donations. Although the expected correlation was not found in this particular sample, the results demonstrate that mafia-active areas exhibit distinct patterns from those without mafia presence, likely attributable to the presence of the mafia. This implies that significant differences may also be observed in the pre-scandal period.

3.6 Conclusion

This essay tests a portion of my illicit benefit thesis that I proposed in a previous essay, specifically within the context of the Canadian construction industry. I selected this industry due to its documented infiltration by the mafia, and the noted collusion between this criminal organization and politicians, as revealed by the public inquiry known as the Charbonneau Commission. I use the performance of the construction industry as a proxy for the contested prize (V) in my theory, and I conducted three empirical tests to examine: (a) whether a thriving, mafia-infiltrated construction economy leads to a decrease in violent crime in areas where the mafia is active; (b) whether a reduction in violent crime extends the tenure of incumbent mayors; and finally, (c) if a booming construction economy results in an increased level of support for incumbents, as measured by political contributions.

My findings suggest that when the construction economy is performing well, areas with an active mafia presence experience a decrease in violent crime, while areas without a mafia activity remain unaffected. I also found a correlation between lower violent crime rates and an increased likelihood of mayors' re-election. Furthermore, I observed that the construction industry's performance differentially impacts political contributions in areas with and without mafia activity. Although this heterogeneous effect is present, the relationship direction contradicted expectations, possibly due to the impact of scandals.

This research has certain limitations due to the selection of measures and data availability. The mafia presence variable may not be sufficiently granular to account for variations in mafia territorial control at the

municipality level. Additionally, while the performance of the construction economy serves as a proxy for the mafia-infiltrated economy, it may not provide a completely accurate picture since the mafia does not infiltrate the entire construction sector. The violent crime rate might also be an overly broad measure for crimes committed by organized crime groups, but it is the best available measure at present. Another limitation is that the three tests conducted in this study establish only correlation and not causation. The potential influence of confounding factors should not be overlooked.

Nonetheless, this essay provides empirical evidence, albeit suggestive, to the theory I propose, substantiating its validity. Both the theory and empirical evidence collectively contribute to the expanding literature on organized crime within the disciplines of political science and economics.

First, my theory and associated evidence align with the notion that corruption between mafia and politicians, specifically a form of collusion that favors one group over another, can result in reduced violence or relative peace. This is exemplified by Mexico under the PRI period (Morris, 2013). However, my theory proposes a novel channel through which such a reduction in violence can be achieved under collusion. The linchpin of my theory is the OCG's incentive to pacify the public for the sake of extended regime survival. Contrary to similar arguments that are mostly applicable to authoritarian regimes, my theory is relevant to both autocracies and democracies. The prime example is shown in the Canadian case examined here.

Second, my theory and evidence pave the way for further research on mafia activity in various national contexts. Asian organized crime groups, such as the Shanghai Green Gang and Yakuza, and organized crime in Canada are markedly understudied areas in this field. Investigating these areas allows us to gain a more comprehensive understanding of organized crime as a global phenomenon.

Moreover, the results from my studies present narratives that contradict recent studies conducted in other countries, such as Italy, Russia, and Latin America. For instance, recent studies on the Italian mafia or Mexican drug cartels depict their activities as notably violent, targeting politicians in an attempt to influence policy (e.g., Trejo and Ley, 2021; Daniele and Dipoppa, 2017; Alesina et al., 2019). This stands in stark contrast to the pattern argued and supported in this paper, where the mafia is shown to refrain from using excessive violence. This discrepancy prompts further reflection on the reasons behind such differences, which can be attributed to factors such as cultural and historical backgrounds of crime groups, economic incentives, institutions, and state capacity. This reflection contributes to the development of a more sophisticated theory of organized crime groups' behaviors.

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Appendix A

Model Appendix

A.1 Proof of Proposition 1

Throughout, I use the solution concept of subgame perfect equilibrium. I solve the equilibrium using backward induction.

Proposition 1. *In any equilibrium where G colludes, there is a high intensity of violence iff:*

- $\bar{m} - \underline{m} < \frac{1}{2} \{1 + (\varepsilon - s)\delta\}(1-t)V - (1-q) \{1 + (tV + \varepsilon - s)\delta\}(1-t)V \equiv m_H^*$
- $r \leq \frac{1}{2} \{1 + (\varepsilon - s)\delta\}(1-t)V - \bar{m}$
- $k \leq \frac{1}{2} \{1 + (\varepsilon - s)\delta\}(1-t)V$

In any equilibrium where G chooses a hands-off approach, there is a high intensity of violence iff:

- $\bar{m} - \underline{m} < \frac{1}{2} (1 + \varepsilon\delta)(1-t)V - (1-q) \{1 + (tV + \varepsilon)\delta\}(1-t)V \equiv m_M^*$

Proof. I begin with the subgame where G colludes. In the final node of this collusion subgame, OCG2 opts for a high level of violence over a low level if it results in a higher payoff than what its counterpart would yield. It should be noted that when G colludes, OCG1's level of violence is regarded as fixed at \bar{m} by assumption.

$$\underbrace{\frac{1}{2} \{1 + (\varepsilon - s)\delta\}(1-t)V - r - \bar{m}}_{\text{choosing the high violence}} > \underbrace{(1-q) \{1 + (tV + \varepsilon - s)\delta\}(1-t)V - r - \underline{m}}_{\text{choosing the low violence}}$$

Rearranging the above inequality into:

$$\underbrace{\frac{1}{2} \{1 + (\varepsilon - s)\delta\}(1-t)V - (1-q) \{1 + (tV + \varepsilon - s)\delta\}(1-t)V}_{\equiv m_H^*} > \bar{m} - \underline{m} \quad (\text{A.1})$$

With the RHS being the cost difference between using the high and low violence, the LHS becomes an upper bound of the RHS. I refer to LHS of the inequality (1) as m_H^* . Substantively, it means that if the cost difference is below this threshold – sufficiently small –, it is optimal for OCG2 to use the high level of violence. Otherwise, OCG2 will be better off restraining its violence.

Moving on to the next point, I establish the condition under which OCG2 opts to fight. OCG2 will choose to retaliate rather than back down if doing so yields a higher payoff. Since Proposition 1 concerns the equilibrium involving high-intensity violence, let's assume that the previously derived Condition (1) is satisfied, and

OCG2 has selected the high level of violence. We define OCG2's payoff from fighting accordingly, while the payoff from backing down is set as 0. The condition under which OCG2 fights can be represented as follows.

$$\begin{aligned} \underbrace{\frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V - r - \bar{m}}_{\text{OCG2's payoff of fighting back}} &\geq \underbrace{0}_{\text{payoff of backdown}} \\ \iff \frac{1}{2}\{1 + (\varepsilon - s)\delta\}V - \bar{m} &\geq r \end{aligned} \quad (\text{A.2})$$

(2) suggests that when the damage of G's attack, captured by r , is small enough, OCG2 is willing to fight back against OCG1 rather than backdown.

For now, let's assume that Condition (2) is satisfied and OCG2 has chosen to fight back. OCG1 must decide whether or not to give a bribe of an exogenously given amount, k . Giving this bribe would allow OCG1 to collude with G. If OCG1 opts for not giving a bribe, OCG1 will be repressed.

$$\begin{aligned} \underbrace{\frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V - k}_{\text{accept and pay a bribe}} &\geq \underbrace{0}_{\text{refuse to pay a bribe}} \\ \iff \frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V &\geq k \end{aligned} \quad (\text{A.3})$$

(3) suggests that if a bribe k is not extremely costly, existing in the range below the threshold, OCG1 will accept to pay a bribe. In addition to (1), (2) and (3) should be met for violence to occur in equilibrium.

Similarly, in the subgame following G's hands-off choice, the selection of violence by OCG1 and OCG2 depends on the comparative cost of high violence versus low violence. Formally, this is expressed as: $\bar{m} - \underline{m}$.

First, I consider OCG2's decision concerning the level of violence, assuming that OCG1 has chosen the high level of violence. OCG2 opts for the high level of violence over the low level when:

$$\begin{aligned} \underbrace{\frac{1}{2}(1 + \varepsilon\delta)(1-t)V - \bar{m}}_{\text{choosing the high violence}} &> \underbrace{(1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}} \\ \iff \underbrace{\frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V}_{\equiv m_M^*} &> \bar{m} - \underline{m} \end{aligned} \quad (\text{A.4})$$

With the RHS being the cost difference between using the high and low violence, the LHS becomes an upper bound of the RHS. I refer to LHS of the inequality (4) as m_M^* .

I also examine OCG2's decision concerning the level of violence, assuming that OCG1 has chosen the

low level of violence. This will be played off the equilibrium path. OCG2 opts for the high level of violence over the low level when:

$$\underbrace{q\{1 + (tV + \varepsilon)\delta\}(1-t)V - \bar{m}}_{\text{choosing the high violence}} > \underbrace{\frac{1}{2}\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}}$$

$$\iff (q - \frac{1}{2})\{1 + (tV + \varepsilon)\delta\}(1-t)V > \bar{m} - \underline{m} \quad (\text{A.5})$$

Note that if (4) holds, (5) always holds. It is because (4) can be rearranged as:

$$(q - \frac{1}{2})\{1 + (tV + \varepsilon)\delta\}(1-t)V - \frac{1}{2}(tV\delta)(1-t)V > \bar{m} - \underline{m}$$

The LHS of (4) is always smaller than that of (5), which indicates that (4) is a more stringent condition. Substantively, this means that whenever OCG2 chooses high violence given OCG1's high violence, OCG2 would also choose high violence if OCG1 opts for low violence.

Building on this finding, I turn to OCG1's decision. When Condition (4) is met, OCG1 can either choose: a high level of violence, which will collectively result in high-intensity violence, or a low level of violence, which will collectively lead to moderate-intensity violence. OCG1 opts for a high level of violence when:

$$\underbrace{\frac{1}{2}(1 + \varepsilon\delta)(1-t)V - \bar{m}}_{\text{choosing the high violence}} > \underbrace{(1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}}$$

$$\iff \frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V > \bar{m} - \underline{m}$$

Note that this condition is equivalent to (4). In summary, when Condition (4) is met, both OCG1 and OCG2 will opt for high violence, ultimately leading to high-intensity violence, assuming G chooses the hands-off approach.

A.2 Proof of Proposition 2

Proposition 2. *In any equilibrium where G colludes, there is a moderate intensity of violence iff*

- $m_H^* \leq \bar{m} - \underline{m}$
- $r \leq (1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V - \underline{m}$
- $k \leq q\{1 + (tV + \varepsilon - s)\delta\}(1-t)V$

In any equilibrium where G chooses a hands-off approach, there is a moderate intensity of violence iff

$$m_M^* \leq \bar{m} - \underline{m} < (q - \frac{1}{2})\{1 + (tV + \varepsilon)\delta\}(1-t)V \equiv m_L^*$$

Proof. Proposition 2 can be proven in the same manner as Proposition 1. I begin with the subgame where G colludes. For a moderate intensity of violence to occur, OCG2 must opt for the low level of violence over the high level, given that OCG1's level of violence is fixed at a high level. This occurs when:

$$\underbrace{\frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V - r - \bar{m}}_{\text{choosing the high violence}} \leq \underbrace{(1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V - r - \underline{m}}_{\text{choosing the low violence}}$$

It is the negation of inequality (1).

$$\frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V - (1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V \leq \bar{m} - \underline{m} \quad (\text{A.6})$$

$\equiv m_H^*$

Moving on to the next point, I establish the condition under which OCG2 opts to fight. OCG2 will choose to retaliate rather than back down if doing so yields a higher payoff. As Proposition 2 pertains to the equilibrium involving moderate-intensity violence, let's assume that the previously derived Condition (6) is satisfied, leading to OCG2's choice of low-level violence. We define OCG2's payoff from fighting accordingly, while the payoff from backing down is set as 0. The condition under which OCG2 fights can be represented as follows.

$$\underbrace{(1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V - r - \underline{m}}_{\text{OCG2's payoff of fighting back}} \geq \underbrace{0}_{\text{payoff of backdown}}$$

$$\iff (1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V - \underline{m} \geq r \quad (\text{A.7})$$

For now, let's assume that Condition (7) is satisfied and OCG2 has chosen to fight back. OCG1 must decide whether or not to give a bribe of an exogenously given amount, k . Giving this bribe would allow OCG1 to collude with G.

$$\underbrace{q\{1 + (tV + \varepsilon - s)\delta\}(1-t)V - k}_{\text{accept and pay a bribe}} \geq \underbrace{0}_{\text{refuse to pay a bribe}}$$

$$\iff q\{1 + (tV + \varepsilon - s)\delta\}(1-t)V \geq k \quad (\text{A.8})$$

(7) and (8) should be met for violence to occur in equilibrium.

Similarly, in the subgame following G's hands-off choice, the selection of violence by OCG1 and OCG2 also depends on the relative cost of high violence compared to low violence, $\bar{m} - \underline{m}$.

Instead of deriving directly the condition for the moderate intensity of violence, I first derive the condition

under which the low intensity of violence occurs and will use such condition to derive the condition for the moderate intensity of violence.

For low intensity of violence to occur, it must be the case that OCG2 chooses the low level of violence when OCG1 has chosen the low level of violence. Such condition is formally represented as follows:

$$\begin{aligned}
 \underbrace{q\{1 + (tV + \varepsilon)\delta\}(1-t)V - \bar{m}}_{\text{choosing the high violence}} &\leq \underbrace{\frac{1}{2}\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}} \\
 \Leftrightarrow \underbrace{\left(q - \frac{1}{2}\right)\{1 + (tV + \varepsilon)\delta\}(1-t)V}_{\equiv m_L^*} &\leq \bar{m} - \underline{m}
 \end{aligned} \tag{A.9}$$

With the RHS being the cost difference between using the high and low violence, the LHS becomes a lower bound of the RHS. I refer to LHS of the inequality (9) as m_L^* . Note that (9) is the negation of the Condition (5).

Here, I leverage the fact proven in the Proposition 1 that if the Condition (4) holds, then (5) always holds. The contrapositive of this statement, which will hold true, is that if the negation of (5) holds, then the negation of (4) holds. Given that the Condition (9) is equivalent to the negation of (5), now we know that the negation of (4) will hold. The negation of (4) is:

$$\begin{aligned}
 \frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V &\leq \bar{m} - \underline{m} \\
 \Leftrightarrow \underbrace{\frac{1}{2}(1 + \varepsilon\delta)(1-t)V - \bar{m}}_{\text{choosing the high violence}} &\leq \underbrace{(1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}}
 \end{aligned} \tag{A.10}$$

The inequality (10) suggests that when OCG1 has chosen the high level of violence, then OCG2 must choose the low level of violence.

Let's assume that the Condition (9) has been met, which automatically implies that (10) holds. With this, I turn to OCG1's decision. OCG1 can either choose: a high level of violence, which will collectively lead to moderate-intensity violence, or a low level of violence, which will collectively lead to low-intensity violence. OCG1 opts for a low level of violence when:

$$\underbrace{q\{1 + (tV + \varepsilon)\delta\}(1-t)V - \bar{m}}_{\text{choosing the high violence}} \leq \underbrace{\frac{1}{2}\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}}$$

Note that this condition is equivalent to (9). In summary, when Condition (9) is met, both OCG1 and OCG2 will opt for low violence, ultimately leading to low-intensity violence, assuming G chooses the hands-off

approach.

Characterizing the condition for the low intensity violence is instrumental to derive the condition under which the moderate intensity of violence occurs under hands-off. Now we know that the Condition (9) leads to the low intensity equilibrium, it implies that in order for the moderate intensity violence to occur, the negation of Condition (9) must hold. Substantively it means that when OCG1 has chosen the low violence, OCG2 must choose the high violence. It is formally represented as:

$$\underbrace{\left(q - \frac{1}{2}\right)\{1 + (tV + \varepsilon)\delta\}(1-t)V}_{\equiv m_L^*} > \bar{m} - \underline{m} \quad (\text{A.11})$$

In addition to the above Condition (11), I consider OCG2's decision regarding the level of violence, assuming that OCG1 has chosen the high level of violence. Recall the Proposition 1. We know that when the Condition (4) holds, the high intensity of violence will occur in equilibrium. In order for the moderate violence to occur, the negation of Condition (4) must hold. Substantively it means that when OCG1 has chosen the high violence, OCG2 must choose the low violence. It is formally represented as:

$$\begin{aligned} \underbrace{\frac{1}{2}(1 + \varepsilon\delta)(1-t)V - \bar{m}}_{\text{choosing the high violence}} &\leq \underbrace{(1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}} \\ \Leftrightarrow \underbrace{\frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V}_{\equiv m_M^*} &\leq \bar{m} - \underline{m} \end{aligned} \quad (\text{A.12})$$

Let's assume that the Condition (11) and (12) have been met. Then, OCG1 chooses either high violence or low violence. Given OCG2's strategies under these conditions, OCG1 will choose the high violence because it will always find choosing the high violence more profitable than the low violence when (11) is met.

$$\begin{aligned} \underbrace{q\{1 + (tV + \varepsilon)\delta\}(1-t)V - \bar{m}}_{\text{choosing the high violence}} &> \underbrace{(1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V - \underline{m}}_{\text{choosing the low violence}} \\ \Leftrightarrow 2\left(q - \frac{1}{2}\right)\{1 + (tV + \varepsilon)\delta\}(1-t)V &> \bar{m} - \underline{m} \end{aligned} \quad (\text{A.13})$$

It is because LHS of (11) is always smaller than that of (13), meaning that (11) is a more stringent condition. If the stringent condition (11) is met, then (13) must hold, implying that OCG1 will always choose the high violence. In summary, when the Condition (11) and (12) are met, formally, $m_M^* \leq \bar{m} - \underline{m} < m_L^*$, then the moderate violence will occur, with OCG1 choosing the high violence and OCG2 choosing the low violence in equilibrium.

A.3 Proof of Proposition 3

Proposition 3. *There is less violence in equilibrium after the government colludes than after the government takes a hands-off approach iff $\bar{m} - \underline{m} \in [m_H^*, m_M^*]$.*

Proof. In Proposition 2, we proved that after G colludes, there is a moderate intensity of violence when $m_H^* \leq \bar{m} - \underline{m}$. In contrast, in Proposition 1, we proved that after G chooses a hands-off approach, a high intensity of violence results when $\bar{m} - \underline{m} < m_M^*$. Here I demonstrate that $m_H^* < m_M^*$, thereby showing that there exists a range in which collusion results in less equilibrium violence than a hands-off approach. $m_H^* < m_M^*$ can be written as:

$$\begin{aligned} \frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V - (1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V &< \frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q)\{1 + (tV + \varepsilon)\delta\}(1-t)V \\ \frac{1}{2}(-s)\delta(1-t)V - (1-q)(-s)\delta(1-t)V &< 0 \\ \frac{1}{2}(-s)\delta(1-t)V &< (1-q)(-s)\delta(1-t)V \end{aligned} \quad (\text{A.14})$$

(14) always holds as $\frac{1}{2} > 1 - q$.

A.4 Proof of Proposition 4

Proposition 4. *Holding all else constant, m_H^* decreases as t increases until $t^* \equiv \frac{(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}}{2(1-q)V\delta} + \frac{1}{2}$. Similarly, all else equal, m_H^* decreases as V increases beyond $V^* \equiv \frac{(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}}{2(1-q)t\delta}$. The shift in the threshold creates a parameter space wherein, assuming government collusion, the equilibrium violence can decrease from a high to moderate intensity. The parameters falling within this intervening parameter space must satisfy the following conditions for violence reduction to occur.*

- $r \leq (1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V - \underline{m}$
- $k \leq q\{1 + (tV + \varepsilon - s)\delta\}(1-t)V$

Proof. Here I take the derivative of m_H^* with respect to t and V . I will start with t .

$$\begin{aligned} \frac{\partial m_H^*}{\partial t} &= \frac{\partial \left\{ \frac{1}{2}\{1 + (\varepsilon - s)\delta\}(1-t)V - (1-q)\{1 + (tV + \varepsilon - s)\delta\}(1-t)V \right\}}{\partial t} \\ &= -\frac{1}{2}\{1 + (\varepsilon - s)\delta\}V - (1-q)(-V) - (1-q)(-2tV - \varepsilon + s + V)\delta V \\ &= -\frac{1}{2}\{1 + (\varepsilon - s)\delta\}V + (1-q)\{1 + (\varepsilon - s)\delta\}V + (1-q)2tV^2\delta - (1-q)V^2\delta \end{aligned}$$

As we would like to know when the threshold decreases, we will see when $\frac{\partial m_H^*}{\partial t} < 0$

$$\begin{aligned}
-\frac{1}{2}\{1+(\varepsilon-s)\delta\}V+(1-q)\{1+(\varepsilon-s)\delta\}V+(1-q)2tV^2\delta-(1-q)V^2\delta < 0 \\
-\frac{1}{2}\{1+(\varepsilon-s)\delta\}+(1-q)\{1+(\varepsilon-s)\delta\}+(1-q)2tV\delta-(1-q)V\delta < 0 \\
(1-q)2tV\delta < \frac{1}{2}\{1+(\varepsilon-s)\delta\}-(1-q)\{1+(\varepsilon-s)\delta\}+(1-q)V\delta \\
(1-q)2tV\delta < (q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}+(1-q)V\delta \\
t < \frac{(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}}{2(1-q)V\delta} + \frac{1}{2} \equiv t^*
\end{aligned}$$

Next I take the derivative of m_H^* with respect to V .

$$\begin{aligned}
\frac{\partial m_H^*}{\partial V} &= \frac{\partial \left\{ \frac{1}{2}\{1+(\varepsilon-s)\delta\}(1-t)V - (1-q)\{1+(tV+\varepsilon-s)\delta\}(1-t)V \right\}}{\partial V} \\
&= \frac{1}{2}\{1+(\varepsilon-s)\delta\}(1-t) - (1-q)(1-t) - (1-q)2Vt(1-t)\delta - (1-q)(\varepsilon-s)\delta(1-t)
\end{aligned}$$

As we would like to know when the threshold decreases, we will see when $\frac{\partial m_H^*}{\partial V} < 0$.

$$\begin{aligned}
\frac{1}{2}\{1+(\varepsilon-s)\delta\}(1-t) - (1-q)(1-t) - (1-q)2Vt(1-t)\delta - (1-q)(\varepsilon-s)\delta(1-t) < 0 \\
\frac{1}{2}\{1+(\varepsilon-s)\delta\}(1-t) - (1-q)\{1+(\varepsilon-s)\delta\}(1-t) - (1-q)2Vt(1-t)\delta < 0 \\
(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}(1-t) < (1-q)2Vt(1-t)\delta \\
V > \frac{(q-\frac{1}{2})\{1+(\varepsilon-s)\delta\}}{2(1-q)t\delta} \equiv V^*
\end{aligned}$$

Finally, two conditions

$$r \leq (1-q)\{1+(tV+\varepsilon-s)\delta\}(1-t)V - \underline{m}$$

$$k \leq q\{1+(tV+\varepsilon-s)\delta\}(1-t)V$$

are necessary for violence to occur in equilibrium. If the first Condition is not met, OCG2 will back down, and if the second Condition is not met, OCG1 will not offer a bribe, leading to G's repression of both OCGs.

A.5 Proof of Proposition 5

Proposition 5. *Holding all else constant, m_M^* decreases as t increases until $t^\dagger \equiv \frac{(q-\frac{1}{2})(1+\varepsilon\delta)}{2(1-q)V\delta} + \frac{1}{2}$. Similarly, all else equal, m_M^* decreases as V increases beyond $V^\dagger \equiv \frac{(q-\frac{1}{2})(1+\varepsilon\delta)}{2(1-q)t\delta}$. The shift in the threshold creates a parameter space wherein, assuming government taking a hands-off, the equilibrium violence can decrease from a high to moderate intensity.*

Proof. Here I take the derivative of m_M^* with respect to t and V . I start with t .

$$\begin{aligned}\frac{\partial m_M^*}{\partial t} &= \frac{\partial \left\{ \frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q) \{1 + (tV + \varepsilon)\delta\} (1-t)V \right\}}{\partial t} \\ &= -\frac{1}{2}(1 + \varepsilon\delta)V - (1-q)(-V) - (1-q)(-2tV - \varepsilon + V)\delta V \\ &= -\frac{1}{2}(1 + \varepsilon\delta)V + (1-q)(1 + \varepsilon\delta)V + (1-q)2tV^2\delta - (1-q)V^2\delta\end{aligned}$$

As we would like to know when the threshold decreases, we will see when $\frac{\partial m_M^*}{\partial t} < 0$

$$\begin{aligned}-\frac{1}{2}(1 + \varepsilon\delta)V + (1-q)(1 + \varepsilon\delta)V + (1-q)2tV^2\delta - (1-q)V^2\delta &< 0 \\ -\frac{1}{2}(1 + \varepsilon\delta) + (1-q)(1 + \varepsilon\delta) + (1-q)2tV\delta - (1-q)V\delta &< 0 \\ (1-q)2tV\delta &< \frac{1}{2}(1 + \varepsilon\delta) - (1-q)(1 + \varepsilon\delta) + (1-q)V\delta \\ (1-q)2tV\delta &< (q - \frac{1}{2})(1 + \varepsilon\delta) + (1-q)V\delta \\ t &< \frac{(q - \frac{1}{2})(1 + \varepsilon\delta)}{2(1-q)V\delta} + \frac{1}{2} \equiv t^\dagger\end{aligned}$$

Next I take the derivative of m_M^* with respect to V .

$$\begin{aligned}\frac{\partial m_M^*}{\partial V} &= \frac{\partial \left\{ \frac{1}{2}(1 + \varepsilon\delta)(1-t)V - (1-q) \{1 + (tV + \varepsilon)\delta\} (1-t)V \right\}}{\partial V} \\ &= \frac{1}{2}(1 + \varepsilon\delta)(1-t) - (1-q)(1-t) - (1-q)2Vt(1-t)\delta - (1-q)\varepsilon\delta(1-t)\end{aligned}$$

As we would like to know when the threshold decreases, we will see when $\frac{\partial m_M^*}{\partial V} < 0$.

$$\begin{aligned}\frac{1}{2}(1 + \varepsilon\delta)(1-t) - (1-q)(1-t) - (1-q)2Vt(1-t)\delta - (1-q)\varepsilon\delta(1-t) &< 0 \\ \frac{1}{2}(1 + \varepsilon\delta)(1-t) - (1-q)(1 + \varepsilon\delta)(1-t) - (1-q)2Vt(1-t)\delta &< 0 \\ (q - \frac{1}{2})(1 + \varepsilon\delta)(1-t) &< (1-q)2Vt(1-t)\delta \\ V &> \frac{(q - \frac{1}{2})(1 + \varepsilon\delta)}{2(1-q)t\delta} \equiv V^\dagger\end{aligned}$$