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How Political Violence Helps Explain Organized Crime: A Case Study of Mexico's "War on Drugs"

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HOW POLITICAL VIOLENCE HELPS EXPLAIN ORGANIZED CRIME: A CASE STUDY OF MEXICO'S "WAR ON DRUGS"

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ABSTRACT

This thesis examines research from the disciplines of political science and criminal justice to develop a theory that explains geographic variation in violence related to organized crime. Large-scale organized crime violence exhibits characteristics of both ordinary crime violence and political violence, but these subjects are generally analyzed separately. However, as large-scale organized crime has become more prevalent and violent in recent years, most notably in Latin America, studies, including this one, have attempted to cross disciplinary boundaries in order to better explain trends in organized crime onset, termination and violence. This thesis argues that although the overall goal of organized crime groups is not to take control of a country, both organized crime groups and insurgent groups confront the state's monopoly on violence, leading to evident similarities in the way they use violence to attain their goals. They both use violence to maintain control over resources, take control from other groups and retaliate against the government. Previous literature has demonstrated that control is directly linked to geographic variation in political violence and through case studies of organized crime violence in Honduras and Brazil, as well as negative binomial regression analysis of organized crime violence in Mexico, this thesis finds that control is also directly linked to geographic variation in organized crime violence.

To my parents, thank you for your endless love and support. Without you, I would not have the opportunities I have today and for that I am forever grateful.

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CHAPTER ONE: INTRODUCTION

This thesis unites research from the disciplines of political science and criminal justice to develop a theory that explains geographic variation in violence related to organized crime. Large-scale organized crime combines aspects of both "ordinary crime" and political violence, subjects that are generally analyzed separately using criminal justice or sociological theories and political science theories, respectively (Kalyvas, 2015). However, as large-scale organized crime has become more prevalent and violent in recent years, most notably in Latin America, studies have attempted to cross disciplinary boundaries in order to better explain trends in organized crime onset, termination and violence. This study finds that although organized crime disputes within countries should not be classified as civil wars or terrorist operations, organized crime violence and political violence share many similar characteristics. Therefore, aspects of organized crime violence, including geographic variation in violence, can be explained by theories that explain civil war violence and political violence.

One notable case of a country that has experienced a significant increase in organized crime violence in recent years is Mexico. Following Mexico's democratization in 2000 and a breakdown of the state-sponsored protection racket between the hegemonic Industrial Revolutionary Party (PRI), violence between organized crime groups (OCGs) and violence between OCGs and the government has reached historically high levels. However, most research has focused on the causes of the breakdown in this state-sponsored protection racket, rather than the geographic and temporal trends in OCG-related violence. From 2006 through 2011, there were over 50,000 murders related to organized crime (Molzan, Rios & Shirk, 2012). This number is likely a conservative

estimate given the difficulty of attributing these deaths to OCGs. While there are other factors that contribute to these statistics, drug trafficking-related deaths account for a large proportion of homicides in Mexico. In 2010, drug trafficking organization (DTO) related homicides reached the record figure of 15,273 victims, making organized crime officially responsible for 45 percent of all intended homicides in the country (Rios, 2013). Additionally, in 2011, there were 1,652 homicides resulting from confrontations between organized crime groups and 740 homicides resulting from direct attacks by organized crime groups on government officials (Molzan, Rios and Shirk, 2012). These statistics make it evident that organized crime violence has reached both the scale and violence of many civil wars and that this violence occurs between DTOs and against the state. However, little has been done to examine how theories on civil war violence and other forms of political violence may help explain organized crime violence in Mexico and in other countries with high levels of organized crime violence. In this thesis, I propose that literature on organized crime violence does not fully account for geographic variation in organized crime violence, a trend that can be seen across countries and illicit markets.

In order to address this gap in the literature, I develop a theory that shows how civil war and political violence can provide an explanation for variations in organized crime violence that is often not explained by other fields that study organized crime violence, such as sociology or criminology. More specifically, I argue that although illicit markets are not always violence, when they do become violent, OCGs fight each other in ways that are similar to insurgent groups and OCGs fight the state in ways that are similar to guerilla groups or terrorist organizations. Based on the similarities between the tactics

used by OCGs and groups engaging in political violence, I argue that fractionalization, competition over access to illicit markets and competition over access to natural resources will increase violence between OCGs. I also argue that the government will targets OCGs in areas that provides access to illicit markets and natural resources, leading OCGs to retaliate against the government and that OCGs will target areas that are symbolic of government power in order to signal their resolve. Overall, I contribute to the literature by providing an overarching framework on the applications of political violence literature to organized crime violence that can be applied to multiple cases of organized crime violence and different types of OCGs.

This thesis is broken down into five additional chapters. In Chapter Two, I review existing literature on organized crime violence and show that sub-national geographic variation in organized crime has been understudied. Then, in Chapter Three, I develop a theory that explains how theories on civil war and political violence can be applied to organized crime violence. In the theory section, I show that there are overlaps in causes of organized crime violence and civil war violence and that theories that explain geographic variation in violence can also explain geographic variation in OCG violence. More specifically, I show that violence between OCGs is done with the goal of control over territory or resources, whereas violence against the state is used to coerce the state into implementing (or not implementing) a policy that is harmful to OCG operations within the state. I show that the state will target specific areas in which an OCG has dominant control to dismantle the OCGs operations and OCGs will target areas that the state has power over to demonstrate the government is incapable of preventing the OCG from operating in the country. Additionally, I argue that OCGs will try and gain control

over territory and resources from other cartels that will improve their illicit operations. After the development of the theory and discussion of alternative explanations, I provide illustrative cases of this theory using the examples of Honduras and Brazil.

In Chapter Four, the research design, I show why Mexico makes a suitable case study to apply this theory. I then provide an overview of organized crime violence in Mexico and then discuss existing literature on geographic variation in organized crime in Mexico. Finally, I provide descriptive evidence that demonstrates the scale and variation of organized crime violence in Mexico in 2010. In this chapter, I also develop my research methodology and operationalize specific variables in order to test my hypotheses. I explain how these variables were operationalized and how the data was collected. Finally, I examine multiple modeling techniques and determine which regression technique is the most appropriate for the data. In Chapter Five, I present the results of six negative binomial regression models and discuss whether or not the results support the hypotheses developed in Chapter Three. I find that when examining OCG-OCG violence, the presence of natural resources in a region and fractionalization increase the likelihood of violence due to OCG rivalry. Although areas that provide access to illicit markets are more likely to experience inter-OCG violence, this finding is not significant across all models, meaning it has mixed support. When examining OCG violence against that state, I find that the presence of natural resources increases OCG violence against the state, but there is mixed support for this hypothesis, as some of the variables that represent natural resources are not significant. I also find that areas with access to illicit markets have more OCG violence against the state, but there is also mixed support for this hypothesis, as some of the variables that represent areas with access to

illicit markets are not significant. Finally, I find that areas with a national or regional capital are significantly more likely to experience OCG violence against the state, providing strong support for the argument that areas that are symbolic of government power will be more likely to experience OCG violence against the state. In Chapter Six, I discuss the implication of these results as well as the limitations of the study and directions for future research. Finally, in Chapter Seven, I provide a conclusion of the thesis.

CHAPTER TWO: LITERATURE REVIEW

This chapter provides an overview of literature on organized crime violence and political violence. In the first section, I provide an overview of organized crime violence, including the definition of organized crime that will be used in this thesis, the characteristics of organized crime groups and the growth of transnational organized crime in the 20th century. I then review literature on the targets and causes of organized crime, including literature that attempts to explain geographic and temporal variation in organized crime violence. In the second section, I provide an overview of literature that examines the overlap between political violence and organized crime violence as well the literature that analyzes geographic variation in political violence, allowing me to compare and contrast works that examine variation in organized crime violence and political violence.

Organized Crime Violence

Organized crime is a phenomenon in which hierarchically organized groups of criminals with the ability to use violence, or the threat of it, acquire or defend the control of illegal markets in order to extract economic benefits from them (Reuter, 2008). Although it is estimated that 50 to 70 percent of OCG revenue comes from the production and distribution of illegal drugs, OCGs engage in a variety of other illicit activities (Galeotti, 2005; Glenny 2008). A growing source of revenue for OCGs is the smuggling of people across international borders (Hall, 2012). Other sources of revenue include the trafficking of licit goods to avoid duty or taxes, weapons trades, trade in counterfeit goods and the provision and control of illicit services, including, but not limited to prostitution, gambling, cyber-crime, robber and extortion (Hall, 2012). Some OCGs also

generate revenue through legal business, as it allows them to gain a more respectable social status and is also a good way to launder illegal money (Fickenauer, 2005). However, despite the variety of activities that OCGs engage in, OCGs generally exhibit similar structural characteristics. These characteristics include lack of ideology, structure/organized hierarchy, continuity, violence/use of force/threat of force, restricted membership, participation in illegal enterprises, penetration of legitimate businesses and corruption (Fickenauer, 2005).

The presence of organized crime in society and organized crime violence is not a new phenomenon. Powerful crime groups today such as the Japanese Yamaguchi Gumi and Italian-American mafia group Camorra have been engaging in a variety of illicit activities and generating billions in revenues for hundreds of years. However, organized crime has drawn more attention in recent years due to its growth, increasing capacity for and increasingly transnational nature. Although organized crime dates back centuries, in the 20th century, transnational organized crime groups grew exponentially. This growth was largely facilitated by the increasingly international scope of legitimate business and significant technological advances including the rise of commercial airline travel, telecommunications technology and computers (Shelley, 1995). Additionally, between 1970 and1990, global trade increased ten times, and with it both the scope and scale of organized crime (Williams, 1994). Today, it is estimated that organized crime constitutes roughly 15 to 20 percent of the global economy (Hall, 2012; Galeotti, 2005). As organized crime and organized crime violence has become an increasingly global phenomenon, more attention has been paid to organized crime violence across both local,

state and global markets. As shown by Table 1, in which a lower score indicates high levels of organized crime, many countries today are experiencing high levels of organized crime (World Economic Forum Global Competitiveness Report, 2013).

Table 1: Countries with the Highest Levels of Organized Crime (2017)
Source: World Economic Forum and United Nations Office of Drugs and Crime

Country	Organized Crime Score	Homicide Rate (per 100,000)
El Salvador	1.5	82.8
Honduras	2.4	56.5
Venezuela	2.5	56.3
Mexico	2.6	19.3
Guatemala	2.7	27.3
Jamaica	2.9	47.0
Colombia	2.9	25.5
Chad	3.1	9.0
Peru	3.2	7.7
Yemen	3.3	1.6
Pakistan	3.3	4.4
Guinea	3.4	8.8
Mozambique	3.4	3.4
Mali	3.4	10.9
Italy	3.5	0.7

A comparison of organized crime rates and homicide rates, based on United Nations Office on Drugs and Crime data, shows that many countries with high organized crime scores also have high homicide rates. Although some countries such as Italy and Mozambique have relatively low homicide rates despite the presence of organized crime, other countries, especially those in Latin America have notably high homicide rates. Seven of the fifteen countries with the highest levels of organized crime have homicides rates over the rate of 10 per 100,000 residents, meaning that their homicide rates are considered to be at “epidemic levels” by the World Health Organization (Cawley, 2013).

Literature on organized crime violence has shown that the presence of organized crime in a country can contribute to increased levels of violence in a country but does find that there is both geographic and temporal variation in the relationship between organized crime and violence (Shirk and Wallman, 2015; Williams, 2009). However, in order to examine the causes of variation in organized crime violence across and within countries, the focus of this thesis, it is important to understand who is affected by this violence and what cause this violence.

Targets and Causes of Organized Crime Violence

Despite the growth of transnational organized crime, not all illicit markets exhibit high levels of violence. However, when violence is present, OGCs can target other OCGs, the state or civilians. This thesis only focuses on violence against OCGs and against the state, so this section discusses literature that explores the causes of organized crime violence against these actors. There are several competing arguments that attempt to explain why and how OCGs use violence against other OCGs. The first line of argument posits that OCGs operate across various countries in illicit markets and because these markets are lacking in any legal mechanisms of redress, violence is used to deal with grievances between OCGs (Williams, 2009). Essentially, actors in organized illegal enterprises lack recourse to legal remedies to rectify violations of business agreements, to protect against other OCGs who would impinge on their activities and to settle perceived violations of their moral order (Andreas and Wallman, 2009; Shirk and Wallman, 2015). Therefore, OCGs have to rely on informal means of resolving conflicts, including violence.

Although the literature has established that violence is often used to redress grievances between OCGs in illicit markets, there is still significant variation in violence

across illicit markets (Williams, 2009; Reuter, 2009; Shirk and Wallman, 2015). Some illicit markets, such as Mexico and Colombia after the mid-1990s experience high levels of violence, whereas other illicit markets such as Burma after the1990s and Mexico before the mid-1990s experience low levels of violence (Snyder and Duran-Martinez, 2009). This temporal variation in violence occurs due to changes in collusion between the state and OCGs. When there is a tentative equilibrium between the government and OCGs and between different OCGs in these markets, violence decreases. Snyder and Duran-Martinze 2009) define this phenomenon as a state-sponsored protection rackets, an informal institution through which public officials refrain from enforcing the law or, alternatively, enforce it selectively against the rivals of a criminal organization, in exchange for a share of the profits generated by the organization. State-sponsored protection rackets are beneficial to OCGs as it allows them to operate within a nation-state with little to no interference and beneficial to that state as it allows officials to receive benefits such as bribes in exchange for "protecting" OCGs. For example, Rios (2013) argues that when Mexico was controlled by the PRI, corrupt officials agreed to allow drug cartels to operate freely within Mexico and traffic drugs to the United States, provided that they did not engage in high levels of violent activity within Mexico, especially activity that affected civilians. However, when state-sponsored protection disappears, usually because the state engages in a crackdown on illegal activity, OCGs engage in violence against one another as they fight for shares of the illicit market (Snyder and Duran-Martinez, 2009; Rios, 2013).

Others argue that even when there is no implicit state-sponsored protection racket, competition between OCGs can lead to temporal variation in violence. This field of

literature argues that violence between OCGs is more likely during disputes of control of lucrative distribution networks and when there is a shift in the balance of power either within or between contending organizations (Friman, 2009). Examining the case of the Cali and Medellin Cartel, who fought in the United States during the 1980s, Friman (2009) argues that violence between the two cartels was highest when they were fighting for control of distribution networks and that one the markets were consolidated levels of large-scale violence decrease (Friman, 2009). Another instance of this trend can be seen in Japan in the 1940s and 1950s when the Yamaguchi-gumi syndicate sought to expand control into the territory of the Inagawa-kai and Sumiyoshi-kai (Shikita and Tsuchiya 1990). When this expansion attempt began, violence between the two OCGs increases, but subsided after the Yamaguchi-gumi abandoned their efforts to expand (Shikita and Tsuchiya 1990; Tamura 1992l; Friman 2009). Overall, although these theories explain variation in violence across illicit markets and temporal variation in violence, they do not explain geographic variation in OCG violence that can be seen in countries such as Mexico, Colombia and Afghanistan.

In comparison to violence between OCGs, violence against the state carried out by OCGs has been understudied. As shown by the literature that explores state-sponsored protection rackets, OCGs often seek to penetrate the state rather than engage in violence against it, as cooperation in the form of a state-sponsored protection rackets is beneficial to OCGs. However, there are instances in which OCGs are unable to penetrate the state and may choose to instead use violence against the state to achieve their goals. Studies that address this phenomenon find that the use of violence against the state is more likely it two situations: where criminal justice personnel are actively engaged in curtailing the

illicit trade and/or where OCGs are pursuing broader political goals (Friman, 2009; Poire and Martinez, 2011). Generally, it is held that OCGs both a threat to the concept of the nation-state, democracy and economic development (Shelley, 1995). However, although there is research on state-sponsored protection rackets formed between the state and OCGs and what happens to violence between OCGs when these rackets break down, there is little research on the relationship between violence against the state carried out by OCGs.

Geographic Variation in Organized Crime Violence

Although it is understudied, literature on organized crime violence does explore its geographic variation, rather than its temporal variation. Some studies have built on existing theories of state-sponsored protection rackets and violence, arguing that in areas where OCGs and the state had some sort of alliance, violence was less likely (Goodhand 2008; Snyder and Duran 2009). A notable example is Afghanistan, where areas with joint extraction schemes for poppies between the state and drug traffickers brings political order, whereas areas with private extraction schemes experience more violence (Goodhand, 2008). Snyder and Duran (2009) also provide another example, arguing that in Colombia, violence in Cali Cartel controlled areas decreased during the time period that they made an alliance with the government, as the government went after the Medellin Cartel and Pablo Escobar. Other studies have focuses on drug cultivation and eradication as a contributor to geographic variation in organized crime violence by OCGs that are involved in drug trafficking. Most of this research focuses on coca cultivation in Colombia and find that crop eradication is positively associated with increased violence, but coca crop cultivation is not a significant predictor of violence (Holmes, Gutierrez de

Pineres, Curtin, 2006; Mejia and Restrepo, 2015). With the notable exception of Rios' (2013) work on organized crime in Mexico and Lessing's (2012) work on organized crime in Brazil, most research on organized crime violence against the state and against other OCGs is largely descriptive and focuses on temporal variation in violence, rather than geographic variation in violence within countries and within illicit markets.

Overall, it is clear that in general, theories on variation in organized crime violence are largely based on descriptive evidence rather than quantitative data and do not explore causes of OCG violence against the state. Furthermore, literature on geographic variation in organized crime violence at the sub-national level is generally lacking, despite the fact that organized crime violence seems to occur in confined areas, while other areas experience relative peace, even if they are part of an illicit market. In the studies that do examine geographic variation in organized crime, there is a lack an overarching theory of geographic variation in organized crime violence. These studies only focus on one specific cause of geographic variation in violence and do not look at the potential effects of multiple variables on geographic variation in organized crime violence. However, literature on political violence does examine geographic variation in violence. The following section reviews the relationship between organized crime violence and political violence and discusses literature that focuses on geographic variation in violence, often in the context of insurgencies, civil wars and terrorism.

The Nexus between Organized Crime and Political Violence

A closer examination of the literature shows that OCGs and insurgent groups have similarities and that the distinction between the two is not always clear cut. In many countries, there is a blurring between OCGs and insurgent organizations. Although OCGs

do not have an ideological aim such as overthrowing the government, both OCGs and insurgents effectively challenge a state's monopoly on violence and both eventually confront the state's full might (Kalyvas, 2015). As they challenge the states monopoly on violence, both crime groups and insurgents face similar obstacles, which leads to similarities in how they use violence. Both OCGs and insurgent groups use violence against other OCGs, use violence to obtain and control resources, and use violence coerce the government and achieve their goals. Examples include the Shining Path in Peru who engaged in violence to maintain a monopoly over coca production is certain regions (Weinstein 2006) and the FARC in Colombia, who drastically increased revenues by engaging in the coca industry in Colombia after the Medellin and Cali Cartels were targeted by the government (Peceny and Durnan, 2006). In addition to insurgent groups who engage in drug trafficking, there are also OCGs that act in way similar to insurgent groups. Both OCGs and insurgent groups use violence as a coercive tool, have a structured or organized hierarchy and both seek to maintain control, be it over an illegal market or over territory (Weinstein, 2006; Finkenauer, 2005). However, political science literature often overlooks similarities between organized crime violence and political violence, meaning that literature on organized crime violence in this field is lacking.

Although terms including "criminal insurgency", "drug war" and "narco-terrorism" have been used to describe organized crime conflicts in countries including Mexico, Afghanistan, Pakistan and Colombia, arguing that organized crime conflicts are civil wars is theoretically problematic. Unlike rebel groups or terrorist organizations, OCGs lack a political ideology and are not attempting to take over the government (Kalyvas, 2015; Osorio, 2013). Therefore, it is problematic to argue that organized crime

conflicts are in the same category as civil wars and that OCGs are terrorist organizations. Another line of argument, most notably in the civil war literature, posits that civil war is largely based on greed and criminal operations (Collier, 2000; Collier and Hoeffler, 2004). However, this model has been heavily critiqued and it has been found that many studies that argue civil wars are motivated by opportunities to engage in criminal operations suffer from empirical issues and overlook the role of other motivations and factors that cause civil war onset (Kalyvas, 2015; Ross, 2006). Although there are differences between organized crime operations and civil wars, the crime as a civil war model does demonstrate that there are some war-like dimensions in large-scale organized crime (Kalyvas, 2015).

As in the literature on civil wars, some studies on terrorism and organized crime violence argue that OCGs and terrorist groups can merge (Makarenko, 2004). However, others have argued that the concept of the term terrorism suffers from "stretching" and that employing phrases such as cyber-terrorism and narco-terrorism is problematic because adopting the term terrorism to a vast number of different concepts diffuses its definition (Weinberg et al, 2004; Bjornehed, 2004). Although there are some instances of OCGs becoming involved in the political arena[1], it is difficult to argue that their goals are truly political more than they are economic. Conversely, arguing that terrorist or insurgent organizations are OCGs is also problematic. Makarenko (2004) and Wilkinson (2006) argue that the FARC in Colombia has shifted from an organization focused on political violence to a branch of organized crime that engages in drug trafficking, coca

[1] Examples include Pablo Escobar's election to the Chamber of Representatives of Colombia and Afghanistan politicians who are elected officials but also oversee drug cultivation and trafficking in their constituent areas.

and opium production, extortion and kidnapping. However, this argument is problematic, as it overlooks the fact that the FARC was still largely politically motivated. The government crackdown on Colombian cartels provided the FARC with the opportunities to extract resources from the cocaine industry, and the FARC in turn used these resources to deepen its long insurgency against the Colombian state (Peceny and Duran, 2006). Although OCGs and insurgent groups or terrorist organizations do not merge, it is evident that there are similarities between the two. Both OCGs and groups engaging in political violence use violence against the state and against each other to achieve these goals, and there are instances of OCGs using terrorist tactics and examples of insurgent groups engaging in organized crime. Additionally, like organized crime violence, political violence often has high levels of geographic variation, especially in the context of civil wars.

Geographic Variation in Political Violence

An examination of civil wars and other form of political violence show that violence is often geographically concentrated to confined areas. Civil war and other forms of political violence have traditionally been examined at the nation-state level, rather than at the sub-national level (Gledsitch and Cederman, 2009; Kalyvas, 2012). However, an examination of civil wars and other form of political violence show that violence is often geographically concentrated to confined areas. Examples include conflict in Kashmir, India and conflict in Chechnya, Russia. Unlike the literature on organized crime violence, literature that examines political violence has begun to recognize that countries typically display large variation within their territory and that looking at spatial variation within individual states allows for comparisons between

conflict and non-conflict as well as the examination of sub-national processes (Gledsitch and Cederman, 2009). This recognition has allowed for literature on political violence to develop theories that can explain sub-national geographic variation in violence across multiple conflicts and countries. These theories have proposed causal mechanisms that explain both violence against the state in political conflicts and violence between groups in political conflicts (Kalyvas, 2000; Cunningham, Bakke and Seymour, 2013; Balcells, 2010). Although much of this literature focuses on geographic variation in violence against civilians, it is still useful to explore, as it reveals similarities between conflicts involving OCGs and the state and conflicts involving insurgent groups and the state.

If we decouple the idea of civil war from civil war violence (Kalyvas, 2000), we can draw comparisons between the dynamics that drive civil war violence and organized crime violence. Most notably, this literature argues that violence is often used by both the state and insurgent groups as a coercive tool and there is a clear coercive dimension of the use of violence by OCGs (Kalyvas, 2015). As previously discussed, other parallels between organized crime violence and political violence include the scale of violence[2], completion over resources, a relationship between control and levels of violence and a relationship between group fractionalization and levels of violence. Given that there are few studies that examine geographic variation in organized crime violence and that these studies have not made strong connections between the similarities seen in OCG violence and political violence, there is clearly a gap in the literature. Building on the literature review, the following chapter will further explore the similarities between OCG violence

[2] In countries with high levels of organized crime, such as Mexico, Guatemala and El Salvador, organized crime violence has certainly reached the scale seen in some civil wars.

and political violence and develop a theory that demonstrates how these similarities can be used to explain geographic variation in organized crime violence.

CHAPTER THREE: A THEORY OF CONTROL AND COERCION

In the literature review, it was established that illegality does not necessarily cause violence. Although violence is often used as a means to redress disputes in illicit markets which are lacking in formal legal mechanisms, there are many instances of illicit markets with little to no violence. However, whenever there is a change in the equilibrium of a market, which can be caused by a variety of mechanisms[3], violence in a market can increase. Similarly, the emergence of terrorism or civil war in the country occurs when there a group decides to challenge the state's power and there is a breakdown in the equilibrium of power. In this chapter, I argue that when instability emerges in an illicit market, violence increases, but that there is geographic variation in this violence. Furthermore, this geographic variation in organized crime violence following a breakdown can be explained by theories that explain geographic variation in political violence. More specifically, when instability emerges, two key mechanisms that drive both conflict between OCGs and conflict between OCGs and that state are competition and coercion. In these conflicts, both OCGs and groups engaging in political violence need to compete with one another and with the state for control over territory and resources. They both use violence to maintain control over resources, take control from other groups and retaliate against the government, and the OCGs use violence to coerce the government to not interfere in their illicit operations. Literature on civil wars

[3] Examples include Mexico, where OCG-related violence increased after democratization, other forms and President Enrique Calderon's "decapitation" strategy led to a breakdown in the existing state sponsored protection racket. Other notable examples are Colombia and Brazil, which did not have a formalized state sponsored protection rackets, but violence in both countries increased after an OCG in the country decided to challenge the government.

has demonstrated that control is directly linked to geographic variation in civil war violence (Kalyvas, 2000) and the following chapter will demonstrate how control is also linked to geographic variation in organized crime violence. More specifically, I argue that although illicit markets are not always violent, when they do become violent, OCGs fight each other in ways that are similar to insurgent groups and OCGs fight the state in ways that are similar to guerilla groups or terrorist organizations. OCG violence against other OCGs is driven by conquest, the goal of which is to definitively expropriate from or replace opponents (Lessing, 2015), whereas when OCGs choose to confront the state, they operate more visibly and seek to influence the way the law is applied and in doing so, they move temporarily into an area that is inhabited by groups such as terrorists or guerillas (Bailey and Taylor, 2009).

This chapter is divided into three sections. I first develop a theory that explains how control and coercion leads to geographic variation in organized crime violence between OCGs and geographic variation in organized crime violence against the state. I then provide support for this theory using case studies of Honduras and Brazil in which I use descriptive data to examine causes of geographic variation in homicides and police deaths. Finally, I examine geographic variation in organized crime violence in Mexico using descriptive data on drug trafficking related homicides from 2006 to 2010. Each of these countries have different types of OCGs and examining them shows how the theory established in this chapter can be applied across countries and OCGs.

Control, Coercion and Organized Crime Violence

This thesis examines two different types of violence: OCG violence against other OCGs and OCG violence against the state. Although one often follows another when there is a breakdown in an illicit market, they are caused by differing causal mechanisms and one can happen without the other. OCG violence against other OCGs is often driven by the desire to gain more resources that will allow them to expand their illegal operations and money and by OCG fractionalization. In this sense, OCG violence against other OCGs is driven by conquest, the goal of which is to definitively expropriate from or replace opponents (Lessing, 2015). This same mechanism drives insurgent groups in civil wars as they attempt to take control from other insurgent groups or the government (Lessing, 2015). On the other hand, OCG violence against the state is not done with the aim of taking control of territory. Rather, the goal of OCG violence against the state is to challenge the state's monopoly on violence and influence the state's behavior in a way that is beneficial to the OCG. Violence can be used to convince a state to adapt a certain policy or discourage interference in their operations. Unlike inter-OCG conflict, conflict between the OCG and the state is driven by constraint and coercion. Essentially, an OCG will not engage in violence against that state unless they feel that it is necessary, as they often use other methods such as corruption and bribery. Overall, similar to insurgent groups in civil wars, OCG violence against other OCGs is driven by conquest, the goal of which is to definitively expropriate from or replace opponents (Lessing 2015), whereas when OCGs choose to confront the state, they operate more visibly and seek to influence the way the law is applied and in doing so, they move temporarily into an area that is inhabited by groups such as terrorists or guerillas (Bailey and Taylor, 2009). However,

both inter-OCG violence and OCG violence against that state challenge the state's monopoly on violence and show that within the state in question, violence is not controlled by the government.

In terms of OCG violence against the state, the immediate triggers may vary, but causes such as government cooperation with rival groups, more intense government repression of crime, adoption of specific policies related to jailhouse segregation of gangs have all been causes of OCG violence against the state in the past (Bailey and Taylor 2009). A clear example is Escobar's campaign of violence against the Colombian government to avoid extradition to the United States (Lessing, 2015). During this time period, violence against the state carried out by Escobar's Medellin Cartel increased, but violence carried out against the state by the Cali Cartel was minimal, showing that even within the same country, an illicit market does not necessarily cause high levels of violence between the state and an OCG. Additionally, OCG violence against the state can also serve as a signal of power to both the state and other OCGs that the OCG in question is not afraid to challenge the state's monopoly on violence or use violence to settle inter-OCG disputes (Bailey and Taylor, 2009). Although their overall goal is not to take control of a country, OCGs and insurgent groups both confront the state's monopoly violence, leading to evident similarities in the way that they use violence against the government to achieve their goals. Overall, while OCG violence against other OCGs and OCG violence against that state are driven by different causal mechanisms, both mechanisms show that violence in used by OCGs against other OCGs and the state in a way that is similar to how insurgents and other politically motivated groups use violence during a conflict. The following sections will apply literature on political violence to

inter-OCG violence and OCG violence against the state, demonstrating that many variables that cause geographic variation in political violence also cause geographic variation in organized crime violence.

Geographic Variation in Inter-OCG Violence

During a conflict, both terrorists and insurgents seek to secure material resources and political leverage that will help in the fight against the government and against other competing groups (Fjelde and Nielson, 2012; Schmid, 2005). These resources can include land, drugs, oil and other natural resources that may help the group gain an advantage over the state, who is usually much stronger than the insurgent group. Additionally, the presence of contraband (drugs and gems) in a conflict can increase the duration of a civil war and mineral resources in a conflict zone is also positively associated with an increase in the size of a conflict zone (Fearon, 2004; Buhaug and Gates, 2002). For OCGs, access to resources is equally as important. Although OCGs dot no seek territorial control, they do seek control over illicit activity within the state and access to resources such as drug crops, mineral resources and illegal markets. When OCGs have control over these resources, they are able to increase their profits, take control away from other OCGs and engage in rent-seeking activities such as extortion. Therefore, when OCGs decide to engage in conflict with other OCGs, they will target areas that contain specific resources that will allow them to weaken other OCGs and increase their own profits. There are two different types of areas that OCGs target in order to maximize profits. The first is areas that provide access to resources that can be used to obtain goods. Examples include land that contains gems and cropland that can used for drug cultivation. The second is areas that provide access to markets where these illicit goods can be sold, as illicit goods are usually produced in one country and then sold in another. Examples include areas that

border another state, transportation hubs and areas that can be used to land planes without government observation. Therefore, competition for control over these resources will be likely to increase violence between OCGs in that region.

Hypothesis 1: The presence of natural resources that can be used to cultivate or obtain illicit goods will increase the likelihood of violence between OCGs in a given region.

Hypothesis 2: The presence of resources that provide access to an illicit market will increase the likelihood of violence between OCGs in a given region.

Fractionalization is another factor that appears in both conflict between OCGs and in civil wars. Fractionalization can be conceptualized among three dimensions: the number of organizations in a movement, the degree of institutionalization across organizations and the distribution of power across organizations (Bakke, Cunningham and Seymour 2012). Literature on civil war violence generally treats insurgent groups as a unitary actor, but insurgent groups cannot always be considered to be unitary actors. In many conflicts, differing goals and tensions over control of territory, control over the civilian population and more can cause group fractionalization (Cunningham, 2013; Akcinaroglu, 2012). More competing factions are associated with higher instances of factional fighting and attacks on co-ethnic civilians and other rebel groups (Cunningham, Bakke and Seymour 2012). Similar dynamic can be seen among OCGs. When an illicit market is stable, OCGs do not engage in large scale violence against one another as this is likely to attract the attention of the government or cause a breakdown in a state-sponsored protection racket, if one exists. Examples of illicit markets that have exhibited stability and low levels of violence despite the presence of OCGs include drug trafficking in Mexico before 1990s, drug trafficking in Burma after the 1990s and poaching in

Namibia, South Africa (Snyder and Duran-Martinez, 2009). Therefore, fractionalization and illegality does not necessarily equate to violence.

However, when conflict or instability emerges, OCGs often take advantage of the conflictual environment in order to gain more control over an illicit market. There are generally two or more OCGs competing for a control over an illicit market, such as the multiple mafia groups in Italy, multiple cartels in Mexico and gangs in El Salvador. Additionally, the degree of institutionalization across OCGs and the division of power across OCGs generally varies greatly. Compounding fractionalization, organized crime markets are inherently unstable because they lack formal mechanisms and rules to deal with disputes and disagreements between organizations (Rios, 2013). Therefore, when instability emerges, fractionalization among these groups will only serve to increase violence as there are no formal mechanisms to deal with disputes or competition between OCGs, and it is difficult for the government to prevent this type of violence and enforce rule of law in illicit markets.

Hypothesis 3: Areas of OCG control that are contested by more than one OCG will be more likely to experience inter-OCG violence.

Geographic Variation in OCG Violence Against the State

Of the two fields, literature that examines geographic variation in violence against the state carried out by insurgent groups or other ideologically motivated groups is less developed than literature focusing on geographic variation in violence between groups. However, as previously discussed, both insurgent groups and OCGs challenge the state's monopoly on violence, leading to similarities in how they use violence. When OCGs chose to confront the state, they operate more visibly and seek to influence the way the

law is applied and in doing so, they move temporarily into an area that is inhabited by groups such as terrorists or guerillas (Bailey and Taylor, 2009).

In civil wars or other political conflicts, both terrorists and insurgents seek to secure material resources that will provide them with an advantage against the government (Fjelde and Nielson, 2012; Schmid, 2005). OCGs also value resources that are useful to them, including resources that provide access to illicit markets and resources that give them an advantage over other OCGs. Therefore, they will want to ensure their control of these resources. In many cases, OCGs prefer to utilize alternative to violence in order to carry out illicit activities, such as corruption or a state-sponsored protection racket (Lessing, 2015; Snyder and Duran-Martinez, 2009). However, when this option does not work or no longer becomes available, due to a change in government policy or loss of a state-sponsored protection racket, OCGs will use violence, if necessary, in order to maintain the ability to utilize these resources without interference from the government. Once this goal has been achieved, OCG violence against the state in this region will decrease.

H4: The presence of resources that can be used to cultivate or obtain illicit goods will increase the likelihood of violence between an OCG and the state in a given region.

H5: The presence of resources that provide access to an illicit market will increase the likelihood of violence between an OCG and the state in a given region.

Another way that both insurgent groups, terrorist groups and OCGs may try to demonstrate control over the government is through retaliating against the government in places that are symbolic of the state's power. As noted previously, violence can be used to inflict pain, but also to provide information about the perpetrator's operational

capacity, resolve, internal cohesion and more (Powell, 2004; Lessing, 2015). OCGs have a long history using violence in this manner. Examples include OCGs murdering politicians and government officials who speak out against them (Snyder and Duran-Martinez, 2009) and attacking symbolic locations, common tactics used in terrorist attacks and civil wars as a form of costly signaling. When an OCG attacks a state, it signals to the state that it is challenging its control of violence within the state. An OCG attack against the state can serve as a warning signal to the government and demonstrate their capacity for resistance (Calderon et al., 2015). Essentially, violence against that state can be used as a costly and coercive signal to the state that an OCG power within the state to conduct illicit activities, even if it does not directly challenge the state's governance. Therefore, when conflict between the state and OCGs emerges, anti-government violence is likely to emerge in areas are centers of the state's power, such as regional and national capitals.

Hypothesis 6: The presence of a national or regional capital will increase the likelihood of violence between an OCG and state in a given area.

Case Studies: Honduras and Brazil

Both Honduras and Brazil are countries that experienced high levels of violence in recent years and much of this violence have been attributed to organized crime. As shown by Figure 1, Honduras and Brazil are both experiencing high levels of violence.

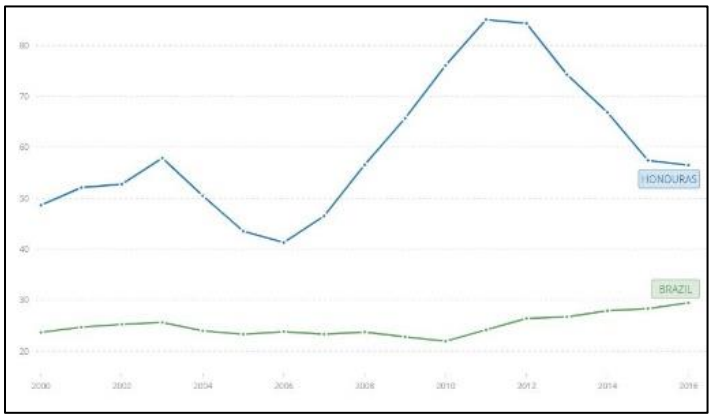

Figure 1: Homicides per 100,000 People in Honduras and Brazil (2000-2016)

Source: UNODC 2016, Graph created using worldbank.org

With an intentional homicide rate of 56.5 per 100,000 people, Honduras is one of the most violent countries in the world and with an intentional homicide rate of 29.5, Brazil does not trail far behind (UNODC, 2016). Much of the violence in both countries has been attributed to violence between OCGs and violence between OCGs and the government (). However, data at the sub-national level shows that both countries experience significant geographic variation in violence. Honduras consists of 18 departments which are subdivided into 298 municipalities, yet government data shows that just three municipalities account for over 40 percent of all murders in Honduras in 2017 (Secretaria de Seguridad, 2017). Brazil consists of 26 states, yet the number of homicides per year in each state ranges from 192 to 6,310 (Brazilian Forum of Public

Security, 2018). Although the data on both countries in not specifically attributed to organized crime violence, there is a well-demonstrated causal link between organized crime and increased levels of violence in an area. Additionally, both countries have experienced inter-OCG and OCG violence against the state in recent years and multiple sources find that many homicides in the country are linked to organized crime violence, making homicides the best reliable proxy variable. The following sections examine the relationship between organized crime and violence in the municipalities in the Honduras and states in Brazil that have experienced high levels of violence in recent years.

Organized Crime in Honduras

Organized crime in the Honduras is overseen by multiple gangs, but the largest and most well-known actors are the Mara Salvatrucha (MS13) and Barrio 18. Both MS13 and Barrio 18 were both founded in Los Angeles, California by immigrants in the 1980s (Bishop, 2014). However, the emergence of both gangs in Honduras and other Latin American countries occurred in the 1990s when legislation in the United States led to increased deportation of ex-convict and numerous members of MS13 and Barrio 18 were deported (InSight Crime, 2015). By the early 2000s, MS13, Barrio 18 and several local gangs were engaged in a bloody turf war for territory, extortion revenue and drug markets (InSight Crime, 2015). Based on Fickenauer's (2005) definition of OCGs used in this thesis both groups can be classified as OCGs given that they exhibit a lack of ideology, have a structure/organized hierarchy, continuity, violence/use of force/threat of force, restricted membership, participation in illegal enterprises, penetration of legitimate businesses and corruption. Barrio 18 generates much of its revenue from the micro-extortion of business and civilians in the territory it controls, extortion of bus and taxi

drivers, stealing goods and selling drugs within Honduras. MS13 generates much of its revenue the same way, but unlike Barrio 18, they avoid violence and micro-extortion against stores and civilians in the territory they control and have moved from selling drugs locally to becoming a wholesale supplier of drugs in Honduras (Insight Crime, 2015). Despite the presence of both OCGs across the country and high homicide rates in Honduras, little has been done to examine the relationship between organized crime and geographic variation in Honduras.

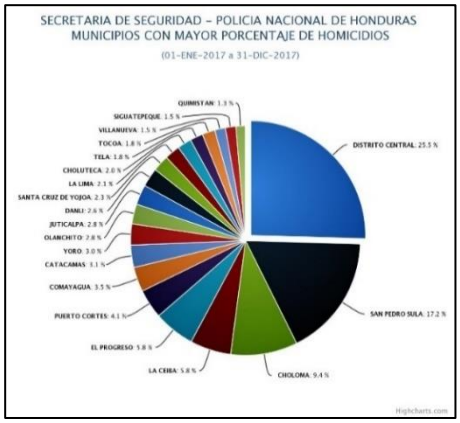

Figure 2: Honduran Municipalities with the Highest Percentage of Homicides (2017)

Source: Honduras Secretary of Security

Figure 2 demonstrates that there is significant geographic variation in homicides in Honduras at the municipal level.[4] Three municipalities, Distrito Central, San Pedroso Sula and Choloma were responsible for 52.1% of all homicides in 2017. A closer examination of the municipalities with the most homicides in 2017 (Distrito Central, San Pedroso Sula, Choloma, La Ceiba and El Progreso), show that this geographic variation in violence can be linked to the fractionalization of organized crime groups, competition

[4] Refer to appendix for additional figures on homicides and explanation of data sources.

over areas that provide access to illicit markets and competition over areas that provide access to access to resources used to generate profits.

Distrito Central, San Pedroso Sula and Choloma and La Ceiba are all home to both the MS13 and Barrio 18. Additionally, within these municipalities, there is a high level of fractionalization between the gangs, as the gangs both have a similar number of members in these areas which has prevented either group from gaining firm control over the area. Fractionalization is further shown by Figure 3 of Tegucigalpa, the capital of Honduras, located in Distrito Central.[5] Police reporting shows that within Tegucigalpa as well as San Pedroso Sula, Choloma and La Ceiba, the gangs fight for control of neighborhoods and there are some areas where both gangs have a presence, which leads to increased fighting as these areas are contested (Insight Crime, 2015). Overall, these statistics clearly show that violence in these municipalities can be attributed to fractionalization.

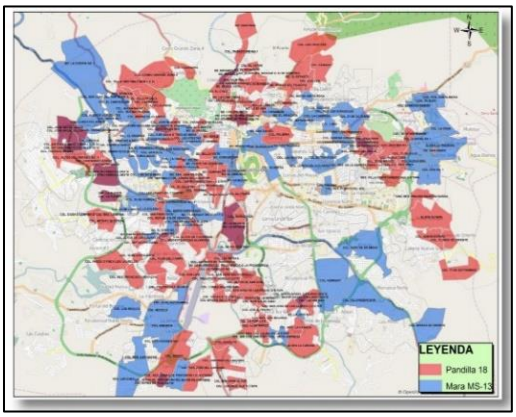

Figure 3: Areas of Gang Control in Tegucigalpa, Honduras (2015)

Source: Data gathered from Honduran police intelligence by Insight Crime

[5] Refer to appendix for additional figures that show fractionalization in San Pedroso Sula and graphics that show the number of gang members in cities across Honduras.

Violence in municipalities with high homicide rates has also been attributed to fights over resources that generate revenue and provide access to illicit markets. For Barrio 18, important resources include access to urban areas, transportation hubs and access to local drug markets. For MS13, important resources include access to transportation hubs, access to local drug markets and access to resources that can be used to transport large amounts of drugs. Access to transportation hubs, like cities, allows both gangs to extort taxi and bus drivers, which is estimated to be a main source of their revenue (Insight Crime, 2015). In Tegucigalpa, a leader of a bus collective reported that his collective of about 80 buses were currently paying four different groups, including MS13 and Barrio 18 (Insight Crime, 2015). This shows clear competition over access to transportation hubs for extortion in this municipality, which has a very high rate of homicides. Additionally, access to local drug markets allows both gangs to sell drugs in Honduras, another source of revenue. The 5 municipalities that had the most homicides in 2017 contain drug markets, which suggests that access to resources could also be a cause of increased violence in these areas, as the gangs fight for control over these resources. Research on drug markets in Tegucigalpa and San Pedro Sula found that the local drug markets are so profitable that Barrio 18 has been making a strong effort to take control of the trade in neighborhoods that are controlled by MS13, conducting incursions in to these neighborhoods and attacking distribution points (Insight Crime, 2015). This qualitative evidence clearly suggests that violence between the two gangs is linked to control of emerging local drug markets. Overall, an examination of homicide rates in Honduras suggests that geographic variation in violence can be attributed to gang fractionalization, fights over territory and access to resources that generate revenue.

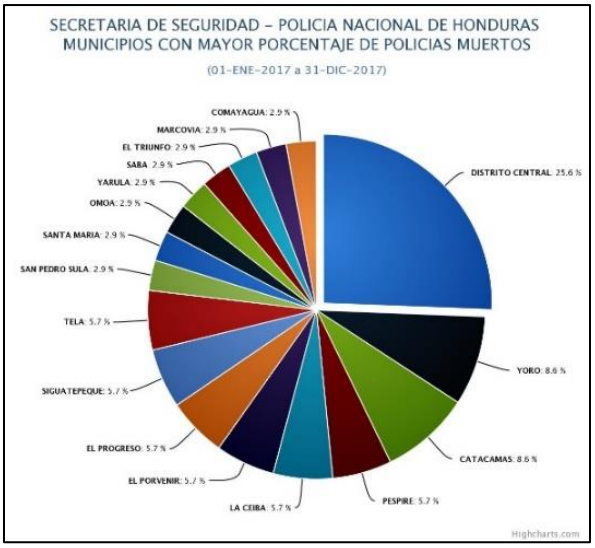

Figure 4: Honduran Municipalities with the Highest Percentage of Police Deaths (2017)

Source: Honduras Secretary of Security

The Honduras National Police also provide data on police killing per municipality, which can be used as a proxy to measure violence against the government by OCGs. Five municipalities, Distrito Central, Yoro, Catacamas, Pespire and La Ceiba were responsible for 54.2 percent of all police killings in 2017. An examination of municipal trends showed that municipalities with high levels of police killings exhibited many, if not all, of the following characteristics: access to resources used by OCGs to generate profits, access to illegal markets and regional or national capitals. Distrito Central and La Ceiba are both municipalities with major cities, proving access to urban area, transportation hubs and local drug markets, resources valued by gangs. La Ceiba is also a coastal city and provides access to the Caribbean, making it a valuable resources as Honduras is one of the main transit points for narcotics trafficked from South America to Mexico and the US. Although rural, Catacamas, located in the Olancho province is near

the Nicaraguan border and has numerous landing areas for traffickers smuggling cocaine en route to the US (BBC, 2011), making it an area with valuable resources for gangs. Although there is evidence of corruption in Honduras in which gangs pay off government officials there is not a formal state-sponsored protection racket and the state is currently trying to decrease gang influence in the country so it stands to reason that gangs in the country will use violence, if necessary, in order to maintain the ability to utilize these resources without interference from the government. Given Distrito Central, La Ceiba and Catacamas all contain resources that can be used to generate revenue or resources that provide access to larger illicit markets, it stands to reason that gangs in Honduras use violence against the government in order to maintain influence in these regions.

In the municipalities of Distrito Central and Yoro, reporting suggests that violence against that state has been used by gangs as a signal to the state that they have the ability to conduct illicit activities in the area, even when the state attempts to crackdown on illicit activity. As mentioned previously, Distrito Central contains Tegucigalpa, the capital of Honduras, but still experience high levels of gang violence and homicides. The municipality of Yoro is home to the Urbina Soto family, who are notorious for their political power in the region and drug trafficking operations. A member of the family was elected mayor and established a state-sponsored protection racket with local police, in which the police protected their illicit activities in exchange for material benefits (Dudley and Puerta, 2017). However, this protection racket broke down in 2014 when members of the Urbina Soto family including the may were arrested by a national counter-narcotics task force (Dudley and Puerta, 2017) and violence against the police in the province increased following the breakdown of the state-sponsored protection racket. Overall, the

level of violence against police in both of these municipalities suggests that violence against the state was used by gangs to signal their strength and ability to conduct illicit activities was used in Yoro after the breakdown of a state-sponsored protection racket.

Organized Crime in Brazil

Organized crime in Brazil is overseen by two main OCGs, the First Capital Command (Primeiro Comando Capital – PCC) and Red Command (Comando Vermelho). Both the PCC and Red Command began in the Brazilian prison system and have expanded their influence across the country, engaging in drug trafficking and sales, extortion and robberies (LaSusa, 2015). However, the PCC and Red Command maintained a tentative truce until 2016, when fighting broke out due to conflict over the drug trade (Alessi, 2016). Additionally, there are instances in which both groups have confronted the state, although they have attempted to engage in non-violent tactics in order to maintain control before using violence against the state (Lessing, 2015). Data on homicides at the state level and anecdotal reporting from studies has shown that there is significant geographic variation in homicides in Brazil and variation in OCG violence against the state. Brazil has experienced a high violence in recent years due to many factors including violence between OCGs, increasing levels of corruption and other socio-economic factors. However, from 2005 to 2015, homicides in the south of Brazil and in Brazil's major cities have actually decreased, while homicides in the normally peaceful northeastern region has increased by more that 232 percent (Asmann, 2017). Furthermore, in 2015, all the states that experienced a growth in homicides of more than 100 percent were located in Brazil's north and northeast regions (Asmann, 2017). These findings are unexpected given that the south, most notably Rio de Janiero and Sao Paolo,

are strongholds of the Red Command and PCC respectively. Given that a long-standing true between the two groups broke down in 2016, it is unusual that violence has actually decreased in the areas they control. A closer examination of this trend suggests that fractionalization, access to both local and transnational illicit markets and fights over drug trafficking routes have caused the increase in violence in the north and northeast.

In comparison to major cities in Honduras with an organized crime presence, in which territorial control is highly fractionalized, Rio de Janiero and Sao Paolo experience little fractionalization. The Red Command and PCC maintain little presence in each other's strongholds (LaSusa, 2016). This trend suggests that fractionalization in these areas has prevented high levels of inter-OCG fighting from occurring, even after the breakdown of their truce. In contrast, neither group has dominant control in northern states. Additionally, the northern region is critically important for international trafficking, as the main drug routes pass through its borders and the northern states have border with Peru, Bolivia and Colombia, countries that are major sources of illicit goods (Alessi, 2016). The north also contains a large local drug market, as a recent report found that 40 percent of Brazil's users of crack and other forms of cocaine live in the north (D'Alama, 2012). This shows that the northern regions of Brazil have many resources that OCGs in Mexico would value access to transnational drug markets, access to local drug markets and access to resources that can be used to transport drugs. After the breakdown of the truce, violence in these areas has increased significantly and much of it has been linked to fights between the PCC and Red Command, supporting the hypotheses that fractionalization increase violence. Additionally, the areas that have seen the biggest increases in violence are states in the north, which provide access to illicit markets and

access to resources that can be used to obtain illegal goods, whereas other areas in Brazil have not seen an increase in violence. This supports the hypotheses that access to natural resources and access to illicit markets in a given region will increase violence between OCGs if they fractionalize.

Corruption has been identified as a major problem in Brazil and studies have argued that in this context, OCGs have eschewed violence, preferring to use corruption and other non-violent methods to prevent state incursion into illicit markets (LaSusa, 2016; Lessing 2015). However, there are instances in which OCGs have used violence against that state and this violence does exhibit geographic variation. Within major cities that are controlled by the Red Command and PCC, violence against the state, namely police forces, by the two groups, is largely limited to favelas. For example, studies have found that the bulk of Rio's violence derives from open clashes, the vast majority of which take place within favela turf in response to police incursions (Lessing, 2013). This suggests that in Brazil, corruption has generally been used as an alternative to violence, unless an OCG feels as if the state is attempting to impinge on its illicit activities and territorial control, both factors that are clearly present in favelas in major cities, supporting the hypotheses that OCGs will engage in violence against the state in order to protect resources and signal power when needed. Another example of OCG violence against the state in Brazil can be seen in the state of Ceara. The state suffered from five nights of attacks that targeted government buildings and police barracks following the new state government's plan to undercut the power of gangs by sending prisoners to whatever jails have space to take them in, ending a longstanding practice of separating them according to gang affiliation (Benassatto, 2019). Essentially, the state government

disrupted the equilibrium between the state and gangs, leading to this increase in violence. The targeting of symbols of government power supports the hypothesis that OCGs will use violence against the government or government symbols of power in order to send a signal to the government that they will use violence to retaliate, if other options such as bribery or a state-sponsored protection racket do not work.

Overall, these case studies of Brazil and Honduras demonstrate support for the argument that although organized crime can lead to increased levels of violence, this violence is often geographic concentrated in a few areas within the country. Furthermore, the case studies provide support for the argument that access to illicit markets, access to resources used to generate revenue, fractionalization and the presence of a regional or national capital will increase both violence between OCGs and violence against the state by OCGs. However, the major drawback of the data on violence in both of these countries is that although homicide levels and police killings have been shown to be causally linked to OCGs, the data is not disaggregated into categories that indicate which specific violent events were related to OCGs. The following section resolves this issue by examining organized crime in Mexico using a dataset that specifically tracked homicides due to OCG rivalry and homicides due to OCG aggressions against the state from 2006 to 2010.

CHAPTER FOUR: RESEARCH DESIGN

Mexico as a Case Study for Organized Crime Violence

Mexico is an ideal case study for examining geographic variation in organized crime violence because of the availability of sub-national data and the presence of existing literature on the rise of organized crime violence in Mexico. Despite that fact that Mexico's organized crime violence rate is not the highest in the world, significant attention has been drawn to the issue because of the sudden and recent increase in homicides. Additionally, in comparison to other countries experiencing organized crime, the availability of data on organized crime violence in Mexico is much greater. Potential data sources include Ejecutometro, a database on organized crime-style homicides per state from 2007-2012 counted by newspaper Reforma and compiled by the Justice in Mexico Project (JMP), Narco Ejecuciones, organized crime-style homicides per year counted by the newspaper Milenio and compiled by JMP, Defunciones por presunta rivalidad delincuencial, a database on organized crime-style homicides at the municipality level counted by the Mexican Government and compiled by JMP and a database on organized crime-style homicides at the municipality level created by Osorio (2013). Although organized crime violence is notoriously difficult to measure, the availability of multiple databases from multiple sources allows for comparison of homicide counts in Mexico across datasets in order to compare the accuracy of the data. Essentially, given the availability of data on organized crime violence in Mexico, lack of research on organized crime violence in other countries with high levels or organized crime violence and the lack of a comprehensive study of causes of geographic variation in organized crime violence, Mexico is an ideal case study for this project.

Organized Crime in Mexico

Mexico has a long history of organized crime dating back to the passage of the Harrison Narcotics Act in the United States. The passage of the act created a demand for opium and heroin and Chinese immigrants in Mexico used the opportunity to use harvest poppies grown in Sinaloa, turn them into gum and sell the opium to Chinese dealers in the US (Grillo, 2012). As drug consumption increased worldwide in the 1960s and 1970s, the surge in demand for drugs including marijuana, heroin and cocaine led to the rise of sophisticated drug trafficking operations, drug cartels. Under the Industrial Revolutionary Party's (PRI's) single-party, authoritarian system, corrupt Mexican government officials played a mediating and regulatory role with DTOs to discourage violence (Rios, 2013). After democratization in 2000, this system based on corruption broke down, the Mexican government pursued more aggressive enforcement tactics against DTOs and violence in the country increased dramatically (Trejo and Ley, 2018). As shown by Figure 5, a major increase in violence related to DTO-related homicides occurred between 2007 and 2008, when homicides jumped from 2,760 homicides to 6,820 (SNSP).

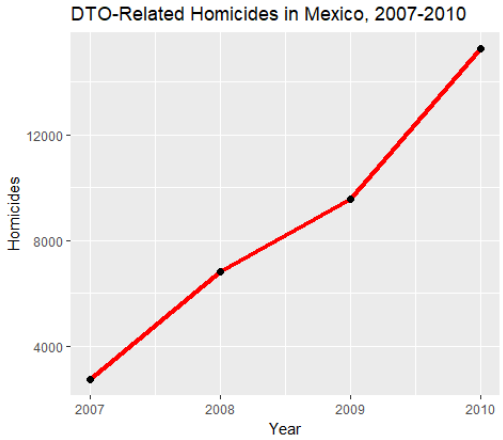

Figure 5: DTO-Related Homicides in Mexico (2007-2010

Source: SNSP

It is generally held that before 2000, the Institutional Revolutionary Party (PRI), which oversaw an authoritarian, single-party system in Mexico, enabled corruption at all levels of government (Rios, 2013; Snyder and Duran-Martinez 2009). Under this pact, selling drugs to the United States and cultivating crops in Mexico was tolerated, but selling drugs in Mexico and engaging in violence that affected Mexican citizens was informally prohibited (Rios, 2013). However, in 2000 the PRI lost the presidential election, paving the way for democratization in Mexico. As multiple political parties emerged and President Calderon launched a crackdown on cartels, the breakdown of state-sponsored protection rackets, a result of well-meaning policy reforms intended to improve law enforcement and governance in Mexico, led to increased DTO-related violence (Snyder, 2009; Williams, 2009).

Most studies that explain organized crime violence in Mexico from a criminal justice or sociological perspective focus on the increase in organized crime violence in Mexico and illicit markets, arguing that although illicit markets are not always violent, structural changes in Mexico including a breakdown in state-sponsored protection rackets, political changes and increased fighting between cartels, made drug markets in Mexico more violent (Snyder and Duran-Martinez, 2009; Williams, 2009; Reuter, 2009). Many of these arguments are merely descriptive and provide no explanation for variation in violence across different states or municipalities in Mexico. However, there are some studies which examine organized crime in Mexico from a political science perspective that provide some explanation for geographic variation in violence. Focusing on the relationship between cartels and the government, Villarreal (2002) find that greater electoral competition is associated with higher homicide rates across municipalities and

over time, even after controlling for other predictors of violent crime. Rios (2015) also found that drug traffickers were more likely to violate the long-standing informal prohibition on selling cocaine in municipalities where the state and municipal governments were controlled by different parties. Using descriptive data, Shirk and Wallman (2015) also find that the highest rates of homicide have been concentrated in areas associated with the production or transit of illicit drugs.

Other studies have focused on factors that many increase inter-cartel violence. One of the policies of the Calderon administration was kingpin removal and the loss of these major players in cartels created fractionalization and conflict between cartels (Shirk and Wallman, 2015; Carpenter, 2010). Subsequently, the loss of these key figures escalated conflict. The emergence of battles for turf between trafficking organizations competing for territories and law enforcement operations has been positively correlated with geographic variation drug-related violence (Rios. 2013; Osorio, 2015). Calderon, Robles, Diaz-Cayeros and Magaloni, 2015 found that violence in a municipality and neighboring municipalities increases following the killing of DTO leader or lieutenant. Additionally, studies have found that while decapitation strategies can play an important role in disrupting organizations, they can also have unintended consequences and increased inter-cartel fighting and fragmenting (Guerrero Gutierrez 2010, Calderon et al., 2015).

In terms of structural factors, Osorio (2015) also finds tentative evidence that structural factors including proximity to the US-Mexico border, local drug consumption and drug production areas are positively associated with increased levels of DTO-related violence, although these factors are not the main focus of the study. Despite some existing research on geographic variation violence in Mexico, much remains to be done.

There has been little connection between explanations for civil war violence and organized crime violence, despite similarities shared by the two and there has been no analysis of structural factors that may cause geographic variation in organized violence.

Geographic Variation in Organized Crime Violence in Mexico

Despite sensationalist reporting that Mexico is in the throes of a "drug war" or experiencing an "orgy of butchery," (Grillo, 2012; Sullivan, Elkus, 2010) little attention has been paid to the significant geographic variation in violence in DTO-related homicides in Mexico. Although the number of DTO-related homicides is troubling, homicides related to DTOs in Mexico are highly geographically concentrated. In 2010, approximately 4 out of 32 states accounted for 84 percent of all DTO-related murders in Mexico and at the municipality level (Rios, 2013). Additionally, 40 percent of all organized crime homicides occurred in 10 of 2,456 municipalities (see Table Two). Of these 2,456 municipalities, 1,637 had no homicide related to drug-trafficking organizations in 2010, clearly showing that organized crime violence in Mexico is geographically concentrated in a few regions.

Table 2: Municipalities with the Highest Number of Homicides Related to DTO-Rivalries (2010)

Source: SNSP

Municipality	Homicides
Juarez	2661
Chihuahua	631
Culiacán	572
Tijuana	461
Acapulco de Juárez	326
Mazatlán	283
Torreón	279
Gómez Palacio	268
Ahome	186
Nogales	180

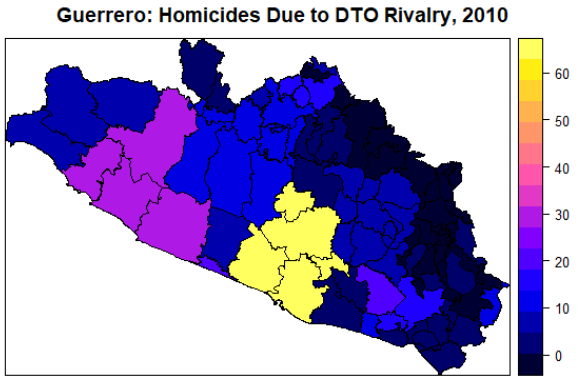

Figure 6: Guerrero

Source: SNSP

Another example of this geographic variation in violence can be seen in the state of Guerrero. Guerrero is one of the most violent states in Mexico, a figure that is not surprising given that an estimated sixty percent of Mexico's poppy crop is grown in Guerrero (Kyle, 2015). However, as shown in Figure 7, there is significant variation in murder density even within the state of Guerrero. Four municipalities showing in yellow had more than 60 homicides due to DTO rivalry, yet all bordering municipalities have very low homicide rates. A similar trend can be seen in municipalities shown in pink, yet all surrounding districts have a homicide rate of 10 or lower.

A similar trend can be seen in homicides related to aggressions against the government, as shown by Table 3 on the following page. In 2010, ten municipalities were responsible for 43% of all homicides due to aggressions by DTOs against the government. A closer examination of the state of Chihuahua (shown in Figure 7 on the following page) which contains the municipality of Juarez, shows that only a small area of the state, shown in yellow, experienced high levels of homicides due to aggressions

against the government by DTOs while much of the state experienced no homicides due to aggressions against the government by DTOs.

Table 3: Municipalities with Highest Homicides Related to Aggressions (2010)

Source: SNSP

Municipality	Homicides
Juarez	39
Miguel Aleman	13
Acapulco de Juárez	13
Chihuahua	13
Zitácuaro	12
Ciudad Valles	9
Jilotean de los Dolores	9
Torreón	8
Teloloapan	8
Tampico	7

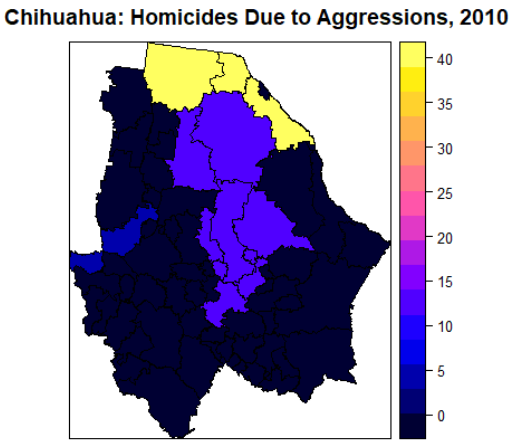

Figure 6: Chihuahua

Source: SNSP

Overall, no existing literature has examined the reasons behind this geographic variation in murders related to DTO rivalry and murders related to DTO aggressions against the

government in Mexico as a whole. The data shown the above tables and figures above[6] demonstrate that despite strong descriptive evidence that the presence of drug cartels contributes significantly to Mexico's high homicide rate and that there is notable geographic variation in DTO-related homicide rates, little has been done to analyze if and why DTO-related deaths are significantly higher in some areas than in others.

Operationalization

The dependent variables, violence between OCGs and violence against the government by OCGs are operationalized using data from SNSP, the Office of Executive Secretary on Public Security. Violence between OCGs is operationalized as homicides rates due to DTO rivalry. Anti-government violence is operationalized as homicide rates due to aggressions against military and police forces. The SNSP dataset measures these variables from January 2006 up until partway through 2011 at the municipality level, rather than the state level, which makes it more suitable for this study than other datasets which only measure homicides at the state level. For the purposes of this study only homicides in 2010 will be analyzed to reduce the size of the dataset, as there are 2,456 municipalities in Mexico and they are considered second-level administrative districts. However, there are some limitations to using just one year. Although the areas that are most violent in Mexico do not change significantly over time, the level of violence seen from 2006-2010 varies, with 2010 having the most homicides. By only analyzing one year, it is impossible to measure time-variant factors that could cause a fluctuation in levels of violence. Additionally, level of control over territory and resources could

[6] Refer to appendix for additional figures that demonstrate geographic violence in states that contain the municipalities listed in Table 2 and Table 3.

change from year to year, due to varying levels of conflict due to inter-DTO fighting and state-DTO fighting.

The independent variables are urban areas, areas that provide access to illicit markets, areas with natural resources, areas of contested OCG control and areas that contain a national or regional capital. For this case study of Mexico, urban area is operationalized and urban population, natural resources is operationalized as areas with drug eradication, fractionalization is operationalized as areas that contain a border between two or more DTOs, and government strongholds are operationalized as national or regional capital cities.

Urban Area

One important resource for DTOs in Mexico is urban area. Urban areas offer several valuable resources to drug cartels in Mexico. First, many urban areas offer access to transportation hubs to smuggle drugs in an out of the country, such as airports, ports and train stations. Additionally, urban areas are often home to highly active drug markets. Dominance in these drug markets allow cartels to increase their profit by providing them

Figure 7: Map of DTO Areas of Dominant Influence in Mexico

Source: DEA

with more customers within Mexico and easier access to ways to smuggle drugs into other countries. Drug-markets in Mexico have high rates of violence and Figure 8 clearly demonstrates that in cities, there are often more than one cartel fighting for control.

In Mexico City, all the major DTOs in 2010 had a presence, and there is more than one cartel in most major cities on the map, including Monterrey, Guadalajara and several other major urban areas. Based on these factors, urban areas should be more likely to have DTO-related homicides due to rivalry and fractionalization. Urban population is operationalized as the percentage of people living in an area with more than 2,500 (National Institute of Statistics and Geography, 2013). Data on urban population as a percentage of the population was compiled from the National Institute of Statistics and Geography (INEGI), an official Mexican government agency.

Access to Illicit Markets

The main illicit market for Mexican DTOs is the United States. It is estimated that drug expenditures in the US for marijuana, cocaine, heroin and meth totaled 108.9 billion from 2002-2010 (Kilmer et al. 2014). According to the DEA, Mexican DTOs are the largest foreign suppliers of heroin, methamphetamines, and cocaine to the United States (Lee and Renwick 2017). Given the size of the US drug market and the fact that Mexican cartels are a major supplier of several different illegal drugs in the US, it stands to reason that access to the US-Mexico border is a valuable resource. I also include highway density as a measure of access to illicit markets. Highways allow for the transport of drugs across Mexico and into the United States. In order to calculate mean highway density, I used a shapefile of highways from the Mexican government to calculate mean highway density across municipalities, as shown in Figure 9.

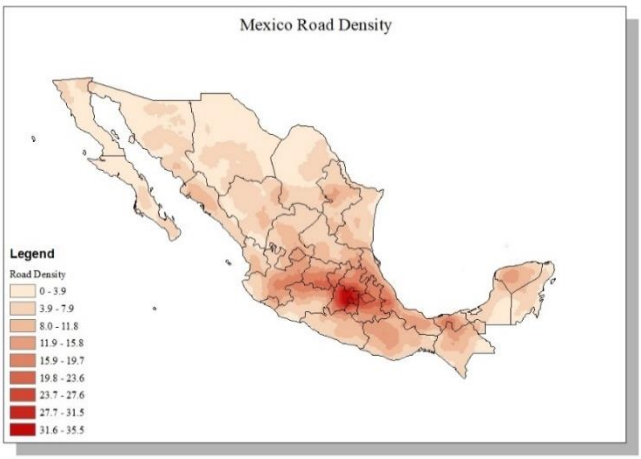

Figure 8: Mexico Road Density

Source: National Institute of Statistics and Geography

Natural Resources

In countries with drug cartels, including Mexico, cropland that can be used for drug cultivation is a valuable resource. Given the value of cropland as a natural resource and its vulnerability to exploitation due to distance from centers of government in Mexico, it stands to reason that cropland that is suitable for drug cultivation can serve as an important resource to drug cartels. In Mexico, cropland, most notably in the mountainous terrain of Sinaloa, has been used to cultivate drugs for years and cartels can buy the crops cheaply, manufacture drugs and then sell them in the US for a significant profit (Grillo, 2012). Mexico remains the world largest supplier of opium and the largest grower of opium poppies in the Americas (UNODC, 2013). Marijuana is also heavily cultivated and although it is difficult to estimate Mexico's marijuana crop production, in 2013 Mexico reported approximately 12,000 hectares under cultivation and 13,430 hectares eradicated (UNODC, 2013). Ferreira (2016) also notes that a major cluster of violence in Mexico can be found in several municipalities in Chihuahua, Durango and Sinaloa. This region is

known as the Golden Triangle and is the epicenter of drug cultivation in Mexico. This suggests that cropland that is used for drug cultivation is a valuable resource to drug cartels in Mexico, as access to this supply of crops ultimately increases profits. To operationalize this variable, I used data from Google Earth Engine Code Editor to calculate average cropland area in a given municipality. Given that certain crops are only able to grow at higher altitudes, I also include mean altitude as an independent variable in my models. This data was calculated using data from Gtopo 30, an elevation shapefile and is shown in Figure 10.

Figure 9: Mean Elevation of Mexico

Source: Gtopo 30

Data on drug cultivation in Mexico is scarce and difficult to calculate and factors including elevation, temperature, participation, slope and sunshine are all factors that determine the suitability of land for drug cultivation (Medel and Lu, 2015). Therefore, including both altitude and cropland in the models is the best way to measure the presence of land in a given region that can be used to cultivate drugs.

Areas of Contested Control

Drug cartels in Mexico are often highly fractionalized groups, who form loose alliances to ensure use of smuggling routes. However, Sullivan and Bunker (2002) argue that in recent years, there has been a blurring of borders as gangs, cartels and rebel groups exploit interconnected economics. Another factor that has increased drug cartel fractionalization is Calderon's campaign against drug trafficking from 2006 to 2012, which included ''decapitation,'' the incapacitation of cartel leaders, as a major tactic (Shirk and Wallman, 2015). By the end of his term in December 2012, all of the major cartels had experienced major arrests or losses that appeared to compromise their operations or at least their relative freedom from competition (Shirk and Wallman, 2015). Calderon's campaign coincided with a period of increased violence, suggesting that there may be a relationship between fractionalization and increased levels of DTO-related violence in Mexico.

In Mexico, drug cartels have generally cooperated strategically, preferring regional agreement on divisions of smuggling routes and alliances between cartels to contain violence (Carpenter, 2010). However, due to Calderon's "decapitation" campaign, drug cartels lost many key leaders and agreements between cartels broke down as a result, or cartels sensing weakness in another cartel, launched an offensive. Levels of violence from inter-cartel conflicts have become so high that some of the conflicts are classified as major non-state armed conflict by the Uppsala Conflict Database Program. Conflicts between cartels ranging from 2010-2012 are shown in Table Four.

Table 4: Major Non-Stated Armed Conflicts in Mexico (2010-2012)

Source: Uppsala Conflict Database Program

Actors	2010 Fatalities	2011 Fatalities	2012 Fatalities
Juarez Cartel vs. Sinaloa Cartel	2515	1668	534
Los Zetas vs. Sinaloa Cartel	29	85	329
Gulf Cartel vs. Los Zetas	412	345	543

In Mexico, boundaries between drug cartels are often highly fluid and drug cartels seek to have a monopoly over the territory they control. As argued by Rios (2013), drug cartels do not want to share territory with other cartels and having a large area of territory that they exclusively control increases their profit and power. It stands to reason that fractionalization in Mexico has increased drug cartel violence and that cartels who share a border will be likely to engage in violence in order to take territory from another cartel.

I operationalize areas of contested control as municipalities that are "border municipalities" meaning that it is within 15km of a border between two drug cartels. The border data was calculated in ArcMap using the DEA map of drug cartel area of control. Any municipality within 15 kilometers of this border was coded as a "border municipality" and border was included as a dummy variable in the models.

Government Capitals

In Mexico, murders of politicians and law enforcement officials has been a common tactic of DTOs (Grillo, 2012). Therefore, when conflict between the state and OCGs emerges, anti-government violence and inter-OCG is likely to emerge in areas are centers of the state's power, such as regional and national capitals. In the case of Mexico, I operationalize centers of the state's power as the national capital, Mexico City, and the capital cities of all 32 states.

Control Variables

Control variables for cartel area of control, population and government coordination, that standard deviation of altitude and border between fighting cartels will also be included. Another possible explanation for variation in cartel violence is which cartel controls the areas, as some cartels are known to be more violent than others. In 2010, Los Zetas weakened due to push back from other cartels, including the Sinaloa Cartel and Gulf Cartel (Stewart, 2010). In 2010, the Sinaloa Cartel was also less active due the capture of major leaders (Stewart, 2010). The Tijuana Cartel, although only controlling a small area of territory, maintained strength due to its control of Tijuana, a major entry point of drugs into the United States. Therefore, cartels will be included in the model as control variables. Area of cartel control is defined as the territory that a cartel has exclusive control over. It is possible that which cartel controls the region will have statistically significant impact on DTO-related homicides. Data on area of cartel control and border between cartels came from the map of cartel territory as of 2012, created by the Drug Enforcement Administration (Figure Three). For cartel territory, the following categories will be included: no cartel, Sinaloa Cartel, Tijuana Cartel, Gulf Cartel, Juarez Cartel, Los Caballeros Templarios, Beltran-Leyva Organization, no cartel and Mexico City. Municipalities in Mexico City will be coded into a separate group called "Mexico City" under the cartel column because all the cartels are in operation there and including this area within one cartel's territory would have affected the data and skewed the findings. Areas with no cartel, which was just municipalities in the state of Yucatan, were coded as "No Cartel." Additionally, the Uppsala Conflict Data Program noted conflicts between several different cartels that reached the level on non-state armed conflicts from 2010-2012, so cartels involved in these disputes may have more violence

in the border areas that they share with the cartel they are fighting. As noted previously, the conflicts between cartels that reached the level of non-state armed conflicts in 2010 were Juarez Cartel vs. Sinaloa Cartel, Los Zetas vs. Sinaloa Cartel and the Gulf Cartel vs. Los Zetas. If a municipality was in these areas, it was coded as a being in a border between two fighting cartels. A municipality is coded as 0 if it is a not a border municipality or if it is a border municipality that is not in a border between any of the warring cartels. A municipality is coded as 1 if it is a border municipality and is located in a border between warring cartels. This allows for the models to test for the interaction between a municipality being in an area where two cartels border each other and a municipality being in an area where two warring cartels border each other.

Finally, based on Rios' (2015) findings that government fractionalization increased violence, I will also include government fractionalization as a control variable. Data from Rios' (2015) paper was unavailable, so I use level of PAN support in a district as a proxy variable to measure government fractionalization. If a municipality has a high level of PAN support, it is more likely that the municipality will cooperate with the government, as the PAN was in power at the national level in 2010. Data on level of PAN support was taken from Castillo, Mejia and Restrepo (2018). For population, data on Mexico's population at the municipality level in 2010 was gathered from Mexican Bureau of Statistics and Research in the form of a shapefile.

Methodology

Because DTO-related homicides and deaths due to aggressions against the government by DTOs are the dependent variable and this thesis examines deaths during 2010, I first used OLS regression. However, Moran's I tests of these models (included in

the appendix) demonstrated that there was significant spatial autocorrelation in the data. Given the geographic grouping of homicides in Mexico, these findings are not surprising. Following these findings, I used OLS regression with spatial lag to test the models. These models are included in the appendix. Based on the unusually high coefficients in the models, I created histograms and density plots of the dependent variables, as shown in Figure 11 and Figure 12.

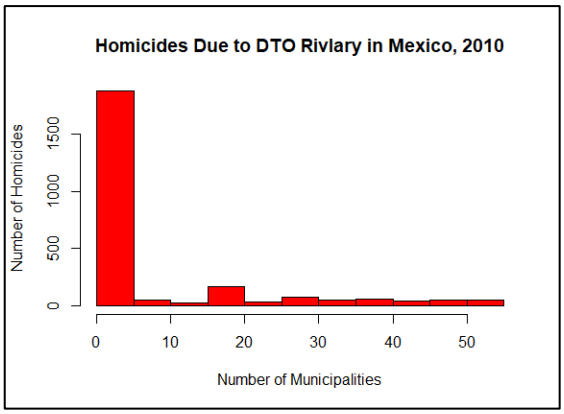

Figure 10: Histogram of Homicides due to DTO-Rivalry in Mexico (2010)

Source: SNSP

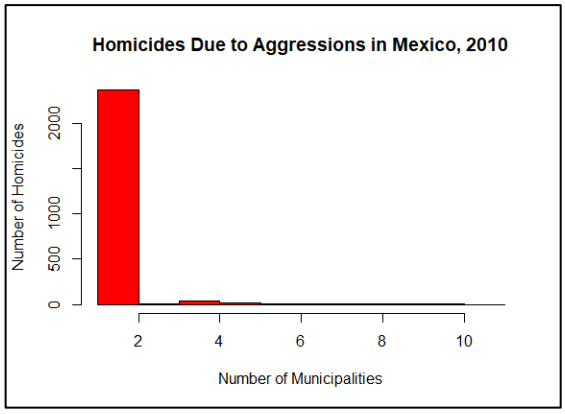

Figure 11: Histogram of Homicides due to DTO Aggressions against the Government in Mexico (2010)

Source: SNSP

These figures clearly demonstrate that the conditional variance exceeds the conditional mean. Essentially, there is an overdispersion of zeros in the model, meaning that negative binomial regression is the most appropriate model to use (IRDE, 2019). It would also be possible to log-transform the data and analyze it using OLS regression, but this present many issues including loss of data due to undefined values generated by taking the log of zero and the lack of capacity to model the dispersion (IDRE, 2019).

Overall, this research design differs from previous research in that it examines multiple factors that geographic variation in violence in Mexico. Although some studies have explored government fractionalization and cartel fractionalization as causes of violence (Rios, 2015; Osorio, 2013), no study has looked at multiple factors that may geographic variation in violence due to competition of control over resources and illicit markets. Additionally, no study has examined variation in violence in organized crime violence in Mexico and connected it to factors such as land used for drug cultivation and overlapping DTO boundaries.

CHAPTER FIVE: RESULTS

The following chapter will present the results of the regression models discussed in Chapter Four. In the first section, I present models that use the number of homicides related to DTO rivalry as the dependent variable in order to test Hypotheses One through Three. In the second section, I present models that use the number of homicides related to aggressions against the government as the dependent variable in order to test Hypotheses Four through Six. Additionally, count data often have an exposure variable, which indicates the number of times the event could have happened. For this data, the exposure variable is population, which indicated the number of people that could be killed in a given municipality. This variable is incorporated into the negative binomial regression models with the use of the offset option and these models are included in the appendix.

Regression Models: Homicides Due to DTO Rivalry

The first model presented in Table Five includes all of the dependent variables (urban area, cropland, altitude, highway density, if the municipality is in a border between two cartels). The only two control variables included are population and spatial lag. The second model presented includes all of the variables in Model 1 as well as the following additional control variables: standard deviation of altitude, if the municipality is on a border between fighting cartels and level of government coordination in the municipality. The third model presented includes all of the variables in Model 2 as well as cartels, which controls for cartel area of control.

Table 5: Homicides Due to DTO Rivalry in Mexico

	Homicides Due to DTO Rivalry in Mexico, 2010		
	(Model 1)	(Model 2)	(Model 3)
Urban Area	1.03^{***} (2.2^{-16})	1.01^{***} (1.5^{-7})	1.02^{***} (1.8^{-8})
Cropland	1.00^{***} (3.0^{-13})	1.00^{***} (2.0^{-12})	1.00^{***} (2.2^{-16})
On US Border	1.83 (0.26)	1.25 (0.67)	2.51 (0.06)
Altitude	1.00^{***} (2.2^{-16})	1.00^{***} (5.3^{-7})	1.00 (0.06)
Altitude Standard Deviation	---	1.00^{*} (0.04)	1.00^{***} (0.0002)
Highway Density	0.96^{***} (2.2^{-6})	$.96^{***}$ (8.8^{-8})	0.94^{***} (2.2^{-16})
Border Between Cartels	1.74^{***} (1.8^{-6})	2.03^{***} (2.1^{-7})	1.44^{**} (0.005)
Border Between Fighting Cartels	---	0.61^{**} (0.005)	1.32 (0.11)
PAN Support	---	6.65^{***} (1.4^{-5})	5.81^{***} (2.2^{-16})
Beltran-Leyva Cartel	---	---	7.81^{***} (2.2^{-16})
Gulf Cartel	---	---	3.27^{*}(0.02)
Juarez Cartel	---	---	8.36^{***} (0.0002)
Los Caballeros	---	---	1.44^{***} (2.2^{-16})
Los Zetas	---	---	1.63^{***} (4.5^{-15})
All Cartels (Mexico City)	---	---	3.88^{***} (2.1^{-8})
Sinaloa Cartel	---	---	1.67^{***} (1.1^{-14})
Tijuana Cartel	---	---	1.17 (0.89)
Population (Log)	1.00^{***} (0.0003)	1.00^{***} (0.0003)	1.00^{**} (3.9^{-5})
Spatial Lag	1.02^{***} (2.2^{-16})	1.02^{***} (2.2^{-16})	1.02^{***} (2.2^{-16})

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

Model One, presented on the previous page, shows that all the variables except US Border (if the municipality is on the US-Mexico border) are significant. However, negative binomial regression must be interpreted differently from OLS regression. Trying to explain the coefficients in logged form can be a difficult when using negative binomial regression, so the incident rate ratios are shown in all models. For urban area, 1.03, is the estimated rate ration for a one unit increase in homicides due to DTO rivalry, holding all other variables constant. This means that urban area compared to non-urban area has a rate 1.03 times greater for homicides due to DTO rivalry. Areas at a higher altitude and areas with cropland have a rate above 1 that is significant, but the rate rounds to 1.00 meaning they effect is small. Highway density has a rate of 0.96, meaning that if highway density were to increase by one unit, the rate ration for homicides would be expected to decrease by a factor of 0.96, holding all other variables constant. Population and spatial lag both have rate rations above 1.0 and are significant.

In Model 2, the results for urban area, cropland, on US border, altitude, population and spatial lag are all very similar to Model 1 and all variables are significant except US border. However, border between cartels has a rate of 2.03, meaning that municipalities on a border between a cartels have a rate 2.03 greater for homicides due to DTO rivalry, as this variable is dichotomous (0 is coded as not located in a border between cartels and 1 is coded as located in a border between cartels. Interestingly, border between fighting cartels has a rate of 0.61, meaning that if border between cartels were to increase by one unit (0 being all municipalizes not on a border between fighting cartels and 1 being all municipalities on a border between fighting cartels) the rate ration for homicides would be expected to decrease by a factor of 0.62. PAN support has a rate

ration of 6.65, meaning that if PAN support increases by one unit, the rate of homicides increases by a factor of 6.65.

In Model 3, all variables except mean altitude, US border and border between fighting cartels are significant. The results for urban area, cropland, on US border, population, spatial lag and PAN support are all very similar to Model 1 and Model 2. The introduction of cartel area of control as a variable shows that all cartels, except the Tijuana cartel have rate rations above 1 and are significant, meaning the presence of the cartel means these areas have a higher rate for homicides due to DTO rivalries in comparison to areas with no cartel.

Regression Models: Homicides Due to Aggressions against the Government

These models are presented on the following page. The fourth model includes all of the dependent variables (urban area, cropland, altitude, highway density, if the municipality contains a national or regional capital). The only two control variables included are population and spatial lag. The fifth model includes all of the variables in Model 4 as well as the following additional control variables: standard deviation of altitude and level of PAN support in the municipality. The sixth model includes all of the variables in Model 5 as well as cartels, which controls for cartel area of control.

Table 6: Homicides Due to Aggressions Against the Government in Mexico

Homicides Due to Aggressions Against the Government in Mexico, 2010			
	(Model 4)	(Model 5)	(Model 6)
Urban Area	1.03^{***} (0.0002)	1.03^{***} (0.0005)	1.03^{***} (0.0002)
Cropland	1.00^{*}(0.03)	1.00^{*} (0.02)	1.00 (0.29)
On US Border	1.14 (0.87)	1.21 (0.83)	1.12 (0.88)
Altitude	1.00 (0.74)	1.00 (0.87)	1.00 (0.11)
Altitude Standard Deviation	---	1.00 (0.85)	9.99 (0.54)
Highway Density	9.47^{**}(0.002)	9.47^{**} (0.002)	9.14^{***} (3.9^{-6})
National or Regional Capital	6.05^{***} (0.0002)	6.75^{***} (0.0001)	7.92^{***} (1.5^{-5})
PAN Support	---	6.06 (0.63)	4.16 (0.12)
Beltran-Leyva Cartel	---	---	3.65 (0.99)
Gulf Cartel	---	---	2.25 (0.99)
Juarez Cartel	---	---	3.13 (0.99)
Los Caballeros	---	---	4.03 (0.99)
Los Zetas	---	---	7.93 (0.99)
All Cartels (Mexico City)	---	---	6.62 (0.99)
Sinaloa Cartel	---	---	6.08 (0.99)
Tijuana Cartel	---	---	4.62 (1.00)
Population (Log)	1.00 (0.84)	1.00 (0.89)	1.00 (0.13)
Spatial Lag	5.23^{***} (2.2^{-16})	5.17^{***} (2.2^{-16})	3.248^{***} (2.2^{-16})

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

In Model 4, urban area, cropland, national or regional capital and highway density are significant. The control variable of spatial lag is significant, while the population is not. Although urban area and cropland are significant, they do not have a strong effect on the independent variable of homicides due to aggressions against the government, with incidence rate ratios of 1.03 and 1.00 respectively. The variables of national or regional capitals and highway density have a strong effect, with incidence rate ratios of 6.05 and 9.47 respectively. This means that if the municipality contains a national or regional capital, the rate ratio for would homicides due to aggressions against the government would be expected to increase by a factor of 6.05 and that if highway density were to increase by one unit, the rate ratio for homicides due to aggressions would be expected to decrease by a factor of 9.47. Model 5 builds on Model 4 with the inclusion of the control variables of altitude standard deviation and PAN support. In Model 5, the results are similar to Model Four. Urban area, cropland and national or regional capital and highway density are all positive and significant, with similar rate ratios. None of the added control variables are significant. In Model 6, cartel area of control is included as a control variable. The variables of urban area, national and regional capital and highway density are significant with similar coefficients to Model 4 and 5. However, in this model cropland is insignificant. The added variable of cartel area of control is also insignificant.

Discussion of Results

The results of Models One through Three provided support for Hypotheses One through Three. According to Hypothesis 1, the presence of natural resources that can be used to cultivate or obtain illicit goods will increase the likelihood of violence between

OCGs in a given region. In Models One through Model 3, the variable of cropland was significant across all three models. The variable of altitude was significant across two of the three models. Although the rate rations of the variables were not high, they were significant at the level of .05 or below in the models, providing support for Hypothesis 1.

Hypothesis 2, that the presence of resources that provide access to an illicit market will increase the likelihood of violence between OCGs in a given region was also supported. Urban area was significant across all three models and proximity to the US border was significant in two of three models. This provides support for Hypothesis 2. However, highway density was significant and had a rate ration below 1.00 across all three models, suggesting that highway density is negatively associated with homicides due to DTO-rivalries. A possible explanation for this is that highway density is highest around Mexico City, and many of these areas may be more developed and more affluent, and subsequently better governed and less prone to DTO-related violence.

Hypothesis 3, that areas of OCG control that are contested by more than one OCG will be more likely to experience inter-OCG violence is also supported although Model 3 presents interesting results on the interactive effect between the variables border between cartels and border between fighting cartels. In Models One, which does not include the control variable of border between fighting cartels, border between cartels is positive and significant. When border between fighting cartels is included it Model 2, it is significant and has a rate ration of below 1.00, but border between cartels remains positive and significant. Additionally, in Model 3, border between cartels remains significant and has a rate ratio above 1.00, while border between fighting cartels does not. Overall, this

suggests that municipalities on a border between two cartels are more likely to experience homicides related to DTO-rivalry, even if the two DTOs are not openly fighting.

The results of Models 4 through 6 provide inconsistent support for Hypothesis 4 and strong support for Hypothesis 5 and 6. Hypothesis 4, that the presence of resources that can be used to cultivate or obtain illicit goods will increase the likelihood of violence between an OCG and the state in a given region, is somewhat supported. Cropland is significant in two of the three models, but altitude is not significant in any of the models. This suggests that although cropland increases the likelihood of violence between a DTO and that state in a given municipality in Mexico, altitude, which affects what types of crops can be cultivated has no effect. As noted by Medel and Lu (2015) the presence of areas that are suitable for drug cultivation is a difficult variable to measure. Many factors such as altitude, precipitation, amount of sunlight and soil composition are important factors that determine whether or not a given drug can grow in an area. This is likely why there is mixed support for this hypothesis. However, overall, these results provide support for Hypothesis 4.

Hypothesis 5, that the presence of resources that provide access to an illicit market will increase the likelihood of violence between an OCG and the state in a given region, is also supported by the models. Urban area and highway density are positive and significant across all the models, showing that in Mexico, urban area and highway density is associated with an increased number of homicides due to aggressions against the government, even when controlling for other factors. However, US border (proximity to the US border), is insignificant across all three models, which does not support Hypothesis 5.

Hypothesis 6, that the presence of a national or regional capital will increase the likelihood of violence between an OCG and state in a given area, is strongly supported across all three models. All coefficients of the variable national or regional capital, which is if a municipality contains a national or regional capital, have a high rate ratio and are significant. This provides strong support for Hypothesis 6. The following chapter will discuss the implications of these results, as well as the limitations of this study and directions for future research.

CHAPTER SIX: DISCUSSION AND FUTURE RESEARCH

In this chapter, I will discuss the implication of my results, as well as the limitations and difficulties of studying both civil war violence and organized crime violence. I will also discuss the limitations of my work and potential directions for future research.

Discussion of Results and Limitations

Overall, the models presented in Chapter Five provide support for the six hypotheses proposed in this thesis. Natural resources, access to illicit markets, and fractionalization were all associated with higher levels of homicides related to DTO-rivalry. Furthermore, natural resources, access to illicit markets and the presence of a national or regional capital were all associated with higher levels of homicides related to DTO aggressions against military and police forces. However, there are several limitations to this study and several areas that could be improved upon in future research.

First, the data sources used in both the case studies of Honduras and Brazil and in the quantitative examination of Mexico presented several methodological challenges. In Honduras, although homicides and police deaths are tracked at the municipality level, cause of death is not clearly tracked, making it difficult to discover which homicides were related to organized crime violence and if the killings were a result of indiscriminate or selective violence. The same can be said of Brazil. Homicides are only tracked at the state level, rather than the municipality level and there is not dataset that classifies the homicides by cause. Additionally, it is likely that in both countries' homicides were underreported or never discovered, given issues with corruption and policing are present in both countries. In the case of Mexico, although the homicides are broken down by

cause, the guidelines on how these homicides were classified were unclear. Additionally, it is likely that the number of homicides in the dataset were underreported. Furthermore, division of these homicides into indiscriminate vs. selective would have allowed for the application of theories on selective vs. indiscriminate violence.

Overall, although there are limitations to this study it provides several important contributions to the literature. It unites literature from the fields of criminology and political science to develop a theory that applies literature on civil wars, fractionalization, costly signaling and more to organized crime violence and applies this theory across multiple countries. It also demonstrates that there is significant geographic variation in organized crime violence and that quantitative methods can be used to successfully find causes of this geographic variation. Finally, it highlights the importance of gathering data on organized crime violence. Violence in the three countries discussed in this thesis has far exceeded the scale seen in most civil wars, but a lack of data and research on this violence makes it difficult to determine its causes and what can be done to reduce levels of organized crime violence.

Alternative Explanations: Kalyvas' Theory of Violence

A seminal work that examines geographic variation in civil war violence, Kalyvas' theory breaks civil war violence into two categories: selective or indiscriminate. Kalyvas defines selective violence as violence that targets individuals based on information about their actions, which leads to a presumption of individual guilt, whereas indiscriminate violence is violence based on guilt by association, rather than individual guilt. Furthermore, Kalyvas argues that indiscriminate violence is largely counterproductive because it does not provide clear incentives for collaboration and

political actors are likely to gradually move from indiscriminate to selective violence. Kalyvas bases his theory on control and access to information. He argues that the stronger the actor's (incumbent or insurgent) control of the territory, the higher the rate of collaboration and denunciations, providing the group with information. In areas where control is evenly divided there will be little violence because actors will not have access to information to carry out selective violence and they will be afraid to engage in indiscriminate violence, which may push people to the other side. In contested areas where one actor has more control, neutrality is as a passive collaboration with the enemy and those who remain neutral are targeted by selective violence. This will encourage civilians to provide the hegemonic actor with information and denunciations, leading to a cycle of selective violence.

There are two possible ways in which this theory could be applied to organized crime violence. In illicit markets, this theory could be applied to violence between the state and OCGs, rather than violence against civilians. When a state sponsored racket exists, public officials often refrain from enforcing the law or enforce it selectively against the rivals of a criminal organization, in exchange for a share of the profits generated by the organization (Snyder and Duran-Martinez, 2009). In these arrangements, OCGs provide denunciations against other OCGs to the government in exchange for the ability to operation freely and the government applies violence selectively against the denounced OCGs. This phenomenon can clearly be explained by Kalyvas (2000). In markets where the government can provide protection to OCGs, if an OCG remains neutral, they may be targeted by selective violence. Conversely, if an OCG provides the government with information, they will avoid being targeted by the

government. Indiscriminate violence by either the government or an OCG would be counterproductive in such an arrangement. Indiscriminate violence on the part of the government would discourage OCGs from providing information and indiscriminate violence on the part of the OCG could cause the government to target them regardless of whether or not they denounce other actors engaged in illicit activities to the government. However, it would be difficult to test this theory with the data on organized crime violence that is currently available. Lessing (2015) attempts to apply Kalyvas' theory to organized crime violence but the evidence provided for the theory is largely anecdotal. Additionally, it is difficult to categorized organized crime related violence as either indiscriminate or selective (Kalyvas, 2015) and it would be difficult, if not impossible, to gather information on denunciations by OCGs. Even if members of OCGs could be interviewed, it is unlikely they would admit to any denunciations, a problem also encountered by Kalyas' (2000) study.

Another way this theory could be applied to organized crime violence is through examining the relationship between territorial control and the use of selective and indiscriminate violence in countries with high levels of organized crime, as Kalyvas argues that indiscriminate violence is counterproductive and that groups will prefer to use selective violence when possible. In Mexico, OCG violence ranges from the assignation of public servants and journalists to indiscriminate massacres (Grillo, 2012; Kalyvas, 2015). In response to this violence and the difficulties of preventing organized crime violence, state security forces have also been known to engage in indiscriminate violence (Grillo, 2012). A similar trend can be seen in Brazil, where police violence against civilians in favelas has been a major problem in recent years (Lessing, 2015). However,

there are two main issues with this theoretical reasoning. Kalyvas' original theory does little to explain why indiscriminate violence occurs in civil wars (see for example government violence in Syria, which can certainly be classified as indiscriminate at times). Additionally, currently available data does not allow for the disaggregation of violence into selective and indiscriminate, making it impossible to test this theory until this data is further developed.

Directions for Future Research

This thesis has opened several avenues for future research, including the application the theory to other years in Mexico, application of this theory to other countries and the development of a dataset on organized crime violence that identifies selective vs. indiscriminate forms of organized crime violence. Although this thesis examines organized crime violence in three countries, Honduras, Brazil and Mexico, the theory developed in Chapter Two could easily be applied to other countries with high levels of organized crime violence. Although the theory developed in this thesis is already generalizable, expanding the research to other countries would provide it with further support. Another interesting avenue of future research is developing a dataset that classifies organized crime violence as selective or indiscriminate. This could potentially be done by gathering data from primary sources such as newspapers or through interviews. The development of such a dataset would allow for the direct application of Kalyvas' (2000) theory to organized crime violence. It would also show if there a difference in geographic dispersion of selective violence and indiscriminate violence in relation to organized crime. Additionally, this would allow researchers to examine if OCGs use different types of violence against both the government and civilians. Overall,

the application of this theory to other countries and the development of a dataset on selective and indiscriminate violence would help further research on geographic variation in organized crime violence.

CHAPTER SEVEN: CONCLUSION

The problem of organized crime violence is a phenomenon that continues to be understudied. Deaths related to organized crime violence far exceed the amount of deaths in many civil wars, yet little has been done to quantitatively explain how and why organized crime generates so much violence. However, organized crime is not inherently violent. Many illicit markets experience low levels of violence and even within illicit markets, violence is often geographically varied. Much of the reporting and research on organized crime violence overlooks this variation and fails to recognize that even in countries with high levels of organized crime violence, many regions remain unaffected, while other region experience incredibly high levels of violence. This thesis attempted to address this gap in the literature by examining geographic variation in organized crime violence and how literature on political violence can help explain this variation.

This thesis clearly demonstrates that defining organized crime conflicts as "wars" or "criminal insurgencies" is highly problematic, and that treating civil wars as events largely motivated by crime and greed is also problematic. However, through applying literature on political violence to civil wars, this thesis shows that as an OCG confronts other OCGs and challenge the state's monopoly on violence they temporarily move into an area traditionally occupied by groups who engage in political violence to achieve a goal, leading to similarities in how both types of organizations engage in violence.
In the theory section, I developed an argument that showed illicit markets are not always violent, when they do become violent, OCGs fight each other in ways that are similar to insurgent groups and OCGs fight the state in ways that are similar to guerilla groups or terrorist organizations. Based on the similarities between the tactics used by OCGs and

groups engaging in political violence, I found that fractionalization, competition over access to illicit markets and competition over access to natural resources will increase violence between OCGs. I also found that the government will targets OCGs in areas that provides access to illicit markets and natural resources, leading OCGs to retaliate against the government and that OCGs will target areas that are symbolic of government power in order to signal their resolve.

Using case studies of Honduras and Brazil, and regression analysis of homicides related to DTO-rivalries and aggressions against the government in Mexico, this thesis demonstrated that this theory had both qualitative and quantitative support. In political conflicts like civil wars, natural resources, resources used to fuel insurgency and group fractionalization are often contributors to geographic variation in violence and this thesis showed that the same is true in organized crime conflicts. This thesis also demonstrated that similar to rebel groups and terrorist groups, OCGs will use violence as a costly signal, leading to increased inter-OCG violence and increased violence against the state in areas where there is a national or regional capital that is symbolic of government power. Overall, these findings provide a greater understanding of geographic variation in organized crime violence, which allows for a better understanding of how to address organized crime violence.

Most importantly, this thesis has demonstrated the importance of crossing interdisciplinary boundaries in order to address important issues such as transnational organized crime and that micro-level causes of geographic variation in violence can be examined empirically. Organized crime generates billions of dollars in revenue every year, can cause increased levels of violence and can lead to the weakening of democratic

institutions. As evidenced by the scale of organized crime and levels of violence it brings to Mexico, Honduras and Brazil, the growth of transnational organized crime and increased levels of organized crime poses a major risk to the stability of these countries and cannot be ignored. Despite the troubling level of violence seen in these countries, few studies have attempted to cross disciplinary boundaries in order to explore organized crime violence and even fewer have recognized the organized crime violence is often highly temporally and geographically varied. Furthermore, a common issue in research on geographic variation in violence is how to develop a theory that can be applied across multiple countries without ignoring the micro-level processes that drive violence during conflicts. This thesis accomplishes this goal by developing a theory that can be applied across countries but does not ignore the different processes that drive organized crime violence in Mexico, Honduras and Brazil. Although this thesis addresses a gap by crossing disciplinary boundaries and developing a theory that explains micro-level geographic variation in violence, it is still clear that much remains to be done in order to explain, address and prevent organized crime violence.

APPENDIX A: CHAPTER THREE

Data Sources: Organized Crime in Honduras

Data on homicides per municipality and police deaths were collected by the National Police Secretary of Security (Secretaria de Seguridad Policia Nacional). The pie charts were generated using tools available through this website. It is likely that the number of homicides included in the data are underreported. However, this was the best available sources of data that showed homicides and police deaths at the municipal level. Homicides were divided into categories, one of which was homicide due to gang violence, but it is likely this data is inaccurate, as almost half of the homicides reported every year are not attributed to any specific cause and it is likely that many of the homicides in the "unattributed" category were actually caused by gang violence. For this reason, I used total homicides rather than homicides attributed to gangs in this case study.

Supplemental Figures

Figures 13 and 14 show the municipalities with the highest number of homicides and the highest number of police deaths in 2017, respectively. Unlike the pie charts presented in Chapter 3, this shows the total number of homicides per municipality rather than the percentage of homicides. I created these figures using the data generator tool on the Honduras Secretary of Security website.

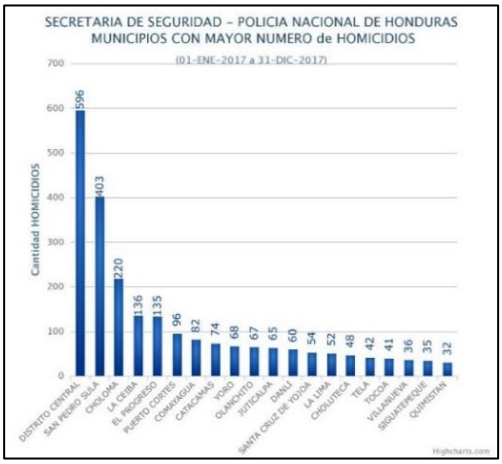

Figure 12: Honduran Municipalities with the Highest Number of Homicides (2017)
Source: Honduras Secretary of Natoinal Security

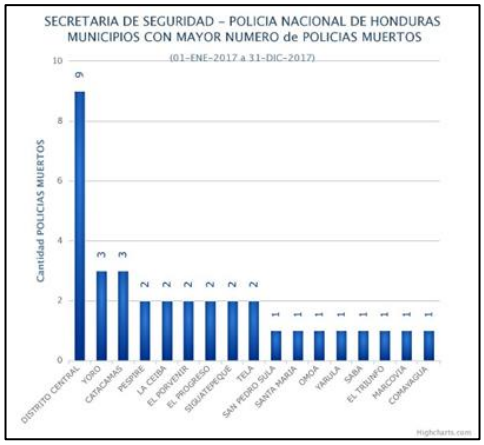

Figure 13: Honduran Municipalities with the Highest Number of Police Deaths (2017)
Source: Honduras Secretary of Security

Figure 15 shows territorial areas of control of MS13 and Barrio 18 in San Pedro Sularosa. This figure was taken from Insight Crime's report on gangs in Honduras and the map was created based on intelligence provided by Honduran police. The figure demonstrates fractionalization and the importance of territorial control to both gangs.

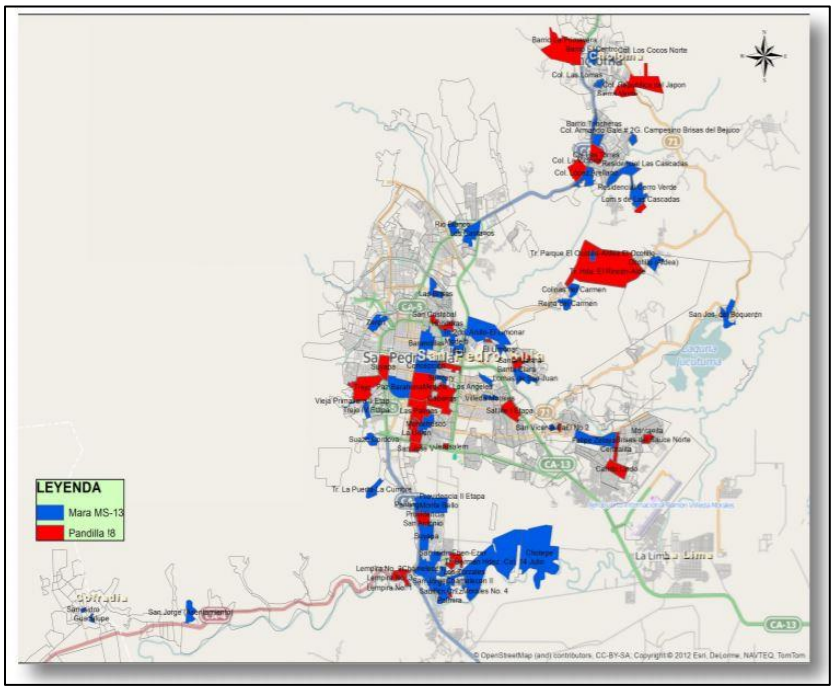

Figure 14: Gang Areas of Control in San Pedro Sularosa, Hounduras

Source: Data gathered from Honduran police intelligence by Insight Crime

Figure 16 shows density plots of the states in Mexico that contain the 10 municipalities with the highest number of homicides due to DTO-rivalry in 2010. All figures demonstrate that even within these states, there is noticeable geographic variation in violence.

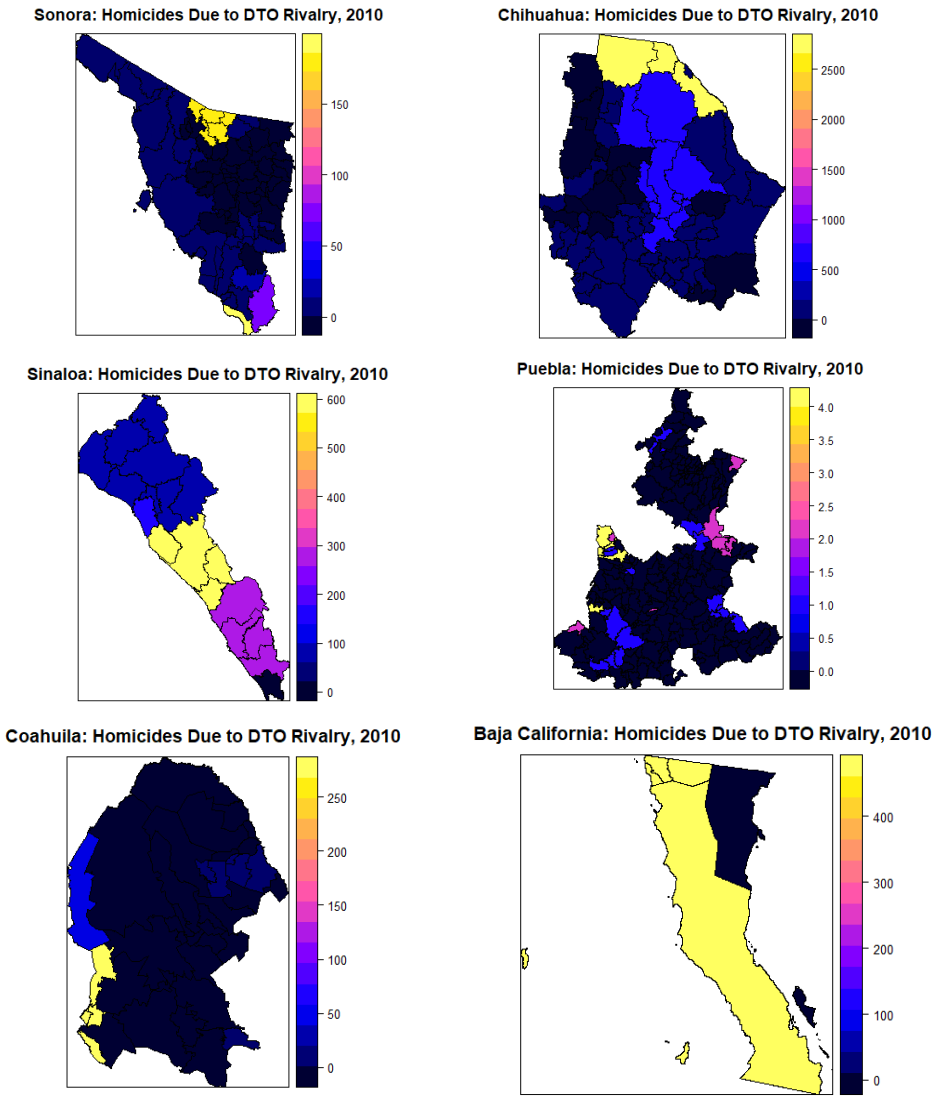

Figure 15: Density Plots of States Containing Municipalities with Highest Rates of Homicides due to DTO-Rivalries

Source: SNSP

Figure 17 shows density plots of the states in Mexico that contain the 10 municipalities with the highest number of homicides due to DTO-rivalry in 2010. All figures demonstrate that even within these states, there is noticeable geographic variation in violence.

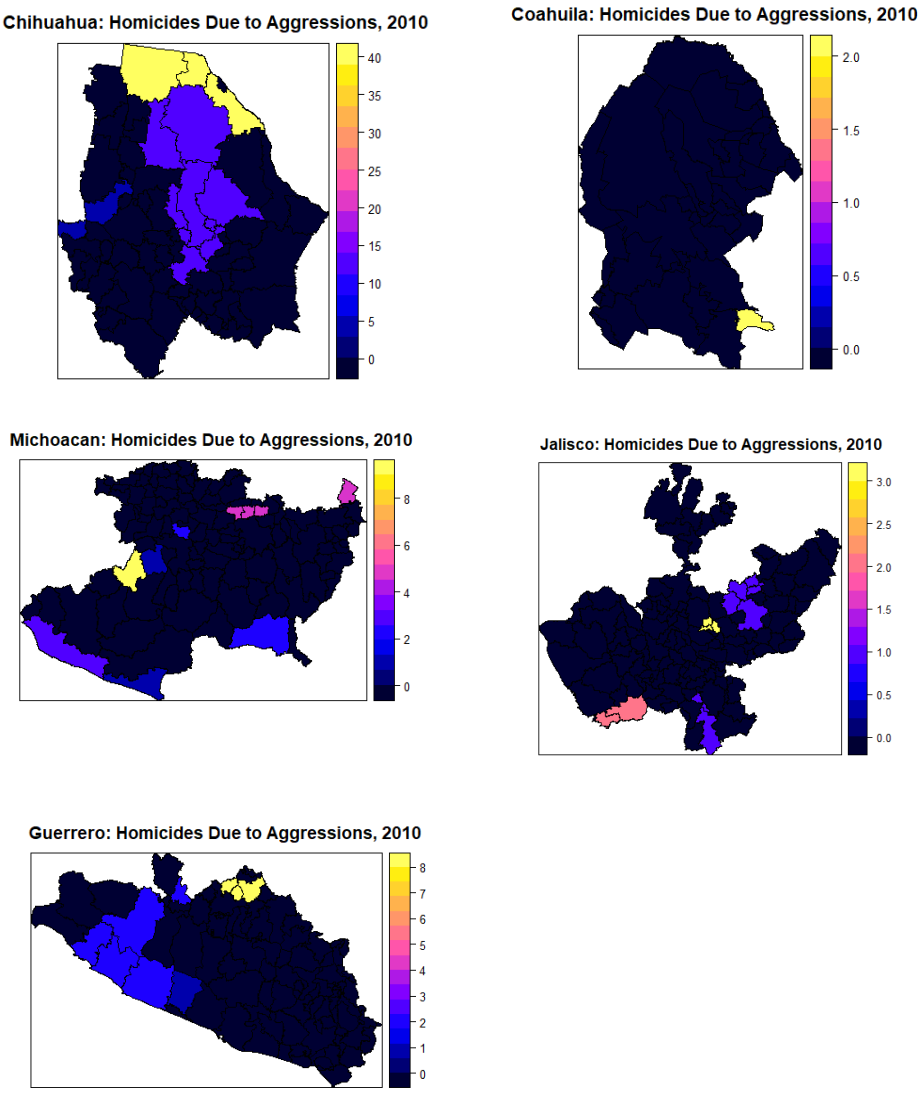

Figure 16: Density Plot of States Containing the 10 Municipalities with the Highest Rates of Homicides Due to Aggressions against the Government

Source: SNSP

APPENDIX B: CHAPTER FOUR

OLS Regression 1 Moran's I Test

Dependent Variable: Homicides due to DTO-rivalry
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, located on a border between two cartels, national or regional capital
Control Variables: Population

Moran I statistic standard deviate = 35.651, p-value < 2.2e-16
Alternative hypothesis: Greater
Sample Estimates

Moran I statistic	Expectation	Variance
0.3994968514	-0.0004073320	0.0001258247

OLS Regression 2 Moran's I Test

Dependent Variable: Homicides due to DTO-rivalry
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, located on a border between two cartels, national or regional capital
Control Variables: Population, altitude standard deviation, border between two fighting cartels, PAN support

Moran I statistic standard deviate = 34.954, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.3930084859	-0.0004073320	0.0001266793

OLS Regression 3 Moran's I Test

Dependent Variable: Homicides due to DTO-rivalry
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, located on a border between two cartels, national or regional capital
Control Variables: Population, altitude standard deviation, border between two fighting cartels, PAN support, cartels

Moran I statistic standard deviate = 23.36, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.2647846612	-0.0004073320	0.0001288722

OLS Regression 4 Moran's I Test

Dependent Variable: Homicides due to DTO-rivalry
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, located on a border between two cartels, national or regional capital
Control Variables: Population, altitude standard deviation, border between two fighting cartels, PAN support, cartels, states (state-fixed effects)

Moran I statistic standard deviate = 25.642, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.2894797284	-0.0004073320	0.0001278054

OLS Regression Model 5 Moran's I Test

Dependent Variable: Homicides due to aggressions against military and police forces by DTOs
Independent Variables: Urban area, cropland, US border, mean altitude, highway densit y, national or regional capital
Control Variables: Population

Moran I statistic standard deviate = 37.611, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.4322053374	-0.0004073320	0.0001323061

OLS Regression Model 6 Moran's I Test

Dependent Variable: Homicides due to aggressions against military and police forces by DTOs
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, national or regional capital
Control Variables: Population, altitude standard deviation, PAN support

Moran I statistic standard deviate = 37.636, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.4325083942	-0.0004073320	0.0001323157

OLS Regression Model 7 Moran's I Test

Dependent Variable: Homicides due to aggressions against military and police forces by DTOs
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, national or regional capital
Control Variables: Population, altitude standard deviation, PAN support, cartels

Moran I statistic standard deviate = 21.949, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.2556120702	-0.0004073320	0.0001360518

OLS Regression 8 Moran's I Test

Dependent Variable: Homicides due to aggressions against military and police forces by DTOs
Independent Variables: Urban area, cropland, US border, mean altitude, highway density, national or regional capital
Control Variables: Population, altitude standard deviation, PAN support, cartels, states (state-fixed effects)

Moran I statistic standard deviate = 26.932, p-value < 2.2e-16
Alternative hypothesis: greater
Sample estimates:

Moran I statistic	Expectation	Variance
0.3127625845	-0.0004073320	0.0001352176

Table 7: Spatially Lagged Regression Models: Homicides Due to DTO Rivalry

	Dependent variable:			
	Homicides Due to DTO Rivalry			
	(1)	(2)	(3)	(4)
Urban Area	-0.114 (0.104)	-0.237 (0.145)	-0.328** (0.151)	-0.078 (0.282)
Cropland	0.00000*** (0.000)	0.00000** (0.000)	0.00000*** (0.000)	0.00000* (0.000)
On US Border	170.674*** (17.932)	175.831*** (20.037)	171.328*** (20.948)	212.351*** (22.954)
Mean Altitude	-0.0001 (0.0001)	-0.00001 (0.0002)	-0.00004 (0.0002)	-0.00003 (0.0002)
Altitude Standard Deviation		-0.0002 (0.0003)	-0.0002 (0.0003)	-0.0003 (0.0003)
Highway Mean	-0.119 (0.229)	0.178 (0.291)	0.270 (0.299)	-0.045 (0.375)
Border between Cartels	0.246 (3.753)	-11.652** (5.460)	-14.349** (5.827)	-16.631*** (6.095)
Border between Fighting Cartels		34.473*** (7.682)	39.321*** (8.250)	38.867*** (9.060)
National or Regional Capital	71.285*** (10.783)	68.268*** (12.112)	54.929*** (12.324)	66.386*** (12.498)
PAN Support		22.778 (17.131)	26.651 (17.365)	33.022* (18.977)
Population	0.00005*** (0.00001)	0.00005*** (0.00002)	0.0001*** (0.00002)	0.0001*** (0.00002)
Spatial Lag	0.603***(0.021)	0.587*** (0.023)	0.472*** (0.027)	0.517*** (0.026)
Beltran-Leyva Cartel			11.600 (11.520)	
Gulf Cartel			-35.874* (18.776)	
Juarez Cartel			155.683*** (21.526)	
Los Caballeros			6.713 (10.999)	
Los Zetas			-1.925 (9.556)	
All Cartel (Mexico City)			16.438 (24.660)	
Sinaloa Cartel			-0.325 (10.152)	
Tijuana Cartel			106.155** (50.517)	
Sinaloa (State)				86.548** (36.874)
Constant	5.568 (7.045)	6.061 (9.527)	8.355 (14.519)	-7.952 (34.491)
Observations	2,456	1,986	1,986	1,986
R^2	0.415	0.420	0.441	0.433
Adjusted R^2	0.413	0.416	0.435	0.420
Residual Std. Error	82.332 (df = 2446)	91.121 (df = 1973)	89.645 (df = 1965)	90.823 (df = 1942)
F Statistic	192.672*** (df = 9; 2446)	119.063*** (df = 12; 1973)	77.487*** (df = 20; 1965)	34.468*** (df = 43; 1942)
Note:				*p**p***p<0.01

Table 8: Spatially Lagged Regression Models: Homicides Due to Aggressions against the Government

	Dependent variable:			
	Aggressions			
	(1)	(2)	(3)	(4)
Urban Area	-0.001	-0.002	-0.003	-0.002
	(0.002)	(0.002)	(0.002)	(0.004)
Cropland	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
US Border	1.312***	1.280***	1.673***	2.118***
	(0.279)	(0.284)	(0.306)	(0.334)
Mean Altitude	-0.00000	0.00000	0.00000	0.00000
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Altitude Standard Deviation		-0.00000	-0.00001	-0.00001
		(0.00000)	(0.00000)	(0.00000)
Highway Density	-0.004	-0.003	-0.002	-0.005
	(0.004)	(0.004)	(0.004)	(0.005)
National or Regional Capital	1.502***	1.475***	1.369***	1.524***
	(0.175)	(0.180)	(0.183)	(0.185)
PAN Support		0.291	0.286	0.422
		(0.236)	(0.240)	(0.270)
Population	0.00000***	0.00000***	0.00000***	0.00000***
	(0.00000)	(0.00000)	(0.00000)	(0.00000)
Spatial Lag	0.671***	0.669***	0.546***	0.598***
	(0.021)	(0.021)	(0.026)	(0.024)
Beltran-Leyva Cartel			0.137	
			(0.163)	
Gulf Cartel			0.425	
			(0.260)	
Juarez Cartel			2.409***	
			(0.327)	
Los Caballeros			0.240	
			(0.159)	
Los Zetas			0.121	
			(0.140)	
All Cartels (Mexico City)			-0.216	
			(0.353)	
Sinaloa Cartel			0.084	
			(0.143)	
Tijuana Cartel			-2.033***	
			(0.750)	
Baja California				-2.737***
				(0.814)
Constant	0.049	0.077	0.017	-0.002
	(0.114)	(0.122)	(0.201)	(0.506)
Observations	2,456	2,395	2,395	2,395
R^2	0.405	0.405	0.422	0.416
Adjusted R^2	0.403	0.403	0.418	0.406
Residual Std. Error	1.333 (df = 2447)	1.349 (df = 2384)	1.332 (df = 2376)	1.345 (df = 2353)
F Statistic	207.980*** (df = 8; 2447)	162.338*** (df = 10; 2384)	96.330*** (df = 18; 2376)	40.924*** (df = 41; 2353)
Note:				*p**p***p<0.01

APPENDIX C: CHAPTER FIVE

Table 9: Negative Binomial Regression of Homicides due to DTO Rivalry with Population Offset, Incidence Rate Ratios

Homicides Due to DTO Rivalry Mexico, 2010			
	(Model 1)	(Model 2)	(Model 3)
Urban Area	1.03^{***} (1.22^{-13})	1.01^{**}(0.002)	1.01^{*} (0.01)
Cropland	1.00^{***}(0.0004)	1.00^{**} (0.0004)	1.00^{***} (3.3^{-14})
On US Border	3.19^{*}(0.03)	3.00^{*}(0.04)	6.55^{***}(0.0003)
Altitude	1.00^{**} (0.008)	1.00^{**} (0.29)	1.00 (0.52)
Altitude Standard Deviation	---	1.00^{**} (.009)	1.00^{**} (0.008)
Highway Density	9.44^{***} (2.65^{-16})	9.44^{***} (1.84^{-15})	9.21^{***} (2.20^{-16})
Border between Cartels	2.44^{***}(7.19^{-13})	2.38 (1.85^{-15})	1.48^{**}(0.006)
Border between Fighting Cartels	---	9.44 (0.76)	1.89^{***}(0.0008)
PAN Support	---	1.64^{***} (9.4^{-10})	7.18^{***} (2.20^{-16})
Beltran-Leyva Cartel	---	---	4.49^{***}(2.20^{-16})
Gulf Cartel	---	---	5.39^{**}(0.002)
Juarez Cartel	---	---	1.78^{***}(2.29^{-6})
Los Caballeros	---	---	5.72^{***}(2.20^{-16})
Los Zetas	---	---	7.09^{***}(8.40^{-8})
All Cartels (Mexico City)	---	---	7.40^{**}(0.004)
Sinaloa Cartel	---	---	1.32^{***}(6.95^{-12})
Tijuana Cartel	---	---	2.17(0.24)
Spatial Lag	1.00^{***} (2.20^{-16})	1.02^{***} (2.20^{-16})	1.01^{***} (2.20^{-16})

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

In comparison to Table 5, which shows the results for the models that use population as a control variable rather than as the offset, the results are mostly the same. Results for urban area, cropland and altitude are the same across both models. In the population as offset model, US border is significant and has higher rate ratios in comparison to the model that does not have population as offset. Highway density also has much higher ratio rates in the offset model. The results for the two border variables are similar in both models. All cartels are significant in both models except the Tijuana Cartel. Spatial lag is significant and has similar rate ratios across all models. The models in Table 9 provide more support for the hypothesis that areas that provide access to illicit markets will see more homicides due to DTO rivalries, which was not strongly supported by the models in Table 5. The models in Table 9 provide additional support for all other hypotheses.

Table 10: Negative Binomial Regression of Homicides due to DTO Aggressions with Population Offset, Incidence Rate Ratios

Homicides Due to DTO Aggressions against the Government in Mexico, 2010			
	(Model 1)	(Model 2)	(Model 3)
Urban Area	1.04^{***} (2.25^{-5})	1.05^{***}(2.56^{-5})	1.05^{***}(1.07^{-5})
Cropland	1.00 (0.08)	1.00 (0.07)	1.00(0.80)
On US Border	1.42 (0.69)	1.55 (0.62)	1.23 (0.81)
Altitude	9.99^{**} (0.0008)	9.99 (0.06)	9.99 (0.16)
Altitude Standard Deviation	---	9.99 (0.62)	9.99 (0.45)
Highway Density	9.03^{***} (3.81^{-7})	9.03^{***} (3.21^{-7})	8.92^{***} (2.45^{-7})
National or Regional Capital	1.05^{***}(3.2^{-5})	1.22^{***} (1.59^{-5})	2.26^{***}(1.22^{-7})
PAN Support	---	4.25 (0.44)	1.12^{***} (0.92)
Beltran-Leyva Cartel	---	---	2.75 (1.00)
Gulf Cartel	---	---	4.23 (1.00)
Juarez Cartel	---	---	6.68 (1.00)
Los Caballeros	---	---	1.33 (1.00)
Los Zetas	---	---	4.81 (1.00)
All Cartels (Mexico City)	---	---	7.32 (1.00)
Sinaloa Cartel	---	---	6.22 (1.00)
Tijuana Cartel	---	---	4.19 (1.00)
Spatial Lag	6.13^{***} (2.20^{-16})	$5..91^{***}$ (2.20^{-16})	4.98^{***} (2.20^{-16})

Note: * $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$

In comparison to Table 6, the results in Table 10 are very similar. The results for urban area, cropland, US border and highway density are all similar. In the population as offset model, national or regional capital has lower rate ratios, but is still significant as the .001 level, which is the same as the models that include population as a control variable in Table 6. PAN support in significant in the third model in Table 10 and is not significant in the third model in Table 6. None of the cartels are significant in both models. Spatial lag is significant and has similar rate ratios in both models. Overall, the results of both the population as a control variable and population as an offset models are very similar.

Table 11: Negative Binomial Regression of Homicides due to Rivalry, Coefficients

	Homicides Due to DTO Rivalry in Mexico, 2010		
	(Model 1)	(Model 2)	(Model 3)
Urban Area	0.027*** (0.003)	0.020*** (0.004)	0.020*** (0.004)
Cropland	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
On US Border	0.602 (0.531)	0.226 (0.528)	0.921* (0.491)
Altitude	0.00003*** (0.000)	0.00002*** (0.000)	0.00001* (0.000)
Altitude Standard Deviation	---	0.00002** (0.00001)	0.00003*** (0.00001)
Highway Density	-0.034*** (0.007)	-0.040*** (0.007)	-0.063*** (0.007)
Border Between Cartels	0.554*** (0.116)	0.706*** (0.136)	0.364*** (0.132)
Border Between Fighting Cartels	---	-0.498*** (0.179)	0.284 (0.175)
PAN Support	---	1.895*** (0.436)	4.063*** (0.410)
Beltran-Leyva Cartel	---	---	4.359*** (0.387)
Gulf Cartel	---	---	1.184** (0.523)
Juarez Cartel	---	---	2.123*** (0.586)
Los Caballeros	---	---	4.967*** (0.379)
Los Zetas	---	---	2.791*** (0.356)
All Cartels (Mexico City)	---	---	3.659*** (0.654)
Sinaloa Cartel	---	---	2.816*** (0.365)
Tijuana Cartel	---	---	0.160 (1.216)
Population (Log)	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Spatial Lag	0.021*** (0.001)	0.020*** (0.001)	0.015*** (0.001)
Constant	-1.449*** (0.223)	-1.161*** (0.232)	-4.710*** (0.434)
Observations	2,456	2,456	2,456
Log Likelihood	-4,103.911	-4,092.104	-3,929.825
Theta	0.169*** (0.008)	0.172*** (0.008)	0.226*** (0.011)
Akaike Inf. Crit.	8,225.821	8,208.209	7,899.650

Note: * p < 0.05 ** p < 0.01 *** p <0.001

Table 12: Negative Binomial Regression of Homicides due to Aggressions, Coefficients

Homicides Due to Aggressions Against the Government in Mexico, 2010			
	(Model 1)	(Model 2)	(Model 33)
Urban Area	0.028*** (0.008)	0.033*** (0.009)	0.034*** (0.009)
Cropland	0.000** (0.000)	0.000** (0.000)	0.000 (0.000)
On US Border	0.133 (0.827)	0.111 (0.824)	0.078 (0.741)
Altitude	-0.00000 (0.00001)	-0.00000 (0.00001)	0.00003 (0.00002)
Altitude Standard Deviation	---	-0.00000 (0.00002)	-0.00002 (0.00004)
Highway Density	-0.054*** (0.018)	-0.061*** (0.019)	-0.098*** (0.020)
National or Regional Capital	1.801*** (0.486)	1.936*** (0.504)	2.094*** (0.474)
PAN Support	---	-0.666 (1.037)	1.227 (0.918)
Beltran-Leyva Cartel	---	---	1.557 (7,041,065.000)
Gulf Cartel	---	---	35.562 (5,728,986.000)
Juarez Cartel	---	---	29.059 (5,728,986.000)
Los Caballeros	---	---	36.146 (5,728,986.000)
Los Zetas	---	---	34.548 (5,728,986.000)
All Cartels (Mexico City)	---	---	-4.651 (7,773,955.000)
Sinaloa Cartel	---	---	34.212 (5,728,986.000)
Tijuana Cartel	---	---	-0.657 (34,039,994.000)
Population (Log)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Spatial Lag	1.654*** (0.051)	1.601*** (0.051)	1.214*** (0.058)
Constant	-4.947*** (0.568)	-5.008*** (0.589)	-39.559 (5,728,986.000)
Observations	2,456	2,395	2,395
Log Likelihood	-662.502	-659.697	-612.063
theta	0.105*** (0.012)	0.107*** (0.012)	0.173*** (0.022)
Akaike Inf. Crit.	1,343.005	1,341.394	1,262.127

Note: * p < 0.05 ** p < 0.01 *** p <0.001

Table 13: Negative Binomial Regression of Homicides due to DTO Rivalry with Population as Offset, Coefficients

	Dependent variable:		
	Homicides Due to DTO Rivalry		
	(1)	(2)	(3)
Urban Area	0.027***	0.017***	0.013***
	(0.003)	(0.004)	(0.004)
Cropland	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
US Border	1.390***	1.316**	1.503***
	(0.537)	(0.529)	(0.520)
Mean Altitude	0.00001	-0.00001	-0.00000
	(0.00000)	(0.00000)	(0.00000)
Altitude Standard Deviation		0.00003***	0.00002***
		(0.00001)	(0.00001)
Highway Density	-0.066***	-0.074***	-0.093***
	(0.007)	(0.008)	(0.008)
Border Between Cartels	0.990***	0.955***	0.730***
	(0.122)	(0.123)	(0.128)
Regional or National Capital	1.830***	1.726***	1.713***
	(0.324)	(0.322)	(0.318)
PAN Support		2.115***	3.968***
		(0.458)	(0.452)
Spatial Lag	0.013***	0.010***	0.008***
	(0.001)	(0.001)	(0.001)
Beltran-Leyva Cartel			4.771***
			(0.472)
Gulf Cartel			3.058***
			(0.590)
Juarez Cartel			3.362***
			(0.646)
Los Caballeros			4.673***
			(0.457)
Los Zetas			3.068***
			(0.438)
All Cartels (Mexico City)			2.908***
			(0.727)
Sinaloa Cartel			3.617***
			(0.446)
Tijuana Cartel			-0.411
			(1.293)
Constant	-10.486***	-9.990***	-13.534***
	(0.243)	(0.248)	(0.518)
Observations	2,456	2,395	2,395
Log Likelihood	-4,105.701	-4,025.121	-3,929.223
theta	0.164*** (0.007)	0.172*** (0.008)	0.203*** (0.009)
Akaike Inf. Crit.	8,229.401	8,072.242	7,896.446
Note:			*p**p***p<0.01

Table 14: Negative Binomial Regressions: Homicides due to Aggressions against the Government with Population as Offset, Coefficients

	Dependent variable:		
	Aggressions		
	(1)	(2)	(3)
Urban Area	0.039***	0.044***	0.046***
	(0.009)	(0.010)	(0.010)
Cropland	0.000*	0.000*	-0.000
	(0.000)	(0.000)	(0.000)
US Border	0.347	0.432	0.206
	(0.863)	(0.868)	(0.860)
Mean Altitude	-0.0001***	-0.00005*	-0.00004
	(0.00002)	(0.00003)	(0.00003)
Altitude Standard Deviation		-0.00000	-0.00003
		(0.0001)	(0.0001)
Highway Density	-0.102***	-0.104***	-0.116***
	(0.020)	(0.020)	(0.022)
National or Regional Capital	2.356***	2.512***	3.104***
	(0.566)	(0.586)	(0.589)
PAN Support		-0.888	0.100
		(1.143)	(1.129)
Beltran-Leyva Cartel			-207.665
			(7,651,274.000)
Gulf Cartel			825.389
			(6,313,071.000)
Juarez Cartel			816.654
			(6,313,071.000)
Los Caballeros			824.234
			(6,313,071.000)
lLos Zetas			823.215
			(6,313,071.000)
All Cartels (Mexico City)			-206.881
			(14,596,926.000)
Sinaloa Cartel			823.478
			(6,313,071.000)
Tijuana Cartel			-214.104
			(34,143,151.000)
Spatial Lag	1.812***	1.775***	1.604***
	(0.059)	(0.059)	(0.074)
Constant	-14.989***	-15.143***	-838.618
	(0.696)	(0.710)	(6,313,071.000)
Observations	2,456	2,456	2,456
Log Likelihood	-694.834	-694.703	-665.900
theta	0.073*** (0.008)	0.073*** (0.008)	0.096*** (0.011)
Akaike Inf. Crit.	1,405.668	1,409.406	1,367.799
Note:			*p**p***p<0.01

APPENDIX D: COPYRIGHT LETTER

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Insight Crime <info@insightcrime.org>
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Alanna Fulk

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