

# Community Resilience to Violence: Local Schools, Regional Economies, and Homicide in Mexico's Municipalities

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## EXECUTIVE SUMMARY

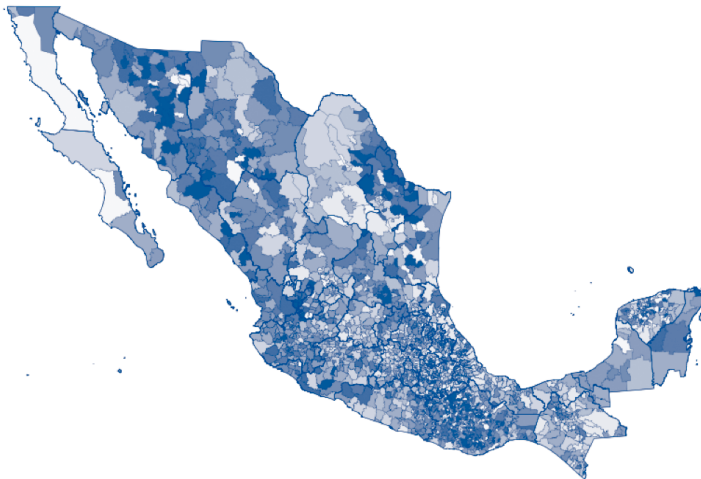
Violence diminishes well-being, and public insecurity erodes the rule of law, undermining the quality of democracy and constraining business and commercial interactions. A better understanding of the origins of violence is therefore crucial. This paper examines the concept of “community resilience” and its current emphasis in the Merida Initiative’s effort to reduce violence, and incorporates measures of this concept in a subnational analysis of 2010 homicide rates across Mexico’s 2,455 municipalities. Core findings include (1) homicide is not randomly distributed across municipalities, (2) homicide rates follow a spatial lag effect, suggesting violence in one community spills over into neighboring communities, (3) education has a meaningful protective effect against violence, but this is only a local, direct effect, and (4) economic *inactivity* exerts an unexpectedly negative direct effect, but a strong positive indirect effect from neighboring communities; that is, when economic conditions deteriorate in nearby communities, local violence increases, suggesting homicide is committed locally but by individuals in economically depressed, outlying areas. Violence-reduction policies, then, require coordination across nearby communities and should proceed on two fronts: (a) localized improvements in educational attainment, which can be addressed within individual jurisdictions, and (b) economic development policies targeted at intermediate regions below the state level but above the municipal level, which require cross-jurisdictional collaboration, even by municipalities across state boundaries. The emphasis on educational attainment within communities nested within broader regions of economic development helps clarify how to build community resilience to violence in the Mexican context—what I refer to as a “local-schools/regional-economy” approach to violence prevention.

## INTRODUCTION

Violence directly affects individual and community well-being, and is also increasingly understood to undermine democracy and constrain development (Seligson, Cruz, and Cordova 2000; Sarles 2001, 49; Mainwaring, Scully, and Cullell 2010, 31; Prillaman 2003). In Mexico, violent crime garners daily media attention, and the years since 2006 have seen a dramatic increase in homicides, tripling between 2007 and 2011, from around 8 to 24 per 100,000 (Molzahn, Ríos, and Shirk 2012; Hope 2014). Meanwhile, U.S. homicide rates have held steady at around 5 per 100,000 for the last 20 years (UNODC 2013), so the incidence of homicide in Mexico is currently four to five times worse than in the United States.

These national figures, however, obscure important subnational variation within Mexico.<sup>1</sup> Figure 1 reports a decile map of 2010 homicide rates across Mexico's 2,455 municipalities (see Data and Methods below for sources). In the decile map, light colors identify municipalities with low homicide rates, and the color darkens as the homicide rate increases. The darkest areas identify the municipalities with the highest homicide rates. Even a cursory glance at this kind of map reveals that there are concentrations of darker, violent areas in (1) the upper, west coast of Mexico (across the states of Nayarit, Sinaloa, Sonora, Chihuahua, and Durango), (2) the northeast (covering parts of Coahuila, Nuevo León, and Tamaulipas), (3) southern Mexico, and (4) portions of the Yucatán peninsula in the southeast. In contrast, there are a few areas in northern, central, and southern Mexico that are lightly colored, i.e., that have low homicide rates.

**FIGURE 1: DECILE MAP OF 2010 HOMICIDES RATES ACROSS MEXICO'S 2,455 MUNICIPALITIES**



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In the United States, the highest rates are reported by cities like Detroit, New Orleans, and Baltimore, but rarely exceed 40. In Mexico, more than 100 municipalities had homicide rates in 2010 that exceeded 100. To be sure, these communities each had a total population below 50,000, and most had populations below 10,000. Still, a very large number of communities lost 1% to 2% of their population to homicide in 2010.

The current crisis of public insecurity and violence in Mexico, along with the associated costs of violence to health, democracy, and development, calls out for a better understanding of the origins of violence, as well as policies that leverage that understanding in order to prevent and reduce violence. However, policies in this area within Mexico and bilaterally between the U.S. and Mexico have tended to emphasize a more reactive approach, including heavy assistance in the form of training and equipment in law enforcement's response to criminality, and punitive models of policing and law enforcement such as the deployment of the military to combat drug trafficking organizations. That is, the policy response to violence emphasizes a more effective enforcement apparatus and efficient justice-sector while neglecting a large literature addressing the root social and economic causes of crime—why crime occurs in the first place (e.g., Shaw and McKay 1942; 1969; Sampson 1987; Land et al. 1990; Baller et al. 2001; Deane et al. 2008).

Policies on both sides of the border in 2010 seemed to shift greater attention to these root, socioeconomic factors influencing crime and violence, pushing the previously more reactive, enforcement-oriented policies of the Merida Initiative to include more proactive, prevention-oriented policies, moving “beyond Merida” (Olson and Wilson 2010). For instance, in Mexico, Todos Somos Juárez received substantial local and federal support to advance a wide array of social, educational, and economic projects based in various neighborhoods of the border city of Ciudad Juárez, which up until that point had suffered an extraordinary homicide rate of about 200 per 100,000 (see Negroponte 2011; Seelke and Finklea 2013, 20–21). By April 2011, a bilateral strategy emerged in which the Merida Initiative articulated new goals addressing these underlying socioeconomic issues. The four pillars of the Merida Initiative are now: (I) disrupt organized criminal groups; (II) strengthen institutions; (III) build a 21<sup>st</sup> century border; and (IV) build strong and resilient communities, including a culture of lawfulness (DOS 2011a; 2011b; 2012; Seelke and Finklea 2013). Pillars I–III can be broadly construed to continue the previous strategy, though Pillar III's specific emphasis on border dynamics is novel. Pillar IV reflects the emerging emphasis on broader cultural, social, and economic factors underlying violence.

Pillar IV speaks most directly to the social-scientific literature on the causes of crime and violence. However, it is unclear what exactly “lawful,” “strong,” or “resilient” mean. This lack of clarity raises several fundamental questions. How do we know community resilience (CR) when we see it, and how should funding be directed or policies be designed in order to achieve CR? That is, what are the

properties of CR? More precisely, how can CR be measured in order to assess or evaluate whether a particular program is building it? What objective criteria should policymakers, governments, or funders use to know whether proposed or existing projects are achieving CR?

What's more, the strategy of the government of Enrique Peña Nieto since December 2012 has clearly emphasized the elements of violence reduction and crime prevention through a strengthening of the social fabric. The Interior Ministry's undersecretary for crime prevention and citizen participation, Roberto Campa, has oriented the work of his office toward this goal, with ample funds available for community-based projects specifically aimed at youth. Returning to the conceptual and measurement questions raised above, what evidence is there that these kinds of programs are building community resilience to violence, or are even have the best approach to do so?

This chapter has four aims: (1) clarify the concept of community resilience as applied to the crisis of public insecurity and violence in Mexico, (2) measure community resilience using available socioeconomic data in Mexico, (3) provide a systematic analysis of the relationship between these measures and homicide in Mexico using the tools of spatial analysis, and (4) based on the results of this analysis, identify evidence-based policy recommendations for violence prevention in Mexico. Overall, the discussion offers a clearer understanding of (a) the concept of community resilience, (b) concrete measures of community resilience (an admittedly complex challenge), (c) the causal relationship between resilience and violence, and (d) how to design policies and programs to prevent and reduce violence.

Looking ahead, the empirical analysis examines 2010 homicide rates across Mexico's 2,455 municipalities, offering a subnational and spatial study of the patterns and causes of violence. Subnational analyses of homicide can leverage within-country variation to provide a more fine-grained picture of the origins of violence that whole-nation comparative studies overlook. Further, a municipal perspective allows the identification of spatial regimes of violence that may straddle state or other administrative borders, pointing to the cross-jurisdictional dimensions of this violence. Adding the spatial perspective addresses the dependent structure of the data, explicitly accounting for the fact that geographic units are linked together, and crime in one territorial unit may influence crime in other units. Spatial models have been employed to examine the spatial structure of homicide and other crimes, including exploratory spatial analysis and both spatial error and spatial lag models, in the U.S. (e.g., Messner et al. 1999; Baller et al. 2001; Deane et al. 2008; Sparks 2011; Yang 2011), Canada (Thompson and Gartner 2014), and Europe (Messner et al. 2011). To the author's knowledge, this is one of a small number of applications of a spatial Durbin model (SDM) to the study of homicide (see Mears and Bhati 2006; Ruther 2013), and the only one in Mexico (see Ingram 2014), despite the high regard SDMs have as the leading edge or "state of the art" in spatial analysis (Ellhorst 2010).<sup>2</sup>

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Core findings include (1) the identification of spatial clusters or “hot zones” of homicide within Mexico, several of which straddle multiple state boundaries, raising questions about the special, cross-jurisdictional challenges of designing violence-reduction policies; (2) a spatial lag effect of violence, suggesting violence in one community spills over into neighboring communities; (3) education has a meaningful protective effect against violence, but this is only a local, direct (within-municipality) effect; and (4) economic inactivity exerts an unexpectedly negative direct effect, but a strong positive indirect effect from neighboring communities; that is, when economic conditions deteriorate in nearby communities, local violence increases, suggesting homicide is committed locally but by individuals in economically depressed, outlying areas. Communities that are most resilient to homicide appear to be those with strong, local educational attainment nested within broader regions or neighborhoods of municipalities that are economically developed. Building community resilience to violence in Mexico's municipalities, therefore, can be understood to entail two concrete policies: (a) localized improvements in education attainment, which can be addressed within individual jurisdictions, and (b) economic development policies targeted at intermediate regions—below the state level but above the municipal level, even straddling state boundaries—which require cross-jurisdictional collaboration. I refer to this combination as a “local-schools/regional-economy” approach to violence prevention.

### CONCEPTUAL CLARIFICATION: COMMUNITY RESILIENCE

The concept of resilience (CR) draws from a wide range of research fields, including the capacity of materials to stretch, rebound, or recover from pressure or deformation in physics, the ability of geographic areas to adapt and recover from extreme conditions in ecology, public and private preparedness for natural or man-made disasters, and the capacity to overcome adversity in individual and community psychology (e.g., Norris et al. 2008; Plough et al. 2013; Frankenberger et al. 2013). Given that resilience can have many meanings across the natural and social sciences, and even the narrower term of “community resilience” can have multiple meanings within the social sciences, several recent reviews sought to identify a concept of community resilience that could be useful across disciplines. The paragraphs below summarize the properties of community resilience as offered in three of these reviews: Norris et al. (2008), Chandra et al. (2010), and, writing for the U.S. Agency for International Development (USAID), Frankenberger et al. (2013). I then follow Norris et al. in comparing community resilience to nearby or related concepts in public health, sociology, and criminology, namely “collective efficacy,” which refers to the social characteristics of neighborhoods better able to prevent and reduce violence (e.g., Sampson et al. 1997), and “social capital,” which

refers to the social connectedness, engagement, and public trust of individuals and groups (Putnam 1995). Drawing on Norris et al.'s link between CR and collective efficacy, as well as Frankenberger et al.'s emphasis on social capital and the capacity for collective action, the concept of collective efficacy provides a logical bridge between CR and its applications to disaster preparedness—natural or man-made—and potential applications to preventing and reducing crime and violence as articulated in Pillar IV.

Readers should note there is a lively and ongoing debate over the meaning of CR. This contribution does not attempt to settle this debate. Rather, I build on existing notions of community resilience, collective efficacy, and social capital to offer a conceptual model of CR as applied to the shock, adversity, or disturbance posed by high levels of crime and violence, whether persistent or sudden. As noted by Frankenberger et al. (10), resilience to one type of adverse event may not translate into resilience to a different type of adversity (see also Sampson et al. 1997, 919, noting that efficacy is task specific). Thus, the present work is a step toward conceptualizing CR in the specific context of the kind of crime and violence experienced in Mexico and elsewhere in Latin America. Further, there is also widespread recognition that CR is difficult to measure (e.g., Frankenberger et al., 23). Indeed, even some internal components of CR, e.g., social networks or connectedness, resist measurement (Chandra et al., 23–24). Thus, the current work can also be understood as contributing to efforts to measure and empirically assess the effect of CR on violence.

In the first review of CR, Norris et al. (2008) identify static and dynamic components of CR. The static resources or properties of a community are critical, but a dynamic notion of the adaptive, transformable nature of these capacities inheres in the concept of CR (135). That is, CR requires a set of resources but also requires creative and imaginative deployment of those resources in the face of new or changing adversities. In short, CR is a process, not a condition (see also Frankenberger et al. 2013).

For Norris et al., these two broad categories of CR break down into four subcategories of capacities: (1) economic development, (2) social capital, (3) information and communication, and (4) community competence. While the authors state that all four capacities can be adaptive to the extent that they are “robust, redundant, and rapidly accessible” (142), they appear to place the most emphasis on the last set of capacities—community competence—as being the most dynamic. First, economic development spans economic growth, stability, and equitable distribution. Economic growth and stability allow communities to dedicate resources to mitigate and rebound from adverse circumstances. Further, marginal or peripheral communities may be at the greatest risk of an adverse event, and are also the least likely to mobilize support after a disturbance (137). Plough et al. (2013, 1191) also emphasize the harmful effect of wide disparities,

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and therefore the importance of equity for building resilience. Second, for Norris et al., social capital refers to the “actual or potential resources that are linked to possession of a durable network of relationships” (137). Social capital can also be conceived of as a cluster of networked, supportive relationships, paired with a “sense of community, place attachment, and citizen participation” (138–139). Thus, social capital encompasses material and nonmaterial resources, i.e., actual personal ties and involvement with other individuals, groups, and organizations, as well as a cultural-ideational sense of civic duty or loyalty to the community. This normative, cultural-ideational dimension of social capital helps understand how scholars or policymakers might think more systematically about promoting the culture of lawfulness advocated as part of CR in Pillar IV. Third, information and communication are key adaptive capacities. Having accurate and timely information about the adverse event or disturbance is crucial, and having a communication system that allows for efficient understandings of the challenge and the appropriate response is also paramount. Given that the reliability of information is also required, public trust in the source of information is perhaps the most important property of community resilience (Norris et al. 140; quoting Longstaff 2005, 55). If the government is the information source or otherwise a key actor, trust in the government is essential (see also Plough et al., noting that this trust is absent in many poorer or developing countries). Indeed, if trust in government is absent, the legitimacy of authority may suffer, leading citizens to withdraw support from other organizations or institutions, or to resort to self-help activities that might run counter to the broader goals of CR (see Nivette 2014, on the relationship between state legitimacy and crime). This trust is part of a larger public confidence regarded by other scholars as central to social capital (e.g., Putnam), and is also related to understanding culture of lawfulness. A key aspect of communication is the creation—intended or unintended—of conceptual frames, themes, or narratives, that can be either beneficial or corrosive (Norris et al., 140). These frames might be created by the government or by media, or they might emerge more organically from within communities (e.g., “Boston Strong” in the aftermath of the Boston marathon bombing, or “We are All Juárez,” in the very name of the 2010 program in Ciudad Juárez; see above). Lastly, community competence includes a sense of agency, efficacy, empowerment, and a real capacity to effect change (Norris et al. 141). These are dynamic qualities that are harder to measure, but proxies can offer good measures. For instance, if the ability to process and assess information, think critically, evaluate options, and solve a new, emerging, or evolving problem makes a community competent, then a logical relationship exists between education and community competence. Similarly, resources must be available for that educated analyst to deploy against the problem. Also, horizontal rather than vertical or hierarchical patterns of authority might facilitate creativity and cooperation (Norris et al. 142). Thus, all else being

equal, education levels and economic resources should be positively related with community competence, and inequality should be negatively correlated with community competence.

Situating their discussion of community resilience specifically within the context of health security, Chandra et al. (2010) note that most definitions of CR identify two types or classes of attributes that contribute to building CR: (1) the underlying material condition of a community prior to an adverse event (e.g., physical or economic condition), and (2) the capability of community to marshal those resources in a response to an adverse event. In this regard, the first and second categories correspond with Norris et al.'s distinction between static and dynamic resources, respectively. Further, Chandra et al. disaggregate their two categories of resources into five components, and they do so more explicitly than Norris et al. In the first set of underlying material conditions, they identify:

- (i) physical and psychological health, and
- (ii) socioeconomic equity and well-being.

That is, a community's baseline public health condition and its underlying education, employment, income, and inequality shape its available material resources for an adverse event. In the second set of more dynamic capability, Chandra et al. identify:

- (iii) effective risk communication;
- (iv) integration of organizations (governmental and nongovernmental); and
- (v) social connectedness.

The ability to convey information rapidly and reliably (16), coordinate the work of public and private organizations at multiple levels of government (e.g., neighborhood, city, district, state) (19), and rely on networks of personal and professional relationships (21–22) enhances the ability of a community to respond to, adapt, and recover from an adverse event. Overall, Chandra et al. and Norris et al. complement each other in noting both static/background conditions and dynamic/adaptive capabilities, though Chandra et al. are more explicit in identifying which capabilities fall into which category, while Norris et al. advocate a more interdependent, interactive conceptualization.

Perhaps most relevant to Pillar IV of the Merida Initiative might be USAID's definition of community resilience, since the agency is integrally involved in managing assistance. In October 2013, Frankenberger et al. published a conceptual framework of community resilience for USAID. Frankenberger et al. emphasize that the "distinctive aspect" of CR is the capacity for collective action (5). Further, they also stress that social capital is essential to collective action (5, 11), and that "the extent to which communities can effectively combine social capital and collective action in response to shocks and stresses is a defining feature of community resilience" (1).

In their fuller formulation of CR, Frankenberger et al. identify a set of "community assets," including social capital, which contribute to CR. They



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understand social capital as the degree and diversity of connections among individuals in a community, including “strong perceptions of local embeddedness, self-regulating moral codes, and the norms, reciprocity, and trust that exist between individuals and groups” (14, citing Chaskin 2008). As noted previously, social capital is a collection of behaviors and attitudes that can be difficult to measure. Assisting social capital, ancillary community assets include other types of capital, including human, financial, natural, physical, and political (11–14). Human capital refers to the community’s aggregate level of health, work, and skills, which might come from local patterns in public health and education. Financial capital refers to “patterns and trends in formal employment, petty trade, entitlements, remittances, and external financial assistance from government and/or civil society” (12). Natural capital identifies a community’s access to natural resources, and physical capital identifies a community’s infrastructure (e.g., utilities, transportation, communication, etc.). Finally, political capital refers to the nature of power relationships in the community, including access to power and influence. Potential measures include institutional effectiveness or performance, voter participation, minorities in positions of leadership, and transparency (13–14).

How do these concepts of community resilience as related to natural disasters link to man-made disasters or social problems? Research in sociology and criminology on the role of community context (Sampson and Groves 1989), “collective efficacy” (Sampson et al. 1997), and social context (Wang et al. 2013; Thompson and Gartner 2014) in explaining crime and violence help bridge the discussion of natural disasters and adverse events of a more social nature. According to Sampson and Groves—and following earlier research by Shaw and McKay (1942; 1969)—violence is a consequence, in part, of social disorganization, and social disorganization can be measured by its external sources, including socioeconomic status (SES) or resource deprivation, residential mobility, and ethnic heterogeneity. Other contributing factors include family disruption, which “may decrease informal social control at the community level” (781; citing Sampson 1987), and urbanization, which “weaken[s] local kinship and friendship networks and impede[s] social participation” (782). Thus, for Sampson and Groves, community capacity to reduce crime is shaped by macro-social and macroeconomic factors like resource deprivation, residential instability, heterogeneity, family disruption, and urbanization, but these structural factors are also mediated by informal social features of communities, including the ability to supervise teenage groups, the size and density of friendship networks, and participation or engagement in civic life.

The themes of community context, social cohesion, or collective efficacy that run throughout Sampson’s work resonate with the political science literature on social capital. Putnam (1995) noted the surging, cross-disciplinary interest in the apparently positive influence of social capital, understood as “features of social organization such as networks, norms, and social trust that facilitate

coordination and cooperation for mutual benefit” (67), which is remarkably similar to Sampson’s definition of “collective efficacy.” Putnam thus understands social capital as a bundle of individual or community properties: social connectedness, neighborliness, and public trust or confidence. Disaggregating further, social connectedness can be public and private. Public connectedness refers to participation in public institutions or associations, including elections (i.e., voting), which resonates with Frankenberger et al.’s discussion of possible measures of political capital. Indeed, voting tends to correlate with measures of associational activity, and dimensions of social capital are also correlated with each other across individuals and countries (Putnam 73). Similarly, components of collective efficacy—informal social control and social cohesion—tend to travel together (Sampson et al 1997, 920). In the case of Sampson et al., the correlations between social control and social cohesion and trust motivated the authors to collapse the two measures into a single measure, which they then labeled “collective efficacy.”

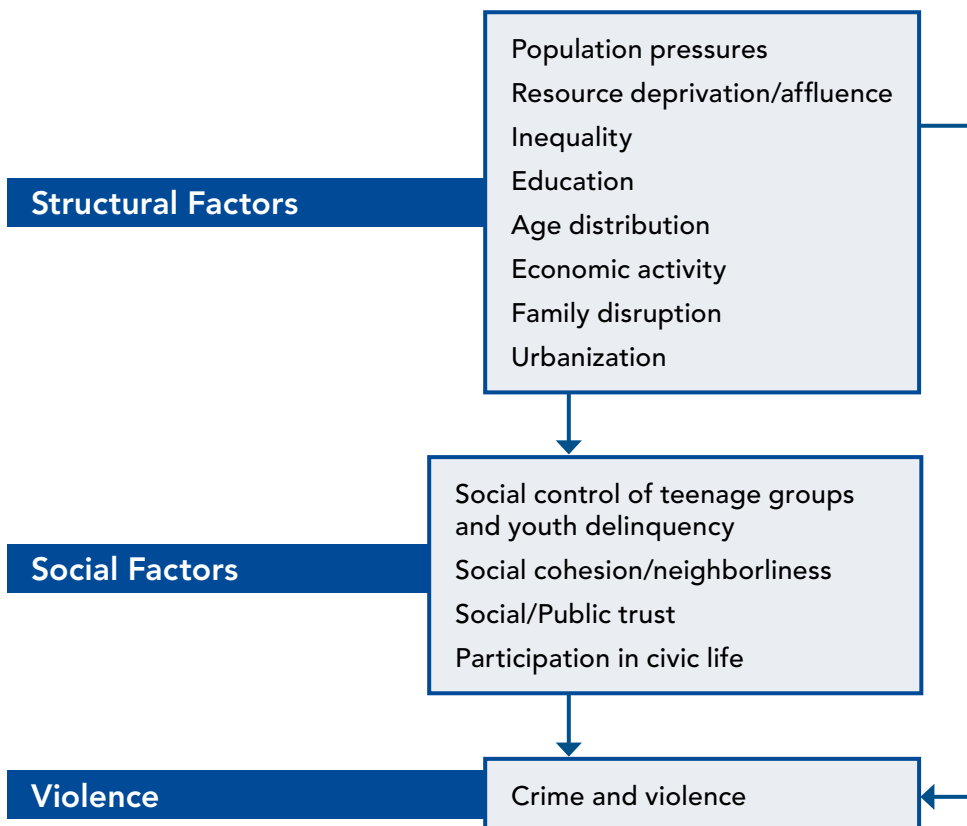
Again, Sampson et al. emphasize that “collective efficacy does not exist in a vacuum”; rather, it is “embedded in structural contexts and a wider political economy that stratifies places of residence by key social characteristics” (919). That is, following Sampson and Groves, as well as other research on the structural covariates of violence (Land et al. 1990; Baller et al. 2001; Deane et al. 2008), broad demographic pressures like population change, shifts in the age structure of the population, and residential mobility can create “institutional disruption and weakened social controls over collective life,” primarily because the formation of social ties and other forms of social capital takes time (919). Further, racial segregation and resource deprivation, and especially concentrated socioeconomic disadvantage, i.e., the combination of extreme poverty, unemployment or low occupational status, and low education, can wreak havoc on social control, cohesion, and trust. Sampson et al. note that existing research has “demonstrated, at the individual level, the direct role of SES in promoting a sense of control, efficacy, and even biological health itself ... [a]n analogous process may work at the community level” (919). Indeed, a community’s structural features may undermine any social assets it may have in terms of collective efficacy: “resource deprivation act[s] as a centrifugal force that stymies collective efficacy. Even if personal ties are strong in areas of concentrated disadvantage, they may be weakly tethered to collective action” (919).

The meaning of community resilience in the context of a persistent crisis of crime and violence now seems to come into clearer focus. Drawing on the disaster preparedness literature, Sampson’s work on community context and collective efficacy, as well as broader interdisciplinary work on social capital, a definition of community resilience that is relevant and measurable in the context of studying crime and violence in Mexico consists of two dimensions: a structural one and a social one. At the structural level, population pressures,

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resource deprivation/affluence, and family disruption are recognized as the primary predictors of violence (Land et al.), and along with inequality, age structure, and education establish the socioeconomic foundations of the social dimension and violence. At the social level, informal social control, cohesion, and trust—or the aggregate notion of collective efficacy or social capital—are shaped by the structural dimension and in turn also shape the incidence of crime and violence in a community. Adapting an earlier causal model of social disorganization theory (Sampson and Groves, 1983, citing Shaw and McKay) and resonating with Chandra et al.'s (3) and Frankenberger et al.'s (9) models of CR, Figure 2 diagrams the conceptual relationship between the structural and social dimensions of CR, and their causal relationship with crime and violence.

**FIGURE 2: CONCEPTUAL MODEL OF CR AND CAUSAL RELATIONSHIP WITH CRIME AND VIOLENCE**



## THEORY AND WORKING HYPOTHESES

How can this discussion of community resilience improve our understanding of the origins of violence in Mexico? Building on the discussion of community resilience and the general causal model represented in Figure 2, this section summarizes core explanations of crime and violence from sociology, political science, and conflict studies, pairing expectations from these fields with expectations from the discussion of community resilience to yield several working hypotheses.

First, sociologists and criminologists have found an association between a large array of demographic, economic, and social features of communities and the rate of crime in those communities. These features included measures of social distance, alienation (or anomie), social disorganization, and fragmentation, as well as measures of opportunities for crime. However, in large-N regressions seeking to explain variation in crime rates, inconsistent results were common (Baller et al. 2001, 562). Land et al. (1990) established that much of this inconsistency was due to multicollinearity among the explanatory variables, and generated three principal components from the primary predictors of interest. These three composite measures captured (1) population structure, (2) resource deprivation/affluence, and (3) family disruption (see discussion by Baller et al, 562, 568). Population size, growth, and density are all anticipated to exert an upward pressure on violence. This expectation aligns with the concern regarding population change and residential mobility in the discussion of structural factors shaping collective efficacy above, though measures for residential mobility are not available at the municipal level in Mexico. Population structure is frequently operationalized as the principal component of total population (logged) and population density (logged), both of which are available for this study, yielding the following hypotheses: (H1) population will exert an upward pressure on homicide rates; and (H2) population density will exert an upward pressure on homicide rates.

The expectation regarding resources mirrors the preoccupation with economic growth, stability, and equity in the discussion of community resilience above. Resource deprivation/affluence has been operationalized as the principal component of income (median family or per capita), inequality (e.g., Gini coefficient), percent of families that are headed by women, percent below poverty, and percent minority (e.g., percent black, in the U.S. context). Unemployment figures and labor force participation also help capture the degree of economic activity in a community. Income, inequality, and economic activity measures are available for Mexico, yielding the following hypotheses: (H3) income will have a negative relationship with homicide rates, (H4) inequality will have a positive relationship with homicide rates, and (H5) economic activity will have a negative relationship with homicide rates.

Third, sociologists' concern with family disruption is exactly the same as the concern with disrupting social or kinship networks among scholars of collective

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efficacy, or the concern with disturbing social connectedness among social-capital scholars. Family disruption has been measured using divorce rates or the percent of households headed by women or single parents (Land et al. 1990; Baller et al. 2001). Divorce rates are available in Mexico, yielding the following hypothesis: (H6) homicide rates will vary positively with divorce rates.

Other predictors of violence frequently included in sociological studies of crime and violence include education and age. Education is also a core, vital concern of community resilience scholars, addressing the competence to access and evaluate information, think critically about problems associated with adverse circumstances, design creative solutions, and adapt this entire chain of activities to new problems under evolving circumstances. Education can also help individuals and communities identify and take advantage of opportunities where others may not see them, helping people avoid entering into a cycle of delinquency in the first place. The age distribution in a community can also help predict the incidence of violence (e.g., Baller et al). Violence tends to occur among younger populations; thus, all else being equal, communities with a lower age distribution (measured as the average or median age) should expect to be at a higher risk of violence. These expectations yield the following hypotheses: (H7) homicide rates will vary negatively with the level of education, and (H8) homicide rates will vary negatively with the average or median age of the population.

Additional empirical implications derive from the political science literatures on violence. Three areas of research yield testable hypotheses in this study: regime competitiveness, social capital, and the greed/opportunity and grievance perspectives on armed conflict.

First, existing research finds that electoral uncertainty can generate powerful incentives to improve public institutions, including legislative institutionalization (Beer 2003; Solt 2004), educational spending (Hecock 2006), and judicial budgets in the Mexican states (Beer 2006; Ingram 2013). Margins of victory and the effective number of parties are frequent measures for competitiveness, but turnover—actual alternation of the party in power—offers evidence that not only are political races close, the incumbent—even a long-standing incumbent—actually lost. Indeed, turnover offers evidence of both electoral uncertainty as well as the likelihood that any illegal networks of crime or corruption have at least been disturbed, if not dismantled. For instance, Snyder and Duran-Martinez's (2009) suggest that state protection rackets that may have existed prior to 2000 were dissolved by the weakening of the formerly dominant party, the Institutional Revolutionary Party (PRI), in the 1990s. In Mexico this would especially be the case where the PRI held the mayor's office and was then displaced by either of the two main opposition parties, the National Action Party (PAN) or the Democratic Revolution Party (PRD). However, even if one of the opposition parties had already displaced the PRI and turnover were capturing the return of the PRI,

the same logic holds. That is, due to both the incentives generated by electoral uncertainty and the disruption of criminal networks, alternation in power should have a curbing effect on homicide rates. Thus, another hypothesis (H9) anticipates that homicide rates will vary negatively with turnover.

Second, echoing the previous discussion of social capital (Putnam 1991; 1995), participation should exert a downward pressure on criminal activity. All else being equal, I anticipate that patterns of more intense civic engagement generate the social resources to reduce or even prevent criminal violence. Empirically, cities with a greater degree of citizen involvement and engagement will experience less violence than cities with less of this social capital. In the context of this book, it may be an important indicator of the capacity of communities to respond to upsurges in violence. Disaggregated measures of civic engagement or associational life are not available across Mexico's municipalities, but a measure of voter participation is, and Putnam identifies voter participation as one indicator of civic engagement, noting also that all components of social capital tend to be correlated with each other. This expectation yields H10: Homicide rates will vary negatively with voter participation.

Third, the conflict literature generally posits explanations that highlight one of two key factors: greed/opportunity or grievance. The opportunity arguments suggest that crime is motivated by material interests and therefore material cost-benefit calculations, especially when those resources are easy to seize, i.e., "lootable wealth" (e.g., Collier and Hoeffler 2001). Thus, individuals join rebel groups or terrorist organizations when there is something material to be gained, and these gains are perhaps most attractive to individuals who are poorer or more resource deprived. In this manner, the opportunity approach to armed conflict overlaps and complements the resource deprivation argument in sociology/criminology, though an implication in the conflict literature is that rebels, insurgents, or dissidents tend to be conceptualized as "greedy criminals," a concept that carries its own normative commitments that frequently need to be examined more closely. In contrast with the greed/opportunity argument, grievance theory contends that armed conflict can have nonmaterial origins, that is, that rebellion or insurgency or political violence can be motivated by a wide range of ideational factors—including revenge, duty, a sense of injustice, or ideology—that may not respond predictably to material cost-benefit calculations. Indeed, actors motivated by deeply held grievances may appear to be engaging in highly risky or costly behavior (e.g., McAdam 1986; Ingram 2012). In this regard, the grievance explanation overlaps with the sense of frustration or injustice that can result from resource deprivation and high inequality, though the motivation for action is different. Grievance raises questions of the legitimacy of laws and justice institutions. For instance, Family (2009) finds that Mexican migrants to the United States report a greater willingness to enter the United States illegally if they perceive the U.S. immigration laws as illegitimate. At the domestic level within

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Mexico, poverty and inequality can lead to similar dynamics, yielding a generalized perception among the poor or resource deprived that the existing social order or norms are illegitimate (see also Nivette 2014). Thus, H11 anticipates that homicide will vary positively with income or resource affluence (cutting against H3), where affluence operates as the target of crime and violence, and H12 anticipates that homicide will vary positively with inequality (complementing H4).

Finally, one last testable argument emerges from the conflict literature, namely, the role of rugged or uneven terrain. Fearon and Laitin (2003) first advanced the argument in a prominent piece, finding that mountainous terrain has a positive relationship with armed conflict. The logic of the argument highlighted the protective cover that uneven terrain afforded rebel groups, thus serving as geographic features that enhanced opportunities for violence. The empirical implication here is that we should see a positive relationship between areas of high variability in terrain and homicide rates (H13).

Notably, alternative hypotheses are testable regarding all explanatory variables. For instance, higher income is generally considered an advantage in reducing crime and violence, but it can be a disadvantage from the perspective of both the conflict literature (H11 above) and “relative deprivation” (Gurr 1970). The latter possibility is compelling given the implications regarding the underlying spatial relationships and the social relativity process inherent in relative deprivation arguments. Social relativity draws on social comparison work (Festinger 1954) to posit that, in estimating one’s own condition or predicament, the absolute value of social or economic characteristics may matter, but the comparison of one’s own position on these dimensions with the position of others may also determine whether the response to this condition is positive or negative. For instance, a person may be poor and may react negatively, becoming frustrated or depressed. However, if that person is surrounded by others who are even poorer, then the person may react positively. As discussed by Yang et al. (2013), and in contrast to the positive feedback of spatial spillovers, the social relativity perspective generates the possibility of negative feedback, i.e., of an unexpected reverse or “opposite” effect than that anticipated by theory.

The “opposite” or counterintuitive implications of the social relativity argument is especially compelling in the study of crime since it suggests specific spatial dynamics and identifies how conventional, accepted efforts to reduce crime in one area may backfire, resulting instead in even higher rates of crime. For instance, one community may see a benefit in reducing resource deprivation, improving incomes and overall economic well-being. However, as that happens in one particular community, neighboring communities may begin to perceive themselves less well in comparison to the first unit, resulting in higher crime in that unit. Notably, if the perception of resource deprivation worsens in the second unit, the first unit may also be targeted, since it is now seen as relatively

affluent. This may happen for at least two reasons: (1) potential criminals may not want to commit the crime in their own community (or may recognize they are more likely to be caught), and (2) the perception is that higher resources, i.e., better targets, exist in the first unit. These possibilities are examined in the empirical analysis below.

## DATA AND METHODS

The dependent variable of homicide rates is from Mexico's national statistics office (Instituto Nacional de Estadística y Geografía, INEGI), as organized by Trelles and Carreras (2012). The variable is logged to normalize its distribution. Systematic data on crime, especially different types of violent crime over time, are unavailable across Latin America and other parts of the developing world. However, homicide is one crime for which data are generally available, it has the greatest impact on well-being and the quality of life in democratic societies, and other types of crimes tend to be correlated with the incidence of homicide (Mainwaring, Scully, and Cullell 2010, 31; Bailey and Dammert 2006, 7). The municipal shapefile is from INEGI, and additional explanatory variables are from INEGI and the United Nations Development Program (UNDP) office in Mexico.<sup>3</sup> Specifically, the population structure component consists of population (logged) and population density (logged), both derived from 2010 population estimates and 2005 area (sq. km.) data from INEGI. Aspects of resource deprivation are captured by income per capita (in U.S. dollars, logged) and inequality (Gini coefficient), both of which are from the UNDP's 2005 municipal report. Educational attainment, economic inactivity (percent not economically active, or PNEA), turnover, and participation data come from Trelles and Carreras. Education captures the average years of total education, and PNEA captures the percent of the population that is both unemployed and not actively seeking work, but still able and willing to work.<sup>4</sup> Turnover data comes from Trelles and Carreras, and capture whether there was a transfer of power from one political party to another in the municipal executive in the preceding five years (2006–2009). The Participation Index is the number of votes cast in the two previous municipal elections divided by the number of registered voters (*votos emitidos/lista nominal*; Flamand, Martínez Pellégrini, and Camacho 2007). Finally, INEGI provides divorce rates (per 1,000, logged) that capture family disruption, and altitude figures for localities within each municipality. The standard deviation of altitude within each municipality captures the unevenness of terrain.<sup>5</sup> Notably, Trelles and Carreras also use the population density measure as a

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3 The municipal shapefile and additional georeferenced census data are from INEGI, <http://sc.inegi.org.mx/sistemas/cobdem>, (accessed October 6, 2013). UNDP: [www.undp.org.mx](http://www.undp.org.mx), (accessed October 6, 2013).

4 See INEGI metadata (accessed January 16, 2014): <http://www.inegi.org.mx/est/contenidos/espanol/proyectos/encuestas/hogares/ene/metadatos/PNEA.asp?s=>.

5 This measure was inspired by Alberto Díaz-Cayeros.



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proxy for urbanization; thus, taken together, the population variables could be used to capture an urban/rural divide. Full descriptive statistics are reported in Ingram (2014).

There is frequently a trade-off between the elimination of multicollinearity by using composite measures (e.g., principal components) of population structure, resource deprivation, and family disruption, as suggested by Land et al. (1990), and the more nuanced inferences made possible by individual covariates. However, this trade-off can be avoided by selecting predictors that are not correlated with each other. For instance, recent analyses of crime (Sparks 2011) and mortality (Yang et al. 2013) have not used composite measures for key explanatory concepts, but rather have included the uncorrelated, individual covariates in their regressions. I do the same, having first confirmed that the variables are not correlated, as well as confirming the absence of multicollinearity in the initial OLS model with the variance inflation factor (VIF). Generally, VIF values below 10 are acceptable, but a more rigorous cutoff is 4. All VIF values in this study fall below 4.

The analysis proceeds in three stages. I first conduct exploratory spatial analysis to identify any spatial regimes in the data. Here, Moran's I (Moran 1948) and a local version of the same statistic, local indicators of spatial autocorrelation, or LISA, statistics (Anselin 1995), constitute the principal techniques. Second, spatial regressions examine the relationship among the dependent and independent variables while accounting for the dependent structure of the data. I then use the Aikake Information Criterion (Aikake 1974) and Lagrange Multiplier (LM) tests (Anselin 1988) to determine which model best fits the data and which model best accounts for spatial autocorrelation, respectively. Generally, lower AIC values identify the best models, and models with an AIC value more than 10 points lower than the comparison model should be preferred (Burnham and Anderson 2002, cited in Yang et al.). LM tests identify whether there is any remaining spatial autocorrelation among the residuals, and models with lower LM values that are not statistically significant should be preferred. Following these guidelines, post-estimation diagnostics of four separate models identify the spatial Durbin model as the one that best fits the data. Finally, given that coefficients of explanatory variables cannot be interpreted directly, I estimate direct and indirect effects, and partition these effects across higher-order neighbors to provide a more complete and nuanced explanation of the spatial dimension of homicide across Mexico's municipalities.

Throughout, a first-order queen contiguity matrix operationalizes the dependent structure of the data. Exploratory spatial analysis is conducted using GeoDa (v1.4.0; Anselin et al. 2006), and the spatial econometric analyses, including the use of the Markov Chain Monte Carlo method to calculate direct and indirect Durbin effects and partition results, are implemented in R (v3.0.2; R Core Team 2013), using the *spdep* package (Bivand 2013).

## RESULTS

### Exploratory Spatial Analysis

Exploratory techniques examine the first null hypothesis, namely, that there is no spatial dimension to the distribution of homicide rates across Mexico's municipalities. Stated otherwise, exploratory spatial analysis examines whether the distribution of homicide rates is spatially random. Exploratory spatial analysis, therefore, is "a critical first step for visualizing patterns in the data, identifying spatial clusters and spatial outliers, and diagnosing possible misspecification in analytic models" (Baller et al. 2001, 563). Maps are not a necessary step, but "[g]raphical displays provide an auxiliary method [to data tables] that may allow patterns to be discovered visually, quickly" (Ward and Gleditsch 2008, 11).

First, global and local tests of spatial autocorrelation capture the degree of overall structural dependence among units. Specifically, the global and local tests of spatial autocorrelation posit a null hypothesis of no spatial dependence among observations, i.e., spatial randomness, and then test whether this null hypothesis is supported. A global test is the global Moran's  $I$ , and examines whether there are any regular patterns among geographically connected units (Moran 1948; 1950a; 1950b; Cliff and Ord 1981). If there are no regular patterns of spatial association, the statistic is not significant. If there are significant spatial associations, the statistic can be positive or negative. A positive global Moran's  $I$  indicates that territorial units that are connected exhibit similar values on the outcome of interest; a negative result indicates territorial units that are connected have divergent or dissimilar values. The global Moran's  $I$  for homicide rates in 2010 is 0.10 ( $p < .001$ ). The positive value suggests similar values of homicide rates cluster together (e.g., high with high). The statistical significance allows us to confidently reject the null hypothesis of spatial randomness. Standard regression techniques would not only be inappropriate, but they would also overlook a key characteristic of the phenomenon.

Building on the discussion of global spatial autocorrelation, a local test for spatial dependence is the local Moran's  $I$ , or local indicator of spatial autocorrelation (*LISA*) (Anselin 1995). A *LISA* statistic provides information on the correlation on an outcome of interest among a focal unit  $i$  and the units to which  $i$  is connected,  $j$  (e.g.,  $i$ 's neighbors,  $j$ ), whether the association is positive (i.e., similar values) or negative (i.e., dissimilar values), and whether the association is statistically significant. Thus, *LISA* statistics serve to identify local clusters or spatial patterns of an outcome of interest. To be clear, while the global Moran's  $I$  may suggest that overall there is little spatial autocorrelation in the data, *LISA* values can identify smaller geographic areas where positive or negative clustering occurs.<sup>6</sup>

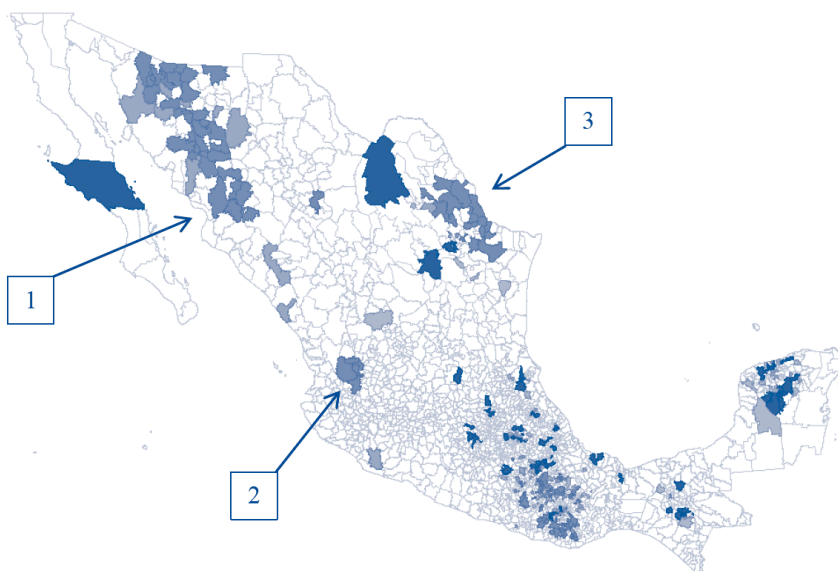
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<sup>6</sup> The global Moran's  $I$  is the mean of all *LISA* values (Anselin 2005, 141).

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Figure 3 reports a LISA cluster map showing the distribution of statistically significant clusters.<sup>7</sup> Blank areas are regions of spatial randomness in the distribution of violence, while colored areas are non-random spatial clusters. All cluster associations are significant at least at the .05 level.<sup>8</sup> Note also that the municipalities colored for significance constitute the core of spatial clusters. That is, the colored municipalities have a statistically significant relationship with the municipalities that border them, including those that are clear. Thus, the outer boundary of the cluster extends into the blank municipalities bordering the colored one, and the true size of the spatial cluster is larger than the colored cores (see, e.g., Anselin 2005, 146).

**FIGURE 3: LISA CLUSTER MAP OF HOMICIDE RATES (LOGGED)**



The LISA cluster map also identifies the substantive content of those clusters. According to Anselin (2005, 140), this kind of map is “[a]rguably the most useful graph” in spatial analysis. Dark blue identifies those municipalities with high levels of homicide that are surrounded by municipalities with similarly high levels of homicide (high-high). Medium blue identifies units with low homicide levels surrounded by units with similarly low levels (low-low). Light blue identifies those units with low levels of violence surrounded by units with high levels (low-high), while the lightest blue identifies those with high levels of homicides surround by units with low levels (high-low).<sup>9</sup>

<sup>7</sup> LISA significance map is omitted for sake of brevity.

<sup>8</sup> Generated in GeoDa (statistical significance based on permutation approach; 9,999 permutations).

<sup>9</sup> This classification corresponds with the location of observations in a Moran scatterplot (Anselin 1996). If standardized LISA values are plotted along the x-axis, and the spatially weighted LISA values (LISAs for neighboring units) are plotted along the y-axis, the four resulting quadrants classify units as reflected in the cluster map (e.g., high-high in top-right quadrant, and low-low in bottom-left quadrant).

Figure 3 shows three spatial regimes that are analytically compelling (marked 1, 2, and 3 in the map). All three areas are high-violence spatial regimes. The first area straddles three states in northwestern Mexico: Sonora, Chihuahua, and Sinaloa. The second area sits at the intersection of three states in central Mexico: Nayarit, Zacatecas, and Jalisco. Lastly, the third area straddles another three states: Coahuila, Nuevo León, and Tamaulipas. Thus, these areas represent cross-jurisdictional clusters—spatial regimes that cross the boundaries of states. Notably, unlike studies of homicide rates at the county level in the U.S. where the south emerges as a high-violence region and the northeast as a low-violence region (Land et al. 1990; Baller et al. 2001), there is no single region in Mexico that can be similarly singled out.

A key question is whether these spatial patterns are the product of (a) “correlated relationship” (Manski 1993), i.e., common exposure to a place-specific phenomenon (spatial error structure), (b) “endogenous interaction relationship”, i.e., the diffusion of violence (mixed or spatial Durbin model), or (c) “exogenous interaction relationship”, i.e., a combination of the lagged outcome and lagged explanatory variables from neighboring units (mixed or spatial Durbin model). Different policy implications flow from common exposure, diffusion of the dependent variable, or diffusion of the explanatory variables. Further, if common exposure is present, then the underlying, unmeasured factor generating the outcome still needs to be identified; if diffusion is present, then the mechanism of diffusion still needs to be identified. The next section turns to spatial regressions.

## Spatial Regression Analysis

Four regression models examined the data: ordinary least-squares (OLS), a spatial error model (SEM), a spatial lag model (SLM), and a spatial Durbin model (SDM). For economy of presentation, full results are reported elsewhere (Ingram 2014), and the key findings are summarized here. Substantial residual spatial autocorrelation remained after estimating the basic OLS model ( $LM = 741.66, p < 0.001$ ), supporting the conclusion that a spatial regression is required. In conventional spatial analysis, Lagrange multiplier tests identify whether to pursue an error or lag specification in such a regression. Here, both tests were significant, and neither robust test was significant at the .05 level (though the robust LM error test was more significant, at .10 level). Still, even if conventional model selection statistics clearly identified the superiority of an error specification or lag specification, or vice versa, the Durbin model is preferred. It should be noted that the interpretation of the coefficients in the SDM is not straightforward and is left for the section on direct and indirect effects below. For now, two findings should be emphasized.

First, based on both statistical tests and theory, the Durbin model emerges as the best among all four. Looking at LM tests and model fit statistics (e.g., AIC), the spatial Durbin model receives the best evaluations. Further, the SDM captures diffusion effects

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among the dependent variables *as well as* diffusion and feedback effects among the explanatory variables. For these reasons, I focus on the results of the Durbin model.

Second, the statistical significance of the lagged dependent variable ( $\rho$ ,  $\rho$ ) shows that patterns of homicide in one municipality can be explained by patterns of homicide in neighboring municipalities. Notably, the direction and magnitude of the coefficient across both the spatial lag and Durbin models is the same, reinforcing the finding regarding the substantive effective of homicide rates in neighboring municipalities. This is strong evidence in favor of a spatial spillover effect for the dependent variable. Specifically, controlling for all other explanatory factors, a 1% increase in the homicide rates of neighboring municipalities translates into about a .1% increase in violence in a focal municipality.

### Durbin Estimates: Direct, Indirect, and Partitioned Effects

Interpretation of the parameters in the Durbin model is not the same as interpretation of parameters in OLS, or even in SEM and SLM. Indeed, interpretation of Durbin estimates can be mathematically complicated (Ellhorst 2010), but also much richer than in conventional spatial analysis (Yang et al. 2013). This is due to the fact that the model captures feedback effects among explanatory variables in neighboring units. “A change in the characteristics of neighboring regions can set in motion changes in the dependent variable that will impact the dependent variable in neighboring regions. These impacts will continue to diffuse through the system of regions” (LeSage and Pace 2010, 369). That is, the effect of an explanatory variable ( $X_{ir}$ ) on  $y_i$  does not equal  $\beta_r$ , and the effect of the same explanatory variable in a neighboring unit ( $X_{jr}$ ) on the outcome in the focal unit ( $y_i$ ) does not equal zero. Rather, the *total effect* of an explanatory variable consists of the *direct effect* of the explanatory variable on  $y_i$  within the focal unit, plus the *indirect effect* of the explanatory variable (spillover effect) from neighboring units (LeSage and Pace 2010, 370). Moreover, these direct and indirect effects can vary over higher orders of neighbors, and are not the same for all units.

With this in mind, partitioned direct and indirect effects across higher orders of neighbors, including the focal unit (zero-order neighbor) is an effective way of interpreting relationships (Ellhorst 2010; LeSage and Pace 2009; 2010; Yang et al. 2013). Full estimates of average direct and indirect effects across all units and partitioned direct and indirect effects across five orders of neighbors are reported elsewhere (Ingram 2014). For ease of presentation, I graph these results, visualizing direct and indirect effects in Figures 4–9. In all figures, the graphs on the left represent direct effects (the influence of the explanatory variables within a municipality) and the graphs on the right report indirect effects (the influence of an explanatory variable in neighboring municipalities, starting with the contiguous neighbors and moving out). The horizontal, x-axis reflects the order of neighbors, moving from the closest to the farthest away, and

the vertical, y-axis reflects the magnitude of effect of the explanatory variable on the homicide rate, i.e., the slope of the relationship. The shaded areas report 95% confidence intervals, so relationships are significant where the upper and lower bounds of this interval are either both above or both below the horizontal zero line, i.e., where the confidence interval does not include zero.

The results show that direct effects are rarely significant beyond the focal unit, essentially disappearing beyond the first-order neighbors, and that a similar process of decay occurs with indirect effects. Comparing the zero-order direct effects with the total direct effects (reported in Ingram 2014, Table 3) shows that the focal unit contributes most of the effect. For instance, the focal unit contributes 99.6% (.228/.229) of the direct effect for population. Similarly, the indirect effect of the first-order neighbor (represented by the indirect effect at  $W_0$ ) contributes most of the effect. For example, the first-order indirect effect of PNEA accounts for 99.8% (5.952/5.961) of the effect.

Among direct effects, population, income, and economic inactivity are statistically significant, yet population and economic activity have unexpectedly negative effects and income has an unexpectedly positive effect. However, as expected, education has a significant (at .10 level) and negative relationship with violence, and uneven terrain has a significant and positive effect on violence.

The main findings demonstrate that: (1) among direct effects, education and uneven terrain have the anticipated effects, but several common predictors of violent crime have an unexpected relationship with homicide; (2) among indirect effects, only economic inactivity is significant and meaningfully affects homicide rates in any focal unit; (3) considering the combined direct and indirect effect of economic inactivity, a social relativity process (negative feedback) marks the relationship between economic inactivity and violence, while there are no spillover effects (positive feedbacks) among explanatory variables; and (4) as expected, direct effects are strongest in the focal units, indirect effects are strongest at the first order, and the decay of these effects is identifiable.

The statistical significance of the indirect effect of economic inactivity demonstrates that this property of a particular municipality's neighbors exerts a meaningful effect on homicide rates within that municipality. Further, these indirect effects follow the theoretically expected relationships more than direct effects. Specifically, economic inactivity in a focal unit's neighbors exerts a positive influence on violence in said focal unit. That is, as unemployment increases and more people fall out of the workforce in nearby communities, homicide rates increase in a focal unit. While this result contrasts with the finding regarding direct effects here and with that of Land et al. (1992) and Baller et al. (2001) regarding economic inactivity in the U.S., the result does follow the more conventional theoretical expectation in the literature on economic activity and crime. Moreover, the opposite relationship between direct and indirect effects suggests a social relativity process underlying the economics of violence.

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FIGURE 4: DIRECT (LEFT) AND INDIRECT (RIGHT) EFFECTS FOR POPULATION AND POPULATION DENSITY

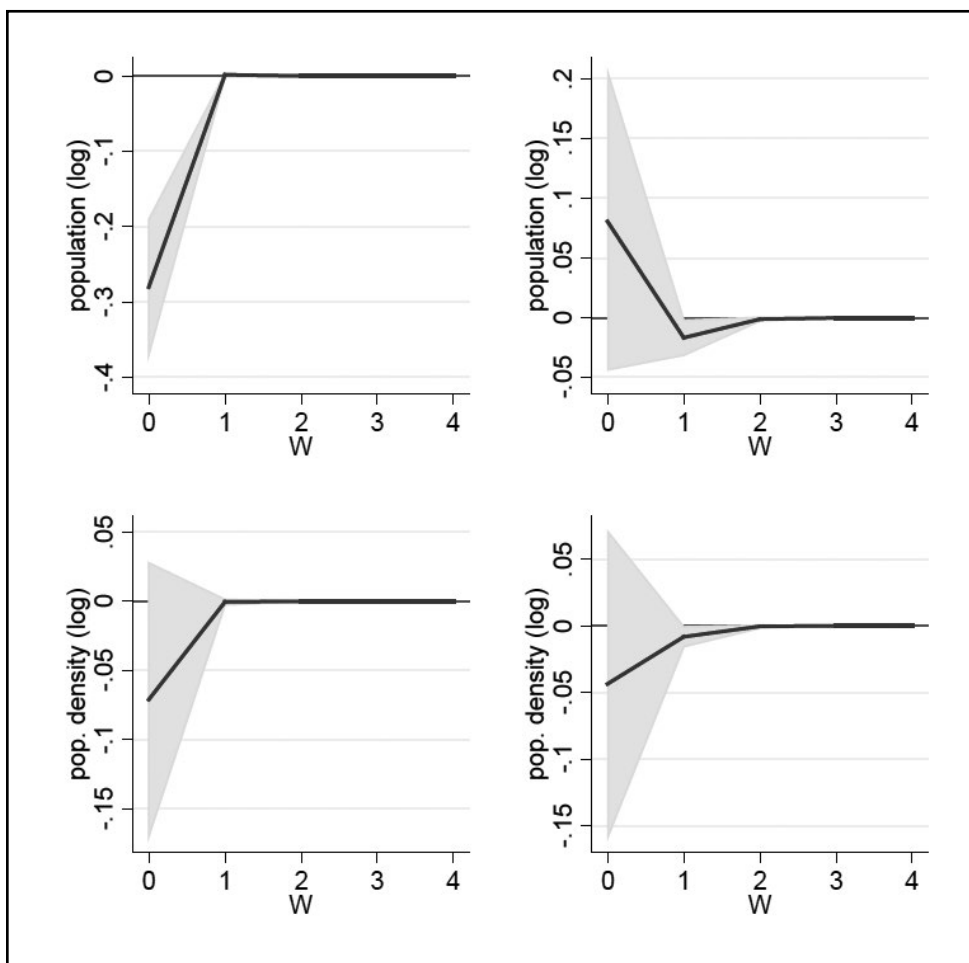


FIGURE 5: DIRECT AND INDIRECT EFFECTS OF AGE AND EDUCATION

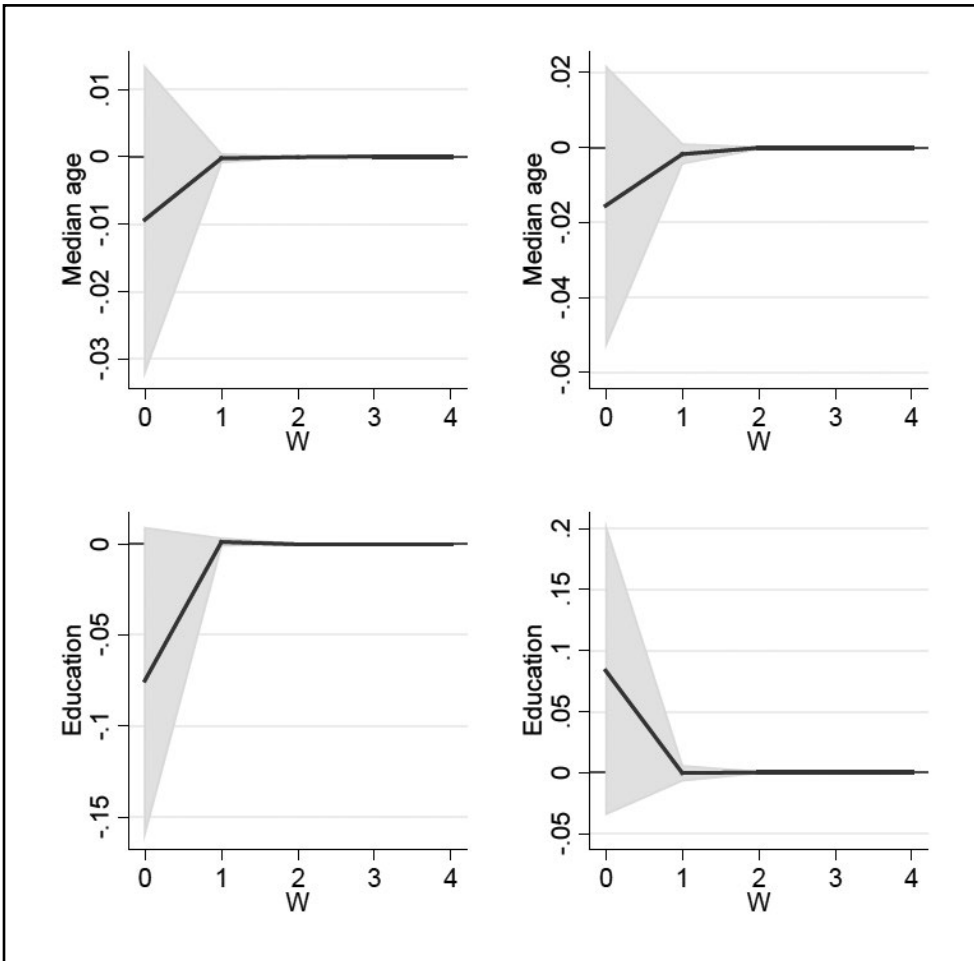




FIGURE 6: DIRECT AND INDIRECT EFFECTS OF INCOME AND UNEMPLOYMENT

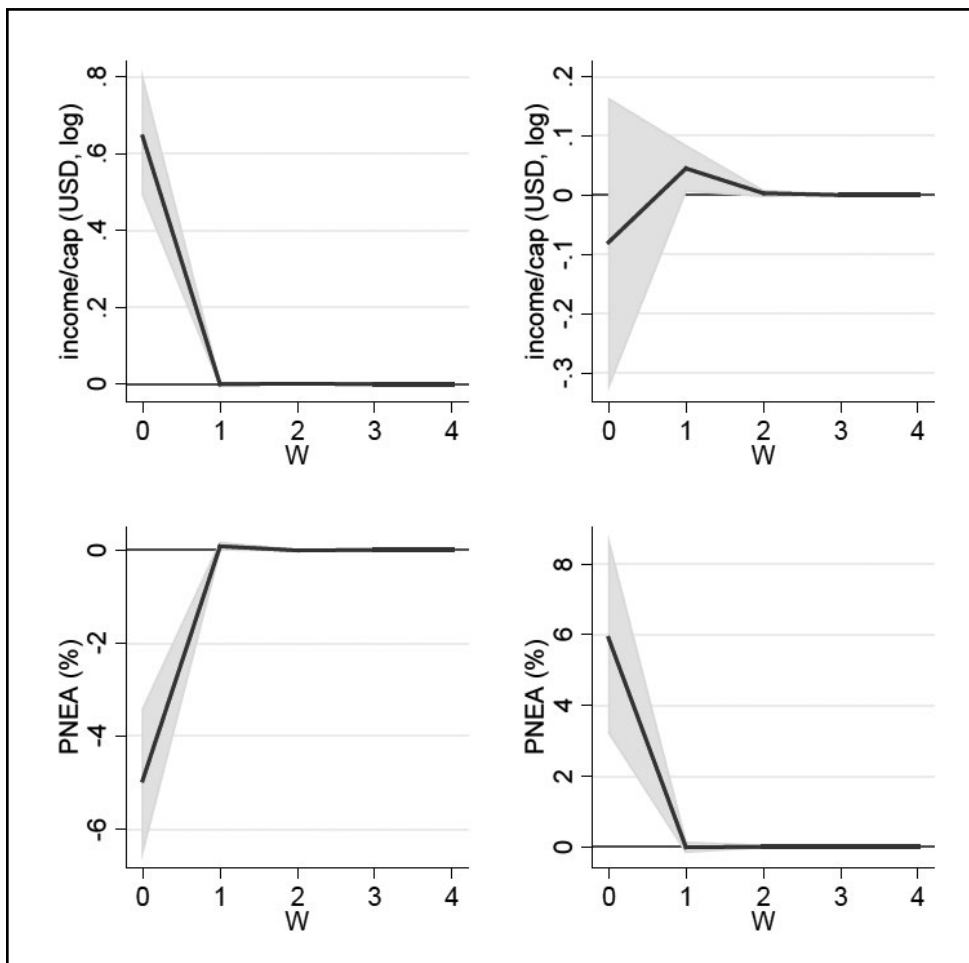


FIGURE 7: DIRECT AND INDIRECT EFFECTS OF INEQUALITY AND DIVORCE RATES

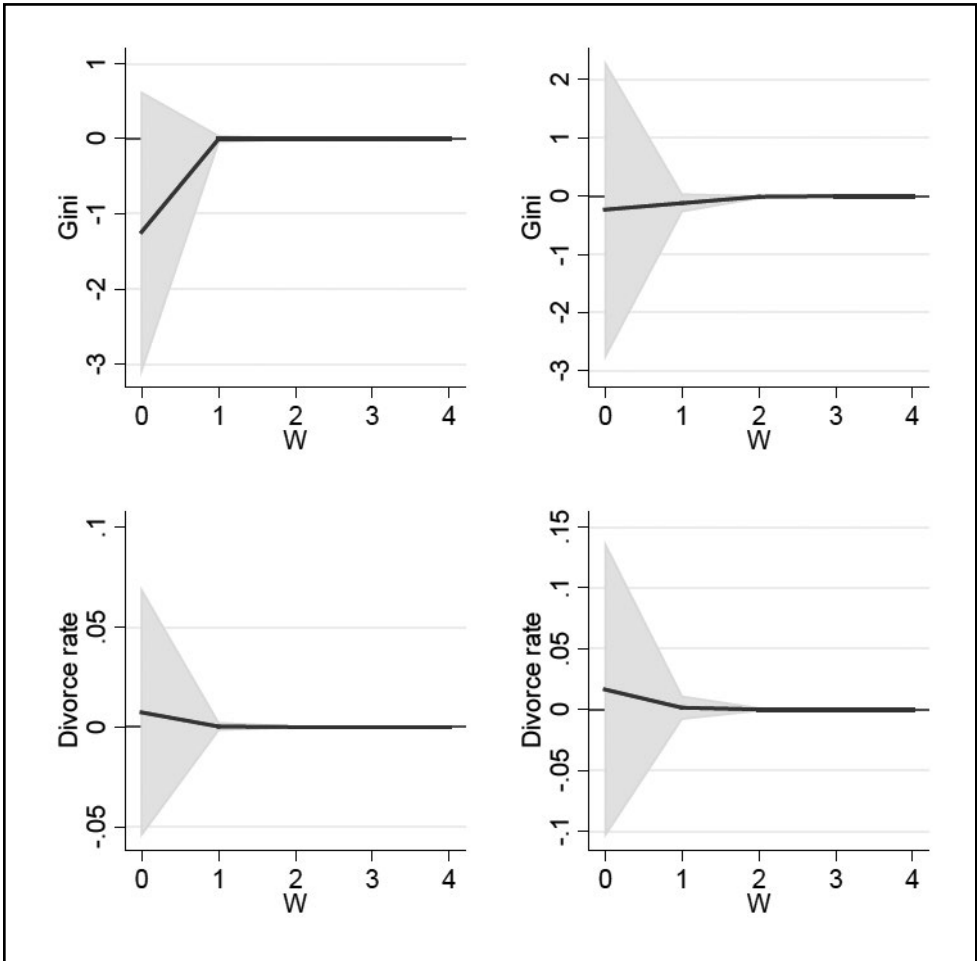


FIGURE 8: DIRECT AND INDIRECT EFFECTS OF TURNOVER AND PARTICIPATION

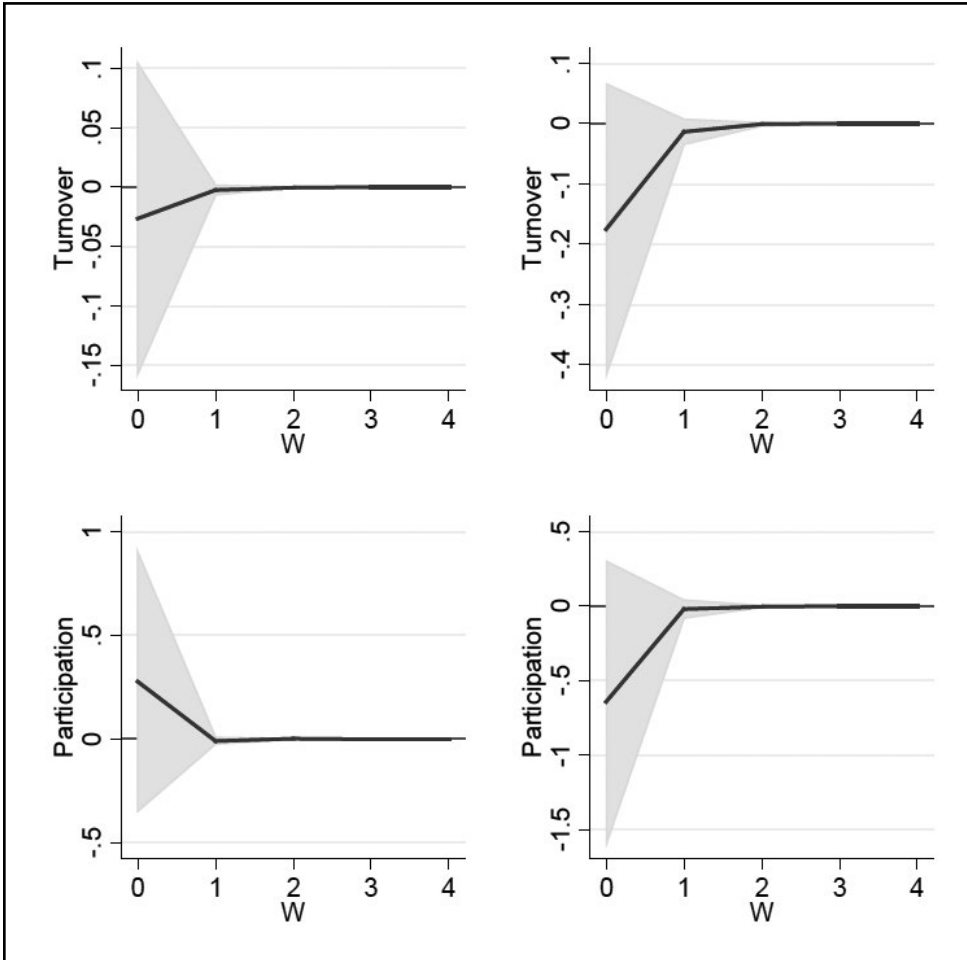
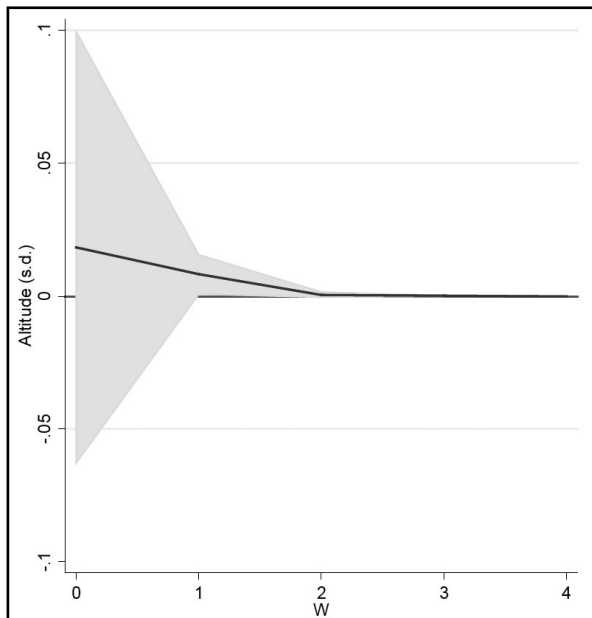
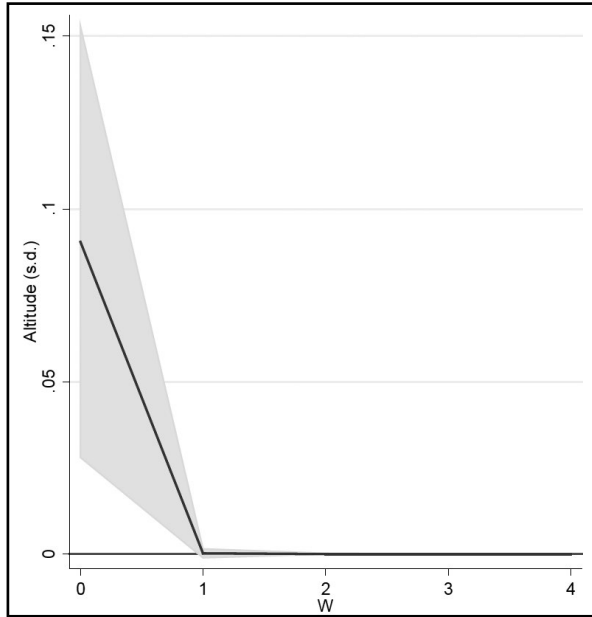


FIGURE 9: DIRECT AND INDIRECT EFFECTS OF UNEVEN TERRAIN (ALTITUDE, S.D., LOGGED)



## DISCUSSION

Examining the spatial dependence of homicide rates, this chapter offers a spatial Durbin analysis of violent crime across Mexico's municipalities that incorporates measures of components of community resilience. The methodological approach builds on existing sociological, political science, and demographic research to offer new insights regarding the origins of violence in a key neighbor to the U.S. and one of the largest democracies and markets in Latin America.

The analysis yields four principal findings. First, violence is not spatially random across Mexico's 2,455 municipalities. Spatial regimes of high and low violence exist throughout Mexico. Particularly compelling are spatial regimes of violence that straddle multiple state boundaries. For instance, a cluster of high homicide rates straddles the boundaries of three states in central Mexico—Jalisco, Nayarit, and Zacatecas—suggesting the need for state and federal authorities to coordinate and collaborate on social, economic, and law enforcement policies.

The cross-jurisdictional spatial regimes also highlight challenges to developing effective crime-reduction policies. That is, these intermediate regions of violence—above the municipal level, below the state level, and crossing state boundaries—demand cooperation, coordination, and collaboration among two or more states, and perhaps the federal government. This kind of inter-governmental policymaking is not always easy, especially when it involves both law enforcement and socioeconomic policy issues.

Second, a key finding highlights the spillover of the dependent variable. That is, an increase in the homicide rate in one municipality exerts an upward pressure on the homicide rate in neighboring municipalities. This spillover effect suggests that neighboring communities have a shared interest in reducing each other's levels of violence. Thus, again, neighboring communities should develop regional policies to reduce and prevent violence. The findings regarding the explanatory variables, especially education and economic inactivity, help us understand how to do this.

A key strength of the Durbin model is reflected in the rich interpretation that is possible with the decomposition of direct and indirect effects. Thus, a third finding relates to the interpretation of spillover or social relativity processes using the direct and indirect effects, and a fourth finding relates to the ability to detect the persistence, decay, or reversal of effects across higher orders of neighbors. The decomposed and partitioned direct and indirect effects run counter to much of the literature on homicide rates in the U.S.: population, population density, income, and inequality have an unexpected negative relationship with homicide. I interpret the population and density findings to suggest that highly populated areas have less violence than more rural, less populated areas. Further, this is primarily a direct effect, and the effect does not persist across higher orders of neighbors, suggesting the current homicide phenomenon in Mexico is occurring outside large cities,

but in adjoining areas not far from these cities. Regarding income, an increase in local, within-unit income is unexpectedly associated with higher levels of violence, but the partitioned indirect effects show that an income increase among the contiguous neighbors (reflected at  $W_0$ ) leads to a reduction in violence in the focal unit (significant at .10 level).<sup>10</sup> The opposite direction of the low-order direct and indirect effect suggest a social relativity process, namely, that a within-unit increase in income may draw offenders from surrounding communities. Thus, when income increases in surrounding communities, violence decreases in the central unit. Again, the policy implication is that neighboring communities have a shared interest in each other's economic growth. More specifically, neighboring communities have a mutual interest in growing economically, and in doing so at relatively the same rate in order to reduce perceived spatial inequalities.

The findings regarding economic inactivity (PNEA) support this inference. Indeed, the evidence is stronger with PNEA for a social relativity process in which murder is being committed in a central unit by those in surrounding units propelled by economic factors. Specifically, an increase in economic inactivity (e.g., unemployment) decreases local homicide rates. This much is consistent with findings in the U.S., where scholars argue that economic inactivity may constrain the circulation of people, thus affording fewer targets for violent crime (e.g., Baller et al.). However, the indirect effect of the first-order neighbor (reflected at  $W_0$ ) is in the opposite direction, significant, and of substantial magnitude. Again, this social relativity process suggests that deteriorating economic conditions in one's neighboring community generate higher violence in one's own community. Thus, neighboring communities should work to develop economically at similar rates.

Alongside these regional or neighborhood effects, education and uneven terrain are significant predictors of violence. Education has the expected negative relationship with violence, though this finding is only significant at the .10 level. Further, education only exerts its protective effect within a particular municipality, i.e., education only has a direct effect on violence and no indirect effects. Thus, the education-violence relationship is more of a local phenomenon, and the policy implication is that education-attainment programs can be narrowly targeted within municipalities. Finally, uneven terrain has the expected positive relationship with violence. This finding brings the armed conflict and criminology literatures into closer conversation, but as with the armed conflict research the policy implication is unclear. Is this variable capturing weak state capacity and enforcement? Or are rural, mountainous regions areas of higher drug production, and therefore, all else being equal, areas of more concentrated violence? The underlying mechanism is unclear, and deserves more attention in future research.

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<sup>10</sup> The direction of the effect reverses again at the next order of neighbors and is statistically significant, but the magnitude of this effect is much smaller.

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Alongside the limitations in interpreting the causal role of uneven terrain, other limitations that could be addressed by future research include incorporating a better measure of concentrated disadvantage, including poverty, more complete measures of social disorganization beyond divorce rates, and hierarchical models—including hierarchical spatial models—that use structural variables to estimate social dimensions of CR, and then use the social variables to estimate crime and violence (e.g., Sampson et al. 1997).

## CONCLUSIONS AND POLICY IMPLICATIONS

The following paragraphs briefly restate the main conclusions from the empirical analysis and identify key policy implications that flow from these conclusions. The final paragraph summarizes the policy implications taking all the findings into considerations.

**1. Homicide is distributed in a geographically non-random manner, and clusters of homicide straddle state boundaries.** There are neighborhoods or regions of communities within Mexico where homicide tends to cluster. Clusters of high homicide rates straddle the borders of three or more states in at least three regions of Mexico, highlighting the need for policy coordination across jurisdictional boundaries. This kind of coordination may be especially difficult where state or municipal authorities identify with different political parties, or where authorities have different policy priorities. Nonetheless, regional and even cross-jurisdictional collaboration must take place.

**2. Homicide in any one Mexican municipality is influenced by homicide in nearby municipalities.** In other words, the likelihood or risk of violence in any one community cannot be explained without reference to the likelihood of violence in nearby communities. This finding advocates a regional approach to violence prevention and reduction. That is, policies should not treat communities individually or as isolated from each other, since violence in one community affects violence in nearby communities.

**3. Educational attainment reduces the local likelihood of homicide.** Educational attainment—measured as the average years of education in a community—has a protective effect against violence. This effect is local, not regional, so education policies can be targeted at individual municipalities and do not necessarily need to be coordinated or uniform across municipalities.

**4. Economic inactivity reduces homicide locally but this effect is outweighed by the fact that economic inactivity in surrounding communities increases homicide.** Economic development projects that increase employment and labor force participation should be targeted at intermediate, regional levels above municipalities but below states, even if the set of connected municipalities making up the region straddles state boundaries. Again,

cross-jurisdictional coordination is necessary, in this case with regard to economic development policies.

**5. Uneven terrain increases the likelihood of homicide.** This finding does not have clear policy implications. On the one hand, policymakers cannot extract communities from mountainous areas. On the other hand, it remains unclear exactly why uneven terrain increases the likelihood of violence. Is it that rugged areas provide bases or hideouts for criminals, including organized crime, and therefore a larger concentration of criminal violence? This might seem to be the case in some parts of Mexico, e.g., Guerrero or Michoacán, as evidenced by the recent crisis of violence and “self-defense” groups in western Michoacán (e.g., Archibold 2014). Future research can contribute to clarifying the relationship between uneven terrain and violence in Mexico.

Taken together, the above findings and implications support a regional approach, and more specifically, a “local schools/regional economy” approach to violence reduction. This recommendation speaks to the increasing emphasis at the federal level on strategies to “build strong and resilient communities,” as articulated in Pillar IV of the Merida Initiative since 2011. Moreover, this recommendation helps identify concrete ways in which we can understand the relative importance of distinct components of the concept of CR in the specific context of the security crisis in Mexico, what “community resilience” means in violence prevention more generally, and how policies can be designed to achieve CR. Summing up the above findings and implications, violence-reduction policies should follow three guidelines.

First, policies and programs should generally not be targeted at individual communities in isolation. Rather, they should be aimed at regions of relevantly connected communities. In the case of Mexico, policies should be aimed at relevantly connected sets of municipalities. Thus, current funding competitions sponsored by the Mexican federal government via the Interior Ministry’s (Secretaría de Gobernación, Segob) National Program for Crime Prevention and Citizen Participation (Programa Nacional para la Prevención y Participación Ciudadana) that reward a range of individual municipal programs independently of each other are not the best use of resources. This critique is quite apart from any issues regarding transparency (*El Universal* 2013). Similar programs in the future should reward collaborative efforts among sets of neighboring municipalities. These inter-municipal collaborations should be rewarded even if the municipalities involved straddle state boundaries. Indeed, perhaps cross-jurisdictional collaborations that should be rewarded the most are the ones that can demonstrate how collaboration would help policymakers understand how to manage cross-jurisdictional challenges in developing policies for these neighborhoods of municipalities that straddle several state boundaries.

Second, policies aimed at increasing educational attainment—measured as the average years of education in the community—can be targeted locally. The



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evidence from the current study does not reveal any neighborhood effects of educational attainment, but improvements in local educational attainment have a protective effect. Thus, fomenting educational attainment can be done at the local level, and is a concrete way that scholars and policymakers can understand how to build community resilience to violence.

Third, policies aimed at economic development should have a regional focus. That is, complementing the first principle about the regional orientation of most violence-reduction policies (cf. education), efforts directed at increasing employment and economic activity more generally should be targeted at regions of relevantly connected municipalities. To be sure, economic development has been a feature of Mexico's federal anti-violence strategy, nominally at first but increasingly since 2010. Indeed, the current president famously avoids discussing security issues in favor of economic or energy topics. One indirect implication of the finding regarding economic development is that this topic can provide a bridge for discussing the prevention of violence while offering the cover of discussions about economic well-being. That is, regional economic development accomplishes violence reduction, but at that same time provides a diplomatic way for the Peña Nieto administration to address security without explicitly discussing it. However, as with other community-based programs, any economic strategy should not be directed at individual communities, treating them as if they were isolated or independent of each other. Funding and other competitions (e.g., prizes, fellowships, or recognition) should be directed primarily at policies or programs that recognize the interconnectedness of communities, and that seek to promote economic development among regions of relevantly connected municipalities. Combined, the local educational and regional economic policies constitute what I call a "local-schools/regional-economy" approach to violence prevention and reduction.

I imagine that these policy recommendations will be uncontroversial to some urban or regional planners, and perhaps even unsurprising. However, given the emphasis on formal institutional reforms to the law enforcement and the judicial sectors thus far, the neglect of the deep literatures in sociology and criminology that address why crime occurs in the first place is startling in places like Mexico. For instance, tens of millions of dollars have been invested in countless waves of police reform over the last three decades (e.g., Sabet 2012), and tens of millions more have been invested in a prominent criminal procedure reform since 2008 that is primarily geared toward redesigning the way the justice system operates—including judges, prosecutors, public defenders, and police (Ingram and Shirk 2012). Only passing attention has been given to the broader social and economic conditions that underlie why criminal behavior occurs in the first place, before people get involved in the justice system. Further, Pillar IV and Mexico's national program do not clarify the concrete ways in which CR, prevention, or participation will be achieved. Without clear, programmatic criteria and objectives, these projects risk being inefficient.

Moreover, without closer attention to the regional dynamics raised here, these projects risk being ineffective. The findings here suggest this new emphasis on the root, socioeconomic origins of crime and violence is on the right track and that policymakers should increasingly turn their attention to the social, political, and economic literatures addressing root causes of violence, but do so with a particular spatial process in mind for different policy areas, namely, the social relativity process underlying the opposing direct and indirect effects of economic inactivity, and the more territorially bounded, direct effects of education. In terms of national or international grant competitions or other opportunities for funding, the findings suggest funders should reward programs and policies addressing these regional and local dynamics, especially those programs and policies that include collaborative, cross-jurisdictional efforts to address regional, economic sources of violence like regional pockets of unemployment, low labor force participation, or other forms of economic inactivity alongside targeted policies to improve local educational attainment. In this regard, a particularly promising development is the creation of state-level comptrollers and inter-institutional commissions to coordinate among local, state, and federal authorities (*Milenio* 2013).

To be sure, these policy recommendations do not exclude other steps to improve justice institutions and continue with other efforts at institutional reform. Indeed, some concepts of CR include a broad range of inter-organizational interactions as part of the definition. That is, inter-organizational interactions—among public and private groups, formal and informal—sustain CR. However, just as social control and collective efficacy should be distinguished from forced control, i.e., efficacy “should not be equated with formal regulation or forced conformity by institutions such as the police and courts” (Sampson et al., 918), CR should also not be equated with formal justice reform. Rather, CR should be more closely associated with the “capacity of a group to regulate its members according to desired principles—to realize collective, as opposed to forced, goals” (Sampson et al., 918). Thus, building community resilience is a process that is analytically and operationally distinct from reforming justice institutions. In any case, it is reasonable to proceed on all fronts at once, with an “integral, holistic approach.”<sup>11</sup>

Lastly, any effort to build community resilience and prevent violence must have long time horizons and proceed with long-term commitments. This may be especially hard for politicians or policymakers who tend to observe short-term incentives generated by the electoral calendar. Still, “[b]uilding resilience requires an investment of time that should not be understated, and our ability to build resilience in the short term should not be oversold” (USAID 2012, 16; also Frankenberger et al., 10).

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11 Remarks by Ariel Moutsatsos, Embassy of Mexico, at “The State of Citizen Security in Mexico: The Peña Nieto Administration’s First Year in Review,” January 16, 2014, Wilson Center, Washington, D.C., <http://www.wilsoncenter.org/event/security-mexico-pena-nieto-administration-review>. (accessed Feb. 10, 2014).

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