

# **Revisiting the Urbanization-Violence Nexus: The Mediating Effect of Local Ethnic Diversity**

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**Abstract:** The worldwide trend of urbanization is becoming increasingly important for social stability. For many, urban concentration and rapid rural-urban migration are often considered factors that trigger violence and conflicts. The empirical evidence for this link, however, is often mixed. Some posit that intensified competition for limited resources and infrastructure in cities causes grievances and social unrest. Yet most quantitative analyses find either an undetermined or even a negative relationship between urbanization and violence. In this study, we argue that the effect of urbanization on violence is conditional on the level of local ethnic diversity. In ethnically homogenous areas, urbanization increases economic welfare and facilitates the provision of public goods and services, therefore lowering the chances of violence. In ethnically diverse areas, increased economic welfare by urbanization is often distributed along ethnic lines, which increases between-group grievances and chances of violence. Using a county-level dataset of ethnic violence in Xinjiang, China between 1997 and 2008, our empirical analysis confirms the theoretical expectation: urbanization decreases the chances of violence in counties with low ethnic diversity but increases chances of violence in those with high levels of ethnic diversity.

**Keywords:** Urbanization; ethnic diversity; violence; Xinjiang.

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## Introduction

Urbanization is often considered a key element to development because it is expected to promote industry and commerce, to achieve the economy of scale for private and public goods provisions, and eventually to lead to a significant improvement for human societies. The unprecedented pace of urbanization worldwide and its implications for sustainable development also raise concerns for the academia and the policy world. Notions such as “fragile cities” – that rapid urbanization will lead to an increased rate of violence – are widespread and influential (Hills 2004; Muggah 2012; Muggah and Savage 2012). For many, urban population concentration and rapid rural-urban migration are often considered factors that trigger violence and conflicts (Reuveny 2007; Raleigh 2015). However, the empirical evidence on the link between urbanization and conflict is often mixed. Some posit that an intensified competition for limited resources and infrastructure in cities causes grievances and social unrest. Yet most quantitative analyses find either an undetermined or even a negative relationship between urbanization and violence (Collier and Hoeffler 2004; Urdal 2005 and 2008; Buhaug and Urdal 2013; Fox and Bell 2016).

In this paper, we argue that the effect of urbanization on violence is conditioned by the nature of social structure under which urbanization takes place. This is because such underlying social structure affects wealth distribution, identity reconstruction, and the mode of collective action. For many societies undergoing urbanization in Asia and Africa, ethnicity is one of the most powerful ascriptive characteristics. In ethnically homogenous societies, urbanization increases economic welfare, therefore lowers grievances and chances of violence. In ethnically diverse societies, increased welfare by urbanization is often distributed along ethnic lines, which increases between-group grievances and chances of violence. Using a county-level data set of ethnic violence in Xinjiang, China between 1997 and 2008, our empirical analysis shows that the effect of urbanization on ethnic violence is indeed contingent on the level of local ethnic diversity: urbanization decreases the chances of violence in counties with low ethnic diversity, but it increases violence in those with high levels of ethnic diversity.

By extending a theory of ethnic diversity as a conditional factor between urbanization and violence, this study sheds lights on the urbanization and violence debate. Our focus on the mediating effect of ethnic diversity is an important step further in the study of urbanization and conflicts that needs to explore potential causal chains and mediating factors rather than assuming a simple linear relationship. In addition, it deepens our understanding of the dynamics of ethnic relations and unrest in Xinjiang, China. Xinjiang has drawn great attention from both the academia and the policy world in recent years due to persistent ethnic violence in the region and its importance in regional and global geopolitics. Population concentration and technology advancement often deepen and diffuse transnational ethno-nationalism, extremism, and even terrorism. Thus, the examination of the Xinjiang case regarding urbanization, ethnicity, and violence provides important policy implications concerning regional and global security.

### Urbanization, Ethnicity Diversity, and Conflict

**Unfolding the Process of Urbanization:** Since 2007 more than half of the world population have been living in urban areas. Global urbanization rate is projected to increase to 68% by 2050 (UN DESA 2018). This massive and irreversible change shapes the human society profoundly, particularly in the developing countries. According to recent data from the United Nations, the future increases in urban population are highly concentrated in a few countries, with India, China, and Nigeria being the top three countries (UN DESA 2018).

There are conceptual disagreements on how to define urban areas and urbanization. At the most basic level, an urban setting is defined as forming a core characteristic of a city

or town, including administrative demarcation, dense human habitation, separation from rural areas, as well a distinctive non-rural set of functions, such as commerce, manufacturing, centralized transportation, and housing facilities. Urbanization is a processual term, referring to a certain area shifting from rural to urban demographically and geographically. There are three driving forces of urbanization, including differences in fertility rate between urban and rural areas, rural-urban migration, and reclassification of rural land. Although urban-rural reproduction rate difference and reclassification of rural areas contribute significantly to urbanization, migration is the primary impetus (Buhaug and Urdal 2013). Rural-urban migration currently accounts for 40 to 60 percent of annual city growth in developing countries (Kahl 2006).

Population pressure in rural area and a modernization trend provide strong driving forces for an increasing share of urban population. However, extensive urbanization, especially in a low-income society context, may cause series of hardships for urban residents, including scarcity of housing, lack of job opportunities, insufficient sanitation, and poverty and poor health. At the same time, traditional rural networks among individuals are replaced by new forms of interactions which are often more temporary, transitory, and instrumental. The consequence of urbanization and how to manage a sustainable urbanization hold a central place in academic debates.

**The Urbanization-violence Nexus:** Urbanization is considered by some as a potential risk to security. The recent literature includes country case studies of Mexico (Cornelius 1969), Turkey (Sayari and Hoffman 1994), South Africa and Rwanda (Percival and Homer-Dixon 1996 and 1998), Kenya (Kahl 2006), and Indonesia (Østby et al. 2011). Huntington argues in his Clash of Civilization thesis that the political support for Islamist movements received little support from rural areas; the radicalization of Islamic movements in the 1970s and 1980s was the result of rapid urbanization in the Islamic World (Huntington 1996: 111-113). Massing of population surplus in urban areas in developing countries is viewed as a primary structural distortion (Walton and Ragin 1990). Goldstone (2002) contends that over-urbanization relative to economic growth, income, and employment can increase the chance of political turbulence.

Existing theories posit several causal mechanisms regarding why urbanization leads to violence. First, rapid urban growth usually goes together with an enlarged disparity between rural and urban areas, which endangers social stability for both areas. Urbanization substantially centralizes wealth and opportunity distribution, which can intensify competition among social groups as they are eager to control vital resources in cities (Schulz 2015). Urban poverty expands as the population and geographical scale of cities enlarges. At the same time, the resilience of self-dependent natural economy often disappears. Migrants from rural areas often hold an expectation to contribute to the urban economy, and thus, to share the wealth at the same time. Nevertheless, this expectation can sometimes be only a wishful thinking. Slums packed with poor rural-urban migrants are found in almost every developing country, for instance, in Orangi Town in Karachi, Pakistan with a population of 2,400,000 and in Neza, Mexico with a population of 1,200,000.<sup>1</sup> Besides the spread of poverty in urban area, competition and inequality are more visible in urban settings. Rural-urban migrants are

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<sup>1</sup> “The World’s Largest Slums: Dharavi, Kibera, Khayelitsha & Neza,” at <https://www.habitatforhumanity.org.uk/blog/2017/12/the-worlds-largest-slums-dharavi-kibera-khayelitsha-neza/>, accessed on March 2, 2020.

more likely to be aware of their socioeconomic marginalization and relative deprivation due to the comparison with privileged city residents and elites.<sup>2</sup>

Second, in addition to the above-mentioned factors giving rise to an increasing urban-rural divide, urban poverty, and grievances, migrants might have difficulties to adjust socially and psychologically in the new environment, leading to a collapse of social norm and radicalization of identity (Cornelius 1969; Moser and Rodgers 2005). For instance, during the 1970s, the *gecekondu*s created in districts around the sprawling metropolises in Turkey became a large recruitment pool for terrorist groups, including various leftist, rightist, and Kurdish extremists (Taw and Hoffman 1995).

Finally, urbanization also helps coordination for uprisings. Geographical concentration and modern communication technologies facilitate the mobilization of financial and personnel resources within larger and denser social networks in cities than in scattered rural areas (Toft 2003). Furthermore, cityward migrants are usually experienced in sharing information about jobs and in supporting each other. Governments, as outsiders of their networks, often lack local information to contain violence at the first place.

While various studies posit that rapid urbanization leads to social unrest and violence, most quantitative studies find mixed evidence and even sometimes reveal an opposite relationship. For instance, Buhaug and Urdal (2013) find no evidence to associate the risk of urban social disorder with urban growth. Interestingly, only looking at the period of 1990 to 2000, Urdal (2005) shows that high urban population growth is linked to lower conflict risk. Urdal (2008) also finds that high urban population growth was associated with a lower probability of traditional armed conflict in a subnational study of India. Fox and Bell (2016) present evidence that a country's level of urbanization is negatively associated with its protest incidence. Elsewhere, Collier and Hoeffler's study on civil war suggests that low urbanization may inhibit government capacity. Interestingly, they find that urbanization rate is lower prior to war than prior to peace episodes (Collier and Hoeffler 2004). State control is underlined as the central explanation for the reduced risk of conflict in urban areas.

More generally, it is not difficult to come up with causal mechanisms to explain why urbanization can help to reduce conflicts. First, urbanization has been a driving force for economic efficiency, poverty alleviation, and development. In a developing country context, on average, urban dwellers are wealthier, more educated, closer to job and business opportunities and public services than rural residents. Higher income and living standards should increase the opportunity cost of engaging in violence. Moreover, thanks to population concentration, technology innovation, economy of scale, and abundance of tax bases, governments in urban areas are more efficient in providing public goods and to maintain social stability (UN 2018: 3).

To explain such mixed empirical findings, series of studies differentiate the effect of urbanization on stability by scope conditions. For example, by examining a sample of 70 less developed countries in 1981-1989, Auvinen (1997) finds that the degree of urbanization is conducive to political protest but is not robustly related to rebellion and even decreases the risk of irregular executive transfer. Esty et al. (1999) show that only in a scenario of "out of balance" between urbanization and economic development level could urbanization lead to higher political risks. Schulz (2015) disaggregates the concept of urbanization by the level of urban concentration. He finds that metropolisation – a high relative concentration of urban population – can increase the risk of governmental conflict. Finally, even though Buhaug and Urdal (2013) find population growth in cities and urban disorder to be causally unrelated,

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<sup>2</sup> A large share of slum dwellers in population, usually young and unemployed, can be susceptible to recruitment by gangs and rebel groups.

they show that economic shock works as a mediating factor that shape the relationship between urbanization and the risk of lethal events.

**Bringing Ethnic Diversity Back In:** Given all the potential causal mechanisms connecting urbanization to violence – some of which are thought to increase violence while others to decrease chances of conflicts – the mixed empirical results might look less puzzling. To advance our understanding of the relationship between urbanization and conflict, it is important to consider under what conditions some mechanisms are more likely to be strengthened while others to be weakened. In other words, not all mechanisms work equally for every society going through the urbanization process. What are some of the most important factors that might condition the effects of urbanization on violence? In this study, we focus on the role of ethnic diversity.

Indeed, several past studies have discussed the importance of ethnicity in urbanization (Toft 2003; Hills 2004; Green 2013; Schulz 2015; Raleigh 2015; Fox and Bell 2016). In many Asian and African countries, the early stage of urbanization during the colonial period was often a process of opportunity distribution along ethnic lines. The disparity between rural and urban areas and the struggle over the control of cities among social groups cannot be separated from ethnic divisions. As Horowitz (2000) points out, location, population pressure, self-selection of certain groups for migration, education and employment, and colonial authorities' policies gave rise to a differential modernization process which dichotomizes ethnic groups into advanced ones and backward ones. Areas around colonial capitals, railways, ports, or resource endowments generated the very first batch of cities. Ethnic groups located nearby, also more likely to receive missionary education, became the very first city residents. An urban-rural ethnicity dichotomy is often important to understand the causes and conditions of violence.

This overlap between an urban-rural dichotomy and ethnic division often continued after decolonization. Bates (1974) established the necessity to examine the role of ethnicity in modernization. For instance, modernization promotes forces to generate and mobilize powerful ethnic groupings.<sup>3</sup> In some societies, economy is segmented along ethnic lines. In societies and economies dominated by a certain language and modern skills, the cityward migrants' prospect depends on how similar they are to the dominant groups living in cities. Language, religion, and culture differences often are among obstacles to participate in the mainstream economy. On the other hand, the disadvantaged ethnic groups rely on their traditional kinship to share information and opportunities. Social capital is highly determined by the ethnic ascriptive feature of an individual. Therefore, during urbanization, the combination of common currency of gratification and opportunity distribution along ethnic lines can intensify competition and relative deprivation between ethnic groups and increase the possibility of identity radicalization in lieu of social integration for the marginalized groups.

Indeed, the salience of ethnic divide in economic welfare and opportunities is one of the two major reasons why we think ethnic diversity is a key mediating factor between urbanization and violence in many developing countries. Urbanization often increases the overall economic welfare and facilitates government provisions of goods and services, which should lower overall grievances and increase average income and therefore the opportunity cost of engaging in violence. However, in ethnic diverse societies, such increased welfare and benefits might be unevenly distributed along ethnic lines (Eifert, Miguel, and Posner 2010). This further increases inter-ethnic inequalities and grievances, therefore chances of

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<sup>3</sup> Social anthropological studies on urban ethnicity often stresses two main factors: intergroup competition and intragroup solidarity (Cohen 2014).

revolts by the disadvantaged groups. The opportunity cost of violence is particularly low for marginalized minorities with a bleak prospect.

The second reason to consider ethnic diversity as a conditional factor has to do with the fact ethnic networks help coordination and collective action. Geographically, many migrants that lack stable income sources and job opportunities choose to live with their own in ethnic enclaves.<sup>4</sup> The process of migration contains various forms of cooperation based on traditional connections including kinships, fictive kinships, common originality and ethnicity, among which ethnicity often can reach further than other factors as a connection instrument. Ethnic enclaves provide protected access to job opportunities, markets, informal sources of credit, and business information; they also cultivate intragroup networks and entrepreneurial opportunities. At the same time, language differences can also make government control of such areas more difficult given an asymmetric information problem. For instance, a recent study on Kibera slum in Nairobi shows the evidence of ethnic patronage in the determination of rental prices and investment. Kibera has experienced many episodes of inter-ethnic violence (Marx, Stoker, and Suri 2019).

In sum, we expect that in ethnically homogenous areas, the benefits of urbanization – increased wealth and job opportunities as well as better provisions of public goods and services – should lead to a decreased risk of violence. In ethnically diverse areas, urbanization can lead to an increased risk of violence because first, an ethnic divide in the distribution of welfare and opportunities increases grievances of the disadvantaged groups and second, ethnic networks help such groups with coordination and collective action for violence.

### **The Case of Xinjiang, China**

Although the importance of ethnicity in urbanization has been discussed in past literature,<sup>5</sup> as far as we know, no study to date has systematically tested whether and how the interactive effect between ethnic diversity and urbanization affects violence and conflicts. In this paper, we choose to adopt a subnational level analysis instead of one based on cross-country data. This is because, first, the most relevant variables for our study, such as violent events, speed of urbanization, and ethnic diversity, often display significant within-country variation that cannot be captured by country-level measures. Moreover, cross-country analysis often suffers more from unobserved heterogeneities between units of analysis. The assumption here, which we think is often reasonable, is that cross-country unobserved heterogeneity (e.g., between India and China) is often higher than within-country unobserved heterogeneity (e.g., between two Indian states or between two Chinese provinces). Of course, the tradeoff is that our within-country analysis lacks the level of external validity of a typical cross-country analysis.

This study focuses on the case of Xinjiang in China, which has been undergoing a massive urbanization process and is also a region with a significant local variation in ethnicity diversity. China is one of the top three countries that contribute to a rapid growth of urban population worldwide. Its urbanization mainly took place in past 40 years, from a country level urbanization rate of 17.9 % in 1978 (the beginning of the marketization reform) to 60.6% at the end of 2019. With urbanization, intergroup contacts became more common and frequent. The 2010 Chinese census reveals that in 1982 only 18 out of the 56 ethnic

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<sup>4</sup> In ethnically divided societies, the distribution of urban population is often along ethnic lines with newly arrived ethnic groups often concentrated in ghettos with an informal economy and in absence of rule of law and other formal state institutions.

<sup>5</sup> In Schultz (2015), ethnic fractionalization is added as a control variable. However, the author does not have a discussion on results regarding ethnic fractionalization.

groups distributed in all provinces. This number increased to 43 out of 56 in 2010. According to an official report in 2015, 16.5% of ethnic minority population are migrants.<sup>6</sup> The mode of minority migration is significantly different from that of the Han majority: more than half (53%) of the minority migration are driven by family and relative reunion, compared to the case of the Han majority with only 26%. This also confirms our previous discussion that ethnic minorities rely more on traditional networks in the urbanization process (Su 2015). Xinjiang's urbanization is driven by cityward minority migration from its rural areas, Han in-migration from other provinces, and reclassification of the suburban areas (usually minority inhabited villages).<sup>7</sup>

We choose Xinjiang for several other considerations. First, Xinjiang represents a typical case to examine urbanization's impact in a multi-ethnic context. The Xinjiang Uyghur Autonomous Region is China's largest provincial jurisdiction by the size of its territory: Uyghur and Han are 47.7% and 32.3% of the provincial population.<sup>8</sup> In contrast, population in most other regions in China is highly homogenous in ethnic composition. According to Alesina and colleagues, China's ethnic fractionalization index is 0.15 – this captures the probability that two randomly selected individuals do not belong to the same ethnic group – ranking 36<sup>th</sup> out of the 190 countries with valid data (Alesina et al. 2003). Our data show that averaged county-level fractionalization index in Xinjiang is 0.39.

Second, Xinjiang has grown in importance in national security due to several recent massive ethnic violent incidents. Recent studies often focus on social stratification and inequality (Wu and Song 2014; Tang et al. 2016). Existing research on the effect of urbanization has been limited to a few case studies (Zang 2007). The most notorious July 5<sup>th</sup> Event in 2009 was triggered by a mass violent fight between Uyghur and Han migrant workers in a toy manufacturer in Guangdong province. Under the current institution of regional ethnic autonomy, outside ethnic autonomous jurisdictions, most citizens and civil servants lack experience in dealing with ethnic issues. Urbanization, and frequent economic and cultural exchanges among ethnic groups as a function of urbanization, pose a challenge to China's intergroups relationship and long-term stability. Systemic empirical research on the intricate relationship between urbanization, ethnic diversity, and violence has the potential to provide policy guidance to increase security and social stability.

Third, Xinjiang also has important policy implications for regional and global security. The persistent violence in Xinjiang often takes the form of ethnic riots and antigovernmental attacks, some in name of a secessionist movement. As a peripheral region, Xinjiang comprises one fourth of China's territory and is bordering eight countries in Central Asia including Afghanistan and Pakistan. Population concentration and the advancement in communication technologies in urban areas help the diffusion of secessionism and religious extremism from abroad. Both Chinese and U.S. government authorities worry about growing transnational ties between Uyghur militants in Xinjiang and al Qaeda-oriented terrorists in South and Central Asia and the Middle East.<sup>9</sup> Understanding what drives ethnic violence in Xinjiang helps provide leverage on the global pictures of jihadist movements.

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<sup>6</sup> The amount of migrant population reached to the highest level of 247 million in 2015. Report on China's migrant Population Development 2018: page 5.

<sup>7</sup> Wu and Song (2014) also find that ethnic earning inequality varies across economic sectors in Xinjiang.

<sup>8</sup> 2018 Xinjiang Statistical Yearbook.

<sup>9</sup> For instance, during a recent visit to China, U.S. National Security Advisor Susan Rice alleged that Chinese Uyghurs from Xinjiang had travelled to Iraq and Syria to fight in the ranks of the Islamic State (ISIS) terrorist insurgency (Page 2014).

## Empirical Analysis

**Ethnic Violence in Xinjiang:** The Ethnic Violence in China (EVC) dataset includes events at the county-year level between 1990 and 2005 in Xinjiang (Cao et al. 2018a). We extend this data set to 2008. We choose not to extending beyond 2008 because the July 5<sup>th</sup> Event took place in 2009, which changed the dynamics of ethnic violence in the region. The July 5<sup>th</sup> Event were a series of violent riots over several days that broke out on the 5th of July 2009 in Ürümqi, the capital city of Xinjiang. After this event, various policies have been implemented by the provincial and central governments to prevent future violence.

We consider ethnic violence as the intentional execution of violent acts, perpetrated by individuals or groups, with political motivations. We only include violent events that at least involved one ethnic minority group. We do not include violent events that occur between members of the ethnic Han majority or events occurring between Han civilians and the government. Various types of events are included such as bombing, assassination, riot, arson, and armed attacks. Because the earliest year for which we have urbanization data is 1996 and we lag our independent variables by a year, our regression analysis covers 1997-2008. There were 132 ethnic violent events between 1997 and 2008. Figure 1 shows the spatial distribution of the cumulated number of events between 1997 and 2008 for each county.

Figure 1 here.

Ethnic violent events were unevenly distributed spatially in Xinjiang. Many counties in east, southeast, and northeast experienced no violence at all. On the other hand, the Hetian City of the Hetian prefecture – the darkest polygon, southwest of the region – experienced 16 ethnic violent events during this 12-year period. This is closely followed by the Yining county of the Yili prefecture (northwest of the region) with 11 events. The provincial capital, Urumqi, experienced 9 events. At the prefecture level, Kashgar – southwest of the region, to the west of the Hentian prefecture – was the hotspot: three county level administrative units – Kashgar City, Yecheng, and Zepu – all experienced 8 ethnic violent events.

For the regression analysis, we use a binary dependent variable, that is, whether there were any ethnic violent events for a county-year.<sup>10</sup> 92 county-years ever experienced violence during this time-period. Xinjiang has 15 prefectures that are divided into about 102 county units. Between 1997 and 2008, the average chance of a county-year to experience any violence is relatively low, at about 0.08.

**Measuring Urbanization and Ethnic Diversity:** To test our theoretical expectation, that is, the effect of urbanization on ethnic violence is conditional on the level of ethnic diversity, we first create a variable that captures the *intensity* of urbanization:  $\Delta urban (\%)_{t-1, t}$ . This is the *change* in the percentage of urban population (among total population) for a given county between year  $t$  and  $t-1$ ; higher values indicate more drastic urbanization. Since this is a variable measuring the change in the level of urbanization, we also control for past year's level of urbanization,  $urban (\%)_{t-1}$ . In our data, for example, for the Aketao county of the Kezilesuk prefecture, the percentage of urban population among total population was 19.78

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<sup>10</sup> The main reason is the concern that multiple events recorded for the same county and during the same year might be part of a larger event. For instance, we've coded cases in which ethnic tensions triggered one violent attack in one location of a county and then a similar attack happened in another location of the county a day or two later. Based on the description of these events, we suspect that they were part of a spatial diffusion process of the same event. In unreported robustness checks, we obtain very similar results using the number of events as the dependent variable. Regression table available upon request.

and 20.05 in 2007 and 2008. The value of our variable  $\Delta \text{urban} (\%)_{t-1, t}$  for Aketao-2008 is therefore the difference between 20.05 and 19.78, that is, 0.27; past year's level of urbanization,  $\text{urban} (\%)_{t-1}$  is 19.78 accordingly.

To measure county-year level ethnic diversity, we construct an ethnic fractionalization index following Fearon and Laitin (2003) and a polarization indicator following Montalvo and Reynal-Querol (2005). More specifically, fractionalization =  $\sum_{i=1}^N \pi_i (1 - \pi_i)$  and polarization =  $4 \sum_{i=1}^N \pi_i^2 (1 - \pi_i)$ .  $\pi_i$  is the percentage of people who belong to ethnic group  $i$  in a given county-year;  $N$  is the number of ethnic groups in that county-year. Intuitively, the former captures the probability that two randomly selected individuals do not belong to the same ethnic group; the latter captures how close the distribution of ethnic groups is to the bipolar distribution that represents the highest level of polarization.<sup>11</sup> For both measures, higher values indicates higher levels of ethnic fractionalization and polarization. To mitigate the reverse causality concern, that is, conflicts affect levels of ethnic diversity, we lag both measures by a year using fractionalization <sub>$t-1$</sub>  and polarization <sub>$t-1$</sub> . These two measures are highly correlated, at a 0.9 level.

**Control Variables:** In addition to measuring urbanization by the urban-rural distribution of population ( $\Delta \text{urban} (\%)_{t-1, t}$ ), we also include a dummy variable that captures the effects of old city re-development projects. This is something highly significant in the areas around Kashgar, Khotan, and Aksu (all prefecture cities) which saw such intense and disruptive projects since the beginning of the Great Western Development Campaign (begun in 2000) (Cappelletti 2015). Such redevelopment projects often destroy cultural heritage and create grievances among local population. Beller-Hann (2014) discusses the case of Qumul in which urbanization in the old city has affected communal sacra, local culture, and local history, and involves complex forms of demolition and (re-)construction. The variable *Akesu, Hetian, Kashi*<sub>2000-2008</sub> is a dummy variable that takes the value of 1 if a county belongs to one of the three aforementioned prefectures (Akesu, Hetian, and Kashi) often mentioned in the press for old city re-development projects and the year of the observation is in the 2000-2008 period (that is, since the Great Western Development campaign started in 2000).

We control for county-level population density because violence often is more likely to happen in areas with high population (Raleigh and Hegre 2009). Chances of ethnic conflict also depend on the size of local minority groups – in the context of Xinjiang, many violent events involved the Uyghur group, which is also the largest minority group in the region. We therefore control the percentage of Uyghur population in a county-year. We include the adjusted GDP per capita based on 1990 Xinjiang price index to control for the impact of poverty.<sup>12</sup> To control for the role of local governments, we calculate the ratio of local government expenditure to local GDP.<sup>13</sup> All four variables are time-variant. We lag all time-variant independent variables by one year in this study.

We also include time-invariant variables (in logit but not in linear probability models because the latter includes county-fixed effects). The reach of state declines as one moves away from the center into the peripheral regions. Given the large size of Xinjiang – one sixth of the Chinese territory, the distance to the provincial capital, Urumqi, may not fully capture state reach. Therefore, we also include the distance to the prefectural capital. Past studies suggest that state boundaries offer exits for insurgents to find sanctuaries in neighboring

<sup>11</sup> County-year data of urban and rural population and ethnic composition is from the Statistical Yearbook of Xinjiang, 1990-2008.

<sup>12</sup> Data for population density, Uyghur %, and GDP per capita are from Qiao (2005).

<sup>13</sup> Data is from the National Prefecture and County Finance Statistics Compendium, 1994–2008. See Liu (2019) for a study of the effect of government spending on ethnic violence.

countries (Buhaug and Rød 2006). We therefore include a dummy variable for border counties.

The uneven redistribution of natural resource bounties often exacerbates the grievances of local minorities (Collier and Hoeffler 2004; Hong and Yang 2020). We collected county-level data regarding oilfields in Xinjiang (General Chronicles of Xinjiang: Oil Industry 1999). We code this variable as 1 when there was at least one oilfield in a county-year; 0 otherwise. Note that there is no temporal variation in this variable after 1995, which makes it a time-invariant variable for our analysis of the 1997-2008 panel.

Furthermore, the Xinjiang Production and Construction Corps (XPCC) is a unique organization that combines functions of government, military and production. It has a hierarchical structure composed of 14 divisions and 175 regiments and these administrative domains of XPCC spread across the whole area of Xinjiang. XPCC can serve as an instrument of government control in the region (McNamee and Zhang 2019). We include a dummy variable to indicate whether there was a XPCC administrative unit in a county: this is also a time-invariant variable.<sup>14</sup>

Finally, spatial dependence between units of observations often exists in conflict data. For a binary dependent variable, it can be computationally challenging to address this issue. We therefore construct a temporally lagged (by one year) spatial lag of the dependent variable (spatial lag<sub>*t*-1</sub>). To account for temporal dependence, we add cubic polynomial approximation ( $t, t^2, t^3$ ):  $t$  is the number of years since the last violent event for a given county-year.<sup>15</sup> Table A-1 and A-2 of the online appendix present descriptive and correlation statistics.

**Main Empirical Findings:** Table 1 presents our main results, estimated by logit regressions with year and prefecture fixed effects, with standard errors clustered at the county level. Here, we present four model specifications: the first and the second use ethnic fractionalization (fractionalization<sub>*t*-1</sub>) to capture county level ethnic diversity; the third and the fourth use ethnic polarization (polarization<sub>*t*-1</sub>). The difference between the first/third model and the second/fourth model is whether we include the spatial lag of the dependent variable (spatial lag<sub>*t*-1</sub>) and controls for temporal dependence ( $t, t^2, t^3$ ); though including these spatial and temporal controls makes no difference regarding the estimates of other variables' statistical associations with the dependent variable.

Across all four model specifications, the interaction terms ( $\Delta$  urban pop (%)<sub>*t*-1, *t* × fractionalization<sub>*t*-1</sub> and  $\Delta$  urban pop (%)<sub>*t*-1, *t* × polarization<sub>*t*-1</sub>) between the intensity of urbanization and measures of ethnic diversity are the ones that we use to test whether and how ethnic diversity mediates the effect of urbanization. In all model specifications, they are positive and statistically significant, suggesting that local ethnic diversity, measured either by fractionalization or polarization, indeed condition the effect of urbanization on local ethnic violence.</sub></sub>

Table 1 here

To illustrate the conditional effect of the local ethnic diversity variables, we use the first model specification in Table 1 and simulate and plot the substantive, interactive effect in

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<sup>14</sup> The full list is taken from the following link <http://baike.baidu.com/view/38528.htm>, accessed on September 21, 2016.

<sup>15</sup> We use 1990 as the starting year to calculate years since last ethnic violent event because we do not have systematic data on ethnic violence before 1990 (Cao et al. 2018a). However, using other years (e.g., 1995 and 1997) as the starting year do not change our results.

Figure 2.<sup>16</sup> More specifically, for a given value of ethnic fractionalization (on x-axis), we simulate and calculate the *change* in probability of ethnic violence as a function of one standard deviation increase in the change in urbanization rate variable (that is, in  $\Delta$  urban pop (%)  $_{t-1,t}$ ) from its mean, holding other variables at their mean levels. The simulated changes in probabilities are summarized by its 90% confidence interval using a vertical, gray line in Figure 2; we also plot the mean value of the simulated changes in probabilities by a black dot. We repeat this simulation exercise from the minimum value of the ethnic fractionalization variable to its maximum value – that is, from 0.01 to 0.75 based on the actual range of the fractionalization  $_{t-1}$  variable – by an interval of 0.01. We also plot a gray histogram for the distribution of the ethnic fractionalization variable in the background.

Figure 2 here

Figure 2 shows that when ethnic fractionalization is low, an increase of one standard deviation in the change in urbanization rate variable ( $\Delta$  urban pop (%)  $_{t-1,t}$ ) lowers the chances of conflicts. This suggests that in areas of Xinjiang with relatively low levels of ethnic fractionalization, an increase in the level of urbanization is associated with a reduced chance of violence. This fits well with our theoretical expectation: in ethnically more homogenous areas, the conflict dampening effects of urbanization dominate as urbanization brings in higher average income, more job opportunities, and better access to public services; these areas do not suffer substantially from the negative impacts of urbanization often found in ethnically diverse areas such as increased inter-ethnic inequalities and grievances.

Regarding the substantive effect, when the value of the ethnic fractionalization variable is close to zero – an ethnically homogenous area – the mean value of the simulated changes in probabilities is around  $-0.02$ ; it suggests that a one standard deviation increase in the  $\Delta$  urban pop (%)  $_{t-1,t}$  variable is associated with a decrease in probability of violence by about 0.02: this is no small change given the mean of the dependent variable is only 0.08 (Table 1);  $-0.02$  here therefore translates into a 25% decrease from the average chance of ethnic violence in a Xinjiang county between 1997 and 2008.

When ethnic fractionalization reaches the level around 0.25 – that is, there is a 0.25 probability that two randomly selected individuals do not belong to the same group, the 90% confidence intervals start to overlap with zero, suggesting statistically insignificant effect. Indeed, the average predicted change in probability turns positive when the level of fractionalization reaches around 0.45; though the associated 90% confidence intervals often include zero after this point. This makes sense because it is very likely that when the level of ethnic diversity reaches a certain level, the conflict dampening and conflict increasing impacts of urbanization start to cancel each other out.

Finally, at the higher end of the ethnic fractionalization variable (x-axis) – a little before the fractionalization  $_{t-1}$  variable reaches 0.7 and till it reaches its highest value of 0.75, the associated 90% confidence intervals do not include zero; with mean values of the simulated changes in probabilities estimated between 0.02 and 0.05 (y-axis) during this range, it suggests that for counties with ethnic fractionalization of close to 0.7 and higher, a one standard deviation increase in the change in urbanization rate variable is associated with an increase in the probability of ethnic violence by at least 0.02: again, this is not a small effect

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<sup>16</sup> Simulations and plots using model specification 3 and 4 with the ethnic polarization variable are very similar to Figure 2. We do not present them here because of space limit: they are available from the authors upon request.

given the mean of the dependent variable is only 0.08; 0.02 here translates into a 25% increase from the average chance of ethnic violence in a county between 1997 and 2008.

**Effects Associated with Control Variables:** Now we turn our attention to the effects of the control variables. First, in addition to the intensity of urbanization ( $\Delta$  urban pop (%)  $_{t-1,t}$ ) and its interactions with variables measuring local ethnic diversity, we also control for the level of urbanization for a county in the previous year (urban pop (%)  $_{t-1}$ ). This variable is positively associated with chances of ethnic violence. The statistical significance level is consistently at the  $p < 0.1$  level. This suggests that urban areas are associated with higher chances of ethnic violence in Xinjiang, which makes sense because rural areas of Xinjiang are very vast with extremely low levels of population density; often these rural areas have few government offices and Han majority population that can become potential targets of ethnic violence. Table 1 also suggests that old city re-development projects seem to be associated with heightened chances of violence as indicated by the positive and statistically significant coefficient estimates of the Akesu, Hetian, and Kashi 2000-2008 variable.

Table 1 shows that a higher population density indeed is associated a higher chance of ethnic violence. On the other hand, a higher GDP per capita is associated a lower chance of ethnic violence. Both findings are consistent with past studies using data from other developing countries (Raleigh and Hegre 2009; Buhaug et al. 2011). To control for the effect of local government spending, we included a variable  $govt. spending_{t-1}$ , this is the ratio of local government expenditure to local GDP. Table 1 shows that the more a local government spends, the lower the chances of violence. This is also consistent with a recent study on the effect of local government spending and ethnic violence (Liu 2019).

Interestingly, Table 1 suggests that the percentage of Uyghur population in a county-year is not associated with the chances of violence. This might seem counter intuitive because media reports often portray ethnic violence in Xinjiang as only involving the Uyghur group. This is not the case. There are many ethnic violent events that do not involve the Uyghur population. For example, Cao et al. (2018b) show that between 1990 and 2005, only 77% of the ethnic violent events involved the Uyghur ethnic group for certain. Finally, the Xinjiang Production and Construction Corps (XPCC) is associated with a lower chance of ethnic violence. This is not surprising given XPCC's role as an instrument of government control in the region. Other than the XPCC variable, other time-invariant variables – oil, border county, distance to prefecture capital, and distance to Urumqi – seem to have no effect on ethnic violence.

**Robustness Checks:** One might question whether there are county-level characteristics that are not included and yet might affect both ethnic violence and our key independent variables. Often these include variables that are hard to measure, such as local culture and historical legacies. Therefore, we use regressions with county fixed effect that can control for such latent local characteristics and traits. One empirical challenge of including many unit fixed effects, especially in our context in which the binary dependent variable has way more zeros than ones, is that logit or probit regression would not converge. Therefore, following the recent literature in economics and political science that explains binary violent events (e.g., Berman et al. 2017 and Christensen 2019), we use linear probability models (that is, OLS) with fixed-county and fixed-year effects. Table 2 presents the results. We cannot include time invariant variables (oil, XPCC, border county, distance to prefecture cap., and distance to Urumqi) with county-fixed effects because there is no within-county variation for these variables.

Table 2 here

Here, we find that even with county-fixed effects, the interaction terms between the intensity of urbanization and measures of ethnic diversity ( $\Delta \text{urban pop (\%)}_{t-1,t} \times \text{fractionalization}_{t-1}$  and  $\Delta \text{urban pop (\%)}_{t-1,t} \times \text{polarization}_{t-1}$ ) are still statistically significant across all model specifications. Also note that in Table 2, none of the control variables is statistically significant anymore, which is different from what we found in Table 1: this is because in Table 2 we include county-fixed effects, which means we only use within-unit (within-county in our case) variations of the independent variables to explain changes in the dependent variable. Cross-unit (that is, between county) variations of these variables are absorbed by the county-fixed effects now. This also suggests that the statistically significant effects associated with these time-variant explanatory variables – urban pop (%)<sub>t-1</sub>, Akesu, Hetian, and Kashi 2000-2008, GDP per capita<sub>t-1</sub>, pop density<sub>t-1</sub>, govt. spending<sub>t-1</sub> – that we found in Table 1 are largely attributed to the between-county variations in these variables.

One might also wonder whether the conditional effect by local ethnic diversity that we found in Table 1 and 2 is not so much a function of ethnic diversity, but the size of the largest ethnic minority group in the region, that is, the percentage of Uyghur population. Therefore, we conduct additional analysis interacting the intensity of urbanization variable ( $\Delta \text{urban pop (\%)}_{t-1,t}$ ) with the percentage of Uyghur population variable (Uyghur (%)<sub>t-1</sub>) to test whether we would observe similar conditional effects.

Table 3 shows the results from both logit regressions and linear probability models. The interactive effects are always estimated to be negative, which is the opposite from what we find in Table 1 and 2 with regard to the effect associated with the interaction terms between urbanization and fractionalization/polarization. More importantly, the p-values for the urbanization and Uyghur percentage interaction terms (Uyghur (%)<sub>t-1</sub> × fractionalization<sub>t-1</sub>) in model 1 and 2 of Table 3 are .065 and .083 respectively, barely passing the p<0.1 threshold. Once we add in county fixed effects, as in model 3 and 4 in Table 3, the coefficient estimates of the interaction term simply become statically insignificant. Therefore, we find no evidence that the percentage of local Uyghur population mediates the effect of urbanization on ethnic violence in Xinjiang.

[Table 3 here]

### Conclusion and Discussion

In this paper, we argue that the effect of urbanization on violence is conditioned by the level of local ethnic diversity. In ethnically homogenous areas, urbanization increases economic welfare, therefore lowering grievances and chances of violence. In ethnically diverse areas, increased economic welfare by urbanization is often distributed along ethnic lines, which increases between-group grievances and chances of violence. We adopt a subnational level analysis, using Xinjiang, China between 1997 and 2008 as a test case. Our empirical analysis shows that the effect of urbanization on ethnic violence is indeed contingent on local ethnic diversity.

Our theoretical focus on ethnic diversity as a conditional factor contributes to the ongoing debate regarding the relationship between urbanization and violence. One natural step for future research is to test the theory using cross-country data to increase the external validity of this research project. One potential challenge for this cross-national approach is the fact that countries often use different criteria to define urban areas. There is no globally accepted definition of what constitutes an urban area. Some countries define urban areas following a minimum population threshold and population density approach, while others use an administrative definition of urban settlement. To make things worse, definitions of urban settlement also vary over time within countries. This seems to confirm one significant

advantage of within-country analysis: there is no between-unit difference in the definition of urbanization since these are administration units within a country.<sup>17</sup>

One might raise endogeneity concerns for our results. First, there is the potential concern of omitting confounding factors – variables that affect both the outcome variable and the key independent variables. We think this is unlikely to be a threat because we have controlled many variables suggested by past studies and included fixed year effects as well as fixed prefecture (in logistic regressions) and fixed county effects (in linear probability models). There is also a reverse causality concern, that is, instead of urbanization, in interaction with local ethnic diversity, affecting chances of violence, local violence determines the speed of urbanization. To address this concern, we lag all our right-hand side variables by one year to mitigate this potential threat of reverse causality. Moreover, our empirical analysis is more likely to suffer from reverse causality if we only find a negative relationship between urbanization and violence, because this can also be interpreted that urbanization is more likely to happen in safe areas as people and business stay away from places plagued by ethnic violence. But this negative relationship only exists for areas with low ethnic diversity. In areas with high diversity, the relationship is just the opposite, that is, urbanization is positively associated with violence: it is hard to imagine that government and business would choose to urbanize in places with more ethnic violence.

One might raise similar concerns for measures of local ethnic diversity. For instance, is the level of local ethnic diversity a function of some omitted variables? Does it change with the intensity of local violence? From our data, ethnic fractionalization and polarization simply do not change much over time as they are a function of the underlying ethnic composition of an area: between 1997 and 2008, the correlation between the ethnic fractionalization variable and its one-year lagged value is 0.999; for ethnic polarization, this correlation is 0.997. It is unlikely that such slow-moving variables would be a function of time-variant omitted variables. They might be a function of some slow-moving or time-invariant latent/unobservable variables such as local historical legacies and geographical conditions. Those variables, however, often can be controlled by unit (prefecture and county) fixed effects, which we include in the empirical analysis. To deal with a potential reverse causality threat, we have also conducted extra robust check, using only the 1996 values of the two ethnic diversity measures in regression analysis. This is the year before our study period of 1997-2008: ethnic diversity measures of 1996 should not be affected by violent events that happened years or even more than a decade later. Table A-3 in the online appendix reports the results: they are very similar to what we find in Table 1.

Finally, probably the most important lesson from our study is for governments to be cautious about urbanization in parts of the country with a diverse ethnic population. More nuanced policies should be implemented to mitigate potential adverse effects of urbanization on disadvantaged ethnic groups who often do not have a fair share from increased economic welfare, job opportunities, and public goods and services in urban areas. For instance, urbanization often creates more jobs that attract rural-urban migrant workers. In our Xinjiang case, linguistic barriers (that is, the ability to speak fluent mandarin) prevent ethnic minority groups from accessing many newly created job opportunities. Government funded language training programs should be able to help in the short run. To fully address such an issue, education system might need to be carefully re-designed so that ethnic minority students can have a better bi-lingual language education while still preserving their own religion and cultural heritage.

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<sup>17</sup> For the 1997-2008 period, we are also unaware of any temporal change in the definition and measurement of urbanization in China.

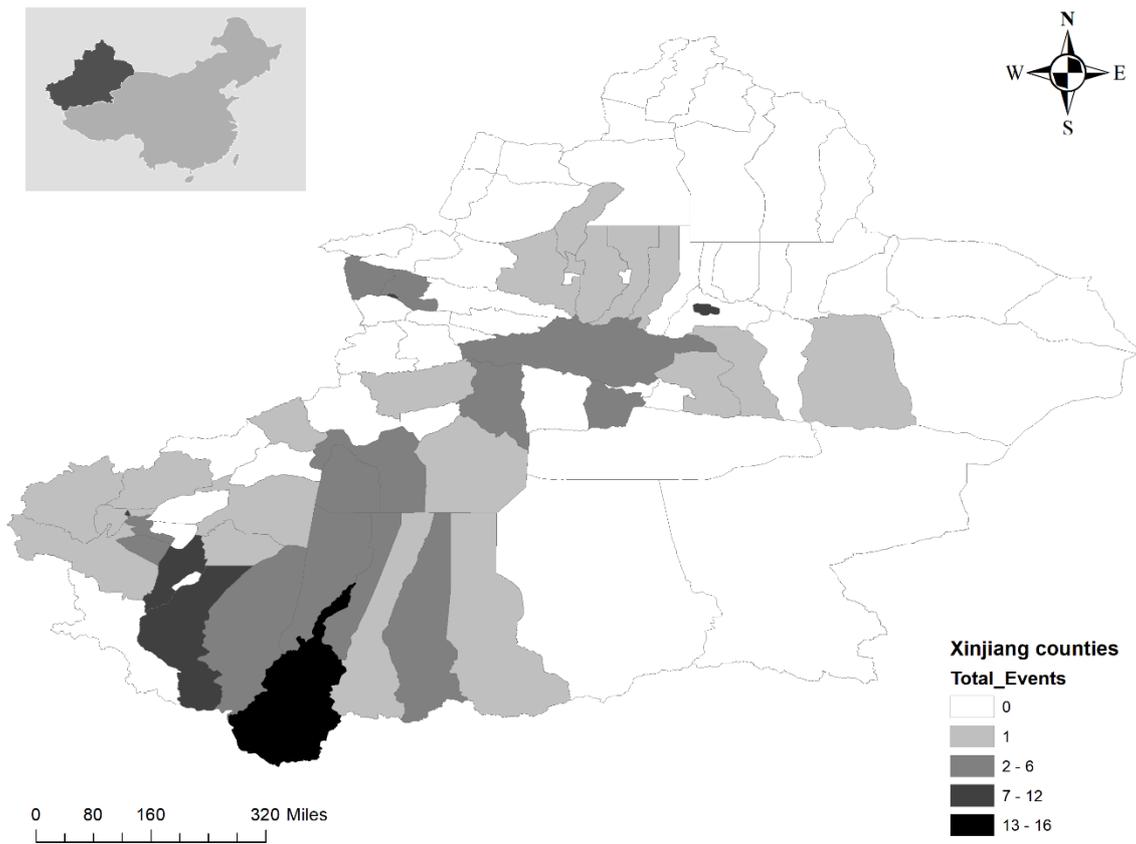
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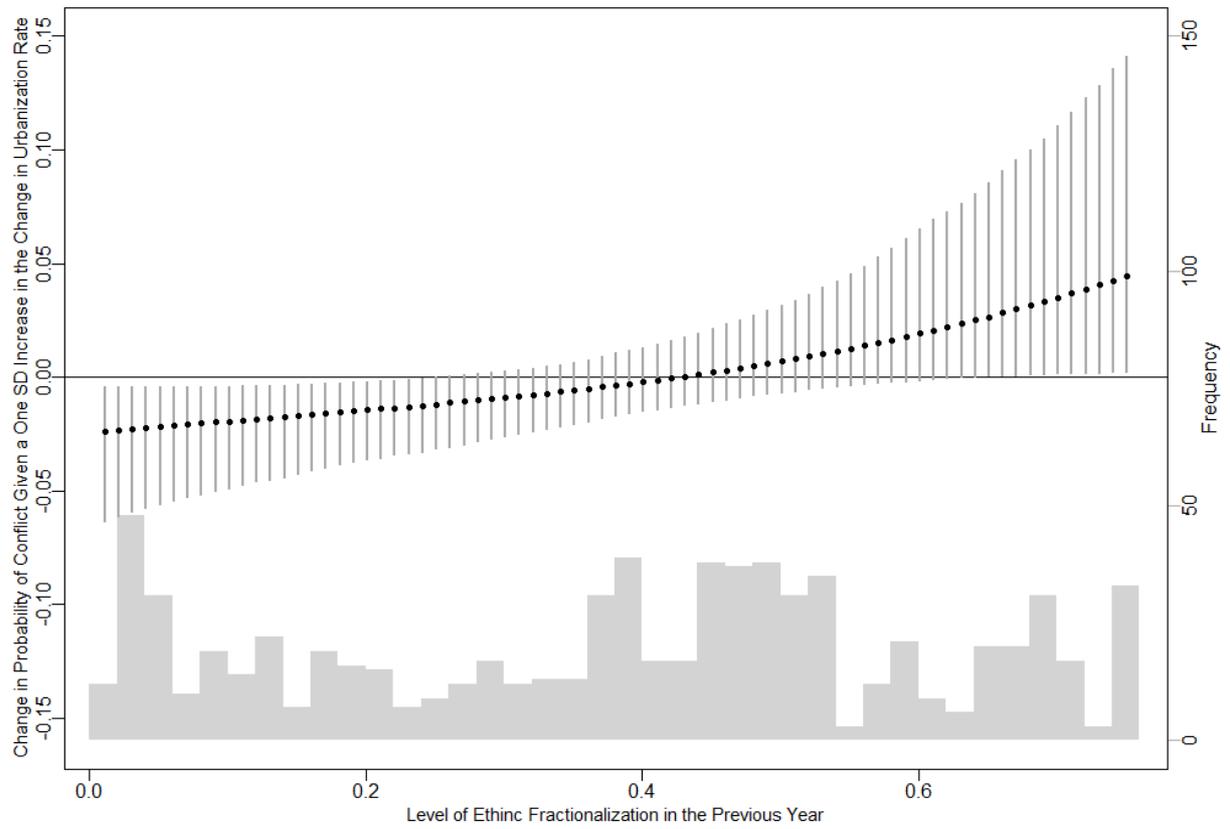
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**Figure 1: Distribution of Ethnic Violent Events in Xinjiang, 1997-2008.**



**Figure 2: Effect of Urbanization ( $\Delta \text{urban pop } (\%)_{t-1,t}$ ) conditional on the level of ethnic fractionalization ( $\text{fractionalization}_{t-1}$ ).**



**Table 1: Testing the interactive effect of urbanization and ethnic diversity using logit models.**

	<i>Dependent variable: any conflict event (1/0)</i>			
	(1)	(2)	(3)	(4)
$\Delta$ urban pop (%) $_{t-1,t}$	-0.298** (0.134)	-0.340* (0.175)	-0.443** (0.201)	-0.495* (0.243)
$\Delta$ urban pop (%) $_{t-1,t} \times$ fractionalization $_{t-1}$	0.661** (0.248)	0.732** (0.318)		
$\Delta$ urban pop (%) $_{t-1,t} \times$ polarization $_{t-1}$			0.711** (0.299)	0.775** (0.350)
fractionalization $_{t-1}$	-0.195 (1.879)	-0.110 (1.831)		
polarization $_{t-1}$			-0.977 (1.090)	-0.884 (1.056)
urban pop (%) $_{t-1}$	0.029* (0.016)	0.029* (0.015)	0.029* (0.016)	0.029* (0.015)
Akesu, Hetian, and Kashi 2000-2008	2.135* (1.064)	2.094** (0.980)	2.108* (1.053)	2.090** (0.987)
GDP per capita $_{t-1}$	-4.005* (2.251)	-4.186** (1.974)	-3.979* (2.253)	-4.196** (2.012)
pop density $_{t-1}$	0.012*** (0.003)	0.011*** (0.004)	0.013*** (0.003)	0.012*** (0.004)
Uyghur (%) $_{t-1}$	0.018 (0.020)	0.017 (0.018)	0.014 (0.020)	0.013 (0.018)
govt. spending $_{t-1}$	-5.082** (2.484)	-5.009** (2.114)	-5.657** (2.686)	-5.580** (2.302)
oil	-0.895 (0.684)	-0.847 (0.640)	-0.932 (0.694)	-0.878 (0.655)
XPCC	-16.790*** (1.271)	-16.957*** (1.316)	-16.697*** (1.257)	-16.862*** (1.309)
border county	0.599 (0.518)	0.497 (0.525)	0.561 (0.517)	0.454 (0.531)
distance to prefecture cap.	0.003 (0.003)	0.003 (0.002)	0.004 (0.003)	0.004 (0.003)
distance to Urumqi	-0.0002 (0.002)	0.0001 (0.002)	0.0003 (0.002)	0.001 (0.002)
$t$		-0.321 (0.532)		-0.338 (0.532)
$t^2$		0.028 (0.072)		0.031 (0.071)
$t^3$		-0.001 (0.003)		-0.001 (0.003)
spatial lag $_{t-1}$		-0.150 (1.058)		-0.111 (1.073)
Constant	-2.651 (2.257)	-1.676 (2.186)	-2.256 (2.272)	-1.320 (2.187)
Year fixed effects (1997-2008)	√	√	√	√
Prefecture fixed effects	√	√	√	√
Clustered s.e. (county)	√	√	√	√
Observations	754	754	754	754
Log Likelihood	-121.436	-120.015	-121.231	-119.851

Note: \* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

**Table 2: Testing the interactive effect of urbanization and ethnic diversity using linear probability models (LPM).**

	<i>Dependent variable: any conflict event (1/0)</i>			
	(1)	(2)	(3)	(4)
$\Delta$ urban pop (%) $_{t-1,t}$	-0.011*	-0.011*	-0.019**	-0.021**
	(0.006)	(0.007)	(0.009)	(0.010)
$\Delta$ urban pop (%) $_{t-1,t} \times$ fractionalization $_{t-1}$	0.026*	0.026*		
	(0.015)	(0.015)		
$\Delta$ urban pop (%) $_{t-1,t} \times$ polarization $_{t-1}$			0.030**	0.032**
			(0.013)	(0.014)
fractionalization $_{t-1}$	-0.117	-0.335		
	(0.647)	(0.643)		
polarization $_{t-1}$			0.185	-0.102
			(0.482)	(0.449)
urban pop (%) $_{t-1}$	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Akesu, Hetian, and Kashi 2000-2008	-0.053	0.018	-0.053	0.019
	(0.074)	(0.068)	(0.073)	(0.067)
GDP per capita $_{t-1}$	-0.051	-0.072	-0.056	-0.075
	(0.063)	(0.057)	(0.062)	(0.056)
pop density $_{t-1}$	0.006	0.006	0.005	0.006
	(0.008)	(0.008)	(0.008)	(0.008)
Uyghur (%) $_{t-1}$	0.008	0.017	0.013	0.019*
	(0.013)	(0.011)	(0.014)	(0.012)
govt. spending $_{t-1}$	0.063	0.180	0.051	0.178
	(0.139)	(0.171)	(0.140)	(0.171)
$t$		-0.015		-0.015
		(0.028)		(0.028)
$t^2$		0.005		0.005
		(0.003)		(0.003)
$t^3$		-0.0001		-0.0001
		(0.0001)		(0.0001)
spatial lag $_{t-1}$		0.049		0.046
		(0.085)		(0.087)
Year fixed effects (1997-2008)	√	√	√	√
County fixed effects	√	√	√	√
Clustered s.e. (county)	√	√	√	√
Observations	754	754	754	754
Adjusted R <sup>2</sup>	0.133	0.196	0.135	0.198

*Note:* county fixed effects included in the regression; therefore, time-invariant variables (oil, XPCC, border county, distance to prefecture cap., and distance to Urumqi) are not included. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01.

**Table 3: Testing the interactive effect of Uyghur percentage and ethnic fractionalization.**

	<i>Dependent variable: any violent event</i>			
	<i>logistic models</i>		<i>linear probability models</i>	
	(1)	(2)	(3)	(4)
$\Delta$ urban pop (%) $_{t-1,t}$	0.169* (0.098)	0.171* (0.096)	0.004 (0.003)	0.003 (0.003)
Uyghur (%) $_{t-1}$	0.020 (0.021)	0.019 (0.019)	0.008 (0.013)	0.017 (0.011)
$\Delta$ urban pop (%) $_{t-1,t} \times$ Uyghur (%) $_{t-1}$	-0.003* (0.002)	-0.003* (0.002)	-0.0001 (0.0001)	-0.0001 (0.0001)
urban pop (%) $_{t-1}$	0.028* (0.016)	0.027* (0.015)	-0.001 (0.001)	-0.001 (0.001)
fractionalization $_{t-1}$	0.202 (1.897)	0.357 (1.829)	-0.068 (0.651)	-0.287 (0.653)
Akesu, Hetian, and Kashi 2000-2008	2.204* (1.125)	2.175** (1.053)	-0.053 (0.074)	0.018 (0.069)
GDP per capita $_{t-1}$	-3.866* (2.232)	-4.001** (1.941)	-0.052 (0.062)	-0.073 (0.057)
pop density $_{t-1}$	0.012*** (0.003)	0.011*** (0.004)	0.005 (0.008)	0.006 (0.008)
govt. spending $_{t-1}$	-4.922* (2.476)	-4.784** (2.093)	0.059 (0.140)	0.175 (0.171)
oil	-0.809 (0.672)	-0.750 (0.628)		
XPCC	-16.899*** (1.281)	-17.093*** (1.330)		
border county	0.597 (0.520)	0.500 (0.530)		
distance to prefecture cap.	0.003 (0.003)	0.002 (0.002)		
distance to Urumqi	-0.0004 (0.002)	-0.0002 (0.002)		
$t$		-0.288 (0.519)		-0.015 (0.028)
$t^2$		0.024 (0.070)		0.005 (0.003)
$t^3$		-0.001 (0.002)		-0.0001 (0.0001)
spatial lag $_{t-1}$		-0.169 (1.037)		0.047 (0.084)
Constant	-2.786 (2.283)	-1.900 (2.192)		
Year fixed effects (1997-2008)	√	√	√	√
County fixed effects			√	√
Prefecture fixed effects	√	√		
Clustered s.e. (county)	√	√	√	√
Observations	754	754	754	754
Adjusted R <sup>2</sup>			0.132	0.194
Log Likelihood	-122.281	-120.990		

*Note:* model 3 and 4 are estimated with county fixed effects; thus, time-invariant variables (oil, XPCC, border county, distance to prefecture cap., and distance to Urumqi) are not included. \* p<0.1; \*\* p<0.05; \*\*\* p<0.01.