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Ethnic Integration and Development in China

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Summary. — This paper pursues an inquiry into the relationship between ethnicity and development in the largest authoritarian country in the contemporary world, the People's Republic of China. It engages the theoretical literature on ethnic diversity and development in general, but also pays special attention to political economy logics unique to authoritarian systems. Focusing on the western part of China over a decade since the launch of China's Western Development Program (*xibu da kaifa*) in 2000, this paper utilizes the data from two censuses (2000 and 2010) together with nighttime streetlight imagery data to analyze the overall relationship between ethnicity and development provision. It also analyzes changes in such a relationship during this period. The paper finds that ethnic minority concentration negatively correlates with economic development in both the years 2000 and 2010 across the western provinces. It also finds that counties in non-autonomous provinces, which are historically more integrated with the rest of China than autonomous provinces, have a positive and systematic correlation between changes in ethnic minority concentration and changes in development during the 10-year period. The counties in autonomous provinces, on the other hand, show the opposite trend. Using three case studies of Tibet, Inner Mongolia, and Xinjiang, the paper concludes that although there is in general a tendency for ethnic minority concentrated areas to be less developed, ultimately which groups prosper more or less depends upon specific economic development and which political control logics the Chinese state implements.

Key words — ethnicity and development, China, western development program, authoritarian regimes and development, authoritarian regimes and ethnicity, East Asia

1. INTRODUCTION

How does ethnic integration explain the level of development we see in authoritarian states? While development in general entails economic growth and provision of public goods, ethnicity has also featured prominently in the literature for its role in shaping and contextualising outcome processes. When economic growth is concerned, for example, the lack of ethnic diversity has been considered a powerful indicator in many parts of the world (Alesina, Devleeschauwer, Easterly, Kurlat, & Wacziarg, 2003; Alesina & Ferrara, 2000; Easterly & Levine, 1997). In terms of public goods provision, ethnicity has also been pointed out as a crucial explanatory valuable (Alesina, Baqir, & Easterly, 1999; Berman & Laitin, 2008). The common assumption is that provision of public goods is easier in ethnically homogenous societies than in ethnically diverse ones, because in ethnically diverse societies, minorities' precarious political status and the tendency toward in-group favoritism among politically connected members of the ethnic majority lead to discrimination in public goods provision against minorities. Ethnically diverse societies may have coordination problems in providing public goods, and different communities may also have divergent preferences (Habyarimana, Humphreys, Posner, & Weinstein, 2007). In addition, much of the literature on the relationship between ethnicity and development often focuses on democracies, where the electoral process specifically incentivizes development along ethnic lines, although certainly democracies often tend to protect minority rights as well (Brown & Mobarak, 2009; Hassler, Storesletten, & Zilibotti, 2007). Few, if any, studies have explored empirically how authoritarian regimes provide development in ethnically diverse settings (Tsai, 2007). Can there be similarities or differences in development provision in ethnically diverse societies when there is a lack of electoral process and rule of law?

This paper pursues an inquiry into the relationship between ethnicity and development in the largest authoritarian country in the contemporary world, the People's Republic of China. It engages the theoretical literature on ethnic diversity and development in general, but also pays special attention to political economy logics unique to authoritarian systems. Empirically, the paper examines whether ethnic divisions between the majority Han Chinese and various other ethnic minorities have an effect on development throughout the western part of China, where the majority of China's ethnic minorities reside. For this purpose, this paper utilizes data from two Chinese censuses in 2000 and 2010, together with nighttime streetlight imagery data, to analyze the overall relationship between ethnicity and development as measured by luminosity, as well as changes in such a relationship during the 10-year period. More importantly, the year 2000 also saw the official launch of "Open Up the West" (*xibu da kaifa*) initiative, also known as the Western Development Program (WDP) (Lai, 2002). While economic development in Western part of China is likely conditioned upon several factors, including various local initiatives for industrialization, the 10-year span since the launch of the WDP creates a golden opportunity to study whether this state-led initiative, which involved the migration of the majority Han Chinese into the ethnic minority-

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dominated western provinces, had any implication on the ethnic dimension of development in China.

The structure of the paper is as follows. After reviewing the literature, the paper introduces the politics of ethnicity in China, the background of the WDP and its ethnic characteristics. It presents a couple of operationalizable hypotheses for empirical testing, explains the research design, and then describes our data. The results of our statistical analysis offer a set of nuanced findings. Overall, ethnic minority concentration negatively correlates with development in both the years 2000 and 2010 across the western provinces. Compared to western provinces designated as ethnic minority autonomous regions (Tibet, Inner Mongolia, Xinjiang, Guangxi and Ningxia), counties in the non-autonomous provinces (Chongqing, Gansu, Guangxi, Guizhou, Qinghai, Shaanxi, Sichuan, and Yunnan) have a positive and systematic correlation between changes in ethnic minority demographic concentration and changes in development during the 10-year period, when the Chinese state directed its attention at economic development in these provinces. The interaction term between the change in minority concentration and the dummy for autonomous province, on the other hand, is negative. This means that while increases in ethnic minority concentration are generally associated with increases in development in western provinces, this relationship does not hold in ethnic minority autonomous provinces. The autonomous provinces have instead benefited less from the WDP, as they have been predominantly inhabited by ethnic minorities and remained less integrated with the rest of China.

We also find that while the overall relationship between the minority concentration and development is negative for autonomous provinces and positive for non-autonomous western provinces, the relationship is much more complex among the autonomous provinces. In Tibet, there is indeed a negative relationship between changes in ethnic minority concentration and changes in the level of economic development. This means that counties with more growth of Tibetan population relative to Han population have experienced less development in comparison with those with more relative growth in Han population during the ten-year period. However, in Inner Mongolia, the relationship is positive, and the growth of ethnic Mongol population is positively correlated with economic development. We contend that because Inner Mongolia is the first ethnic minority region established in 1947, where more than 80% of the population are Han Chinese, the Chinese state perceives that the region is much better integrated than Tibet, where the Tibet autonomous region was only established in 1965 and where Han Chinese still only account for less than 10% of the local population. These findings suggest that we have to understand the ethnic dimension of economic development in an authoritarian system such as China through the lens of political control. This paper presents the two contrasting case studies of Tibet and Inner Mongolia in detail to illustrate such logics. In addition, we include a third case of Xinjiang, where rising violence from radicalized Uyghurs has rendered the Chinese government's plan to encourage development through integration of Han Chinese less successful. In the following conclusion, we present further theoretical reflections on ethnicity and economic development in authoritarian systems in general.

2. ETHNICITY, DEVELOPMENT PROVISION, AND AUTHORITARIANISM

There has been a vast amount of literature written in economics and political science on the development externalities of ethnicity. Scholars have probed how development is dependent upon various ethnic factors in ethnically diverse societies. For example, there are many works concerned with the economic consequences of ethnic distribution in a given society. For some, ethnic diversity is shown to have a direct negative effect on economic growth (Alesina *et al.*, 2003; Alesina & Ferrara, 2000; Easterly & Levine, 1997; Gisselquist, 2014; Sala-i-Martin, Doppelhofer, & Miller, 2004). For others, it is not ethnic fractionalization but rather ethnic polarization that is believed to retard economic development. The effect of polarization on economic growth can be explained through its impact on civil wars, the rate of investment, and the proportion of government consumption over GDP (Montalvo & Reynal-Querol, 2005). Relatedly, there is also discussion about the effect of regime type on ethnicity's relations with economic growth, in that democracies prove to be able to ameliorate the negative effect of ethnic diversity (Collier, 1999).

A large body of literature related to the issues of economic development also exists; specifically, how ethnic diversity affects the provision of public goods. As one of the classic pieces on the topic by Alesina, Baqir, and Easterly argues, ethnically diverse societies tend to have fewer provisions of public goods than ethnically homogenous ones (Alesina *et al.*, 1999). Although this study is based on data from the United States, the idea has been empirically tested elsewhere (Berman & Laitin, 2008; Cooray, 2014; Miguel & Gugerty, 2005; Schündeln, 2013). For example, Baldwin and Huber, in their study of 46 African countries, demonstrate that although ethnic diversity can mean different things according to specific measurements, economic differences between ethnic groups are statistically and negatively correlated with public goods provision (Baldwin & Huber, 2010).

Additionally, scholars have probed why, instead of whether, ethnic diversity impedes public goods provision. As stated originally by Alesina, Baqir, and Eastly, the reasons why ethnically diverse societies have low public goods provision are mainly due to two mechanisms: either because people do not want to share with ethnically different others or because different ethnic groups tend to have non-aligned preferences when public goods provision is concerned (Alesina *et al.*, 1999). Adding on to these mechanisms, Habyarimana *et al.* contend that public goods provisions are better provided in ethnically homogenous societies because co-ethnics are more likely to play cooperative equilibria. Therefore, the under-provision of public goods in ethnically diverse societies is not because of innately different preference systems across ethnic groups (Habyarimana *et al.*, 2007). On the other hand, Lieberman and McClendon instead argue that ethnicity is rather used as a group heuristic for evaluating public policies, which illustrates that the relationship between ethnicity and public goods provision is in fact a strategic and political one (Lieberman & McClendon, 2013). In addition, Wimmer contends that the relationship between ethnic diversity and public goods under-provision is spurious because "both contemporary ethnic heterogeneity and low public goods provision represent legacies of a weakly developed state capacity inherited from the past" (Wimmer, 2016).

Thrown in this mix is how the type of regime can contextualize the relationship between ethnic diversity and public goods provision. Similar to the literature on ethnicity and economic development, there currently exists more of a focus on how ethnic diversity affects public goods provision in a democratic setting. Baldwin, for example, argues that in Zambia people are more likely to vote with their traditional chief if they perceive that a strong relationship between chiefs and politicians can lead to better local provision of public goods

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(Baldwin, 2013). Indeed, such an ethnic favoritism argument is quite easy to understand in that politicians are believed to be more likely to favor their co-ethnics in redistributive politics—although Kasara's study demonstrates the opposite may be the case in some settings (Kasara, 2007).

Most such studies tend to focus on public goods provision in democratic societies (Brown & Mobarak, 2009; Hassler *et al.*, 2007; Nooruddin & Simmons, 2015; Rosenzweig, 2015). There is scarcely any study that specifically looks at the dynamics of public goods provision in ethnically diverse but authoritarian societies (Tsai, 2007). In this context, one can argue that due to the lack of the democratic process of monitoring, ethnic minorities may be more likely to be discriminated against when it comes to development programs directed by the central state. Indeed, political or material goods are often provided by the ruling regime for some key sections of the population in return for their political support (Taydas & Peksen, 2012), similar to the distributive politics setting in democracies. For example, in a recent study on public goods provision and violence in the Syrian civil war, De Juan and Bank demonstrate that the risk of violence has been lower in sub-districts that have been favored by the ruling Assad regime in terms of preferential access to material goods such as electricity (De Juan & Bank, 2015).

Following the logic of political control, we can also conceptualize that an authoritarian state is more likely to foster development in areas in which it feels its control is more secure and state dominance is unquestioned. This means that in areas where the majority ethnic group has more dominance, the state is more likely to direct development to that area. For ethnic groups living in those areas, the state might also feel comfortable in encouraging development among these groups because their loyalty is considered more trustworthy. However, in areas that the majority ethnic group does not have such dominance, then the state would be more likely to encourage the migration of the majority group to that area through the incentives of economic development. For ethnic minority groups living in these less secure areas, economic development is less likely to be provided unless they demonstrate their loyalty toward the central state. The development change due to the WDP in this regard provides an invaluable case study for the authoritarian state's policy impact on ethnic minority areas.

3. THE POLITICS OF ETHNICITY AND DEVELOPMENT IN AUTHORITARIAN CHINA

China provides an ideal setting to study the relationship between ethnicity and economic development because it has an authoritarian political system with strong development records. [1] The state has pursued provisions of necessary infrastructure such as roads, railways, and airports as means to promote local economic growth and, in turn, integrate ethnic minorities with the Han majority. It is therefore both theoretically and empirically interesting to explore how and whether, in the context of rapid economic development, ethnicity features in the "mind" of the authoritarian Chinese state.

As the ruling party of the largest authoritarian country in the world today, the Chinese Communist Party (CCP) has ruled the PRC for more than 60 years. For the past few decades, the country has also wholeheartedly pursued a "developmental state" strategy that has put an exceptional amount of emphasis on economic development (Knight, 2014; Nordhaug, 2012). At the same time, China is also a country with many ethnic problems. According to China's 2010 Census, about 91.5% of the Chinese population belong to the majority Han Chinese while the other 8.5% are various ethnic minority groups (National Bureau of Statistics of China, 2013). Although this percentage might be a relatively small one, the absolute number of ethnic minority people in China is more than 100 million, an unarguably significant number. More significant is the fact that the areas where various ethnic minorities have historically resided (and were subsequently designated as minority autonomous areas) constitute about half of China's territory. In particular the areas of Tibet and Xinjiang, two autonomous regions where almost half of Tibetans and most Uyghurs reside and two regions who have ongoing disputes with the central state, are both extremely large in area size and of significant strategic importance (Bovingdon, 2010; Han, 2013; Millward, 2007; Sautman & Dreyer, 2006; Shakya, 1999).

China's policies toward its various ethnic minorities have many components. On the one hand, some of the Chinese state's policies have often been described as discriminatory. Although Chinese society has undergone dramatic changes during the past few decades, the Chinese state still has shown little tolerance for political dissent from ethnic minorities. Any signs of resistance from these ethnic minorities, often interpreted as separatism by the Chinese state, have faced severe repression (Clarke, 2015; Han & Paik, 2014; Pirie, 2013). Discriminatory policies toward ethnic minorities can also be observed in the job market, where they are significantly disadvantaged (Hannum & Xie, 1998; Hasmath, 2011; Maurer-Fazio, 2012). One therefore wonders whether such discrimination against ethnic minorities is also present when economic development is concerned.

Those discriminatory aspects aside, the Chinese political system nonetheless provides "nominal" autonomy based on ethnicity. Institutionally, there are five autonomous regions jurisdictionally equivalent to provinces: Guangxi Zhuang Autonomous Region, Inner Mongolia Autonomous Region, Ningxia Hui Autonomous Region, Tibet Autonomous Region, and Xinjiang Autonomous Region. At sub-provincial levels, there are also autonomous prefectures and autonomous counties, most of them located in non-autonomous provinces. However, in reality, this autonomy translates to no genuine power for the minority groups. Instead, we can think of the provision of autonomous status as an indicator of a lesser presence of the majority Han Chinese, and subsequently as areas that the Chinese state, comparatively speaking, has less secure control than other non-autonomous provinces.

On the other hand, where ethnic minorities are concerned, the Chinese government sees economic development as the main solution for ethnic dissent (Barabantseva, 2009). Since China's economic reforms began in the late 1970s, the government's development strategy has focused on initially jump-starting the economy on the eastern coast. Deng Xiaoping deemed it necessary to let some regions to growth their wealth first, with the understanding that the wealth would later trickle down and spread to the rest of the country (Vogel, 2011). In reality, the development gap between the eastern provinces and the western ones significantly widened throughout the 1980s and 1990s. Particularly worrying for Beijing is the fact that many of its western provinces are also home to the majority of China's ethnic minority groups. This has created concern among the Chinese leadership as to whether the widening economic gap would hinder its national integration project, or worse still, contribute to further grievance on part of some ethnic minorities toward the central government (thus creating a national security problem). In fact, in much of China's domestic discourse, problems of ethnic conflict have often

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been blamed on underdevelopment and poverty among certain ethnic minority groups (Barabantseva, 2009; Fischer, 2005).

Due to concerns about widening economic gaps, the Chinese government launched the WDP around the year 2000.[2] Theoretically at least, this meant that with this change of development focus, there would be not only more resources directed to the western provinces, but also more state intervention in economic development (Goodman, 2004). Concerns about creating a more equal development model aside, the other key mission of the WDP was to generate enough economic centripetal force to further integrate its peripheral regions in which various ethnic minority groups reside. Given this reason, developing the economies of the western provinces and further integrating them into the rest of the country had a nation-building function (Goodman, 2004).[3] As far as the Chinese state is concerned, economic development has been necessary to prevent ethnic minority regions from estrangement, that is, "[I]f minority nationalities were not given better chances for economic development, it was argued, then social harmony, political stability and national security would be in danger" (Holbig, 2004).

Owing to this nation-building dimension, the WDP put emphasis on two strategic goals that aimed to facilitate better movement of goods and people between the western regions and the "core" of China. The first was the priority of infrastructure development (Perkins, 2004). This manifested not only in some landmark rail projects, such as the Qinghai–Tibet Railway, but also highways linking the west to the core and roads connecting rural and urban areas in the west. Similarly, many airports have been built to increase connectivity between western regions and the rest of China. The other focus was the implicit push for the migration of more Han Chinese to areas populated with ethnic minorities, although in reality the most migration of Han Chinese into ethnic regions tends to occur in urban areas. Historically, various countries have encouraged members of the ethnic majority to settle minority areas, in order to alleviate population density in ethnic core areas and solidify control over peripheral regions. (Fearon & Laitin, 2011). In the Chinese context, in the 19th century the Qing Dynasty government encouraged the migration of Han Chinese to Manchuria and Mongolia, in order to prevent encroachment upon those areas from the north and expanding Tsarist Russia (Jagchid, 1999).

Therefore, within the context of China, we have a somewhat complicated situation. On the one hand, the ostensibly authoritarian nature of the Chinese government comes with a history of discrimination and repression against ethnic minorities. Meanwhile, the recent strong development focus on the western provinces through the WDP also means that the Chinese state has an explicit goal of further integration of the ethnic minority areas to the rest of China through infrastructure development and migration of its Han Chinese population to ethnic areas. With the confluence of all of these different factors, how does ethnicity feature in terms of development change in China?

4. RESEARCH DESIGN AND DATA

In order to examine the relationship between development and ethnicity in China, we conceptualize the empirical test to include two levels of analysis. One is to see cross-sectionally the overall relationship between ethnic concentration and development provision in 2000 and 2010. The other is to see temporal changes in development provision in the context of changing ethnic demographic distribution during the 10-year period of the WDP. The purpose is to examine the association between the change in economic development and the factor of ethnicity since the start of the WDP in 2000. Does the Chinese government provide more development in areas with larger shares of Han Chinese? Can we observe areas having an upsurge of such provisions alongside Han Chinese in-migration? Regarding these inquiries we have the following three main hypotheses.

H1. Areas with higher percentages of Han Chinese residents get more provisions of development.

H2. As a result of Han Chinese in-migration, areas with larger Han Chinese population growth get more of provisions development over the 10-year period.

H3. Ethnic minority autonomous regions where the Chinese government has less control would report less development over the 10-year period.

The level of analyses of our paper is at the county level, and we confine our analyses to the western provinces in China targeted by the WDP, including Chongqing, Gansu, Guangxi, Guizhou, Inner Mongolia, Ningxia, Qinghai, Shaanxi, Sichuan, Tibet, Xinjiang, and Yunnan.

The data for our analyses come from two main sources. First, for our main dependent variable of development in China, we utilize nighttime streetlight images to gauge the level of electricity provision throughout China. In the Chinese context, the state grid monopolizes electricity provision, whereas almost no private provision exists (Ngan, 2010). Instead of using official statistics from China, this use of illumination data is not only more objective, but also captures the general level of electricity usage on the ground.[4] There remain potential drawbacks of using luminosity as a measure of development; these include measurement errors in light density related to any cross-county differences in the use of nightlights, blooming and bleeding of light images, gas flares that incorrectly increase luminosity, and differences in light sensitivity across different satellites. When truly unbiased estimates of development activities are available, they should be preferred to the light data for the above reasons. In the absence of such, however, we argue that the luminosity score in China, averaged over a calendar year to minimize these potential measurement errors, serves our purpose as an arguably suitable proxy.

While we interpret the brightness scale as a measure of overall development of the region, the streetlight data feature prominently in both economics and political science literature, albeit in different ways. For example, numerous works in economics use the electricity data to overcome the lack of credible productivity measures at both national and subnational scales (Chen & Nordhaus, 2011; Ebener, Murray, Tandon, & Elvidge, 2005; Henderson, Storeygard, & Weil, 2012; Michalopoulos & Papaioannou, 2011; Sutton, Elvidge, & Ghosh, 2007). In political science, total lumens are interpreted as functions of government provision of electrification, the allocation of scarce power (in countries with shortages), and government investment in streetlights. In a democratic context, scholars have also used the level of illumination as a measure of the extent to which public goods provision is driven by political favors (Agnew, Gillespie, Gonzalez, & Min, 2008; Golden & Min, 2013). Their doing so highlights the political incentives to distribute public goods depending on both a

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region's political importance and leaders' strategies for rewarding their constituents.

To measure illumination within each county, we collected data on light from human settlements detected by the Defense Meteorological Satellite Program's Operational Linescan System (DMSP-OLS). The DMSP-OLS "nighttime lights of the world" images are processed specifically for the detection of change, and are made available by the National Geophysical Data Center. In this paper, we only use lights from human settlements in cloud-free composite images produced using all the available archived satellite images of DMSP-OLS during a calendar year. These composites are scaled onto a geo-referenced 30 arc-second grid (approximately 1 km^2) where each grid cell takes on a 6-bit scale digital number (DN), from 0 to 63. For each year, a grid cell with a value of zero can be interpreted as an area with zero nighttime light. On the other hand, the value of 63 is the saturation value and indicates the brightest area for each year.[5] For each region we calculate the average DN and the difference in DN during 2000–10 as our key dependent variable.

Our main independent variable on ethnic minority population is derived from the 2000 and 2010 Chinese censuses. We use the reported percentages of the population at the county-level which are categorized as ethnic minorities in these two censuses. We also take a list of control variables. For the time-series analysis with 2000–10-differenced control variables, we include changes in population density and total county population, and changes in urban population as a percentage of county population. There are other variables that can influence the changes in streetlight provision over the time period, some of which are only available in the year 2000. Given that we cannot observe the changes in many of these variables over time, we do not use a standard difference-in-differences estimation approach but instead include a list of variables measured in 2000 as initial confounders; these include the mean luminosity score as well as the ethnolinguistic fractionalization (ELF) index score (Fearon, 2003), urban population, total population, population density, average number of years in school, and the percentage of population that is illiterate, all obtained from the China county population census data. We also include 2000 census data on road and railroad coverage by county in kilometers from the township population census data (China Data Center, 2009). In addition, we include several geographic controls, such as the mean county elevation, longitude, and latitude, as well as indicators for a county being an urban center, measured as whether it is where the provincial or prefectural government is located. Finally, we include controls for provincial fixed effects, and an indicator for counties belonging to one of the five ethnic autonomous regions—Guangxi, Inner Mongolia, Ningxia, Tibet, and Xinjiang. We argue that Chinese government's control in those ethnic autonomous regions is less secure, and thus they would have an effect on development provision along ethnic lines. We will also look at the variation among such autonomous regions according to the level of control the Chinese government has, measured by how early the autonomous region was established and how much its population are Han Chinese.

In the following section, we present our findings with a potential caveat of a simultaneity bias in mind; that is, despite a series of demographic, geographic and initial condition controls, we may not fully exclude the possibility that Han Chinese moved to areas that are more developed over the years. One argument that could help with our empirical strategy is to assert that regions with development attracted not only Han migrants, but other types of migrants as well, i.e., local minority groups who moved from rural to urban areas in search for employment opportunities. Since all types of ethnic groups could move to urban areas, this would imply little evidence of higher luminosity necessarily leading to less minority concentration. However, given the lack of urban population data classified into ethnic groups, and in the absence of a clear instrumental variable for the minority concentration variable, we refrain from making any explicit causal claims here, and focus instead on finding a meaningful association between changes in minority concentration and development.

5. EMPIRICAL FINDINGS

We first present summary statistics for both autonomous provinces and non-autonomous provinces in Tables 1a and 1b. It is evident from these tables that autonomous provinces continue to have significantly higher minority concentrations than other western provinces. We also find that for western provinces, both the urban population and population density increased over the time period. Our first cross-sectional analyses are conducted with each census year, and in Table 2, we can see that overall there is a statistically significant and negative correlation between ethnic minority population concentration and development provision. It appears that counties with more ethnic minority concentration generally tend to have fewer developments provided in the form of streetlights compared with counties with more Han Chinese population, irrespective of a set of demographic and geographic controls, as well as provincial fixed effects. The sets of results support our first hypothesis that in terms of development provision, there is a latent bias in the Chinese context, where ethnic minorities have been disproportionally under-provided with electricity.

We then investigate the effect of institutional autonomy in the Chinese setting in Table 3. First, we divide the western provinces into two groups: autonomous provinces including Guangxi, Inner Mongolia, Ningxia, Tibet and Xinjiang, and non-autonomous provinces including Chongqing, Gansu, Guizhou, Qinghai, Shaanxi, Sichuan, and Yunnan. Additionally, we create an interactive variable between ethnic concentration and an autonomy dummy variable. As in Table 2, counties with higher minority concentration appear to have less development, especially in 2010. The coefficients of the interaction variable are negative and suggest that counties in autonomous regions with more ethnic minority concentration may receive lower development provision relative to those in other western provinces, although the results are tenuous to the regression specification and year.

When looking at changes over time, we find evidence of a positive and significant correlation between changes of ethnic minority concentration and changes of development provision during 2000–10. In Table 4 we regress changes in light luminosity on the changes in ethnic minority concentration across counties with a set of control variables, and we also test the effect of autonomy. On the one hand, we find that with the progression of time over the decade, counties in non-autonomous western provinces that have an increase of ethnic minority concentration also report a greater increase in development levels. This perhaps means more targeted development provision toward western provinces that are not institutionally autonomous by the Chinese government.

The analyses also show that autonomous regions are somewhat marginally affected with development provision in temporal terms in comparison with other non-autonomous

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Table 1a. *Summary statistics of autonomous provinces*

Variables	(1) N	(2) mean	(3) sd	(4) min	(5) max
Mean Luminosity in 2000	353	3.280	9.857	0	60.80
Mean Luminosity in 2010	353	6.184	13.71	0	63
Minority Conc. in 2000	353	49.90	37.10	0.390	99.78
Minority Conc. in 2010	353	50.00	36.56	0.190	99.78
Total Urban Pop. in 2000 (in millions)	353	0.0735	0.0972	0	0.506
Total Urban Pop. in 2010 (in millions)	353	0.107	0.139	0.000508	0.724
Total Population in 2000 (in millions)	353	0.216	0.211	0.00638	1.359
Total Population in 2010 (in millions)	353	0.237	0.229	0.00688	1.497
Population Density in 2000	343	639.5	2,831	0.102	35,590
Population Density in 2010	343	1,127	6,797	0.139	107,631
Mean Elevation in km	343	1.856	1.601	0.0312	5.156
Longitude	353	99.97	13.66	74.90	124.5
Latitude	353	36.22	8.150	21.45	51.62
Average Years in School in 2000	353	6.717	2.195	0.630	11.06
Percent of Population illiterate, 2000	353	17.93	19.22	0.550	86.22
State Road Coverage (km) in 2000	353	63.77	81.06	0	488.2
Provincial Road Coverage (km) in 2000	353	64.42	85.65	0	728.9
Railway Coverage (km) in 2000	353	15.94	46.65	0	470.5

Table 1b. *Summary statistics*

Variables	(1) N	(2) mean	(3) sd	(4) min	(5) max
Mean Luminosity in 2000	666	2.459	7.645	0	63
Mean Luminosity in 2010	666	5.895	11.88	0	63
Minority Conc. in 2000	666	26.49	33.78	0	99.11
Minority Conc. in 2010	664	26.75	33.76	0	98.86
Total Urban Pop. in 2000 (in millions)	666	0.103	0.147	0	1.262
Total Urban Pop. in 2010 (in millions)	666	0.153	0.188	0.00286	1.375
Total Population in 2000 (in millions)	666	0.378	0.289	0.00889	1.649
Total Population in 2010 (in millions)	666	0.381	0.283	0.0105	1.563
Population Density in 2000	666	1,036	7,625	0.246	131,858
Population Density in 2010	666	1,454	13,572	0.282	309,756
Mean Elevation in km	666	1.555	1.030	0.243	4.809
Longitude	666	104.6	3.324	92.61	110.9
Latitude	666	30.54	4.299	21.73	40.63
Average Years in School in 2000	666	6.458	1.552	1.470	11.71
Percent of Population illiterate, 2000	666	17.86	14.49	1.600	75.65
State Road Coverage (km) in 2000	666	35.53	60.92	0	1,039
Provincial Road Coverage (km) in 2000	666	57.84	58.94	0	582.0
Railway Coverage (km) in 2000	666	12.50	25.65	0	209.0

Table 2. *2000 vs. 2010 level analysis of western provinces*

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Year 2000			Year 2010		
Minority Conc. in 2000	−0.053***	−0.020***	−0.016***			
	(0.008)	(0.006)	(0.006)			
Minority Conc. in 2010				−0.103***	−0.035***	−0.017*
				(0.012)	(0.009)	(0.010)
Observations	1,019	1,009	1,009	1,017	1,007	1,007
Dem.Controls	No	Yes	Yes	No	Yes	Yes
Geo.Controls	No	No	Yes	No	No	Yes
Provincial FE	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Note: Demography controls include total and urban population, and population density; geographic controls include elevation, longitude, and latitude.

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Table 3. *2000 vs. 2010 level analysis of autonomous provinces*

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	2000			2010		
Minority Conc. in 2000	−0.043***	−0.008	−0.012			
	(0.006)	(0.005)	(0.007)			
Minority2000XAutonomous	−0.027	−0.026	−0.030**			
	(0.018)	(0.015)	(0.010)			
Minority Conc. in 2010				−0.096***	−0.033**	−0.028***
				(0.013)	(0.012)	(0.008)
Minority2010XAutonomous				−0.024	−0.014	−0.011
				(0.022)	(0.026)	(0.020)
One of Autonomous Provinces	3.139	2.339	3.130***	3.749	1.540	2.047
	(1.849)	(1.572)	(0.968)	(2.408)	(2.245)	(1.643)
Constant	3.586***	1.319**	12.518**	8.456***	4.743***	22.942**
	(0.451)	(0.591)	(4.699)	(0.915)	(1.087)	(7.621)
Observations	1,019	1,009	1,009	1,017	1,007	1,007
Dem.Controls	No	Yes	Yes	No	Yes	Yes
Geo.Controls	No	No	Yes	No	No	Yes

Robust standard errors in parentheses.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Note: Demography controls include total and urban population, and population density; geographic controls include elevation, longitude, and latitude.

Table 4. *Changes in luminosity on changes in minority concentration, 2000–10*

Variables	(1)	(2)	(3)	(4)
Change in Minority Conc.	0.103	0.093	0.073*	0.066**
	(0.089)	(0.079)	(0.034)	(0.027)
One of Autonomous Provinces	−0.511	−1.197	−1.239**	−0.785*
	(1.014)	(1.033)	(0.479)	(0.425)
Change in Minority Conc.XAutonomous	−0.068	−0.105	−0.130**	−0.118**
	(0.113)	(0.099)	(0.052)	(0.047)
Constant	3.412***	3.265***	−10.066**	−5.696
	(0.587)	(0.724)	(4.212)	(4.283)
Observations	1,017	1,007	1,007	1,007
Change Controls	No	Yes	Yes	Yes
Year 2000 Controls	No	No	Yes	Yes
Geographic Controls	No	No	No	Yes

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Note: Change controls include changes in total and urban population, and population density; year 2000 controls include minority percent in total population, ELF index, mean light intensity score, urban and total population, population density, average years of school attendance, illiteracy rate, state, provincial road, and railway coverage in kilometers; geographic controls include elevation, longitude, latitude as well as indicators for county being an urban center.

western provinces. That is, counties within autonomous regions in general report temporally negative correlation between ethnic minority concentration and public goods provision. For example, a 10% increase in minority concentration for a county in a non-autonomous region is associated with an increase in luminosity score ranging from 0.66 to 1.0, depending on the specification. In autonomous regions, we find that the increase in minority concentration is associated with an effect mostly in the opposite direction; columns 2–5 show a decrease in luminosity between 0.12 and 0.57 lumens. The effect is small in magnitude, but also points to the situation whereby the WDP has been utilized to target those non-autonomous provinces in the western regions rather than those autonomous regions per se.

In order to understand whether the bias against autonomous regions in development provision is pervasive, we also run separate tests in Table 5 using only the four autonomous regions (Tibet, Inner Mongolia, Xinjiang, Guangxi), but fail to find a consistent and statistically significant relationship across the board.[6] Two autonomous regions report significant but opposite trends during the past 10 years. In the Tibet case, we find that during the 10-year period, the increase in ethnic Tibetan concentration is negatively associated with growth in development provision. The findings suggest a 10% increase in minority concentration being associated with a decrease in light intensity by 0.4 lumens. For Tibet, there is some support for Hypothesis 2 in that the increase of a Han Chinese concentration is positively correlated with more development provision. The coefficient value suggests that one-standard deviation in the minority concentration change explains about 9% of the standard deviation in luminosity change.[7]

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Table 5. *Changes in luminosity on changes in minority concentration, 2000–10 (autonomous provinces)*

Variables	(1) NonAutonomous	(2) Tibet	(3) InnerMongolia	(4) Xinjiang	(5) Guangxi
Change in Minority Conc.	0.042	−0.044*	0.249***	0.018	1.045
	(0.025)	(0.025)	(0.087)	(0.050)	(0.832)
Constant	20.228	−0.515	-42.924*	14.406	73.482
	(11.793)	(1.230)	(24.930)	(14.338)	(74.394)
Observations	664	73	101	94	56

Robust standard errors in parentheses
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Note: Column 1 includes provincial fixed effects; each regression includes the same set of change, year 2000, and geographic controls as in Table 4.

Inner Mongolia, on the other hand, shows the opposite trend. In Table 5 column 3 we find that an increase in non-Han concentration over the decade appears to have led to increased luminosity of the region by 2010 with relatively bigger impact; a 10-percent increase in minority concentration is associated with an increase in light intensity by 2.5 lumens. [8] It appears that in contrast with Tibet, the increase of minority concentration has in fact led to more development provision at the county level, at least in terms of electricity provision for streetlights. The following section offers an interpretation of these results in regards to the effect of regional autonomy in the three largest autonomous regions: Tibet, Inner Mongolia, and Xinjiang.

6. A TALE OF THREE AUTONOMOUS REGIONS

How do we make sense of the opposing relationship between ethnicity and development provision between Tibet and Inner Mongolia during the 10-year span of the WDP? In Tibet, why would we see a temporally negative correlation between growth of Tibetan population and development provisions, while in each year 2000 and 2010 we observe an opposite correlation? In Inner Mongolia, why would there be a positive relation between growth in the ethnic Mongolian population and development provision during the 10-year period, yet we couldn't find significant results in our cross sectional analysis? The following section will comparatively analyze these two ethnically autonomous regions, paying special attention to the logic of demographic changes and their utilities in the Chinese state's developmental strategies. The addition of the third region, Xinjiang, extends this analysis to the three largest ethnic autonomous regions.

(a) *Tibet*

China's rule over Tibet has not been short of controversies, including the official annexation of Tibet after the signing of the 17 Point Agreement in 1951, subsequent rebellions, and the exile of the Dalai Lama to India in 1959 (Goldstein, 1989, 2007, 2014). Despite persistent resistance by Tibetans, the Chinese state's control over Tibet has nonetheless deepened during the past few decades. This manifests not only in the ever-strong security presence and the state's heavy-handed treatment toward dissent, but more so in the sense of deepening integration of Tibet with the rest of China–economically, socially, and culturally. As the last autonomous region to be incorporated into the PRC, and due to its rough terrain, high altitude and inaccessibility, Tibet is still arguably the least integrated ethnic region in China (Paik & Shawa, 2013).

Demographically, ethnic Tibetans still overwhelmingly dominate Tibetan areas. Although there have been waves of Han Chinese migration to Tibet, most Han are concentrated in the urban areas (Hu & Salazar, 2008; Sautman & Eng, 2001). Increasingly, the interethnic division between Han Chinese and Tibetan has taken on an urban versus rural dimension (Fischer, 2008). Also, many of the Han Chinese migrants to Tibet are not long-term settlers like those in Xinjiang and Inner Mongolia. Given the historical record and tendency to settle Han Chinese in peripheral areas to solidify control, it is unreasonable to believe that the current Chinese state has not tried to implement a large-scale, long-term settlement policy. That is, the fact that the Tibetan areas have not been made demographically more Han Chinese is not a policy oversight on part of the Chinese state, but rather a failure to successfully implement such migration and settlements into an area that is geographically inhospitable. However, despite such difficulties, with the fast growth of China's economy and of its technological know-how, the physical integration of Tibet with the rest of China has certainly sped up during the past few decades with construction of roads, railways, and airports that facilitate the mass movement of people and goods (Lafitte, 2013). In addition, the Chinese state has used extensive economic subsidization of TAR, which has arguably exacerbated the dependence of local Tibetan livelihoods on these state strategies (Fischer, 2015).

Therefore, because of the continual need to further integrate Tibet and encourage more Han Chinese to migrate to Tibetan areas, it is not surprising to see, from our statistical analysis above, that during the 10-year period during 2000–10, there has been an observable positive correlation between development provision and the growth of the Han Chinese population in Tibet, and this effect is confined within the TAR at the provincial level, but not for other Tibetan areas outside of the TAR (see Table 6, which reports non-significance results for Tibetan Autonomous Prefectures (TAP) outside the TAR). [9] This supports the argument that the Chinese state is offering special incentives to ease Han Chinese migration to Tibetan areas. This also supports the argument that Tibetans are increasingly marginalized, with more economic development in Tibet disproportionally benefiting Han Chinese (Fischer, 2013; Yeh, 2013). In this case, the Chinese state's preferential treatment of Han Chinese in Tibetan areas with better provision of development across time is consistent with the logic of ethnic preference by a biased political center.

Table 6. *Changes in Luminosity on Changes in Minority Concentration, 2000–2010 (Tibetan Autonomous Prefectures)*

Variables	(1) TAP	(2) TAP without TAR
Change in Minority Conc.	−0.024	0.004
	(0.022)	(0.028)
Constant	1.224	10.875
	(2.941)	(11.236)
Observations	158	85

Robust standard errors in parentheses.
$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.
Note: Columns 1 and 2 include provincial fixed effects; each regression includes the same set of change, year 2000, and geographic controls as in Table 4.

(b) *Inner Mongolia*

Although it is one of China's five autonomous regions, Inner Mongolia differs from Tibet in that it is geographically closer to "China proper." Continuing the long historical pattern of intensive interaction between nomadic and agrarian societies in northern China (Grousset, 1988), the relationship between the Mongol minority and the Han majority in the recent past has been characterized by the tension between pastoral and agricultural economics and their corresponding social and cultural systems (Sneath, 2000). These factors together mean that in Inner Mongolia, Han Chinese migration and settlement have been a relatively long process, and today more than 80% of population in Inner Mongolia are actually Han Chinese, while the Mongols have become an absolute minority (Bulag, 2002). Therefore, compared with Tibet, Inner Mongolia has been much better integrated with the rest of China. [10] Whereas the former is still being integrated, as we discussed above, with the state's active encouragement of Han Chinese migration and settlement, in Inner Mongolia integration is no longer such a priority for the Chinese state. In addition, Inner Mongolia's geographical proximity means that it is deeply integrated with industrialization of north China, with heavy emphasis on the mining sectors (Fischer, 2013, p. 136).

Instead, during the past few decades or so, the Chinese government's Inner Mongolia development strategy has been motivated by pastoral management in the name of environmental protection and resettlement of Mongolians from pastoral areas into urban settings (Baranovitch, 2016; Han, 2011). This involves a layered system of grazing bans in pastoral areas as well as resettlement of mostly ethnic Mongolian herding communities to specially designated places in urban areas. In the process, many ethnic Mongols are promised economic compensation and additional incentives to move into those resettlement areas, such as housing, and jobs, and so forth (Dong, Liu, & Klein, 2012; Rogers & Wang, 2006). From our analysis above, we can see that areas with growing ethnic Mongol populations during the 10-year period are also the ones experiencing more development, at least in terms of electricity. Due to this different development logic in Inner Mongolia, we have observed an opposite preferential treatment along ethnic lines as compared to that of Tibet, whereby the provision of public goods favored the ethnic minority group rather than the majority.

(c) *Xinjiang*

Xinjiang is the largest ethnic autonomous region that connects China with Central Asia. As the largest ethnic group in the region, Uyghurs had historically been dwellers of oases in southern Xinjiang, while nomadic groups such as the Kazaks and Mongols roamed the steppes in the north. The Han Chinese population arrived largely after the incorporation of Xinjiang into the PRC, and currently is the second largest ethnic group, concentrated in the urban areas in northern Xinjiang.

In comparison with Tibet and Inner Mongolia, the extent of Han Chinese migration to Xinjiang and the level of political integration of Xinjiang lies in the middle. This autonomous region was established in 1955, and Han Chinese have so far accounted for more than 40% of the total population. Thus in Xinjiang, Han Chinese and the Uyghurs are almost at parity with each other in terms of demographic balance. Certainly, the Chinese state is interested in encouraging further Han Chinese migration to Xinjiang to solidify its control. Yet such attempts have been hampered by the radicalization of the Uyghurs and the deteriorating security situation in the region.

Of all the autonomous regions in China, Xinjiang is by far the most violent, as it has been marred by waves of ethnic riots for the past couple of decades. Since the collapse of the Soviet Union in Central Asia in the 1990s, the Uyghurs have strongly resisted the PRC's control through violent means. Bombings, assassinations, and militarized attacks have been carried by Uyghur militants, targeting public places, Uyghur government officials and religious clerics believed to be in cooperation with the Chinese government (Millward, 2004). However, the largest riot in Xinjiang occurred in Urumqi in July 2009, in which attacks on civilians led to the death of 184 people. Since then, there have been many further attacks resulting in high civilian death tolls—mostly of ethnic Han Chinese. In April 2014, coinciding with Chinese President Xi Jinping's visit to Xinjiang, bombs went off at the Urumqi Railway station, killing three and injuring 79. [11] In September 2015, a major terrorist attack by Uyghur militants in a coal mine in southern Xinjiang led to the death of at least 50 people. [12]

As a result of these attacks aimed at the Han Chinese, as well as an overall deterioration of security conditions in the region, Xinjiang has witnessed a reversal of Han Chinese immigration. These violent incidents have diminished impact of the WDP on Han presence and subsequent development therefrom, which may explain the non-significance of change in minority concentration in Table 5 Column 4. [13]

7. CONCLUDING REMARKS

The conventional understanding of ethnicity and development suggests that ethnically diverse societies are worse at providing public goods and fostering economic growth.

Furthermore, ethnic minorities tend to experience discrimination because of their lack of access to political power; thus collective action problems arise due to their diverging interests. Such logic is easier to comprehend within a democratic setting, wherein electoral incentives often negatively affect ethnic minority communities. However, there is less of a consensus on how such a relationship pans out in authoritarian settings. From our analysis of the data on China's western regions, we find that the relationship between ethnic minority concentration and development is not a straightforward one. Although there is in general a tendency for ethnic minority concentrated areas to be less developed, ultimately, which groups prosper more or less depends upon specific economic development and political control logics that the Chinese state implements. Such logics, especially in authoritarian regimes, might be extremely difficult to generalize, because the state tends to have more autonomy (or even whim) to decide who gets what in terms of public goods. Groups might be punished for political dissent, but they might also be the aim of an attempt to woo. This is especially so when an authoritarian regime does not rely upon a narrow power base, such as perhaps the Assad regime in Syria (De Juan & Bank, 2015). What we find in this paper is a combination of both systematic ethnic integration spurred on by the Beijing administration and the consequential development focused around Han Chinese migration. At the same time, however, development is witnessed in ethnic minority areas where there has already been a history of integration prior to the WDP implementation. These findings suggest that, in the corporatist system that the CCP currently operates in China, the state's interest in providing development might not be subject to a system of deliberate discrimination, rather depending instead upon unique circumstances of political manipulation and control.

NOTES

1. The PRC has been consistently categorized as an authoritarian regime within the field of political science. For example, the Polity Project and the Freedom House ranking always rank the PRC as an authoritarian. However, there are certain features of the nominally communist regime that makes it distinct from other authoritarian governments, in that the Chinese state officially endorses a multiethnic nationalist ideology whereby in theory all ethnic groups are equal, and the state is committed to providing economic development to all. However, in reality, the majority Han Chinese have always been considered as stewards to help all the other smaller ethnic groups progress. Furthermore, the ruling CCP is neither accountable to an electorate, nor does it respect people's political and civil rights. Therefore, the inherent authoritarian regime logic toward development provision should be generalizable to other authoritarian regimes.

2. In fact, the Chinese central government started to prioritize western development in the 9th Five Year plan from the mid-1990s onwards. Given the previous development bias favoring the coastal provinces, this prioritization on the Western provinces aimed to readdress the imbalance. We thank an anonymous reviewer for this point.

3. A further and important goal of WDP was to develop a supply chain for coastal exporters. We thank an anonymous reviewer for this point.

4. In De Juan and Bank's piece on political violence in Syria, the authors also use electricity as measured by nighttime light image as indicators of public goods provision.

5. While the digital numbers are relative values and thus are not comparable between two years, we follow standard practice in assuming that the calibration problem is in fact not crucial. As long as the measurement error and saturation issue in light intensity occur uniformly across different districts (as seems plausible, since the errors that compromise comparability pertain to satellite-specific issues and not errors that vary over space), we argue that we can compare differences in light intensity between the two years by controlling for any year-specific biases.

6. In the individual analysis of different autonomous provinces, Ningxia is excluded because of its low number of counties (19).

7. The mean change in light intensity in Tibet is 0.20 over the decade, with a standard deviation of 0.99; the mean change in minority concentration (in terms of percentage of total population) is −1.65, with a standard deviation of 2.11.

8. Another way to interpret the result is that one-standard deviation of change in minority concentration in Inner Mongolia (4.97), explains about 20% of the standard deviation of change in light intensity over the same decade (6.06).

9. An alternative logic of this high correlation between development provision and Han Chinese population growth is the high-speed urbanization that the TAR has experienced during the past couple of decades. During this process, large number of Tibetan rural population has been moving to urban areas where Han Chinese migrants are also concentrated, yet the Tibetans face systematic exclusions in the urban labor market (Fischer, 2011). We would like to thank an anonymous reviewer for this point.

10. In addition, the historical interaction between the Mongols and Han Chinese has also been more intense than Tibetans or Uyghurs. Overall speaking, Mongols in China have better linguistic skills in Mandarin Chinese than Tibetans or Uyghurs, which means they are better positioned to participate and benefit from the Chinese labor market than the other two ethnic minority groups. We would like to thank an anonymous reviewer for this point.

11. http://www.cnn.com/2014/04/30/world/asia/china-xinjiang-explosion/.

12. http://www.scmp.com/news/china/policies-politics/article/1863165/least-50-reportedly-killed-September-xinjiang-attack.

13. In the case of Xinjiang, we also investigate whether the north–south division in the province is associated with the level of development change. In Southern Xinjiang, especially Kashgar and Hotan, the Uyhgurs are more than 90% of local population, whereas Han Chinese are largely concentrated in the industrialized and urbanized north of the province. Including a dummy that identifies the south counties to the regression in Table 4 Column 5, we find suggestive (but statistically insignificant) evidence for less development in the south over the decade relative to the north. The inclusion also does not alter our main result in Column 5. We code the counties within the following prefectures as in the south of Xinjiang: Aksu, Bayingol, Hotan, Kashgar, and Kizilsu.

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