Can underdeveloped areas catch up with developed areas in China?

Evidence from nighttime light intensity data from outer space

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Abstract

Using nighttime light intensity data of prefecture-level cities and counties as a measure of economic development of China from 2005 to 2013, we make an attempt to explore whether underdeveloped areas can catch up with developed areas by evaluating ranking persistence of regional economy year by year. Our analysis suggests that underdeveloped areas cannot successfully catch up with developed areas during this period of time and the regional economy ranking did not change statistically significantly. Moreover, we should consider the uneven development of regional economies and the real effect of varieties of regional revitalization programs in China.

JEL classification numbers: O11, R11, R58

Keywords: regional economy, satellite light data, China economy

1 Introduction

In China, the economic development of Guizhou Province draws more and more public attention. The development of Guiyang, which is Guizhou's capital city, has soared in the last decade. Guiyang's economic growth rate are ranked first in China's provincial capital cities, and the process of Guiyang's economic development is a successful road of self-struggle. Guiyang has been hailed as the capital of "China's big data capital". Many world leading enterprises are establishing branches here or are about to move here, such as Alibaba, Apple, Huawei, Qualcomm and so on. Guizhou Province is an example indicating that China's underdeveloped area can catch up with developed areas by efforts. We aim to study whether this is an individual case or a general phenomenon

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in China during the last decade.

Nowadays, there is a large body of literature concerning the regional economic development of emerging market (Chi Gong and Soyoung Kim,2018; Lahoti and Swaminathan,2016; Hai Zhong,2011). Some emerging markets have implemented economic reforms successfully in recent years and experienced amazing economic development. However, uneven development of economy in these emerging markets draw more and more attention (Dabla Norris et al.,2016; W Cai et al., 2016; Haoyuan Ding et al.,2018). Illuminating researches on China's economy increase dramatically recently (Daniel S. Kim, et al.,2018). In this research, we are interested in the real effect of China's strategic policy - Common Prosperity Policy and we try to answer the question that do underdeveloped areas catch up with developed areas in the latest decade. According to Henderson JV et al. (2012), we use nighttime light intensity data as a proxy for regional economic level.

2 Data and Methods

2.1 Nighttime light intensity data and vector map of China

We obtain China's nighttime light intensity data from National Oceanic and Atmospheric Administration's3(NOAA). Satellites from the United States Air Force Defense Meteorological Satellite Program(DMSP) have recorded the intensity of Earth-based lights using the Operational Linescan System(OLS) sensors since the 1970s. Scientists at NOAA process the raw data and distribute the final data to the public. Each satellite-year dataset is a grid reporting the intensity of lights as a six-bit digital number. The digital number is an integer between 0 (no light) and 63 (brightest).

Here we give more details of a few of these aspects. Because sensor settings may vary across satellites and as a satellite ages, Elvidge et al. (2009) perform an "intercalibration," relating the different satellite‐years of data to each other, without tying them directly to physical quantities, based on the identifying assumption that lights in Sicily did not change between 1994 and 2008. Rather than use the formulas

[3] https://www.ngdc.noaa.gov/eog/dmsp/downloadV4composites.html

in Elvidge et al. (2009) to do that specific intercalibration, in statistical work we get rid of these problems by only using light intensity data to rank, which we find to be readily interpretable. Light intensity data processed by a specific satellite in the same year is comparable and can be ranked in the same year. So our ranking method is not affected by the subtle non-comparability between different years and different satellites.

We obtain vector maps of administrative divisions in China from National Geomatics Center of China consisting of 33 provinces, 340 prefecture-level cities and 2382 counties respectively. China's land area is 9.6 million square kilometers, about 1/15 of the world's total land area, ranked third in the world. The eastern region, the central region and the western region accounted for 10.5%, 25.3% and 64.2% respectively. China is the world's second largest economy (after the United States), the world's largest industrialized nation and the world's largest agricultural country. China’s vector map with county’s boundaries is illustrated in Figure 1:

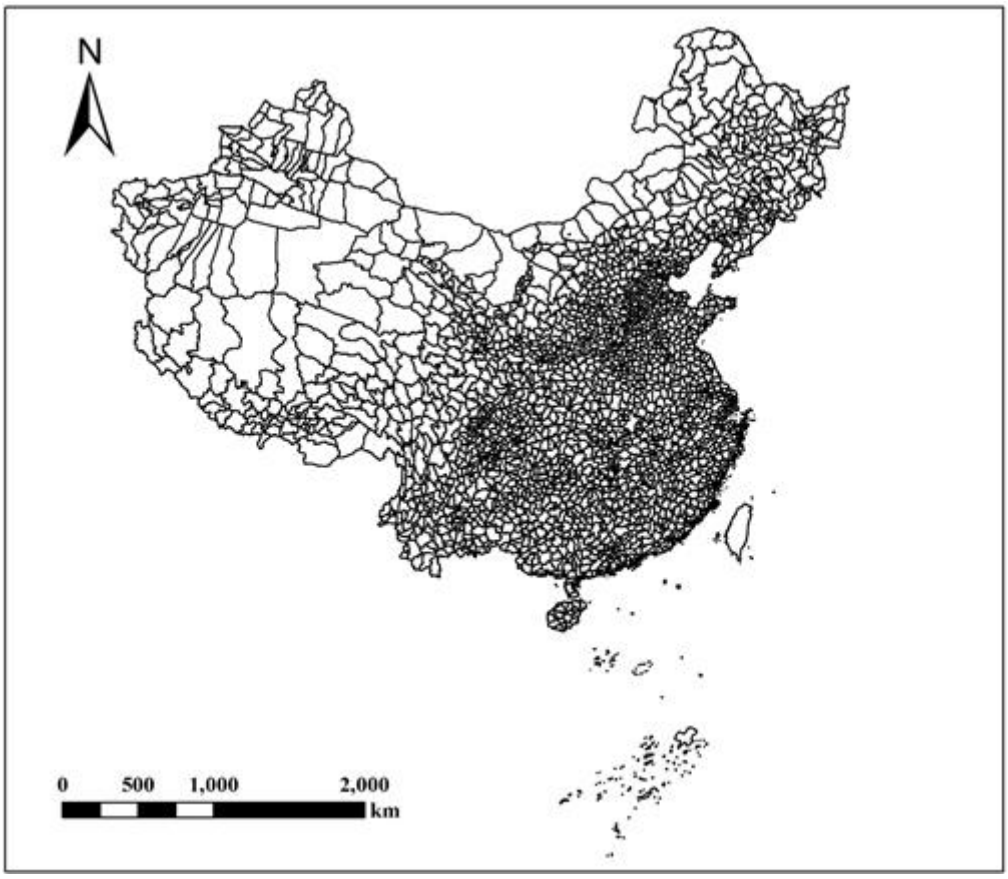

Figure 1: County map of China

2.2 Nighttime light intensity data of administrative divisions

Firstly, we merge NOAA's nighttime light intensity data with vector map of administrative divisions of China, then we have digital numbers in each of administrative divisions. Secondly, we calculate simple average of digital number as measure of light intensity of each administrative division by vector-raster technique. Consistent with common sense, the larger the light density is, the more developed the area is. If we study the sum of digital number in each administrative division, the results remain unchanged. Researchers have confirmed the linear correlation between light intensity and economic level. We use it as proxy for economy level instead of official GDP, because it's more reliable than official GDP statistics. For example, China's nighttime light intensity of the year of 2013 is illustrated in Figure 2:

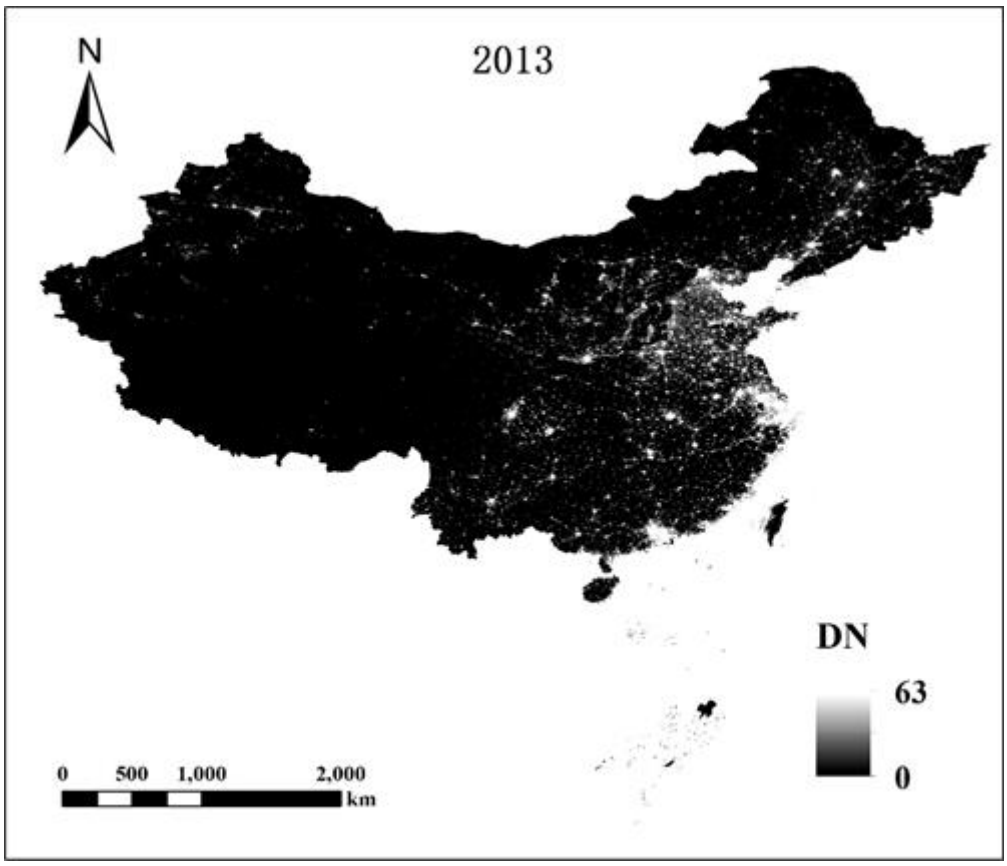

Figure 2: China's nighttime light intensity in 2013

where DN indicates digital number with a range of [0,63] . The summary statistics of digital number is illustrated in Table 1 as follows:

Table 1: Summary statistics of digital number by year

year	obs	min	max	mean	median	std	p25	p75
2005	2382	0	63	4.72	1.67	8.23	0.53	5.15
2006	2382	0	63	5.43	1.94	9.03	0.57	6.18
2007	2382	0	63	6.16	2.54	9.61	0.79	7.10
2008	2382	0	63	6.13	2.41	9.76	0.74	6.94
2009	2382	0	63	5.75	1.95	9.30	0.59	7.03
2010	2382	0	63	8.28	3.70	11.40	1.30	10.30
2011	2382	0	63	7.62	3.18	11.13	1.13	9.04
2012	2382	0	63	7.87	3.38	11.15	1.14	9.69
2013	2382	0	63	8.58	3.65	11.94	1.31	10.77

2.3 Methods: Spearman Correlation Test and Contingency Table Test

In order to answer whether underdeveloped areas can catch up developed areas, we study whether the regional nighttime light intensity ranking will change significantly in two consecutive years. If the underdeveloped can catch up with the developed, their ranking may change year by year and the ranking can't be persistent all the time. Conversely, if economy ranking is stable and changes little then the underdeveloped can't catch up with the developed statistically. From 2003 to 2012, We use light intensity ranking of year T as formation period ranking, then we use light intensity ranking of year T+1 as the test period ranking. By comparing rankings in these two consecutive years, we can estimate how the ranking changes. We use two different methods (Spearman Correlation Test and Contingency Table Test) to estimate the correlation between T-year's ranking and T+1-year's rankings and repeat this estimation every year.

Spearman correlation test is generally used to study the correlation of two sequences, when the distribution of the sample does not obey the normal distribution, the total distributed type is unknown or the data is ordered, the Spearman correlation is an effective and reasonable choice. The Spearman correlation coefficient takes the range between (-1,1), the sign indicates the correlation direction, namely a positive coefficient indicating that two sequences are positive correlation, vice versa. The greater the absolute value of Spearman correlation coefficient, the stronger the

correlation is. For example, the Spearman correlation test statistics are as follows:

$$\rho_t = 1 - \frac{6\sum_{i=1}^{n_t} d_{i,t}^2}{n_t(n_t^2 - 1)} \quad (1)$$

where $d_{i,t} = r_{i,t-1} - r_{i,t}$, and $r_{i,t-1}$ and $r_{i,t}$ are respectively region i's light intensity ranking in the year t-1 and year t, nt is the number of the areas in year t. If the ρt is significantly greater than 0 (or less than 0), it indicates that the ranking of regional economy is persistent (or reversible), and that if the difference between the Spearman correlation coefficient and 0 is not significant, the sorting period ranking and the test period ranking are not correlated at all.

In contingency table test, we can track the dynamics of light intensity ranking with a nonparametric methodology based upon contingency tables. Every year, we use a contingency table to report the frequency counts. The table identifies an area as a winner in the current year if it is above or equal to the median of all areas with light intensity reported that year. The same criterion is used to identify it as a winner or loser for the following year. For example, Winner - Winner (WW) for 2005 is the count of the winners in 2005 that were also winners in 2006. The same principle defines the other categories. According to Droms (2001), cross - product ratio reports the odds ratio of the number of repeat performers to the number of those that do not repeat; that is, (WW∗LL)/(WL∗LW). The null hypothesis that performance in the first year is unrelated to performance in the second year corresponds to an odds ratio of one. In large samples with independent observations, the standard error of the natural log of the odds ratio is well approximated. The structure of contingency table is illustrated in Table 2.

Table 2: Contingency Table

Test year / Formation year	(Winner)	(Loser)
(Winner)	WW	WL
(Loser)	LW	LL

Cross - Product Ratio is calculated as follow:

$$CPR = \frac{WW * LL}{WL * LW} \tag{2}$$

ln(CPR) is normally distributed, its standard deviation is as follow:

$$\sigma_{\ln(CPR)} = \sqrt{1/WW + 1/WL + 1/LW + 1/LL} \tag{3}$$

Then we can test by constructing Z statistics to see if it equals to 0. When the observed values are independent of each other, the Z statistic follows standard normal distribution approximately.

$$Z = \frac{\ln(CPR)}{\sigma_{\ln(CPR)}} \to Norm(0,1) \tag{4}$$

If the Z statistic is significantly greater than 0, the corresponding CPR is significantly greater than 1, indicating that the regional economic rankings are sustainable. Conversely, if Z statistic is significantly less than 0, the corresponding CPR is significantly less than 1, indicating a reversal of the ranking of regional economy. If the difference between Z statistic and 0 is not significant, the corresponding CPR is close to 1, at this time number of region in each group is roughly equal, indicating that regional economy rankings is random at test year.

3 Main Results: Estimating the dynamics of regional economy ranking

In this part, we give the test results of the regional economic rankings of 3 different administrative levels, namely provinces, prefecture-level cities and counties. The results show that the regional ranking is statistically persistent, and there is no statistical evidence that the underdeveloped can catch up and exceed the developed. The developed are have been the engine of China's economy for three decades. For underdeveloped regions, the backwardness of the status quo is unchanged.

3.1 Can underdeveloped counties catch up with developed ones?

The main results of county-level economy ranking dynamics are reported in Table 3, Table 4, Table 5 and Table 6. In table 3, nation-wide spearman coefficients of county

economy ranking are all less than and close to one, indicating that economic development of China's counties is relatively stable and the underdeveloped areas can't catch up with the developed areas statistically. Moreover, according to standard of National Bureau of Statistics of China, we divide China into four regions (East Area, Middle Area, West Area and Northeast Area) and calculate spearman coefficients respectively, while the results also validate that few catch-up cases happen in recent years.

Table 4 shows that county economy ranking persistent in 4 different regions. The eastern region is most developed, the middle region is a sub-developed area, the western region's economy is backward, the northeast region is a declining industrial base with net outflow of population. Table 4 also validates the previous point of view since spearman coefficients are significantly larger than 0, indicating that county level economy ranking is significantly persistent and there's few evidence that underdeveloped ones catch up with developed counterparty.

Table 3: Spearman analysis of County-level economy ranking

(Formation)-Test	Spearman Coefficient	P value
(2005)-2006	0.991	<.0001
(2006)-2007	0.993	<.0001
(2007)-2008	0.993	<.0001
(2008)-2009	0.986	<.0001
(2009)-2010	0.986	<.0001
(2010)-2011	0.994	<.0001
(2011)-2012	0.993	<.0001
(2012)-2013	0.994	<.0001

Table 4: Spearman analysis of county-level economy ranking by 4 regions

(Formation)-Test	Region	Spearman Coefficient	P Value
(2005)-2006	East	0.988	<.0001
(2006)-2007	East	0.996	<.0001
(2007)-2008	East	0.996	<.0001
(2008)-2009	East	0.99	<.0001
(2009)-2010	East	0.99	<.0001
(2010)-2011	East	0.994	<.0001
(2011)-2012	East	0.996	<.0001

(2012)-2013	East	0.995	<.0001
(2005)-2006	Middle	0.986	<.0001
(2006)-2007	Middle	0.982	<.0001
(2007)-2008	Middle	0.991	<.0001
(2008)-2009	Middle	0.974	<.0001
(2009)-2010	Middle	0.975	<.0001
(2010)-2011	Middle	0.991	<.0001
(2011)-2012	Middle	0.99	<.0001
(2012)-2013	Middle	0.989	<.0001
(2005)-2006	West	0.987	<.0001
(2006)-2007	West	0.99	<.0001
(2007)-2008	West	0.988	<.0001
(2008)-2009	West	0.983	<.0001
(2009)-2010	West	0.981	<.0001
(2010)-2011	West	0.988	<.0001
(2011)-2012	West	0.989	<.0001
(2012)-2013	West	0.991	<.0001
(2005)-2006	Northeast	0.971	<.0001
(2006)-2007	Northeast	0.964	<.0001
(2007)-2008	Northeast	0.966	<.0001
(2008)-2009	Northeast	0.975	<.0001
(2009)-2010	Northeast	0.95	<.0001
(2010)-2011	Northeast	0.985	<.0001
(2011)-2012	Northeast	0.966	<.0001
(2012)-2013	Northeast	0.971	<.0001

In Table 5, Z statistics are significantly greater than 0, indicating that nation-wide county economy ranking change little between formation year and test year. WW proportion of each test year is always larger than 47%, while LL always account for about 48% of total observations. It tells that winners are always winners and losers are always losers, even the ranking is rarely changed. Every year, about two percent of counties falling into below-median group from above-median group, while same percent of counties replace their place in above-median group. But this is not a statistically significant catch-up phenomenon, so contingency table test also suggests that underdeveloped counties can't catch up with their counterparties during last decade. Although Table 6 supports this conclusion, but there's subtle difference among the 4 different regions in contingency table test. We find that the more developed the region is, the smaller probability of WL (or LW) is. The developed eastern region has least

probability of WL/LW, while the proportion of WL/LW of northeast region is larger.

Table 5: Contingency table test of County-level economy ranking

(Formation)-Test	CPR	Z-statistic	WW	LL	WL	LW	obs
(2005)-2006	786.68	29.67	48.3%	48.3%	1.7%	1.7%	2382
(2006)-2007	872.43	29.41	48.4%	48.4%	1.6%	1.6%	2382
(2007)-2008	827.93	29.54	48.3%	48.3%	1.7%	1.7%	2382
(2008)-2009	395.8	31.16	47.6%	47.6%	2.4%	2.4%	2382
(2009)-2010	310.09	31.57	47.3%	47.3%	2.7%	2.7%	2382
(2010)-2011	1090.63	28.83	48.5%	48.5%	1.5%	1.5%	2382
(2011)-2012	972.61	29.13	48.4%	48.4%	1.6%	1.6%	2382
(2012)-2013	1157.66	28.67	48.6%	48.6%	1.4%	1.4%	2382

Table 6: Contingency table test of county-level economy ranking by 4 regions

(Formation)-Test	Region	CPR	Z	WW	LL	WL	LW	obs
(2005)-2006	East	470.0	15.92	47.9%	47.7%	2.2%	2.2%	635
(2006)-2007	East	3906.2	12.97	49.3%	49.1%	0.8%	0.8%	635
(2007)-2008	East	945.4	15.08	48.5%	48.3%	1.6%	1.6%	635
(2008)-2009	East	312.5	16.29	47.4%	47.2%	2.7%	2.7%	635
(2009)-2010	East	406.7	16.06	47.7%	47.6%	2.4%	2.4%	635
(2010)-2011	East	776.3	15.33	48.3%	48.2%	1.7%	1.7%	635
(2011)-2012	East	1496.7	14.44	48.8%	48.7%	1.3%	1.3%	635
(2012)-2013	East	648.1	15.56	48.2%	48.0%	1.9%	1.9%	635
(2005)-2006	Middle	226.7	15.76	46.9%	46.9%	3.1%	3.1%	578
(2006)-2007	Middle	333.7	15.49	47.4%	47.4%	2.6%	2.6%	578
(2007)-2008	Middle	967.8	14.36	48.4%	48.4%	1.6%	1.6%	578
(2008)-2009	Middle	256.0	15.68	47.1%	47.1%	2.9%	2.9%	578
(2009)-2010	Middle	180.9	15.86	46.5%	46.5%	3.5%	3.5%	578
(2010)-2011	Middle	778.4	14.63	48.3%	48.3%	1.7%	1.7%	578
(2011)-2012	Middle	450.7	15.23	47.8%	47.8%	2.2%	2.2%	578
(2012)-2013	Middle	638.7	14.86	48.1%	48.1%	1.9%	1.9%	578
(2005)-2006	West	621.0	19.44	48.1%	48.0%	1.9%	1.9%	985
(2006)-2007	West	1013.2	18.66	48.5%	48.4%	1.5%	1.5%	985
(2007)-2008	West	457.4	19.86	47.8%	47.7%	2.2%	2.2%	985
(2008)-2009	West	170.8	20.73	46.5%	46.4%	3.6%	3.6%	985
(2009)-2010	West	193.9	20.67	46.7%	46.6%	3.4%	3.4%	985
(2010)-2011	West	349.7	20.18	47.5%	47.4%	2.5%	2.5%	985
(2011)-2012	West	416.7	19.97	47.7%	47.6%	2.3%	2.3%	985
(2012)-2013	West	621.0	19.44	48.1%	48.0%	1.9%	1.9%	985
(2005)-2006	Northeast	205.4	8.92	46.7%	46.7%	3.3%	3.3%	184
(2006)-2007	Northeast	484.0	8.55	47.8%	47.8%	2.2%	2.2%	184

(2007)-2008	Northeast	147.4	8.98	46.2%	46.2%	3.8%	3.8%	184
(2008)-2009	Northeast	110.2	8.99	45.7%	45.7%	4.3%	4.3%	184
(2009)-2010	Northeast	110.2	8.99	45.7%	45.7%	4.3%	4.3%	184
(2010)-2011	Northeast	302.8	8.78	47.3%	47.3%	2.7%	2.7%	184
(2011)-2012	Northeast	147.4	8.98	46.2%	46.2%	3.8%	3.8%	184
(2012)-2013	Northeast	205.4	8.92	46.7%	46.7%	3.3%	3.3%	184

3.2 Can underdeveloped prefecture-level cities catch up with developed ones?

In this section, we provide prefecture-level cities ranking analysis with the same method showed above. The main results are reported in Table 7, Table 8, Table 9 and Table 10. In table 7, nation-wide spearman coefficients of prefecture-level cities ranking are all less than and close to one, indicating that economic development of China's prefecture-level cities is relatively steady and the underdeveloped areas can't catch up with the developed areas significantly. Spearman coefficients of East Area, Middle Area, West Area and Northeast Area also validate that catch-up stories are not general phenomenon in China economy.

Table 8 shows that prefecture-level cities' economy rankings are persistent in 4 different regions. It also validates the previous point of view since spearman coefficients are significantly larger than 0, indicating that prefecture-level cities' rankings are significantly persistent and underdeveloped cities left behind of the developed ones.

Table 7: Spearman analysis of prefecture-level city ranking

(Formation)-Test	Spearman Coefficient	PValue
(2005)-2006	0.994	<.0001
(2006)-2007	0.994	<.0001
(2007)-2008	0.995	<.0001
(2008)-2009	0.986	<.0001
(2009)-2010	0.988	<.0001
(2010)-2011	0.994	<.0001
(2011)-2012	0.995	<.0001
(2012)-2013	0.995	<.0001

Table 8: Spearman analysis of prefecture-level city ranking by 4 regions

(Formation)-Test	Region	Spearman Coefficient	PValue
(2005)-2006	East	0.991	<.0001
(2006)-2007	East	0.994	<.0001
(2007)-2008	East	0.993	<.0001
(2008)-2009	East	0.979	<.0001
(2009)-2010	East	0.983	<.0001
(2010)-2011	East	0.988	<.0001
(2011)-2012	East	0.994	<.0001
(2012)-2013	East	0.993	<.0001
(2005)-2006	Middle	0.988	<.0001
(2006)-2007	Middle	0.978	<.0001
(2007)-2008	Middle	0.991	<.0001
(2008)-2009	Middle	0.979	<.0001
(2009)-2010	Middle	0.974	<.0001
(2010)-2011	Middle	0.989	<.0001
(2011)-2012	Middle	0.987	<.0001
(2012)-2013	Middle	0.988	<.0001
(2005)-2006	West	0.991	<.0001
(2006)-2007	West	0.992	<.0001
(2007)-2008	West	0.993	<.0001
(2008)-2009	West	0.991	<.0001
(2009)-2010	West	0.988	<.0001
(2010)-2011	West	0.991	<.0001
(2011)-2012	West	0.993	<.0001
(2012)-2013	West	0.994	<.0001
(2005)-2006	Northeast	0.99	<.0001
(2006)-2007	Northeast	0.992	<.0001
(2007)-2008	Northeast	0.973	<.0001
(2008)-2009	Northeast	0.975	<.0001
(2009)-2010	Northeast	0.968	<.0001
(2010)-2011	Northeast	0.977	<.0001
(2011)-2012	Northeast	0.961	<.0001
(2012)-2013	Northeast	0.971	<.0001

In Table 9, Z statistics are significantly greater than 0, indicating that nation-wide prefecture-level economy ranking change little between formation year and test year. Winer-Winer proportion of each test year is always larger than 48%, while Loser-Loser always account for more than 48% of total observations. It shows that winners are always winners and losers are always losers, while the ranking is rarely changed. Every year, only about one percent of prefecture-level cities falling into lower half from upper half, while the same amount of prefecture-level cities replacing their counterparties in

upper half. Statistically, this is not a significant catch-up phenomenon, so contingency table test also suggests that underdeveloped prefecture-level cities can't catch up with their counterparties during the last decade.

Table 10 supports previous viewpoint and delivers some extra information among the 4 different regions in contingency table test. We find that WL (or LW) accounts for more than three percent of observations in East region. While the other three less developed regions have less probability of WL/LW. For example, between 2010 to 2012, ranking of middle region hadn't changed at all and there's no WL/LW samples.

Table 9: Contingency table test of prefecture-level cities ranking

(Formation)-Test	CPR	Z	P	WW	LL	WL	LW	obs
(2005)-2006	1088.74	10.89	<.0001	48.5%	48.5%	1.5%	1.5%	340
(2006)-2007	7054.85	8.81	<.0001	49.4%	49.4%	0.6%	0.6%	340
(2007)-2008	1722.25	10.41	<.0001	48.8%	48.8%	1.2%	1.2%	340
(2008)-2009	1722.25	10.41	<.0001	48.8%	48.8%	1.2%	1.2%	340
(2009)-2010	1088.74	10.89	<.0001	48.5%	48.5%	1.5%	1.5%	340
(2010)-2011	3098.76	9.76	<.0001	49.1%	49.1%	0.9%	0.9%	340
(2011)-2012	747.07	11.26	<.0001	48.2%	48.2%	1.8%	1.8%	340
(2012)-2013	747.07	11.26	<.0001	48.2%	48.2%	1.8%	1.8%	340

Table 10: Contingency table test of prefecture-level cities ranking by 4 regions

(Formation)-Test	Region	CPR	Z	P	WW	LL	WL	LW	obs
(2005)-2006	East	196	6.25	<.0001	46.7%	46.7%	3.3%	3.3%	90
(2006)-2007	East	196	6.25	<.0001	46.7%	46.7%	3.3%	3.3%	90
(2007)-2008	East	196	6.25	<.0001	46.7%	46.7%	3.3%	3.3%	90
(2008)-2009	East	64	6.2	<.0001	44.4%	44.4%	5.6%	5.6%	90
(2009)-2010	East	105.06	6.28	<.0001	45.6%	45.6%	4.4%	4.4%	90
(2010)-2011	East	105.06	6.28	<.0001	45.6%	45.6%	4.4%	4.4%	90
(2011)-2012	East	196	6.25	<.0001	46.7%	46.7%	3.3%	3.3%	90
(2012)-2013	East	196	6.25	<.0001	46.7%	46.7%	3.3%	3.3%	90
(2005)-2006	Middle	390	5.82	<.0001	48.2%	47.0%	2.4%	2.4%	83
(2006)-2007	Middle	164.62	6.02	<.0001	47.0%	45.8%	3.6%	3.6%	83
(2007)-2008	Middle	390	5.82	<.0001	48.2%	47.0%	2.4%	2.4%	83
(2008)-2009	Middle	164.62	6.02	<.0001	47.0%	45.8%	3.6%	3.6%	83
(2009)-2010	Middle	390	5.82	<.0001	48.2%	47.0%	2.4%	2.4%	83
(2010)-2011	Middle	-	-	0.4001	50.6%	49.4%	0.0%	0.0%	83
(2011)-2012	Middle	-	-	0.4001	50.6%	49.4%	0.0%	0.0%	83

(2012)-2013	Middle	390	5.82	<.0001	48.2%	47.0%	2.4%	2.4%	83
(2005)-2006	West	4159.91	5.85	<.0001	49.6%	48.9%	0.8%	0.8%	131
(2006)-2007	West	4159.91	5.85	<.0001	49.6%	48.9%	0.8%	0.8%	131
(2007)-2008	West	434	7.27	<.0001	48.1%	47.3%	2.3%	2.3%	131
(2008)-2009	West	1007.82	6.81	<.0001	48.9%	48.1%	1.5%	1.5%	131
(2009)-2010	West	434	7.27	<.0001	48.1%	47.3%	2.3%	2.3%	131
(2010)-2011	West	1007.82	6.81	<.0001	48.9%	48.1%	1.5%	1.5%	131
(2011)-2012	West	434	7.27	<.0001	48.1%	47.3%	2.3%	2.3%	131
(2012)-2013	West	236.37	7.49	<.0001	47.3%	46.6%	3.1%	3.1%	131
(2005)-2006	Northeast	289	3.89	<.0001	47.2%	47.2%	2.8%	2.8%	36
(2006)-2007	Northeast	-	-	0.5794	50.0%	50.0%	0.0%	0.0%	36
(2007)-2008	Northeast	289	3.89	<.0001	47.2%	47.2%	2.8%	2.8%	36
(2008)-2009	Northeast	289	3.89	<.0001	47.2%	47.2%	2.8%	2.8%	36
(2009)-2010	Northeast	289	3.89	<.0001	47.2%	47.2%	2.8%	2.8%	36
(2010)-2011	Northeast	-	-	0.5794	50.0%	50.0%	0.0%	0.0%	36
(2011)-2012	Northeast	64	3.92	<.0001	44.4%	44.4%	5.6%	5.6%	36
(2012)-2013	Northeast	64	3.92	<.0001	44.4%	44.4%	5.6%	5.6%	36

4 Conclusion

The county is the cornerstone of China and county economy is an important starting point to study China's economy. The vitality of county economy directly determines the growth potential of China's overall economy. This also applies to prefecture-level cities and provinces. To answer the question that whether the economic miracle of Guizhou province is a common phenomenon or not, we study the China’s regional economy with nighttime light intensity as a proper proxy for economic level disregarding low quality of official GDP statistics in China. By analyzing the changes in the economic rankings of more than 2,300 counties in China, we find that the ranking of county economy has changed little during recent years. When we study the provinces and prefecture-level cities, we still get the same conclusion. Uneven development of economy is prevalent in emerging countries. In China, the government launch national policies to eliminate imbalances in regional economy. The Common Prosperity Policy is China’s national policy to enable some regions to prosper before others, so that they can support and assist the underdeveloped regions. However, our research indicates that China has substantial work ahead to implement this policy, because majority of underdeveloped areas still left behind of developed areas. We should consider varieties of regional economic revitalization strategies such as Western development.

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