

Temporal and Spatial Difference Analysis of Income in Inner Mongolia from 2000 to 2016

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Abstract: Taking Inner Mongolia as research unit, this paper analyzes the temporal and spatial difference of per capita income in rural area and urban area from 2000 to 2016 through mathematical statistics and ArcGIS spatial analysis. The results show that: (1) The per capita net income of rural and pastoral areas and per capita disposable income of urban residents in Inner Mongolia showed a continuous upward trend from 2000 to 2016. The absolute difference of per capita net income of rural and pastoral areas and per capita disposable income of urban residents increased significantly, but relative difference increased first and then decreased from 2000 to 2016. (2) The spatial characteristics of per capita net income of rural and pastoral areas and per capita disposable income of urban residents showed that West high East low from east to west, south high north low from south to north and slight drop in the middle in Inner Mongolia from 2000 to 2016.

Key words: Per capita income; Income difference; Temporal and spatial changes; Inner Mongolia

Introduction

Regional income difference has great significance for measuring the balanced development of the region. Both scholars in China and abroad have paid much attention to regional income differences. The research results are mainly focus on the following aspects: income gap^[1-4], influencing factors^[5-9], evolution trend^[10-12], countermeasures^[9, 13, 14] and so on. Some scholars have analyzed the income difference of residents in rural and pastoral areas of Inner Mongolian^[16] and the spatial and temporal differences of urban wage^[17]. However, few have analyzed the income difference between the per capita net income of rural residents and the per capita disposable income of urban residents in Inner Mongolia. In view of this, this paper takes the cities in Inner Mongolia as the basic research unit, analyzes the temporal and spatial difference of income in rural area and urban area from 2000 to 2016 based on the per capita net income of rural and pastoral residents and the per capita disposable income of urban residents so as to provide a reference for promoting regional coordinated development.

1 Overview of the research area

Inner Mongolia is located in the interior of Eurasia and is located in the northern frontier of China. It is adjacent to eight provinces (regions) including Heilongjiang, Jilin, Liaoning, Hebei, Shanxi, Shaanxi, Ningxia and Gansu, and borders Mongolia and Russia. Inner Mongolia is one of the five ethnic minority autonomous regions in China, with a total land area of 1.183 million km². Inner Mongolia has a vast territory with complex terrain and a narrow shape. The distance between the east and the west is 2,400 km, and the north-south span is 1,700 km. It has 9 cities

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Acknowledgement

The research in this paper was supported by Planning Project of philosophy and social sciences of Inner Mongolia Autonomous Region: Research on the integration of Hulunbuir's cultural industry and tourism industry (NO. 2015JDB067) ; Scientific research project of university of Inner Mongolia Autonomous Region: Research on the coupling process, pattern and mechanism of ecological security and new urbanization in poverty areas of Inner Mongolia (NO. NJZY18233); The doctoral research fund of Jining Normal University: Research on the coupling relationship between ecological environment and poverty—A case of Ulanqab City (NO. jsbsjj1701); Scientific research project of Jining Normal University: Research on the integration development of Chahar's cultural industry and tourism industry (NO. jsjy2018073).

and 3 leagues. According to relevant literature, Inner Mongolia is divided into the eastern region (Hulunbuir City, Hinggan League, Tongliao City, Chifeng City, Xilin Gol League) and the western region (Hohhot City, Ulanqab City, Baotou City, Erdos City, Bayannur City, Alxa League, Wuhai City).

2 Data source and research method

2.1 Data source

The data used in this paper mainly comes from the Inner Mongolia Statistical Yearbook from 2001 to 2017 and the statistical bulletin of the National Economic and Social Development of Inner Mongolia Autonomous Region from 2000 to 2016. Some missing data are obtained from the relevant official website of Inner Mongolia, relevant statistics of Inner Mongolia, and the second-hand data from articles and reports.

2.2 Research methods

2.2.1 Standard deviation and coefficient of variation

The standard deviation and coefficient of variation were used to measure the absolute difference and relative difference between the per capita net income of rural and pastoral residents and the per capita disposable income of urban residents in Inner Mongolia.

2.2.2 GIS spatial analysis

The vector data symbol method and trend analysis of ArcGIS9.3 software is adopted to analyze and symbolize the spatial pattern of the per capita net income of rural and pastoral residents and per capita disposable income of urban residents in Inner Mongolia.

3 Results and analysis

3.1 Income temporal changes

The average per capita disposable income of rural pastoral areas and urban residents in Inner Mongolia from 2000 to 2016 is calculated by using excel2003. As shown in Fig.1, the average per capita disposable income of rural pastoral areas and urban residents in Inner Mongolia has continued to rise from 2000 to 2016 (Fig.1). The average per capita disposable income of rural and pastoral residents increased from 2,248 yuan in 2000 to 12,986 yuan in 2016, showing an increase of 5.78 times. The average per capita disposable income of urban residents increased from 4,879 yuan in 2000 to 32,193 yuan in 2016, showing an increase of 6.60 times.

In this paper, the standard deviation and coefficient of variation were used to measure the absolute difference and relative difference between the per capita net income of urban and pastoral residents and the per capita disposable income of urban residents in Inner Mongolia (Fig.2 and Fig.3). It can be seen from Fig.2 that the absolute difference in per capita net income of rural and pastoral residents from 2000 to 2016 basically showed an increasing trend, from 282.14 in 2000 to 2752.04 in 2016 with an increase of 9.75 times. The absolute difference in per capita disposable income of urban residents in Inner Mongolia from 2000 to 2016 generally showed an expanding trend. The changes can be divided into three stages: 2000-2012, continuous rising period, increased by 14.92 times in 12 years; 2012-2013, sudden decline stage, dropped from 6 485.88 to 5 113.96; 2013-2016, rebound period, increased from 5113.96 to 6163.78. It can be seen from Fig.3 that the relative difference between per capita net income of rural and pastoral residents and the per capita disposable income of urban residents in Inner Mongolia showed an increase trend at first and decline trend later on during 2001-2016.

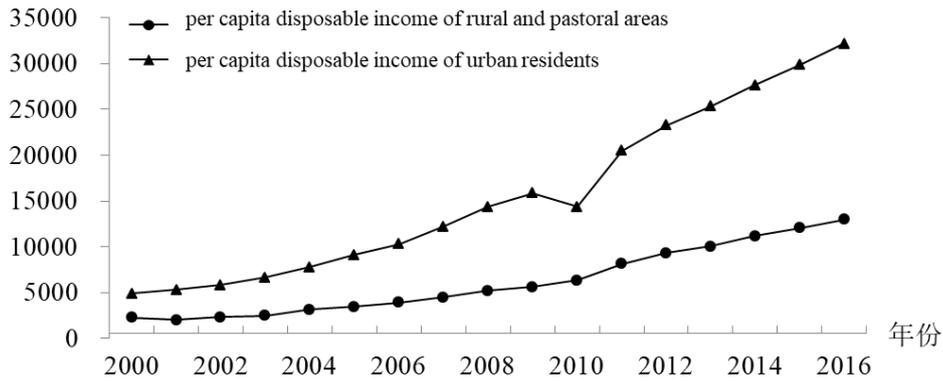


Fig.1 The per capita net income of rural and pastoral areas and per capita disposable income of urban residents of city regional in Inner Mongolia from 2000 to 2016

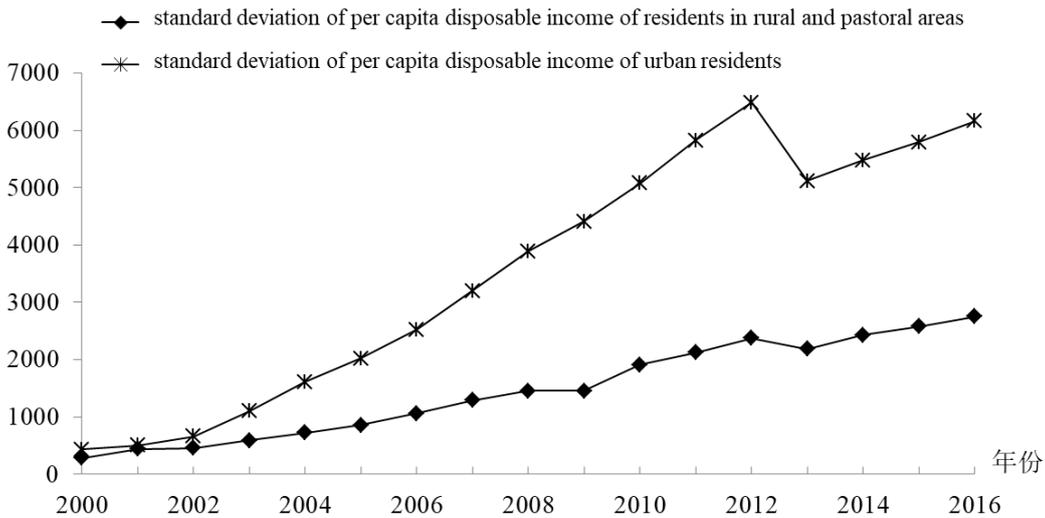


Fig.2 The standard deviation per capita net income of rural and pastoral areas and per capita disposable income of urban residents of city regional in Inner Mongolia from 2000 to 2016

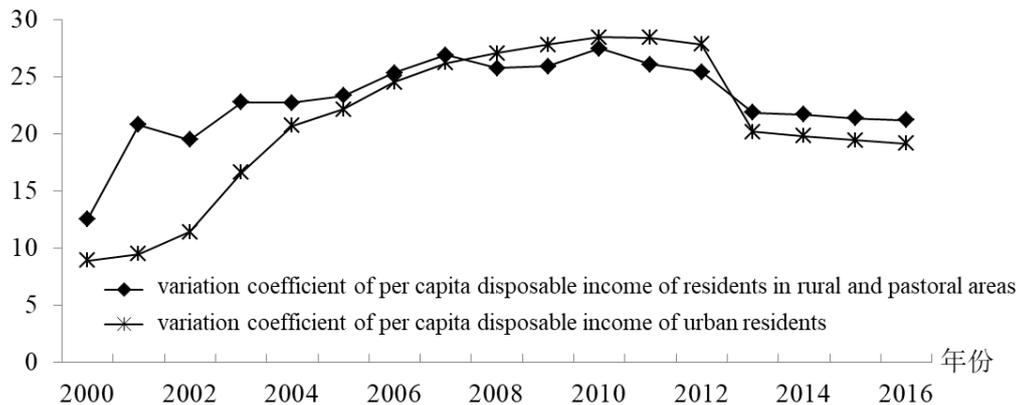


Fig.3 The variation coefficient of per capita net income of rural and pastoral areas and per capita disposable income of urban residents of city regional in Inner Mongolia from 2000 to 2016

It can be seen from Fig.1 that the per capita net income of rural and pastoral residents in Inner Mongolia and the per capita disposable income of urban residents showed an increasing trend. It can be seen from Fig.2 and Fig.3 that the absolute difference of per capita net income of rural and pastoral areas and per capita disposable income of urban residents increased significantly, but relative difference increased first and then decreased.

3.2 Evolution of income spatial pattern

3.2.1 Urban and rural income classification

It can be seen from Tab.1 that in 2000, the per capita net income of rural and pastoral residents and the per capita disposable income of urban residents in Inner Mongolia showed the following characteristics: The per capita net income of rural and pastoral residents of Baotou City ranked first, reaching 2,548 yuan, and that of Chifeng was the lowest with a value of 1,684 yuan, showing a difference of 864 yuan. The per capita disposable income of urban residents of Hohhot ranked in the first place at 5,582 yuan, and that of Ulanquab was the lowest at 4,202 yuan, revealing a difference of 1,380 yuan. The per capita net income of rural and pastoral residents and the per capita disposable income of urban residents in 2016 showed the following characteristics: The per capita net income of rural and pastoral residents of different cities showed relatively large difference, with the highest value of 16,746 yuan found in Alxa League and the lowest value of 8,533 yuan found in Hinggan League, showing a difference of 8,213 yuan. The per capita disposable income of urban residents of Baotou City was the highest, reaching 40,955 yuan, and that of Hinggan League was the lowest with a value of 24,279 yuan, showing a difference of 16,676 yuan.

Tab.1 The per capita net income of rural and pastoral areas and per capita disposable income of urban residents of city regional of city regional in Inner Mongolia in 2000 and 2016

District	per capita net income of residents in rural and pastoral areas (Yuan)		per capita disposable income of urban residents (Yuan)	
	2000	2016	2000	2016
	Hohhot	2 539	14 517	5 582
Baotou	2 548	14 692	5 436	40 955
Hulunbuir	2 191	12 540	4 680	28 885
Hinggan League	1 990	8 533	4 644	24 279
Tongliao	1 931	11 585	4 646	27 444
Chifeng	1 684	9 517	4 588	27 336
Xilin Gol League	2 438	13 188	4 608	32 903
Ulanquab	2 003	9 085	4 202	26 565
Erdos	2 453	15 480	5 502	40 221
Bayannur	2 418	14 476	4 803	26 259
Wuhai	2 351	15 475	4 691	36 515
Alxa League	2 434	16 746	5 164	34 737

The vector data notation method is adopted based on ArcGIS9.3 software, the per capita net income of residents of rural and pastoral areas and the per capita disposable income of urban residents in Inner Mongolia in 2000 and 2016 were symbolized, and they were divided into four grades according to the natural fracture method (jenks). (as shown in Fig.4, Fig.5, Fig.6 and Fig.7). On the whole, the spatial characteristics of per capita net income of rural and pastoral residents and per capita disposable income of urban residents in Inner Mongolia in 2000 and 2016 were “high in the west and low in the east”. It can be seen from Fig.4, Fig.6 and Tab.1 that the spatial characteristics of per capita net income of rural and pastoral residents in Inner Mongolia in 2000 and 2016 were as follows: the per capita net income of rural and pastoral residents was obviously higher in the west areas (except for Ulanqab city) than in eastern regions. The overall level of per capita net income of rural and pastoral residents was relatively low in the eastern regions except for Xilin Gol League. It can be seen from Fig.5, Fig.7 and Tab.1 that the spatial characteristics of

per capita disposable income of urban residents in Inner Mongolia in 2000 and 2016 were as follows: the overall value is relatively higher in the western region except for Bayannur City and Ulanqab City, the overall value is relatively low in the eastern region except for Xilin Gol League.

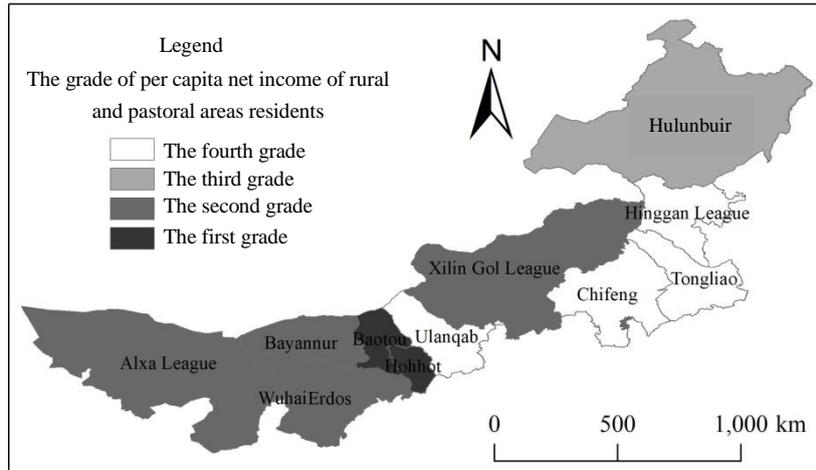


Fig.4 The grade of per capita net income of rural and pastoral areas residents of city regional in Inner Mongolia in 2000

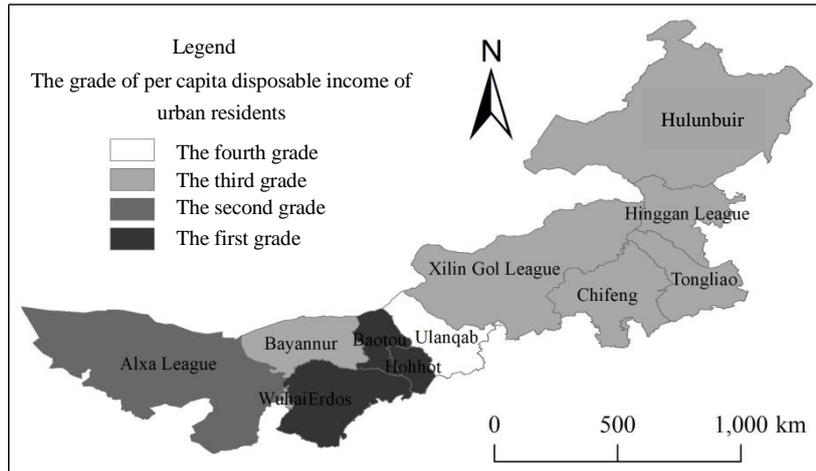


Fig.5 The grade of per capita disposable income of urban residents of city regional in Inner Mongolia in 2000

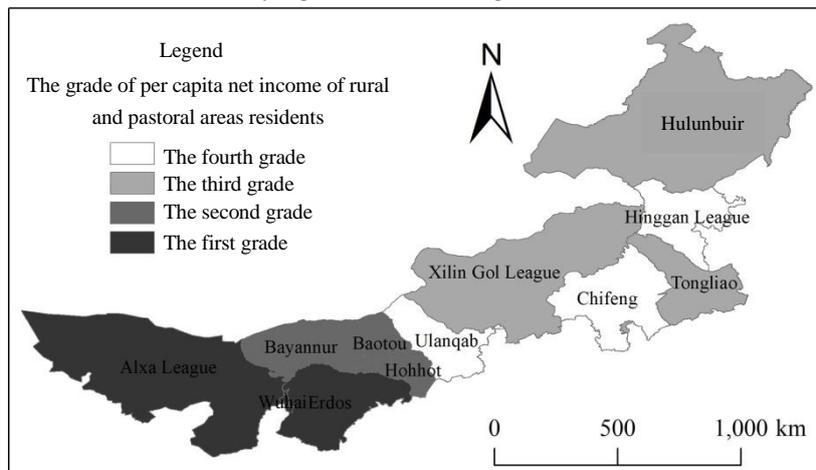


Fig.6 The grade of per capita net income of rural and pastoral areas residents of city regional in Inner Mongolia in 2016

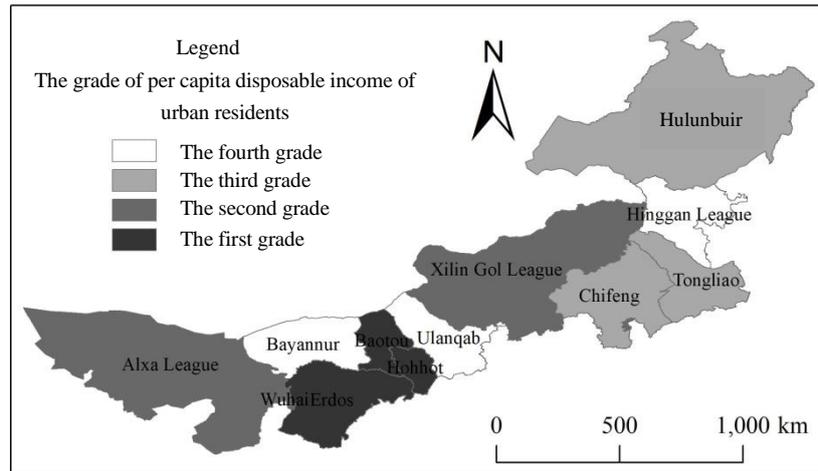


Fig.7 The grade of per capita disposable income of urban residents of city regional in Inner Mongolia in 2016

3.2.2 Spatial difference between urban and rural income

In order to intuitively reveal the overall law of the per capita net income of residents in rural and pastoral areas in Inner Mongolia and the per capita disposable income of urban residents, ArcGIS9.3 software was used to calculate and analyze the trend of per capita net income of residents in rural and pastoral areas and the per capita disposable income of urban residents in Inner Mongolia in 2000 and 2016. (Fig.8 and Fig.9). Each of the vertical bars and sampling points in Fig.8 and Fig.9 represents the per capita net income of residents in rural and pastoral areas and the per capita disposable income of urban residents and their spatial locations. The per capita net income of the residents in rural pastoral areas and the per capita disposable income of urban residents in the 12 cities were projected on the plans formed based on x, z axis and y, z axis. An optimal trend simulation curve is formed by connecting all the projection points on the plans. It can be seen from Fig.8(a), Fig.8(b), Fig.9(a) and Fig.9(b) that, the spatial distribution of per capita net income of rural residents and per capita disposable income of urban residents in Inner Mongolia from 2000 to 2016 stayed high in the west and low in the east, high in the south and low in north, with a slight downward trend in the middle, basically showing an inverted "U" type distribution. It can be concluded that in 2000 and 2016, the per capita net income of residents in rural and pastoral areas and the per capita disposable income of urban residents in Inner Mongolia showed obvious spatial heterogeneity.

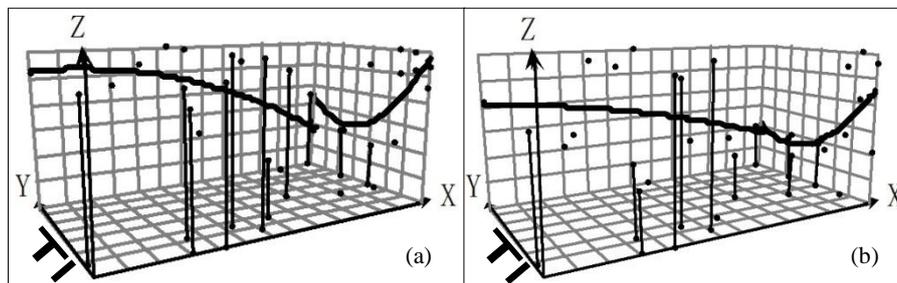


Fig.8 Spatial distribution tendency of per capita net income of rural and pastoral areas (a) and per capita disposable income of urban residents (b) in Inner Mongolia in 2000

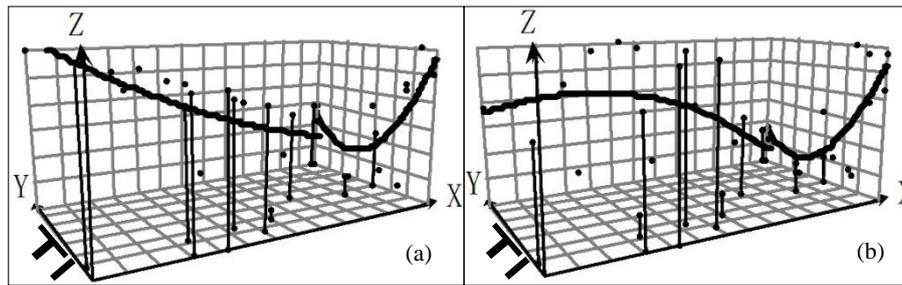


Fig.9 Spatial distribution tendency of per capita net income of rural and pastoral areas (a) and per capita disposable income of urban residents (b) in Inner Mongolia in 2016

4 Conclusions and discussion

Taking Inner Mongolia as research unit, this paper analyzes the temporal and spatial difference of per capital income in rural area and urban area from 2000 to 2016 through mathematical statistics and ArcGIS spatial analysis. The main conclusions are as follows:

(1) From the perspective of income time series, the per capita net income of rural pastoral areas and the per capita disposable income of urban residents in Inner Mongolia have shown a continuous upward trend from 2000 to 2016; The absolute difference of per capita net income of rural and pastoral areas and per capita disposable income of urban residents increased significantly, but relative difference increased first and then decreased from 2000 to 2016.

(2) From the perspective of income level difference, the spatial characteristics of per capita net income of rural residents and per capita disposable income of urban residents in Inner Mongolia in 2000 and 2016 showed a higher value in the western region and relatively lower value in the eastern region.

(3) Judging from the spatial difference of income, The spatial characteristics of per capita net income of rural and pastoral areas and per capita disposable income of urban residents showed that West high East low from east to west, south high north low from south to north and slight drop in the middle in Inner Mongolia from 2000 to 2016.

(4) Due to the limitation of space, this paper does not discuss the causes and countermeasures of the income difference in Inner Mongolia. Future research can be carried out from the above mentioned perspectives.

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