

# Research on Economic Regionalization and Financial Regionalization in China —Based on Gini Coefficient, Theil's Entropy Measure and Financial Interrelations Ratio

Fengrui Liu<sup>1, a</sup>, Fuchang Li<sup>1, b</sup>, Xiaohui Hu<sup>1, c, \*</sup>

<sup>1</sup>School of Economics & Management, Yunnan Normal University, Juxian Street, Kunming, China.

<sup>a</sup>921754310@qq.com, <sup>b</sup>24695192@qq.com, <sup>c</sup>75042344@qq.com

\*Corresponding author

**Keywords:** Regionalization; Gini Coefficient; Theil's Entropy Measure; FIR.

**Abstract:** China's economy is a typical big-nation economy. The economic gap between regions and the development of the financial industry are quite different. This paper analyzes the economic data of China from 2005 to 2016, and uses the per capita GDP data of the region to calculate the Gini coefficient and Theil's Entropy Measure (or Theil index) based on inter-provincial data, data of the eastern, central and western regions, and data of the three major economic regions from 2005 to 2016 in China. Using the data of regional GDP, regional deposits, and total regional loans, we calculated the financial interrelations ratios of China's provinces, municipalities, and autonomous regions and the three major economic regions from 2005 to 2016. Although there are fluctuations and differences in China's economic development, the trend is gradually narrowing. The level of financial development in China has been increasing year by year, and the trend of development differences is gradually expanding.

## 1. Introduction

China's economic pattern is a typical type of big country economy. The problem of economic disparity between regions has been a long-standing issue. The inter-regional financial disparity that this triggered has also become increasingly prominent since the development of financial freedom. After the reform and opening up, as a result of our country's unique interregional economic development strategies for economic development, the gap between our economies in the region has become increasingly large. Lots of scholars have studied China's regional economic gap and various reasons through certain methods. At the same time, as the level of financial liberalization becomes higher and higher, the gap in financial development between regions is also growing. After the financial market reform, the development of China's financial industry has entered a new stage. The allocation and development of financial resources has begun to significantly differentiate between different regions. More scholars have begun to focus on the financial differences between regions.

Most of the previous researches didn't compare the differences between regional economic development and regional financial development directly. Some of the studies were conducted earlier and the latest data have not yet been studied. The study of this paper is based on Gini coefficient, Theil index and regional financial interrelations ratio (FIR) analysis of data from 2005 to 2016 in mainland China.

## 2. Analysis of Regional Economic Disparity in China Based on Gini Coefficient and Theil Index

In order to study the development gap in China's economic regions since 2005, this paper collates the Gini coefficient and Theil index calculated from the per capita GDP index of each province, city and autonomous region from 2005 to 2016. All data comes from the National Bureau of Statistics of People's Republic of China.

The formula for the Gini coefficient is:  $G = \frac{2}{\mu n^2} \sum_{i=1}^n iX_i - \frac{n+1}{n}$

The formula of Theil Index is:  $T = \frac{1}{n} \sum_{i=1}^n \left(\frac{X_i}{\mu}\right) \lg\left(\frac{X_i}{\mu}\right)$

Among them,  $n$  is the number of economic subjects,  $X_i$  is the per capita GDP of the  $i$ th economy,  $\mu$  is mathematical expectations of per capita GDP of all economic subjects,  $i$  is fixed code after sorting economic subjects,  $i = 1, 2, \dots, n$ .

The reason for choosing the Gini coefficient and the Taylor index is that the Gini coefficient is more sensitive to the provincial data with average GDP per capita, and the Thail index is more sensitive to the data of higher and lower provinces with higher per capita GDP.

The line graph of Gini coefficient between provinces and regions is as follows:

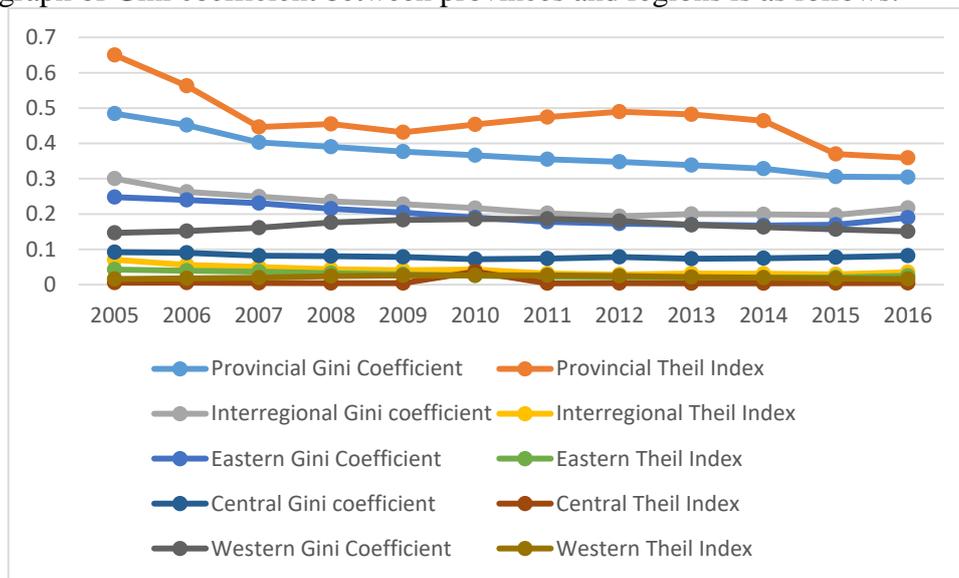


Figure 1 Inter-provincial, Inter-regional Gini Coefficient and Theil Index Line Chart

### 3. An Analysis of Financial Inter-regional Financial Disparities in China Based on Financial Interrelations Ratio

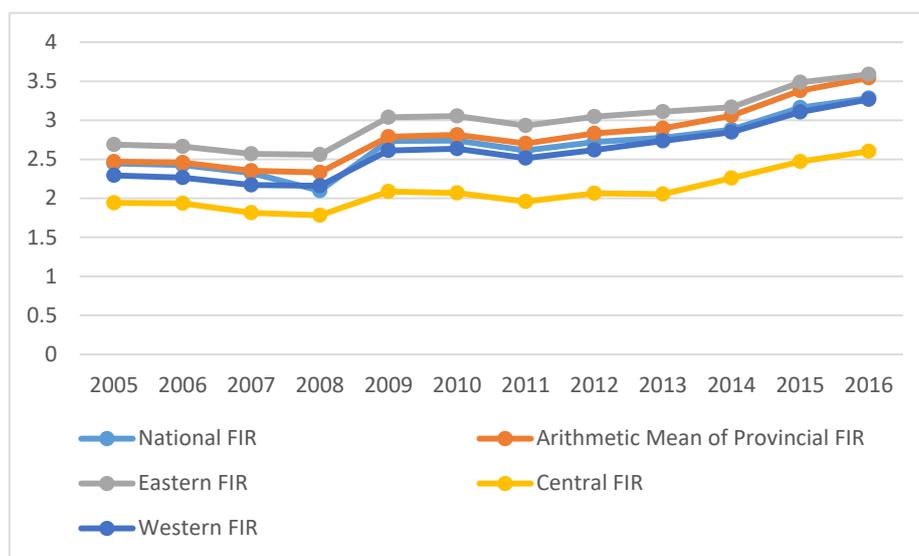


Figure 2 FIR Charts across the Country, Provinces, and Regions

We select financial interrelations ratio (FIR) as a measure of financial regionalization. Its general formula is:  $FIR = \text{Total financial assets} / \text{GDP}$ . In research, to simplify the search for data and

calculations, the formula is usually simplified:  $FIR=(S+L)/GDP$ . Among them, S is total deposits in the region, L is total loans in the region, GDP is Gross Regional Product. The data we used in this paper to calculate the FIR comes from the regional financial operation reports issued by the provinces, municipalities, and autonomous regions from 2005 to 2016 issued by the People's Bank of China. The FIR line graph calculated from the above data is as follows:

The degree of financial development in China's provinces from 2005 to 2016 falls into three categories. The first category is the most developed region, they are Beijing, Shanghai and Xizang; the second category is the less developed regions, they are Shanxi, Guangdong, Chongqing, Sichuan, Guizhou, Ningxia, Tianjin, Yunnan, Xinjiang, Liaoning, Shaanxi, Zhejiang, Hainan, Gansu, Qinghai; the third category is the relatively underdeveloped regions, they are Inner Mongolia, Shandong, Henan, Hunan, Jiangsu, Fujian, Anhui, Heilongjiang, Guangxi, Hebei, Jiangxi, Jilin, Hubei.

In 2005, most of the eastern provinces were high-level financial development areas; most of the central provinces were low-level financial development areas; the western provinces were mostly middle-level financial development. Regional disparities are more pronounced, and the standard deviation of financial interrelations ratios across regions across the country is 0.91. Among them, the highest financial interrelations ratio was 6.36 in Beijing, and the lowest was 1.52 in Inner Mongolia Autonomous Region, with an average of 2.47. 2016 and 2005 are similar, but the number of provinces with high levels of financial development in the east has increased, and the number of provinces with low levels of financial development in the central region has increased. The regional disparity is even more pronounced and the standard deviation is greater than 2005, at 1.29. The increase in the standard deviation shows that the financial development gap between regions in China has become larger, with the highest financial interrelations ratio being 7.87 in Beijing, and the lowest in Hunan being 2.20, with an average of 3.54.

Classical economic theory believes that the flow of capital between different regions will gradually reach a state of equilibrium with the competition among regions, making the marginal efficiency of capital in all regions equal. However, the widening gap in the development of the financial industry in China is obviously not in line with the theoretical expectations. The hypothesis of this theory is that there is complete information and extremely low or non-existent interregional cost of capital, which is obviously not in line with the actual situation. In the development of China's financial industry, people's investment will gradually flow to regions with high capital yields, resulting in excessive investment in the region and insufficient investment in low-yield regions. However, the trend in the future is that the capital return rate in regions with oversupply of capital will gradually decrease, or the long-term expected value will be lower than in other regions, so that capital will flow to other regions and the development of the financial industry will become more balanced. Due to the inadequate liquidity of capital, inter-regional capital flows have been high in recent years, but also need policies to promote more rational and effective distribution of capital.

#### **4. Conclusion**

During a dozen year from 2005 to 2016, the changes in regional economic differences in China are different from the changes in regional financial differences in China. The differences in regional financial development in China are increasing, and the differences in financial development between regions and regions are gradually widening. The differential development trend of China's regional economic development is gradually narrowing. This is a sign that China's economy is gradually moving toward healthy development and sustainable development. The differences in economic development between regions and within regions are gradually decreasing. The level of economic development in China has increased year by year, and economic growth has entered a new normal. The development of the financial industry is inseparable from the development of the economy. The development of the economy determines the scale of development of the financial industry. At the same time, the scale of development of the financial industry will adversely affect the economic development of our country. Judging from the development of large regions, the

differences in economic development among the three major economic regions have become smaller and smaller, but the gap in financial development has gradually widened. This is due to the tilt of state policies and certain historical reasons. The future development trend is to keep the economic development gap gradually narrowed, but the difference in financial development will slowly expand. There are many factors that affect financial development. Economic development is only one of the decisive factors. Other influencing factors are also affecting the development trend of finance. For example, the fiscal policy designated by the financial department, the monetary policy of the People's Bank of China, the construction and cooperation of intra-regional and inter-regional financial institutions, the intra-regional and inter-regional credit distribution, etc.

### **Acknowledgements**

The authors greatly appreciate the anonymous referees and the associate editor for their very valuable and helpful suggestions on an earlier version of the paper. This research is supported by the NSF of China (Grant No. 71562036, 71362028), Project on Applied Basic Research in Yunnan province (2015FB142), Youth Leaders Project in Academic and Technical of Yunnan Province (2014HB009), and Yunnan provincial doctoral discipline construction planning (Applied Economics).

### **References**

- [1] Hu Liang. Research on Financial Deepening and Regional Development [D]. Doctoral Dissertation. Jilin University. 2006.
- [2] Zhou Tianyun. Yue Keyan. Zhang Xing. An Empirical Study on Regional Financial Center and Regional Economy [J]. *Economic Geography*. 2014.(1):114-120.
- [3] Li Lin. Liu Ying. The Driving Forces of Regional Economic Synergistic Development in China: Empirical Study by Stages Based on Haken Model [J]. *Geographical Research*. 2014.(9):1603-1616.
- [4] Peng Baoyu. Xie Guizhen. Wei Xueyan. He Yuejuan. Regional Disparity Comparisons between Economic and Financial Development in China [J]. *Areal Research and Development*. 2016.(8):1-6.