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Research Article

Measurement and Evaluation of Economic Competitiveness of National Top 100 Counties

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Abstract: In this study, we give the research for measurement and evaluation of economic competitiveness of national top 100 counties. With our research, summarization of governance models of national top 100 counties by region and classification could provide useful reference for other county governments' governance. National Top 100 Counties are scattered in different regions, so their geographical location, resource endowments, economic conditions and social environment are bound to bring effects of varying degrees to county governance models. Scientific and rational measurement and evaluation of economic competitiveness of National Top 100 Counties would be conducive to summarizing the characteristics of different types of governance models, so as to make it easy to find a scientific and efficient county government governance model after comparison and it would reflect requirements of legal regulation under the market economy system and the idea of "people-oriented" and finally realize the scientific.

Keywords: Economic competitiveness, evaluation, measurement, top 100 counties

INTRODUCTION

In the past, China County Economic Research Institute used to evaluate the comprehensive strength solely based on economic competitiveness; evaluation indicators were usually indicators of economic category and those on politics, society, environment were few and far between, if any, they also carried little weight, so the evaluation results were not that scientific and reasonable. With the development of society and deepening of research, China County Economic Research Institute begins to evaluate county comprehensive strength based on 2 aspects of basic competitiveness evaluation of county economy and county scientific development evaluation, so the design of evaluation indicators is more scientific and reasonable. Basic competitiveness evaluation of county economy and county scientific development evaluation complement each other and are indispensable. County economy and county development are interrelated; county economy is an important part of the county, while scientific development is the ultimate goal of county economy, thus overall investigation and evaluation of county economy and county scientific development is conducive to promoting comprehensive, coordinated, sustainable and scientific development of the county. The National Top 100 Counties mentioned in this paper refer to the counties (cities) whose comprehensive strength ranks top 100 nationwide. The Tenth National Top 100 Counties (Cities) announced by China County Economic Research Institute in August 2010 are located in 19 provinces (cities, districts) of China, among these, there are 103 in the eastern region, 16 in the central region and 7 in the western region.

Miao and Juqin (2012) have a study on government governance models of national top 100 counties. Chen (2009) studies the "province governing county" reform: administrative system reform and new exploration. Ma *et al*. (2008) have a comparison of Chinese and American local governance models. Zhang (2008) analyze the path selection of promoting township (town) governance innovation. Wang (2009) give a research of the Henan province county economic development models and countermeasure. Zhao (2009) study the financial policy study of promoting county economic development.

In this study, we give the research for measurement and evaluation of economic competitiveness of national top 100 counties. With our research, summarization of governance models of national top 100 counties by region and classification could provide useful reference for other county governments' governance, so as to make it easy to find a scientific and efficient county government governance model after comparison and it would reflect requirements of legal regulation under the market economy system and the idea of "people-oriented" and finally realize the scientific.

COUNTY ECONOMY AND COUNTY SCIENTIFIC DEVELOPMENT EVALUATION SYSTEM

To evaluate basic competitiveness of county economy and county scientific development at the same time provides new methods for comprehensive evaluation of social, economic, political, ecological and other aspects of the entire county, as well as for county government governance performance assessment by higher level government. However, the comprehensive evaluation that reflects Scientific Outlook on Development is not an "unification evaluation", when indicator law is not grasped, simply accumulating and unifying all evaluation indicators is not the way to do it, otherwise, the evaluation results obtained don't bear any comparability and practical significance. Therefore, when conducting evaluation of basic competitiveness of county economy, separate evaluation of county development indicators that are mutually associated and restrained with county economy should also be done by classification and grading at the same time, thus it will bear more pertinence and further promote scientific development and efficient governance of county economy. Therefore, it should also conduct evaluation on county relative wealth degree, relative happiness index and humanistic environment of scientific development by classification in addition to the evaluation of basic competitiveness of county economy, so as to strengthen county economy under the constraints of economic development.

MEASUREMENT AND EVALUATION OF ECONOMIC COMPETITIVENESS OF NATIONAL TOP 100 COUNTIES

The National Top 100 Counties is elected through calculation in mathematical statistics methods such as principal component analysis and factor analysis, etc., with open, objective, comparable and core statistical data collected that are related to the county by establishing a scientific and rational evaluation indicator system. The measurement process can be summarized as three steps; they are establishing evaluation indicator system, scientifically choosing evaluation method and rationally determining evaluation results.

Establishing evaluation indicator system: It is the premise of conducting scientific evaluation to establishing evaluation indicator system; the scientificalness of evaluation indicator system directly affects the rationality of the evaluation results, so its importance is self-evident.

Basic competitiveness evaluation indicator system of county economy: Basic competitiveness of county economy refers to exclusive competitive edge of the county obtained by optimizing the allocation of resources by county economic unit in resource utilization, product sales, technical innovation and market development and service and the like which other regional economic subjects do not have. Basic competitiveness evaluation indicator of county economy could be divided into three categories of total amount, average amount and speed and 12 indicators. Although this evaluation system only has 12 indicators, but they are clear and concise and reflecting thought of "Simplicity is king" and the basic principles of evaluation indicators are true, objective and comparable. The general principles of establishing evaluation indicator system is that the indicator law could be grasped or roughly grasped; evaluation objects have a relatively strong pertinence; evaluation results have exact guidance quality and evaluation study has feasibility and practicability. Because of huge differences of national counties' economy and a large number of influencing factors, the evaluation of basic competitiveness of county economy should adopt the most basic core data. This evaluation indicator system has the following four characteristics:

First, it has removed indicators of economic structure category. Because of large differences of national counties' economy, indicators of economic structure category don't have much comparability with competitiveness law. Some of these indicators can not reflect the unified law, like what the ratio of import and export value and regional GDP reflects is degree of dependence on foreign trade, but the performance in the eastern and Midwest counties is obviously different; a considerable number of Midwest counties don't have a big appetite for foreign trade, their resources allocation could be completed within China, so they don't have to engage in international trade. Another example is non-agricultural industrial ratio, because the county economy is characteristic economy; "suitable for industries, developing industries; suitable for agriculture, developing agriculture; suitable for commerce, developing commerce; suitable for tourism, developing tourism" and major grain production counties also have their reason to exist and they also don't have comparability characteristics for various counties.

Second, determining the number of evaluation indicators according to reality of the county. The number of evaluation indicator varies for different counties and there is no unified standard and it is not "the more the better", it depends on the object's realities. When the law between each indicator and competitiveness, as well as between indicators is not certain, simply putting a number of indicators together might not get you an accurate competitiveness. Although there are only 12 evaluation indicators of basic competitiveness of county economy, they all have a

strong comparability and practicability and are in line with reality of each county.

Third, it's conducive to conducting continuous evaluation. The basic competitiveness evaluation results of county economy mainly reflect the present state and slightly in a way reflect the future, but mainly reflect the strength of current competitiveness. Therefore, the designed evaluation indicator, first, should be "Present Perfect Tense"; second, after the comparison of successive evaluation results, should be able to roughly infer "Future Tense" through continuous "Present Perfect Tense" and investigate the status and trends of county economic competitiveness together.

Fourth, it's conducive to classification evaluation. Due to big differences of national counties' economy and their characteristic economy qualities, the development path of county economy couldn't be 1 but many. Thus we should conduct classified research and guidance of county economy and basic competitiveness evaluation of county economy should be evaluated and improved by classification.

County relative wealth degree evaluation indicator system: In order to reflect the "people-oriented" concept of Scientific Outlook on Development and commit the unification of thriving the county and enriching the people, China County Economic Research Institute has also carried out the evaluation “County Relative Wealth Degree" of top 100 counties.

County relative wealth degree takes the average level of each county nationwide as reference coordinates and comprehensively investigates residents' income, basic public services, economic development and financial regulating and controlling capability, which reflects the Scientific Outlook on Development, i.e., people-oriented, thriving our nation and enriching our people and coordinated development. There are many kinds of expressions of wealth degree, such as per capita regional GDP, per capita resident income, urban and rural residents' per capita outstanding of deposits, Engel's coefficient, per capita years of education, etc. County relative wealth degree evaluation indicator system contains five categories and 3° with a total of 22 indicators. It mainly includes population category indicator, residents' income category indicator, public service category indicator, regional development category indicator and financial coordination category indicator. In the indicator system, residents' income category and public service category indicators constitute the residents′ wealth part of wealth degree, while regional development category and financial co-ordination category indicators constitute the coordinated development part of wealth degree.

The relative wealth degree is a dynamic, relative and basic concept of development level and is the basic measure to investigate the county’s development level and civilization degree. Therefore, the county relative wealth degree evaluation indicator system has the following main characteristics: people-oriented, per capita evaluation indicator, taking national average as standard; highlighting residents' income level, comprehensively considering wages, savings, consumption and other factors that are associated with residents' income; highlighting residents' wealth degree, comprehensively considering education, medical health and other public services; not only emphasizing residents' income and public services, but also emphasizing county's economic development and financial co-ordination capability. The county relative wealth degree evaluation established on the basis of this evaluation indicator system embodies the following 3 characteristics: first, in relative to core connotation, the county's relative wealth degree reflects the core part of the county wealth degree and reflects the basic level of county development; second, relative to the national average level, county relative wealth degree takes national average as basis and reflects the comparison situation of the county and national average; third, relative to historical development course, county relative wealth degree is associated with socialist modernization timing sequence and reflects the common wealth degree in the course of history.

County relative green index evaluation indicator system: County relative green index evaluation aims to promoting coordinated development of county economy between society and environment as well as the transformation of county economic development pattern. The county relative green index evaluation includes 4 parts, i.e., green economy, green environment, green livableness and green survey. By referring the idea and relevant requirements of building a moderately prosperous society, ecological county, green model county, garden city, forest city, reference data of county relative green index and indicator system and various indicators can be concluded, thus comprehensive evaluation of national county relative green index can be realized so as to promote the construction of green county.

Humanistic environment evaluation indicator system of county scientific development Humanistic environment of county scientific development mainly refers to county's advanced culture and all-round human development, including social stability and harmony, people's satisfaction and happiness, etc. As spiritual level and superstructure, humanistic environment of county scientific development will provide a strong driving force for county economy and county scientific development. Humanistic environment of county

scientific development is a binding factor for county economy and county scientific development and these binding factors will react on and require scientific development of the county economy and the county. Humanistic environment evaluation of county scientific development is mainly conducted through 2 aspects of collecting and summarizing assessment information of the county from relevant state departments and conducting social survey of happiness index, so there is no quantified exact indicator system. The information on social security, social harmony, spiritual civilization, political incorruption, democratic legal system, cultural construction and other study from relevant state department may be collected and summarized and those that have been incorporated into the humanistic environment evaluation of county scientific development mainly includes "National Advanced counties and cities in security construction" information released by Central Social Security Comprehensive Governance Committee, "National Civilized Cities" information released by Central Spiritual Civilization Guidance Committee, "National Advanced Cultural Counties" information released by Ministry of Culture, as well as other information relevant departments and important media have paid attention to. County happiness index evaluation is carried out through special social surveys. In "humanistic environment of county scientific development", "county happiness index" is a core content. Happiness is the eternal dream of mankind and the realization of people's happiness is the historical mission of the party and the government. County happiness index reflects the satisfaction degree of the people, reflects every aspect of county economy, county society, county culture, county ecology, county politics, reflects the comprehensiveness of county economy and county scientific development.

SCIENTIFICALLY CHOOSING EVALUATION METHOD

After establishing indicator system and collecting relevant statistical data, the key question needs addressing is how to integrate multiple indicators into 1 unified evaluation value, which requires scientifically determining the weight of each indicator and conducting dimensionless processing of indicators. There are many comprehensive evaluation methods of multi-indicator system, such as subjective weight method, analytic hierarchy process, empowerment evaluation method, principal component analysis, factor analysis, clustering analysis method, etc. Because some indicators for evaluating county's economic competitiveness have a close relevance, in order to eliminate the collinearity issue of independent variable and make the evaluation results more objective and reasonable, China County Economic Research Institute mainly adopts factor analysis to evaluate each county's economic competitiveness. Factor analysis is a multivariate statistical analysis method that mainly studies the symbiotic combination law and correlations among variables and also studies the relation between variables and samples; its main function is to turn a number of relevant variables into a few unrelated new comprehensive indicators (AKA common factor's unobservable variables) to represent the basic data structure. These common factors could reflect the main information the original multiple variables represent, which helps simplify the data structure and facilitate the objective of the study. The specific steps of factor analysis are as follows:

Suppose there are n counties and p indicators that could reflect some county's economic competitiveness characteristics, it could be shown with the matrix in 3-5: This p reflects the economic competitiveness differences among n counties. Factor analysis means finding m (m<p) common factors from p indicators and making these m common factors still maintain most differences of counties' economic competitiveness the original p indicators reflect.

Conducting dimensionless processing of indicator data: Generally standardized processing is used, making the average value of variable value 0 and standard deviation 1 after standardization. The computational formula of standardized processing is: $xij' = \left(x_{ij} - \overline{xj}\right)/\sigma_j$, among which, i = 1, 2..., n; j = 1, 2..., p . The dimensionless data obtained after processing has eliminated the influence of original data unit and order of magnitude.

After standardized processing of original data, you'll get following factor model:

$$\begin{cases} x_1 = a_{11}F_1 + a_{12}F_2 + ... + a_{1p}F_p + \varepsilon_1 \\ x_2 = a_{21}F_1 + a_{22}F_2 + ... + a_{2p}F_p + \varepsilon_2 \\ ..... \ ..... \ ..... \ ..... \ ..... \ ..... \\ x_p = a_{p1}F_1 + a_{p2}F_2 + ... + a_{pp}F_p + \varepsilon_p \end{cases}$$

In the above factor model, x represents the new variable after standardization and F is the common factor of x and an independent unobservable theoretical variable. Matrix A that is composed of common factor's coefficient is the factor loading matrix, element is factor loading in matrix A, namely i^{th} variable's load on j^{th} common factor. Among these:

$$A = \begin{bmatrix} a_{11} & a_{12} & ... & a_{1m} \\ a_{21} & a_{22} & ... & a_{2m} \\ ... & ... & ... & ... \\ a_{p1} & a_{p2} & ... & a_{pm} \end{bmatrix}$$

Solve factor loading matrix through PCA (Principal Components) in SPSS statistical software, after getting common factor loading matrix table, rotate it with variance maximum (Varimax), then get rotated factor loading matrix. According to general principle of factor extracting, that is, when first few factors' accumulated variance contribution rate reached or exceeded 80%, extract m common factors and signify common factors as original variables' linear combination, then further get common factor's score. The score function of obtained factor is: $F_j = b_{j1}x_1 + b_{j2}x_2 + ... + b_{jp}x_p$, j = 1, 2, ..., m, among which, is the weight of new variables.

Calculating total score value F of county economic competitiveness factor, computational formula is $F = \sum_{i=1}^{m} W_i F_i$ i = 1, 2, ..., m, among which, is the weight of extracted m common factors, is the score value of all counties' common factors. The computational formula of common factor's weight is: $W_i C / \sum_{i=1}^{m} C_i$ i = 1, 2,..., m, among which, is the characteristic root of extracted m common factors. According to total factor score of all counties' economic competitiveness, rank the factor's total score of n counties, the bigger the total score, the stronger the county's economic competitiveness. From the perspective of score, positive value means its economic competitiveness is above the average level of all counties; if negative, then below. So the factor's total score sequence stands for the ranking of n counties' economic competitiveness.

REASONABLY DETERMINING EVALUATION RESULTS

The evaluation results of the basic competitiveness of national counties′ economy and county scientific development can be got by following the evaluation ideas. The evaluation results are not only scientifically reliable, but also realistic. How to present the evaluation results, i.e., the presentation method of the evaluation results is also very important. How to rank the counties with identical or similar evaluation results is also an issue required careful consideration and further effort should be made to combine universality with particularity, population with classification and individual and group in the evaluation. For this purpose, China County Economic Research Institute has developed an expression table for evaluation results of basic competitiveness of county economy and county scientific development. County scientific development degree is divided into 3 sub-tables of county relative wealth degree, county relative green index and county humanistic environment; the same county has different ranking in each sub-the table, which avoids the drawback of "one size fits all"; and as for the counties with similar economic development level or close geographical location, assign all of them into "regional economic development group" and count them as a whole unit.

CONCLUSION

County government governance is a local governance practice with strong empirical characteristics; therefore it is vital to the development of county economic development in the new era by summarizing and exchanging new exploration, new practices and new experiences of governance models of top 100 county governments. The exploration of governance models of national top 100 counties in the new era does not focus on system breakthrough and transition, but how to realize scientific development under the socialist market economy system. Based on this idea, research and summarization of governance models of national top 100 counties by region and classification could provide useful reference for other county governments' governance. Government's governance model should also change with the change of development model of county economy and the county government should actively explore governance models that are compatible with economic and social development. Higher level governments should govern the county government by classification and level with counties as units and then formulate the most basic indemnificatory level; so it would reflect requirements of legal regulation under the market economy system and the idea of "people-oriented" and finally realize the scientific.

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