Dear Economics Editorial Office:

Many thanks for Anonymous -Referee report 2 for our submission,

MS 2211, entitled"Adaptation Assessment and Analysis of Economic Growth Since the Market Reform in China"for the further peer review process.

We deeply appreciate the reviewer's comments, and we have modified and perfected this paper strictly according to their comments. For these comments, our responses are as follows:

Response to Question One:

This paper focuses on the economic adaptation after China introduced market-oriented reforms in 1992. Currently there has been a significant decline in terms of medium-to-high speed growth of GDP in China. Economic adaptation and sustainable economic growth are closely related. Since it is the first time that our paper has been submitted to your journal with a view to the special issue on Sustainable Development Goals, we genuinely hope that a proper issue will be arranged for this article. Thank you very much.

Response to Question Two:

As for the lack of understandability of some equations in this paper, as noted by reviewers, it is our fault and we are sorry for that. We have rearranged the Multilevel Extension Evaluation Method and Membership Function Coordination Model. Every variable will be explained in details and represented by a different symbol.

a

The multilevel extension assessment is the expression of matter-element with triple $R = (N, C, V)$. If matter N has n characteristics $C(c_1, c_2, \cdots, c_n)$, m matter-element to be assessed $R_1 = (N_1, C, V_1), R_2 = (N_2, C, V_2), \cdots, R_m = (N_m, C, V_m)$ has the same characteristic C, then matter-element R with the same characteristic can be expressed as:

$$R = \begin{bmatrix} N & N_1 & N_2 & \cdots & N_m \\ c_1 & v_{11} & v_{12} & \cdots & v_{1m} \\ c_2 & v_{21} & v_{22} & \cdots & v_{2m} \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ c_n & v_{n1} & v_{n2} & \cdots & v_{nm} \end{bmatrix} \quad (1)$$

N_m ——matter-element to be evaluated; N ——the whole body of matter-element to be evaluated $N_1, N_2, \cdots, N_m$; v_{ij} ——value of the i th characteristic of the j th matter-element

to be evaluated，$i = 1, 2, \cdots, n$；$j = 1, 2, \cdots, m$.

Based on this, the Multilevel Extension Assessment Method will be established. By identifying matter-elements with the same characteristics, determining the value range of every characteristic, describing the characteristic values of matter-element to be evaluated and calculating correlation degrees, the category to which the matter-element to be evaluated belongs will be finally concluded (Cai W, 1983; 1994; 1999).

The application of Multilevel Extension Assessment Method is consisted of 6 steps, i.e. generally identifying classical domain, identifying joint domain, identifying matter-element to be evaluated, identifying weight of evaluation index, identifying correlation degree of different categories of the matter to be evaluated, and identifying the category of the matter to be evaluated and the characteristic value of grade variables.

Step one: identify classical domain.

Suppose there are m matter-element to be evaluated (or category of evalution) $N_1, N_2, \cdots, N_m$, using $\left[a_{ij}, b_{ij}\right]$ to indicate the range of characteristic value of matter-element (or category) to be evaluated, then matter-element with the same characteristic R_0 can be expressed as:

$$R = \begin{bmatrix} N & N_1 & N_2 & \cdots & N_m \\ c_1 & \left[a_{11}, b_{11}\right] & \left[a_{12}, b_{12}\right] & \cdots & \left[a_{1m}, b_{1m}\right] \\ c_2 & \left[a_{21}, b_{21}\right] & \left[a_{22}, b_{22}\right] & \cdots & \left[a_{2m}, b_{2m}\right] \\ \vdots & \vdots & \vdots & \vdots & \vdots \\ c_n & \left[a_{n1}, b_{n1}\right] & \left[a_{n2}, b_{n2}\right] & \cdots & \left[a_{nm}, b_{nm}\right] \end{bmatrix} \quad (2)$$

In this equation, N_m——the j th matter-element (or category) to be evaluated; c_i——the i th evaluation index; $v_{ij} = \left[a_{ij}, b_{ij}\right]$——the value range of c_i defined by defined by N_j N_j, i.e. the classical domain.

Step Two: identify joint domain .

$$R_P = \left(P, C, V_P\right) = \begin{bmatrix} P & c_1 & \left[a_{1P}, b_{1P}\right] \\ & c_2 & \left[a_{2P}, b_{2P}\right] \\ & \vdots & \vdots \\ & c_n & \left[a_{nP}, b_{nP}\right] \end{bmatrix} \quad (3)$$

In this equation, P——the whole body of evaluation category; $\left[a_{iP}, b_{iP}\right]$ ——the value range of c_i defined by P, i.e. the joint domain .

Step three: identifying matter-element to be evaluated.

For the matter to be evaluated, the data can be expressed by matter-element:

$$R_d = \begin{bmatrix} P & c_1 & v_1 \\ & c_2 & v_2 \\ & \vdots & \vdots \\ & c_n & v_n \end{bmatrix} \quad (4)$$

In this equation, R_d ——matter-element to be evaluated; v_i ——the value of the matter to be evaluated corresponding to c_i .

Step four: identifying weight of evaluation index.

$$\sum_{i=1}^{n} W_i = 1$$

$$Wi \geq 0 \qquad \left(i = 1, 2, \cdots, n\right) \quad (5)$$

Step five: identifying correlation degree

Calculate distance:

$$\rho\left(v_i, v_{ij}\right) = \left|v_i - \frac{1}{2}\left(a_{ij} + b_{ij}\right)\right| - \frac{1}{2}\left(b_{ij} - a_{ij}\right) \quad (6)$$

$$\rho\left(v_i, v_{ip}\right) = \left|v_i - \frac{1}{2}\left(a_{ip} + b_{ip}\right)\right| - \frac{1}{2}\left(b_{ip} - a_{ip}\right) \quad (7)$$

In this equation, $\rho\left(v_i, v_{ij}\right)$ ——distance between point v_i and interval v_{ij} ; $\rho\left(v_i, v_{ip}\right)$ ——distance between point v_i and interval v_{ip} .

Calculate correlation function:

$$K_j\left(v_i\right)=\begin{cases}\dfrac{\rho\left(v_i, v_{ij}\right)}{\rho\left(v_i, v_{ip}\right)-\rho\left(v_i, v_{ij}\right)} & v_i \notin v_{ij} \\ \dfrac{-\rho\left(v_i, v_{ij}\right)}{\left|v_{ij}\right|} & v_i \in v_{ij}\end{cases} \tag{8}$$

$K_j\left(v_i\right)$——correlation function, index

The membership grade of index c_i of the matter to be evaluated corresponding to category j; $\left|v_{ij}\right|$——the length of interval $\left[a_{ij}, b_{ij}\right]$, i.e. $\left|b_{ij}-a_{ij}\right|$.

Calculate correlation degree:

$$K_{j0}\left(P\right)=\max K_j\left(P\right) \quad \left(j=1,2,\cdots,m\right) \tag{9}$$

In this equation,

$K_j\left(P\right)$——considering the index weight, the combination value of index c_i of the matter to be evaluated corresponding to category j.

Step six: identifying the category of matter to be evaluated and the characteristic value of grade variables

If 若 $K_{j0}\left(P\right)=\max K_j\left(P\right) \quad \left(j=1,2,\cdots,m\right)$, then 则 P is identified to belong to category $j0$. Note

$$\overline{K_j}\left(P\right)=\frac{K_j\left(P\right)-\min\limits_{1\le j\le m} K_j\left(P\right)}{\max\limits_{1\le j\le m} K_j\left(P\right)-\min\limits_{1\le j\le m} K_j\left(P\right)} \tag{10}$$

then the characteristic value of grade variable of P is j^*：

$$j^*=\frac{\sum_{j=1}^{m} j\cdot\overline{K_j}\left(P\right)}{\sum_{j=1}^{m}\overline{K_j}\left(P\right)} \tag{11}$$

b.

Membership Function Coordination Model is rearranged as follows:

The static coordination degree model is expressed in its basic form as follows:

$$CD_s(A,B)=\frac{\min\{u(A/B),u(B/A)\}}{\max\{u(A/B),(u(B/A)\}} \quad (12)$$

where $CD_s(A,B)$ denotes the static coordination degree between systems A and B, that is, $0 \le CD_s(A,B) \le 1$. A larger $CD_s(A,B)$ implies the better coordination of the system. $u(A/B)$ denotes the degree of coordination, which is calculated based on the discrepancy between the actual level of development of the system and the coordination value. Such degree is calculated as follows: $u(A/B)=\exp\left\{-(x-\hat{x})^2/s^2\right\}$, where x is the actual value of the system, $\hat{x}$ is the coordination value between systems A and B that is generally expressed by a regression coefficient and s^2 is the mean square error of system A.

The dynamic coordination degree model is expressed as follows in its t basic form:

$$CD_d(t)=\frac{1}{T}\sum_{y=0}^{T-1}CD_s(t-y) \quad (13)$$

where $CD_d(t)$ represents the index of dynamic coordination degree within a time span of t, that is, $0 \le CD_d(t) \le 1$, whilst $CD_s(t-y)$ denotes the static coordination degree amongst systems in each moment. When $t_1 > t_2$ and $CD_d(t_1) \ge CD_d(t_2)$, the system is currently in a state of coordination of continuous development. Otherwise, the system is currently in a state of coordination of continuous decline.

c.

When China's economic adaptation is evaluated using Multilevel Extension Evaluation Method, we can quantitatively evaluate economic adaptation and identify the grade according to the results, then qualitatively determine the status of economic adaptation. Therefore, we decide that Multilevel Extension Evaluation Method is applicable to our research.

d.

According to the systems theory, as the basis of the sound operation of the system, the coordinated development of the system can promote the development of the system. The non-coordination of the system will affect the sustainable development. In this paper, we determine whether the system is coordinated according the coordination of its economic adaptation. Non-coordination indicates unsustainable development.

Response to Question Three:

a.

As for the selection criteria of economic adaptation index, this paper follows 6 principles: （1） principle of scientific. The establishment of index system of economic adaptation is based on the scientific knowledge of profoundly understanding the concept and meaning of economic adaptation, which objectively and truly reflects the economic adaptation generated by disturbance facing the subsystems; it enables us to adopt scientific data processing methods and models to accurately measure economic adaptation for scientific evaluation; （2） principle of systematic. Economic adaptation is a compound system that involves economic subsystems, social subsystems and resource environmental subsystems. The interaction between different subsystems decides the adaptation in economic growth. When the internal factors of a subsystem are considered, the characteristics of factors manifested by other subsystems should be taken into account so that we can analyse and evaluate economic adaptation from the perspective of system theory to essentially get hold of the adaptation in economic growth . （3）principle of dynamic. The system is a dynamic process of constant changes. When the system of economic growth changes under constant disturbance, the economic adaptation is also in a state of in a state of constant change. The index should be selected according to the goal of sustainable economic growth。 （4） principle of leading. An index should be properly selected. Among all the influencing factor of subsystems, not every factor is predominant. When the index system is established, the leading factors and representational factor of the goal of sustainable economic growth must be listed as measurement indexes。（5）principle of general adaptive. As for the establishment of evaluation index system of economic adaptation, we should focus on coordinated analysis, which will facilitate the comparison and reapplication of evaluation results.（6）principle of operable. The availability and reliability of index data should be taken into full consideration in terms of data information acquisition. We should try to use universal standards for measurement to avoid the influence of human factor. The quantifiable expression will ensure the accuracy and objectivity of evaluation results.

b.

25 indexes of economic adaptation have been selected in this paper, which is the result of weighing and choosing among various indexes on the basis of literature review. Each index can reflect the importance of China’s economic growth. Based on the understanding of each team member, we select 25 indexes to measure China’s economic adaptation. These indexes reflect the

capacity characteristics of economic adaptation of each subsystem, and the model application results essentially reflect realities of China's economic adaptation. We think that these indexes can basically meet our research objectives.

c.

Explanations of some indexes

C6（Ratio of FDI to GDP）: FDI is the main form of capital nationalization. In the process of marketization, a higher ratio of FDI to GDP indicates that China is using more international capital factors. Thus, the level of development of factor market is higher.

C14（Ratio of education expenditure to GDP）: When the index is selected, we did take into account per capita education expenditure. But after much consideration, we select the ratio of education expenditure to GDP. The weighing principle is to examine education development from the perspective of macro economic growth. The basic education (for instance, preschool education, elementary education and secondary education) is taken as a whole. Seen from the total education expenditure, an overall analysis of education input of China in the process of economic development will in part reflect social development capacity.

C15 （Ratio of health expenditure to GDP）: Seen from the total health care expenditure, an overall analysis of health expenditure of China in the process of economic development will in part reflect social development capacity.

C19 （Expenditure on natural disaster relief per 10,000 persons）: This index reflects the economic aid for the affected population. A higher index indicates a stronger ability to withstand natural disasters.

C21（Efficiency of energy conversion）: This index is mainly included in China Statistical Yearbook, of which energy mainly refers to total primary energy production in China for a certain period of time. The output of primary energy includes the electric energy production of raw coal, crude oil, natural gas, hydroelectric power, nuclear energy and other dynamic energy (for instance, wind energy, geothermal energy), while it does not include low-heat value fuel output, solar thermal energy utilization, or output of secondary energy converted from primary energy.

Response to Question Four:

a.

C refers solely to the index of economic adaptation in the paper, and modifications have been made. It is our fault and we are sorry for that.

b.

The international standard is a general standard adopted by national departments regarding these indexes, while the theoretical standard is an established standard from literature search. The expert advice is acquired by discussions of professors from Nanjing University, Nanjing University of Technology, Lanzhou University and Northwest University for Nationalities.

c.

Entropy method is adopted to identify weight. I have listed steps of entropy method in detail in my reply for the first time. The detailed steps of entropy method are listed as follows:

First step: Data normalization. All indexes chosen for this study are of positive attributes; thus, positive data processing method is used in this study.

$$Y_{ij} = \frac{X_{ij} - X_{\min(j)}}{X_{\max(j)} - X_{\min(j)}}$$

Where Y_{ij} is the statistics of index j of sample i, and $X_{\min(i)}$ and $X_{\min(j)}$ are the minimum and maximum values of index j, respectively. After data normalization, the value data is within the range of [0–1].

Second step: Calculate weight value of index according to the standardized data of data processing.

$$P_{ij} = \frac{Y_{ij}}{\sum_{i=1}^{m} Y_{ij}}$$

Where P_{ij} is the proportion of index j of sample i, and m is the sample number.

Third step: Calculate information entropy.

$$E_j = -k \sum_{i=1}^{m} P_{ij} \ln(P_{ij})$$

$$k = 1/\ln(m)$$

Where E_j is the information entropy of index j.

Fourth step: Calculate utility value.

$$U_j = 1 - E_j$$

Where U_j is the utility value of index j.

Fifth step: Calculate weight.

$$W_j = \frac{U_j}{\sum_{j=1}^{n} U_j}$$

Where W_j is the weight of index j. All the index weights of each system are added, and the sum is the weight of the system.

Response to Question Five:

The weight of an index calculated according to the entropy method is a reflection of its importance. In an economic sense, it indicates how important economic adaptation is for the market-oriented reforms in China. A higher index weight implies a higher importance of China's economic growth.

Response to Question Six:

We are truly sorry. We have strictly reviewed the inconsistency between descriptions in Ch. 5.2 and Table 6, and have duly made modifications.

Thank you for Referee report of this manuscript.

Sincerely,

Chongqiang Ren

07/09/2017