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Research on Promote Global Fairness of a New Business Model - Assuming Asteroid Mining

Xi Luo

Northeastern University, Shenyang, 110000, China

Abstract: *Most wealth is now in the hands of a very small number of people, which greatly exacerbates today's social inequality. At the same time, with the continuous consumption of earth resources, people gradually focus on the mining of asteroids. When such new resources as asteroids are developed, whether a new trade model can be established to promote global equity becomes the research issue of this paper. Firstly, putting forward the concept of global equity: Obtain benefits commensurate with the country's overall strength, with greater emphasis on promoting the interests of its most pressing aspects--each takes what they need. Then defining an indicator to measure global equity: the relative profitability of countries. The indicator is positively correlated with country strength. Then, the influencing factors of national profit are analyzed, the correlation coefficient is obtained by the least square method, and the model equation is established. Finally, the reliability of the model is verified by the F-Validation. Secondly, establish Asteroid Mining Alliance--Antitrust trade model: countries can cooperate through technical funding platforms and sales platforms. Then, the support coefficient o that reflects the strength of cooperation between countries is defined, and the model planning is established based on Model I, and the optimal value is 0.57. The final comparison finds that after the introduction of high-level country support, the global Gini coefficient drops from 0.6943 to 0.57978. So the reduction in the gap between the rich and the poor shows the necessity of this support method. According to the model, all countries in the alliance can be guaranteed a certain amount of ore. This effectively avoids the inequality caused by some countries owning the majority of ores. While maximizing global total income, countries with strong comprehensive national strength will maximize income from ecology and people's happiness, while countries with weak comprehensive national strength will maximize income from industry, science, and technology.*

Keywords: *Asteroid Mining, Multi-objective Linear Programming, F-Validation, Global Fairness, New Trade Model*

1. Introduction

The rich have endless money to spend, while the poor worry every day about how to survive. The wealth and resource imbalance between countries has caused a series of international problems. At the same time, the development of the economy needs a huge amount of material resources, especially rare metals and rare earth, and other minerals whose value is much higher than even gold. With the continuous consumption of resources on the earth, all countries are actively looking for new resources. The idea of asteroid mining is becoming a reality.

Most countries in the world signed the 《1967 United Nations Outer Space Treaty》 to use space resources peacefully and justly. However, with mankind's further thirst for space resources, this equity faces many challenges. For example, only a very few countries in the world have mastered the technology of asteroid mining. So we require a reasonable cooperation model.

2. Model I: Global Fair Judgment Mode Building And Solving

Taking into account the comprehensive capabilities and different needs of the country, we mainly adopt the principle of each taking what is needed [1].

Considering the different levels of development of countries in the world, to ensure that countries can get a return in proportion to their comprehensive capabilities after making joint efforts, we define an indicator based on various factors: relative profit of countries Y.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon \quad (1)$$

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β_i is the coefficient of each,X_1, X_2, X_3, X_4, X_5Respectively, economic profit, ecological profit, population size, increase in the happiness index, and level of scientific and technological progress, ε are random coefficients.

Through considering and analyzing the factors that affect a country's profitability, including economic profitability, ecological profitability, increased happiness index, and level of technological progress. At the same time, I also believe that changes in a country's international image also have an impact. one of its important factors.

A country's total profit Y is positively correlated with its comprehensive strength T or is similar after normalization, it is considered fair.

Through collecting and normalizing various indicators of global countries, and then sorted out the data of some countries to get the following chart form

The impact of various indicators on equity

First, use the obtained data to draw a scatter plot (Figure 1) to judge that it has a certain linear relationship.

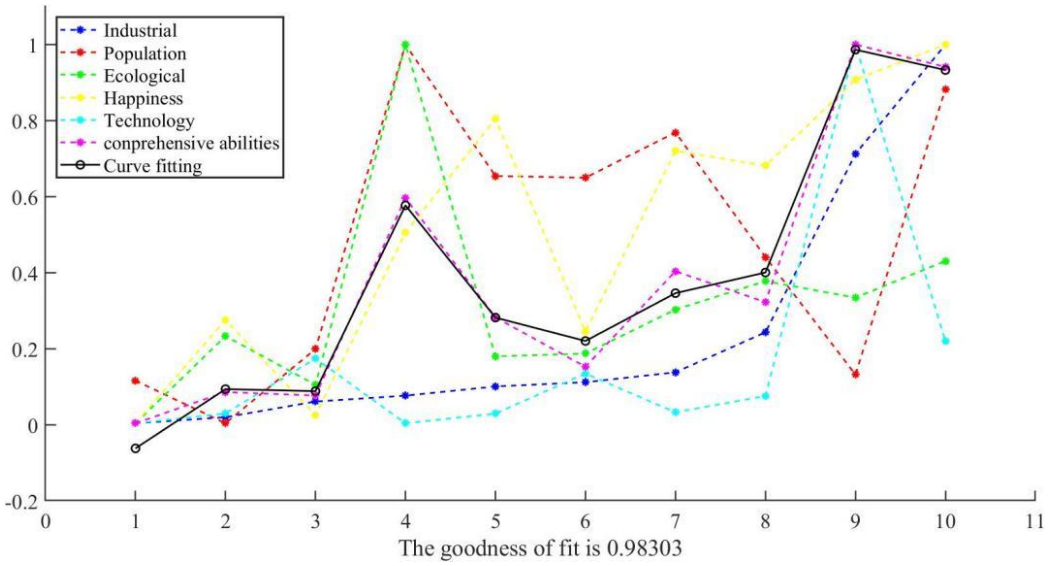

Figure 1:Scatter plot of the obtained data

Then use the normalized data to obtain the observation matrix of different countries.

$$X = \begin{bmatrix} 1, & x_{11} \cdots & x_{15} \\ \vdots & \ddots & \vdots \\ 1, & x_{K1} \cdots & x_{K5} \end{bmatrix} (2)$$

Using the method of least squares, the coefficient matrix can be expressed as:

$$\beta = \begin{bmatrix} \beta_0 \\ \vdots \\ \vdots \\ \beta_5 \end{bmatrix} = (X^T X)^{-1} X^T y (3)$$

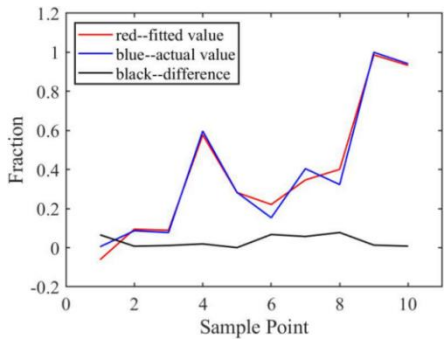

Figure 2: Linear Regression Curve Fitting Results.

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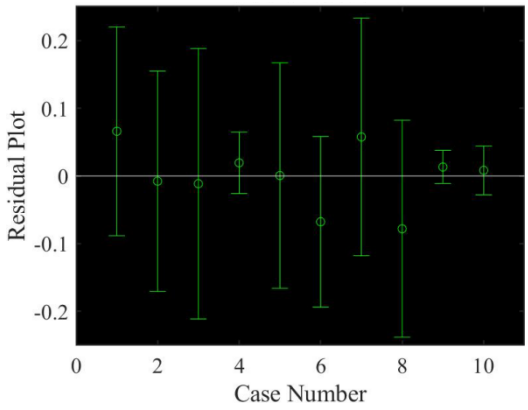

Figure 3: Residual Case Order Plot.

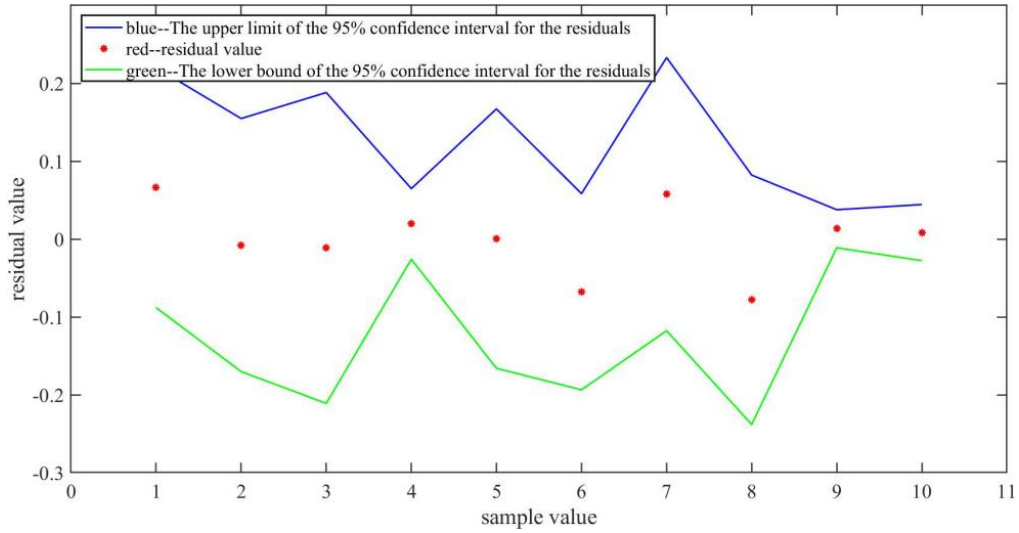

Figure 4: Confidence Interval.

Table 1: Solve and Analyze

Satas	R^2	F	P	S^2
Numerical value	0.9832	46.3330	0.0012	0.0048

As can be seen from the above figure, R^2=0.9832 means that 98.32% of the dependent variable y can be determined by the model, the F value is far beyond the critical value of the F test, and p is far less than 0.05, so the regression model is available.

By solving the solution we get the model equation is:

$$Y = -0.0805 + 0.4513X_1 + 0.1038X_2 + 0.4156X_3 + 0.2009X_4 + 0.4102X_5 + \varepsilon(4)$$

3. Model II: Asteroid Mining Model Building and Solving

Due to the differences in geographic location, resource content, and production methods of each country, there was inherent inequity in the earnings of each country, and the emergence of monopolistic organizations made this inequity even stronger.

In 1960, monopolistic organizations already had most of the resources for rapid development. The economies of Europe and North America were growing rapidly, with their national incomes accounting for 75% of the world's total national income. The rest of the continents are still lagging relatively, seriously causing inequity. It can result in global inequality in health, wealth, education, and many other aspects that are critical to our lives.

But with the globalization of the economy in the 21st century, income levels have risen markedly in many poorer countries, particularly in Southeast Asia, where incomes have grown faster than in richer

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countries. While large income differences remain, the world is no longer neatly divided into "developed" and "developing" groups. Nor are the gains across continents as disparate as they were 40 years ago

In view of the adverse impact of this organizational form of monopoly on global fairness, we establish the following model:

Build an asteroid mining consortium model. Under the principle of not violating the principle of global fairness, the alliance will require countries with stronger comprehensive strength to provide technology and funds, while weaker countries are responsible for extraction and processing.

After analyzing the relevant data, it is found that high-level countries pay more attention to the ecological environment and people's happiness index, while low-level countries pay more attention to the improvement of the economy and technology. Therefore, we established the following scheme:

Establish a technical funding platform. High-level countries provide mining and production technologies and help build factories (meeting the domestic ecological environment requirements of high-level countries); low-level countries are responsible for providing land and labor (conducive to national economic and technological development). Producer countries use platforms to find technology providers to complete mining and processing.

Establish a sales platform. The countries with high comprehensive strength will put in the capital as required, and the weaker countries will put in products. Later, the products will be distributed to the corresponding countries according to the proportion of invested funds; the funds will be distributed to the corresponding countries according to the proportion of invested products, but certain equipment rentals and royalties will be paid to the technology provider.

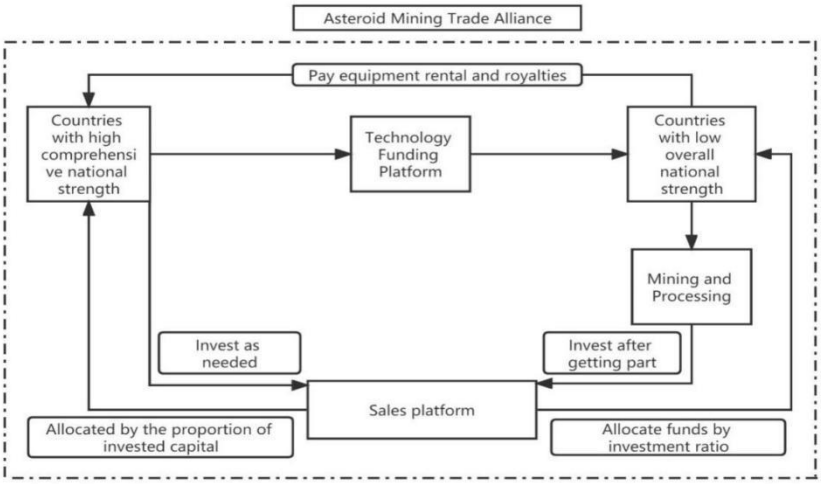

Figure 5:Operation mode of trade union

Considering the inter collaboration between countries, defining a coefficient-- the support coefficient. It responds to the strength of support from high-level countries to low-level countries. The profitability of the factors of a country after inter collaboration is linearly related to the original one so that the profitability after cooperation can be expressed as

$$X'_{ij}(j = 1,2,4,5) = X_{ij}(1 + M_{ij}) \quad (5)$$

$M_{ij}$is the rate of increase of each factor for the country. According to today's international situation, and the relevant international trade policies, we take the following table (Table 2) as a reference after taking the values :

Table 2:The rate of increase of each factor for the country

	Weak comprehensive power countries	Comprehensive Strength Power
M_{i1}	0.4o	0.1o
M_{i2}	-0.3o	0.35o
M_{i4}	-0.2o	0.4o
M_{i5}	0.7o	0.1o

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On this basis, the following planning model is established in order to make the profit of each country as equal as possible:

$$\begin{cases} \max S = \sum_{i=1}^{n}(\beta_0 + \beta_1 X'_{i1} + \beta_2 X'_{i2} + \beta_4 X'_{i4} + \beta_5 X'_{i5} + \varepsilon) \\ \max\ L = \beta_1 X'_{i1} + \beta_5 X'_{i5} \\ \max\ H = \beta_2 X'_{i2} + \beta_4 X'_{i4} \end{cases} \quad (6)$$

$$\text{s.t.} \begin{cases} X_i > 0 \\ \Delta y = \left|\frac{y'-y}{y}\right| \le 10\% \end{cases} \quad (7)$$

S is the total global profit after mutual cooperation, L and H respectively represent the total profit of low-level and high-level countries, $y'$is the total profit of a country after mutual cooperation, Δy is the profit change range.

By arranging and simplifying the above three equations, we can turn the planning model into three functional equations only related to O.

$$\begin{cases} S = \Phi_1(O) \\ L = \Phi_2(O) \\ H = \Phi_3(O) \end{cases} \quad (8)$$

As three unary functions, we can easily solve for the values $O_{n\ (1、2、3)}$ to maximize S, L, H.

To ensure that all three dependent variables are maximized as much as possible, i.e., to ensure that both high and low aggregate power countries can get what they want with high aggregate global interest. The gains that are of greater concern to them are maximized. To facilitate the calculation, we let

$$\begin{cases} Z_1 = S \\ Z_2 = L \\ Z_3 = H \end{cases} \quad (9)$$

In the process of solving for the optimal O value, we adopt the shortest distance ideal point method to seek the closest distance from $Z_{n\ (1、2、3)}$ to Z^* as an approximation and construct the evaluation function.

$$f(Z) = \sqrt{\sum_{n=1}^{3}[Z_n - Z_n^*]^2} \quad (10)$$

Then minimize f(Z), i.e. solving for

$$\min_{x \in D} f(Z) = \sqrt{\sum_{n=1}^{3}[Z_n(O) - Z_n^*]^2} \quad (11)$$

Take its optimal solution O^* as the "optimal solution".

Obtained by MATLAB, the optimal support coefficient O is 0.57.

The total global benefits and the combined power of both strong and weak countries maximize the benefits as much as possible and ensure global equity.

Introduce the Gini coefficient.

In a way that supports a goal of similar outcomes. According to this view, we analyzed the model we made. And introduced the concept of the Gini coefficient [2] G and its trends to measure the fairness of the global income.

$$G = \sum_{i=1}^{n} X_i Y_i + 2\sum_{i=1}^{n} X_i(1 - V_i)_i - 1 \quad (12)$$

X represents the population proportion of various countries, Y represents the income proportion of each country, and V represents the cumulative income proportion of each country. The larger the Gini coefficient, the larger the national direct income gap and the more inequitable the country's development.

We used MATLAB to plot the Lorenz curve and found that the Gini coefficient of the more developed countries before providing support was 0.6943 (Figure 6) and the Gini coefficient after providing support was 0.57978(Figure 7) .

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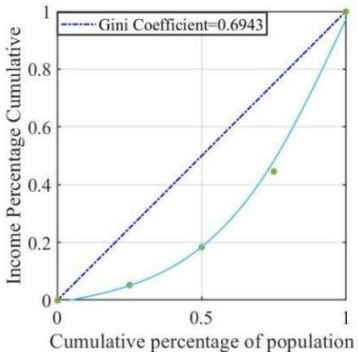

Figure 6:

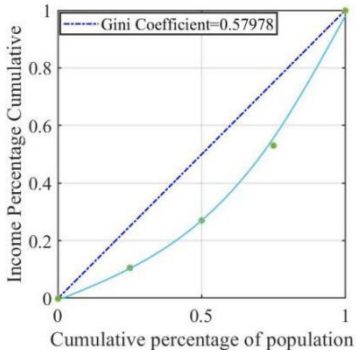

Figure 7:

It can be seen that after the introduction of high-level country support, the global Gini coefficient has a downward trend. Therefore, in order to promote global equity as much as possible, it is necessary for high-level countries to provide corresponding support to low-level countries.

4. Conclusion

By proposing the definition of the concept of global fairness, analyzing five aspects to judge the strength of a country's comprehensive strength. Judging the role played by the new trade model based on the strength of comprehensive strength, countries with strong comprehensive strength can benefit from the environment and people's happiness, and countries with strong comprehensive strength can benefit from technology and industry, so as to achieve Each gets what they need and develops together, which is conducive to alleviating global inequity.

References

[1] Global Equality, Diversity and Inclusion Policy, Nord Anglia ,11 November, 2020
[2]Pyatt, Graham. "On the Interpretation and Disaggregation of Gini Coefficients." The Economic Journal, vol. 86, no. 342, 1976, pp. 243–55, https://doi.org/10.2307/2230745. Accessed 26 Apr. 2022.
[3] The World Distribution of Income And Its Inequality, 1970–2009. Liberati, P. (2013) Review of Income and Wealth. doi: 10.1111/roiw.12088.