The Impact of the Asteroid Mining Industry on Global Equity

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Abstract. Since asteroid resource contains rare metals and minerals which its benefits are considerable. However, there is also the issue of the global equity of asteroid mining resources along with the benefits. Focusing on promoting global peace and reduce inequality, this article contributes to define and quantify global equity and imagine the future of asteroid mining and its impact on global equity, thereby providing recommendations of the revision of space treaties. In order to establish global equity model, we propose a standard for judging equity from these two aspects. Firstly, basing on the global standards of equity in food, housing, other services necessities, and labor value, we propose two indicators: the first indicator is global poverty rate (human rights equity) which taking diet, housing, and other services necessities into account, and the second indicator is difference coefficient of the global labor value ratio (labor equity). For the future asteroid mining, we estimated current costs and benefits from asteroid mining. In order to describe the future development of the industry, we define technological progress index γ according to the law of technological development. Finally, we establish a 'future asteroid mining income' model. Applying this model, we calculate the average annual income of a single country. From the results, we find that with the advancement of technology in the future, the income of the asteroid mining industry will increase from a loss to a profit, and tend to balance after reaching the technical limit. Then we have selected different conditions for analysis under three visions (monopoly, international cooperation, and national dividends). The results show that with the advancement of technology, more and more countries are developing the asteroid mining. At the beginning, the inequity trend caused by the monopoly on a few countries has weakened, and both human rights equity and labor equity have a positive trend. The increase in tax rates will indirectly increase the average income of global citizens, and the labor value ratios of all countries have also increased as well as there are also positive trends in terms of global equity. By combining with the analysis, we proposed to the United Nations corresponding policy adjustments to update outer space: use national dividends and technical assistance to enable the asteroid mining industry to move forward in the direction of promoting global equity developing.

Keywords: Global equity, Asteroid mining, Technological progress index, Global poverty rate

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1 INTRODUCTION

The development of technology always comes with opportunities and challenges. According to the United Nations, the resources of space should be common to all mankind, and the outer space technology should be freely explored and used by all countries. However, in contemporary world, each country has different opportunities to explore space and have access to resources because of the unbalanced development of each country in space, and in this case, the equity of the original treaty makes people doubt that it can continue to guarantee. As an important part of space resources, asteroid resources contain a large amount of rare mineral resources that we need and have economic and developmental significance. With the development of technology, we believe that asteroid mining must be feasible and economical worth investing in the future. Therefore, it is important to model the impact that an asteroid can have on global equity when it is a common asset for all the humanity. Then, we should also think about how to set reasonable policies to make asteroid mining enhance global equity.

In this paper, we develop a definition of global equity and use our definition to develop a model that allows us to measure global equity. Then we present, describe, and justify one likely vision for the future of asteroid mining, and determine the impact of mining on global equity with an analysis that includes the use of our global equity model. And we also develop and implement an analytical approach to explore how changes in the asteroid mining sector could impact global equity differently. Finally, we make justified policy recommendations so that the asteroid mining might truly benefit all humankind.

2 MODEL BUILDING

2.1 Establishment of global equity model

We think that the environment everyone lives in, the value of laboring everyone generates, and the equity everyone believes in is not same. Therefore, egalitarianism must not be a globally recognized equity. Under this premise, we propose that, for everyone, the definition of global equity should include the following two parts:

- All people in the world have an obligation to help any person in the world to have the right to live, that is, all people recognize that all people are created equal and have the right to live in the world;
- Any one will have labor to pay for everyone else, that is, the equity of labor. Everyone should get the same reward for the same labor.

However, due to the obvious differences between individuals and the large number of people in the world, it is impractical to make these two fair judgments for everyone in the world. However, the existence of a country will make people in the same country have similar habits of clothing, food, housing, and transportation. Therefore, when judging global equity, we take the country as the smallest unit, and use the national average data of national statistics as the fair data for all citizens of the country.

At first, global equity requires that all people can meet their own survival needs, that is, they do not belong to absolute poverty. In order to determine the number of poor people in a country, it can be divided into two steps, the first step is to define the absolute poverty line, and the second step are to calculate the poverty rate according to the poverty line.

For the determination of absolute poverty, the concept of absolute poverty line needs to be introduced first. Referring to the definition of minimum food basket [1], the absolute poverty line is defined as the cost of goods and services necessary to maintain people's basic survival under certain conditions of time, space, and social development stage. This basket is mainly composed of three parts, the diet part, the living part and the residual part, and the value of each part in this basket will vary with the region, the ages, and other factors.

The Diet Part will vary depending on the gender and age of the person, so we divide the people into G groups by age and gender. Then, according to the nutrition model recognized by the state and the main food types of the residents in F, the daily requirement in grams of each main food per capital in the j group, namely w_j^i, and the price of each main food, namely v_j, are determined. Then count the proportion of the i group in the population z_i, adding up the food consumption of each group is the food part c_{food} (1) in the absolute poverty basket. Thus obtaining:

$$c_{\text{food}} = \sum_{i=1}^{G} \sum_{j=1}^{F} w_j^i v_j z_i \tag{1}$$

Based on the minimum living area and the rent per square meter in the country, the residential portion of the absolute poverty basket can be calculated using the following formula: Where s_i is the minimum living area required for a family with i members, m_i is the number of families with i members, r is the national rent per square meter, and finally c_{house} (2) is the residential part of the absolute poverty basket. Thus obtaining:

$$c_{\text{house}} = \sum_{i=1}^{10} s_i m_i * r \tag{2}$$

The Residual part includes the minimum necessities and services required for clothing, communication, knowledge, moving, education, and physical health. It also needs to be considered the age and number of family members. According to the relevant literature, the formula can be obtained from the food portion c_{food} (1), the proportion of each group z_i and unknown parameter α, β. The parameters need to be fitted with the formula: $\ln(c_{\text{remain}}) = \alpha * \ln(\text{sap}) + \sum_{i=1}^{G} \beta_i * z_i$, where sap is food expenditure. Thus c_{remain} (3) could be obtained:

$$c_{\text{remain}} = \sum_{i=1}^{G} (c_{\text{food}})^{\alpha} * \exp\left(\sum_{i=1}^{G} z_i * N * \beta\right) \tag{3}$$

Finally, our total national absolute poverty line consists of the three parts mentioned above, calculated by the following formula (4):

$$c_{\text{bot}} = c_{\text{food}} + c_{\text{house}} + c_{\text{remain}} \tag{4}$$

After making a model for absolute poverty, we get a standard of the absolute poverty line. Then we will calculate the poverty rate based on this poverty line. Between the income and expenditure of the residents, we choose the income to compare with the poverty line. The reason is that residents' expenditure may be affected by personal and social factors, resulting in less expenditure, which may lead to false poverty, while residents' income can better reflect the wealth of residents and is closely related to happiness. Therefore, the formula (5) for judging whether a person is poor as follows:

$$P(\mathrm{In}) = \begin{cases} 1 & \left(\mathrm{In} <= c_{bot}^{k}\right) \\ 0 & \left(\mathrm{In} > c_{bot}^{k}\right) \end{cases} \tag{5}$$

Where In is the income of the resident to be judged, and the superscript k in c_{bot}^{k} represents the absolute poverty line of different countries.

After that, according to the absolute poverty line, we can judge whether any resident is poor or not. Finally, the number of poor people in a country can be calculated as follows formula (6):

$$R_p = \frac{\sum_{i=1}^{K} \sum_{j=1}^{N^k} P(In_j)}{\sum_{i=1}^{K} N^k} \tag{6}$$

where R_p is the global poverty rate, K is the number of countries participating in the statistics, and N^k is the population of the k country.

And global equity also requires that the equity of the rewards that individuals gets when they contribute to others or the society, that is, the equity of labor which can also be divided into two steps. The first step is to measure the labor input, and the second step is to measure the output of labor, and finally find equity from the value of labor.

The input of labor is measured by time, and the concept of socially necessary labor time is proposed. However, this measurement still has two disadvantages [3]:

- Ignoring the factor of labor intensity, under the same labor time, if the labor intensity is different, the labor amount will also be different;
- Calculating labor time requires the end time minus the start time, and the start and end times of labor are sometimes difficult to define;

Therefore, we find another way to measure the output of labor from the perspective of chemical energy. Labor is the process of outputting energy, material, and information to the outside world, and we are working all the time. Even rest can be regarded as preparation for labor, that is, indirect labor. According to the above two points and energy conservation, the energy input of individual laborers can indirectly represent the labor output of laborers, and the monetary value of such individual energy input can be approximated by the food expenditure of individuals. The following Figure 1 can help us understand this process:

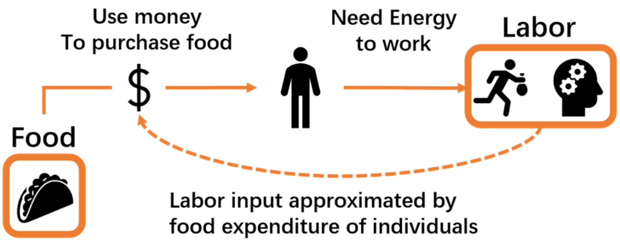

Figure 1. The Food expenditure & Labor Input.

Since we consider fairness with the country as the smallest unit, the labor output of a single country can be expressed by the following formula (7):

$$La^k = C_{food}^k \tag{7}$$

Due to we consider fairness as the smallest unit, where C_{food}^k is the total food consumption of all citizens.

In order to measure the value of labor, labor output is required in addition to the input of labor. The reward of labor is the output of labor, and the measure of national output is gross domestic product (GDP), which includes physical labor and mental labor, and is the embodiment of all labor output. Therefore, we use the gross domestic product to represent a country's labor output, expressing by the following formula (8):

$$Fb^k = GDP^k \tag{8}$$

After that, the output of labor divided by the input of labor is the value of labor, and the formula (9) for the value of labor in each country is as follows:

$$Lv^k = \frac{Fb^k}{La^k} = \frac{GDP^k}{C_{\text{food}}^k} \tag{9}$$

Labor in Global equity is fair and emphasizes that the same amount of labor should get the same reward at anytime and anywhere, that is, the same labor value. Therefore, absolute labor equity means that the labor value of each country is equal. In order to evaluate the gap between absolute equity, we use the coefficient of variation (10) of the labor value on each country to describe equity:

$$C.V_{Lv} = \frac{\sum_{k=1}^{K} \left(Lv^k - \sum_{k=1}^{K} Lv^k/K\right)^2}{\sum_{k=1}^{K} Lv^k/K} \tag{10}$$

Finally, combining human rights equality with labor equality, the final global equity model (11) is as follows:

$$\text{Equity} = (Rp, C.V_{Lv}) \quad (11)$$

Just as the definition of global equity we put forward above, equity includes two aspects in total. The larger Rp is, the higher the global poverty rate is, and the right of people to survive is not guaranteed, which is global inequity in terms of human rights; The larger $C.V_{Lv}$ is, the greater the variance between labor values across countries in the world, and the same amount of labor has different values in different countries, which is global inequity in labor. Only when both parameters are infinitely small can we approach global equity infinitely.

2.2 Establishment of predictive model of asteroid mining's income

By observing the entire future asteroid mining process [8], we can find a complete industrial chain: looking for asteroids suitable for mining; launching spacecraft to capture asteroids and bringing it to LEO; launching orbiting base stations to meet asteroids at LEO and Mining and processing minerals; aircraft bring the processed minerals back to Earth, and ground companies receive the minerals and sell them. Corresponding to the traditional mining industry: mineral exploration, transportation, mining, and processing, sales. The process of asteroid mining is shown in the following Figure 2:

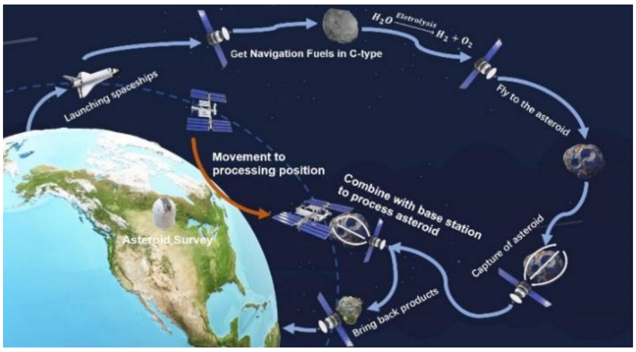

Figure 2. The Process of asteroid mining

We assume that the maximum mass of asteroid blocks that can be mined at one time is m_0, the mass of the asteroid to be mined is M, the number (12) of times to be collected is:

$$N = \frac{M}{m_0} \quad (12)$$

Asteroid surveys are generally carried out by the state, and the main mission are to detect asteroids and their locations that can be used for the next mining plan. Taking FAST as an example, its maintenance cost is 400,000/day. Therefore, the Research and development costs $C_{\text{obs}} = 23083000$/year.

The main missions for Transportation process are to capture the asteroid to LEO and transport the processed products of LEO back to Earth. And we will predict the asteroid mining's income in all stages of transportation process:

- Kick stage cost: The cost of R&D and manufacturing of rocket launch vehicle, including the cost of the main research and development C_{dev} of the spacecraft (spacecraft C_{spa}), the cost of manufacturing C_{man} and the cost of required propellant (required propellant C_{pro}), namely C_{ks} (13):

$$C_{ks} = C_{\text{pro}} + C_{spa} = C_{\text{prop}}\, m_{\text{prop},ks} + (C_{\text{dev}} + C_{\text{man}})m_{spa} \tag{13}$$

Among them, the mass of the parameter propellant $m_{\text{prop},ks}$ is according to the literature, m_{spa} (14) represents the dry weight of the aircraft main body (excluding fuel), the formula is as follows:

$$\begin{aligned} m_{prop,ks} &= m_l\left(1 - e^{-\frac{\Delta V_{LEO\rightarrow \text{artil}}}{I_{sp} g_0}}\right) \\ m_{spa} &= \frac{\varepsilon_{min}}{1-\varepsilon_{min}} m_{prop,ks} \end{aligned} \tag{14}$$

where m_l = 136 metric tonnes are the launched wet mass, and ΔVLEO→ orbit is the Hohmann ΔV to transfer from LEO to a target orbit. ε_{min} = 0.1 is the minimum allowed structural coefficient.

- Launch cost: The estimated cost of launching the vehicle to the ideal orbit (before turning on the solar panels), denoted by $C_l = 13.09\times 10^6$. [6]
- Space flight cost: According to the mining process planning, in order to save energy, the main energy used in the second half of the voyage is H_2 and O_2 formed by electrolysis of solar energy and water absorbed on C-type planets. Among them, solar energy does not consume costs, and C-type planets The water absorbed above is the mineral cost, denoted as C_{H_2O}.
- $E_{pro} = C_{H_2O}$: According to the ideal situation, the fuel used by the spaceship of the transportation company after leaving the C-type planet is the mineral income collected on the C-type: water, which saves a lot of fuel expenses for the propellant income of the navigation fuel.
- Resource price to customers in orbit: The price for which the resources are sold is dependent on the type of material to be sold (low value-to-mass or high value to-mass) and where this material will be sold. If the material is to be sold in orbit, the price p_1 (15) must be competitive with the cost if the same material is launched from Earth. Kargel (1997):

$$p_1 = p' + C_{l,orbit} = p' + C_l \tag{15}$$

where p' is the price on Earth, and $C_{l,orbit}$ is the cost of putting the same amount of mineral raw material into orbit.

Above all, the cost of the transportation process is E_{tran} (16):

$$E_{\text{tran}} = p_1 + E_{\text{pro}} - \left(C_{ks} + C_l + C_{fli}\right) = p_1 - (C_{ks} + C_l) \tag{16}$$

The main mission of the Mining and processing process is to launch mining base stations to LEO and mine the captured asteroids at LEO. And launch phase cost, launch phase cost, and sailing cost are the same as defined by the Transportation process. The rest of the definitions are as follows:

- Raw material cost $(C_{raw} = p_1)$: The cost of raw materials purchased by the mining and processing process from the transportation process is the same as the selling price of the transportation process.
- Operation cost $(C_{op} = R_{op} \times t_{mis})$: After the asteroid mining base station is combined with the asteroid, the cost of the robot for mining work is released. where R_{op} is the operation cost rate and t_{mis} is the total mission duration.
- The price of the product (p_{earth}): In order to make the same product competitive, the sale price of the finished product should be the same as the sale price of the same product on land, and p_{earth} represents the sale price of the same amount of this product on earth.

Above all, the income of the mining and processing process is E_{mining} (17):

$$E_{\text{mining}} = p_{\text{earth}} - \left(C_{ks} + C_l + C_{\text{raw}} + C_{\text{op}}\right) \tag{17}$$

Like the conventional industry, companies or individuals can choose to invest in each link of the asteroid mining industry to become their shareholders, and their final income will be distributed as a percentage of their investment to the total cost E_{inve} (18):

$$E_{\text{inve}} = a\% \times E_{\text{sur}} + b\% \times E_{\text{tran}} + c\% \times E_{\text{mining}} \tag{18}$$

where $a\%$, $b\%$, $c\%$ are the percentages of investors' investment in asteroid exploration, transportation, and mining industries, respectively.

According to the model established above, we can estimate the current cost value of the asteroid mining industry C_{now} for the current state of technology, because in the assumption we assume that asteroid mining is feasible at some point in the future, so we think that in the future, the cost of asteroid mining C_{future} will be lower.

The development of technological evolution often experiences an initial slow growth stage, followed by a rapid growth stage, and finally reaches a plateau (like an s-shaped curve), so in order to make the change of the technological progress index Closer to the advancement of time, we define the scientific and technological progress index γ (19):

$$\frac{C_{\text{now}}}{C_{\text{future}}} = \frac{\alpha}{1+e^{\beta-\eta\cdot\gamma}} \tag{19}$$

We assume 1 year for a single mining asteroid, so we could estimate the future benefits of asteroid mining E (20):

$$E = E_{\text{future}} + \left(\frac{1+e^{\beta-\eta\cdot\gamma}}{\alpha}\right) C_{\text{now}} \tag{20}$$

3 ANALYSIS OF ASTEROID MINING ON GLOBAL EQUITY

3.1 Impact on the global equity model

Since mineral resources account for very little of the minimum means of production and living necessary for human beings, the impact on mineral resources brought by the mining industry on the absolute poverty line is negligible. The impact of the mining industry on the national poverty rate is the income impact. Based on the national income E_{country} from mining in the asteroid mining model and the number of people in the country N, we can calculate the increase I^+ (21) in the national per capital income from mining:

$$I^+ = \frac{E_{\text{country}} - C_{obs}}{N} \tag{21}$$

So, the formula (21) for judging poverty in our equity model is changed as follows:

$$P(In) = \begin{cases} 1 & \left((In + I^+) <= c_{bot}^k\right) \\ 0 & \left((In + I^+) > c_{bot}^k\right) \end{cases} \tag{21}$$

Due to the change of the formula for judging poverty, it will inevitably lead to changes in the poor population and thus the poverty rate, and when the income increases, that is, when In^+ is positive, the national per capital income will increase, and the poverty line will remain unchanged. Under these conditions, more people can be lifted out of poverty, thereby indirectly promoting human rights equity in the country.

3.2 Impact on the global equity model

According to the parameters set by our vision of asteroid mining, as technology advances, the income of the industry gradually increases, that is, the labor value of the industry will become larger and larger. From the perspective of the impact on the country, the industry will play a driving role in the national GDP (21):

$$GDP^{+} = \frac{E}{N} \tag{21}$$

Since it is assumed that the asteroid mining has little impact on food expenditures, the calculation formula for the single-country labor value of the equity model is changed as follows (22):

$$\begin{aligned} Lv_{new}^{k} &= \frac{Fb_{new}^{k}}{La^{k}} = \frac{GDP^{k}+GDP^{k+}}{C_{food}^{k}} \\ C \cdot V_{Lv} &= \frac{\sum_{k=1}^{K}\left(Lv_{new}^{k}-\sum_{k=1}^{K}Lv_{new}^{k}/K\right)^{2}}{\sum_{k=1}^{K}Lv_{new}^{k}/K)^{2}} \end{aligned} \tag{22}$$

The effect of asteroid mining on the difference coefficient of global labor values is non-linear. However, when only a few high-income countries get benefits of asteroid mining, the coefficient of variation will be larger, that is, the global distribution of labor value will be more uneven. When all countries in the world get benefits of asteroid mining, the coefficient of variation will be smaller, that is, global labor will more equitable.

4 REVISION OF POLICY AND FACTOR ANALYSIS

In our previous model, due to the use of public equity, it means all citizens have invested together, but there is no reward for citizens, so they become poor eventually. It is not good for global equity. Moreover, the high-reward labor of asteroid mining only occurs to a few countries, so the mean square error of labor value in the world will increase, and it is also bad at global labor equity. To promote global equity, the future of asteroid mining will have to adjust. We will analyze asteroid mining from two aspects and then propose 4 policy recommendations:

- Who are the asteroid miners? And what about mining investments?

Asteroid mining requires the support of prerequisite technical conditions, and the income brought by asteroid mining can be enjoyed only after the conditions are met. According to the progress of asteroid exploration in various countries, with the progress of global technology, the number of miners in the asteroid mining industry has changed from less to more. Taking the countries with asteroid exploration progress as an example, we calculated the impact on mining countries changing from less to more on global equity, as shown in the Figure 3(a):

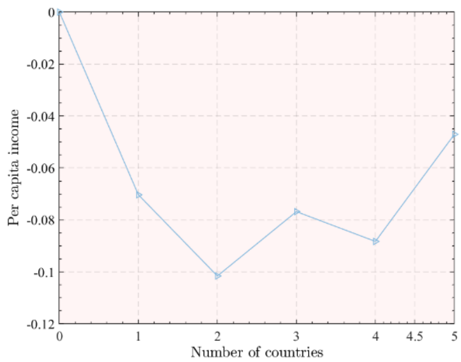

Figure (a). Asteroid Mining Impact for Global Equity

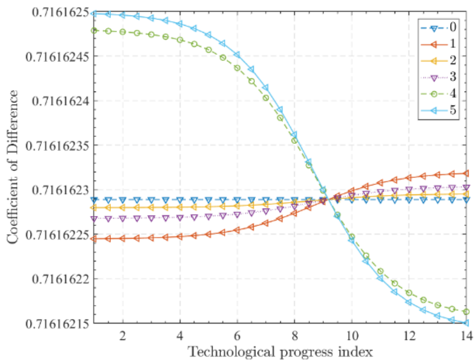

Figure (b). Trend of the impact of the coefficient of variation on the global labor value ratio with technological progress when mining is common to 0-5 countries

Figure 3. Asteroid Mining Impact

From Figure 3(b), Since the cost of mining processes and maintenance equipment in different countries is almost the same, the cost is shared by the national, so the national per capital income is negative. At the beginning, only a few countries were mining, and the maintenance costs were borne by only a few countries, and everyone's income also decreased, but as the participating countries became more and more. If there are more participants, the cost of mining will be shared by more people, and the average income of mining to the whole will rebound. By observing the Figure 3(b), before the mining industry (dark blue line), the coefficient of variance remained almost constant with technological progress. As the number of countries involved in mining is still small, the labor value ratio has not changed much. However, when only a few countries (such as the orange line , purple line, and red line) are monopolized with the progress of science and technology, the global difference coefficient will become larger, that is, the global labor value will become more and more unequal; but when the number of countries When it increases (such as light blue and green line), the difference index begins to gradually decline, and the more countries that can mine, the faster the difference decreases with the scientific and technological progress index. All the lines meet at a point, and that point is the break-even point for the asteroid mining industry.

We could also see that as the number of miners increases, the number of beneficiary countries brought by asteroid mining has gradually increased, global poverty has been improved, and global human rights equity has been improved. And more and more countries are affected by asteroid mining and increase the value of their own labor. It can be predicted that when the technology of most countries can support and benefit from asteroid mining, the average value of global labor will increase, and the impact of the gap will also be reduced, that is, the global labor equity is promoted.

- Who are the asteroid miners? And what about mining investments?

Due to the equality of human rights, asteroid mining should also belong to the global people. In order to make asteroid mining practically benefit everyone, we charge a certain tax rate on the mining revenue, and use the tax for global public utilities, indirectly allowing the global people to gain from it. beneficial. Assuming that the tax rate is $r\%$, then the benefit obtained by the country or company responsible for mining is $(1-r\%)\ E$, and the global benefits are $r\%\ E$, according to $r\%$ differences in the value of we make the impact of asteroid mining on global equity, as shown in the Figure 4(a):

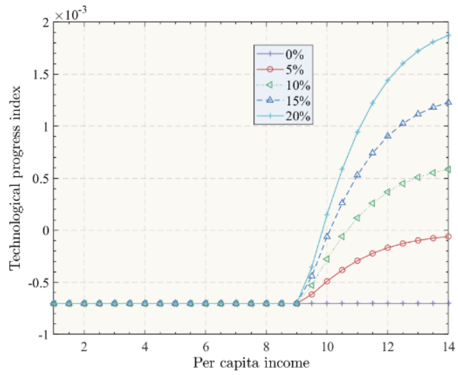

Figure (a). Impact of taxation on income

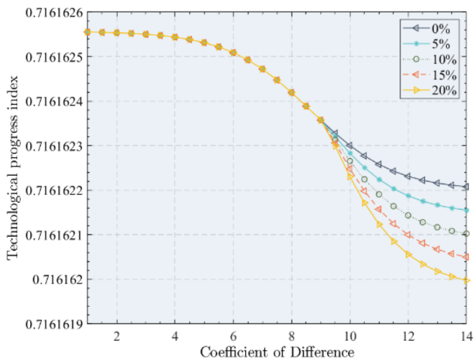

Figure (b). Impact of taxation on coefficient of difference

Figure 4. Impact on equity in the case of five-country

From Figure 4(a), when the tax rate is 0 (purple line), since all the benefits are attributed to a small number of people, the impact on global income is small and almost unchanged. When the tax rate is a certain positive value, as the coefficient of technological progress increases, the global per capita income also increases. We find that all lines intersect at the same point, then scatter. This point is the break-even point of the asteroid mining industry. Before this point, the mining industry cannot make a profit, and the tax rate is calculated at 0%; After this point, the mining industry can make a profit, and the tax rate will divide the profit, which is the income of everyone is above (purple line).

From Figure 4(b), We could find coefficients of variance between all five lines are in a downward trend, as the number of mining countries is sufficient for global labor values to converge. When the tax rate is 0% (purple line), it is the orange line in Figure 4. As the tax rate increases, the coefficient of difference decreases more and more rapidly. And all the lines are separated from a point, which is the break-even point of asteroid mining. Before this point, the mining industry cannot make a profit and no tax is charged; after this point, because the mining industry is profitable, the tax it pays can make more many countries can enjoy the benefits. As the average global income rises, the tax rate will be higher and the coefficient of variance smaller. And then, we will propose 4 policy recommendations:

- The first Policy Recommendation: For countries with asteroid mining technology, the asteroid mining industry is permitted to receive worldwide investment with full transparency and disclosure of profits and costs.

Justification: The policy is designed to enable countries without mining capacity to participate in and benefit from the asteroid mining industry, thereby increasing global human income and contributing to global human rights equity.

- The second Policy Recommendation: All countries are encouraged to cooperate with each other on a global scale to jointly promote the development of the asteroid mining industry.

If mining equipment or personnel are in accident or in distress during the mining process, the contracting parties should provide them with all possible assistance.

Justification: This policy is to increase the cooperation of countries, make asteroid mining more secure and reliable, and allow more countries to participate and join the asteroid mining industry. We hope that people around the world can benefit from it, and that asteroid mining can contribute to global human rights equity.

- The third Policy Recommendation: Encourage global exchange of asteroid mining technology, allow technology to flow around the world, and allow mining technology patents to be granted.
- Justification: This policy is to enable mining technology not to be hindered by monopoly, and the world can synchronize technical difficulties, to gather global power to jointly update technology, so that mining technology can grow at the fastest speed, so that more countries can organize their own Mining of asteroids can increase the overall labor value ratio in the world, reduce the coefficient of difference, and promote global labor equity.
- The fourth Policy Recommendation: Set a unified global tax rate, which will be adjusted with the advancement of asteroid mining technology. The adjustment principle should not only be attractive to the dominant player, but also contribute to global equity to the greatest extent. The attractiveness of the leader is that the after-tax income of the industry can attract people to be the leader, and to contribute to global equity, the tax rate should be as high as possible.

Justification: The policy is to attract the dominant players in the mining industry and global equity. This paper proposes to determine the tax rate with reference to the global average labor value ratio, such as a certain multiple of the global labor value ratio, to attract people to dominate without being excessive Deviate from global equity.

5 CONCLUSION

In conclusion, with the advancement of technology in the future, the income of the asteroid mining industry will increase from a loss to a profit, and tend to balance after reaching the technical limit. The results show that with the advancement of technology, more and more countries are developing the asteroid mining. At the beginning, the inequity trend caused by the monopoly on a few countries has weakened, and both human rights equity and labor equity have a positive trend. The increase in tax rates will indirectly increase the average income of global citizens, and the labor value ratios of all countries have also increased as well as there are also positive trends in terms of global equity.

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