The Unbalanced Physical Movements of International Trade

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Abstract: The goods produced in developed nations are often of higher quality, advanced technology and better design, hence goods even with little physical mass have higher value than goods produced in developing nations. This means that if the payment is balanced between developed and developing nations, the physical mass must be unbalanced. As a result, developed nations will become increasingly heavier, and the northern hemisphere where developed nations are clustered will also become more and more heavy. The earth will be reshaped like a ice-cream. Using customs data we confirm this conjecture.

Keywords: Balance of Payment, Imbalance of Physical Movement, International Trade

1. Unbalanced movement of mass

It is well known that the earth is round, and almost no man would like to defy the fact today. There exists more than 6 billion people in this round planet, who are producing and consuming without ceasing, transporting material things from one location to another. Human beings are "transportation master" just like ants, which can lift the material hundreds times of their own weight, and the difference is human beings have more powerful transportation capability by virtue of a variety of machines, such as trains, cars, airplanes and ten-thousands-tons supertankers.

In a story named "*Mr. Fool wants to move the mountain*" in China, any huge mountain can be moved by a man and his infinite decedents who has strong determination. Therefore, when billions of Mr. Fool transport raw materials, fuels and end products, what will happen to the shape of the earth? As is well known that human beings have polluted the river, changed the air indigents, and even altered the climate, so human beings changing the shape or the weight distribution of the earth is not a fussy question to consider.

This paper studies the unbalanced physical movements between nations for the reason of international trade. The goods of developed nations are often of higher quality, advanced technology and better design, so goods even with little physical mass have higher value than goods produced in developing nations. This means a surprising conclusion: (1) if the payment is balanced, then the physical mass of goods must be unbalanced between developed and developing countries, hence developed nations will become more and more heavy; (2) Meanwhile, since the majority of developing nations cluster in the southern semi-sphere and the majority of developed nations cluster in the northern semi-sphere, so the former will become more and more heavy, and latter will become lighter consequently. When the unbalanced physical movement continues, does the earth will become into "ice-cream shape" rather than round?
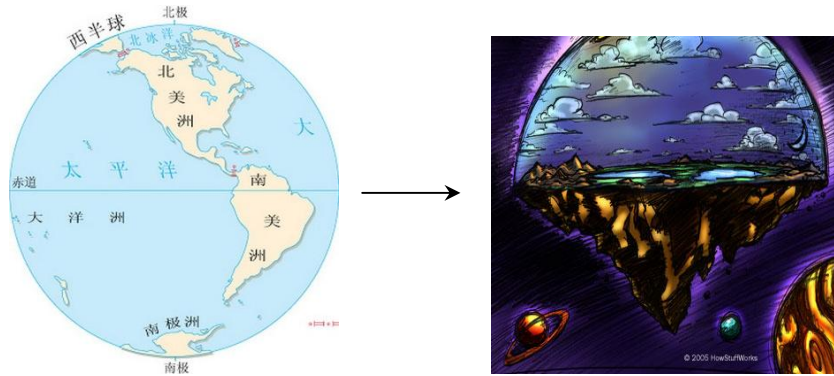
Figure 1. The change of the earth shape because of international trade

This trend becomes clear after 1990s, for the science and technology have a great transition, which is focusing on the micro level. While before the time span, the products of developed nations commonly have regular or bigger shape, such as cars, ships and factory machine, which can be seen by naked eyes. As a result, developing countries can buy these products, and then disassemble them, imitate them and overcome them; perhaps this was the way of Japan, South Korea and other nations which caught up with developed nations in a very short period, while the original producers lose its advantage in these fields. Maybe it is the reason that developed nations pay more attention to the technology of micro level, such as medicine, gene products, soft-ware and integrated chips, which are difficult to find a clue to imitate. As a result, developed nations are attaining huge net mass of products using products with zero or negligible weight, thus further aggravating the imbalance of physical mss movement.

We can use importing and exporting data from customs to testify the above hypothesis, and the existence, velocity of the unbalanced physical movement. Although the customs data were widely used to study the principles of international trade, those studies almost focus entirely on the balance of payment, productivity, technology intensity and other metaphysical movement, while the physical movement itself was surprisingly ignored.

2. The statistics of customs on mass

The statistic units of customs in the majority of nations are different. For example, there are more than ten kinds of statistical units in China. However, kilogram and piece are used most frequently, there are nearly 95% transactions recorded by the two kinds of units alone. As a result, we can make analysis mainly based on the two kind of units. We can see the detail in table 1.

Table 1. The statistical units of customs in China

Unit name	Frequency	Percent	Unit name	Frequency	Percent
Kilogram	8,522,468	0.526922	kilogram	6,215,640	0.655126
Piece	6,628,544	0.409826	Piece	2,762,729	0.29119
pair	463,907	0.028682	meter	393,607	0.041486
meter	377,248	0.023324	Cubic meter	48,000	0.005059
Square meter	110,072	0.006805	gram	19,589	0.002065
Cubic meter	38,840	0.002401	pair	19,134	0.002017
gram	17,381	0.001075	Square meter	13,562	0.001429
liter	10,115	0.000625	liter	8,716	0.000919
karat	2,633	0.000163	karat	6,155	0.000649
thousand	1,367	8.45E-05	thousand	460	4.85E-05

hundred	1,208	7.47E-05	Kilowatt hour		79	8.33E-06
kiloliter	168	1.04E-05	kiloliter		22	2.32E-06
Kilowatt hour	95	5.87E-06	hundred		15	1.58E-06

3. The test of unbalanced physical movement

Using customs data of exporting and importing in China, we then analyze the existence, scale and direction of unbalanced physical movement. The analyses have a certain representativeness, because China is one of the largest country in terms of trade volume.

(1) The existence and scale of unbalanced physical movement

We construct an index named ***trade physical deficit***, which is the result of the weight of export goods minus import goods. After sorting the trade physical deficit, we list the top ten nations or regions in table 2. Mainland China imported about 19.7 million tons of goods from Taiwan, and export to Taiwan about 49.6 million tons in the year 2006, which means about net 29.9 million tons deficit was made. If these trade surplus are put evenly on the 35.8 thousand square kilometers of land in Taiwan, every square meter will be increased by about 0.83 kilogram that year. If trade surplus from mainland China was put evenly to smaller region, for example, Macao and Hongkong, per square meter of these two regions will be increased by 126.98KG/m^2 and 23.03KG/m^2![1]. There is no doubt that those regions will become heavier rapidly due to international trade. Thus, the imbalance of physical movement not only exists, but also on a large scale.

Table 2. The top ten trade partner of China on physical deficit in 2006 (weight)

nations	Export (kg)	Import (kg)	ratio	Trade physical deficit	Area (km^2)	Increased weight (kg/ m^2)
Taiwan	49698856960	19716970496	2.52	29,981,886,464	36192	0.83
Japan	56316112896	29774438400	1.89	26541674496	377835	0.07
Hongkong	32711680000	7295472128	4.48	25416207872	1104	23.02
Korean	54346272768	34106828800	1.59	20239443968	100210	0.20
U.K.	50921746432	34937004032	1.46	15984742400	9629091	0.00
Spanish	9441646592	2535423488	3.72	6906223104	505925	0.01
Italy	8095815680	1494684416	5.42	6601131264	301338	0.02
Netherlands	6764184576	2584657664	2.62	4179526912	41543	0.10
Macao	4390026752	225244736	19.49	4164782016	32.8	126.98
Belgium	5967097856	1917737856	3.11	4049360000	30528	0.13

If we use "piece" as the statistics unit, the surplus scale is more astonishing. From Table 3 we can see that every resident in Hongkong got 24.11 thousand pieces of goods, and every resident in Singapore got 3,660 piece of goods from mainland China on average in 2006. Even in a large country with more population, the net deficit is also a big number. For example, every American can got net 140 pieces of goods from China in the year 2006.

Table 3   The top ten trade partner of China on physical deficit in 2006 (piece)

country	Export (piece)	Import (piece)	ratio	Deficit pieces	Population (thousand)	Deficit piece/ person

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[1] There is attention that Hongkong is an important transition port, so quite a part of the goods are exported again lately.

Hongkong	219621982208	47675580416	4.61	171946401792	7130	24115.90
U.S.A	49215885312	5058631168	9.73	44157254144	315250	140.07
Singapore	27096023040	7185096704	3.77	19910926336	5430	3666.84
Germany	20814540800	3650196992	5.7	17164343808	82264	208.65
India	6546259456	291742112	22.44	6254517344	1210193	5.17
U.A.E	5988989440	2329444	2571	5986659996	5080	1178.48
Netherland	6248539648	382549216	16.33	5865990432	16740	350.42
U.K	6398381568	973345024	6.57	5425036544	62262	87.13
Italy	4592215552	484152960	9.49	4108062592	62001	66.26
Russia	4327686144	370485856	11.68	3957200288	142370	27.80

(2) The general trend of unbalanced global movement

There are two realities which determine that the countries in southern hemisphere are generally physical deficit exporter. The first is that the developed countries are mainly concentrated in the northern hemisphere; the second is that the few developed countries in the southern hemisphere, such as Australia, New Zealand, South Africa are also major mineral exporters unfortunately. Thus outpouring iron ore resource exports to Japan, South Korea and other countries. However, we have not customs data of all the countries, so we can only analyze the trade trend from the viewpoint of China.

The mine pits in Australia   The iron ore powder is unloading China

The southern hemisphere in this paper, refers to the countries distributing at the south of the equator, in spite of only part or all of the area in the southern hemisphere[②]。 After calculation, we can find that China exported 28947729 tons goods to southern nations, and imported 324216081 tons of goods from them, which means every one of 1.31 billion Chinese got 247.49 kilogram and every square meter of mainland China increased by 33.77 grams just because the goods from the southern hemisphere.

Table 4   The top ten trade partner of China in the southern hemisphere in 2006

nation	export	import	ratio	trade physical deficit

[②] The southern hemisphere include the following countries in this paper: (1) African countries: Angola, Botswana, Burundi, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Rwanda, Seychelles, South Africa, Swaziland, Tanzania, Zambia, Zimbabwe, the Democratic Republic of the Congo, Gabon, Equatorial Guinea, Republic of Congo; Kenya, Somalia, Sao Tome and Principe, Uganda; (2) Asian countries: East Timor, Indonesia, Maldives; (3) Oceania: Australia, Fiji, Nauru, New Zealand, Papua New Guinea, Samoa, Tonga, Tuvalu Salomon islands, Kiribati, Vanuatu; (4) South America: Argentina, Bolivia, Chile, Paraguay, Peru, Uruguay, Brazil, Ecuador, Columbia.

Australia	4010018304	152765726720	0.03	-148755709952
Brazil	3555490048	94426439680	0.04	-90870947840
Angola	1231746944	23452706816	0.05	-22220959744
Indonesia	8242685952	25922803712	0.32	-17680117760
South Africa	2055696256	15625142272	0.13	-13569445888
Argentina	562084672	9793735680	0.06	-9231650816
Peru	537812864	7250881024	0.07	-6713068032
Equatorial Guinea	57220916	5267235840	0.01	-5210014720
Chile	808591296	5437223424	0.15	-4628632064
Sultan	637799552	4949500928	0.13	-4311701504
Gabon	60990568	2016871296	0.03	-1955880704
New Zealand	560589376	1626724352	0.34	-1066134976
Mauritania	28276704	903779840	0.03	-875503104

4. Conclusion

Due to the data availability, we use the customs data of China to analyze the unbalanced physical movement. We find that, if countries trade based on the rules of equal values, then the physical movement must be unbalanced between developing and developed nations. Developed nations will become more and heavy, and the northern hemisphere where are clustered developed nations will also become increasing heavy. The earth will be reshaped. We hope every country construct statistics from weight or piece, then more detailed rules about the movement can be found.

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