

## Energy and Forces in economics

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In the gravity model of international trade, the attractive force between two nations for trading can be described as:

$$F = \frac{GMm}{r^2}$$

Thus, we know the money mass of the two nations decides the attractive force between the two nations. ( $r$  is the money distance between the two nations) The gravity field of one nation for the other nation is:

$$g = \frac{GM}{r^2}$$

Thus, we know if one nation has more money mass, then it will have more attractive gravity field for other smaller nations. For example, China and America have the second largest and largest GDP (Money mass) of the world, so the two nations will attract smaller countries such as Taiwan to trade with them. The larger the nations, the more attractive gravity field is. Thus, we should have more overseas capitals into our country. And, we know the integral of force is energy. Thus, we can also have the gravity energy of the two nations:

$$E = \frac{GMm}{r}$$

This is the gravity potential energy of the two nations. And, we know the gravity constant  $G=SC^2/2$  ( $S$ =spinity-impelity constant,  $C$ =lightspeed). Thus, the gravity field of the one nation can be rewritten as:

$$g = \frac{SMC^2}{2r^2}$$

Here, the trade gravity field is due to the half of money mass energy:  $1/2mc^2$ .

Because of Einstein's mass energy equivalence, we know the energy of money mass should be equal to:

$$E = MC^2$$

This is the rest mass money energy. If the money mass stays at one nation, it will serve as the source to attract outside money to the nation. We know the maximum

money velocity is also equal to lightspeed. That is we cannot carry money to travel faster than lightspeed. Thus, the equation is the same as Einstein's equation. And, if we consider the internal kinetic energy for one nation, the net money energy is:

$$E = MC^2 + \frac{1}{2} MV^2$$

Here, V is domestic money velocity. Besides, there is also impelity for the money. The impelity equation is:

$$F = \frac{SPp}{r^2} = \frac{SMVmv}{r^2}$$

If a large amount of money moves into the nation with fast velocity, it will attract or drag other smaller amount of money to move into the nation. It is the impelity of money. For example, if a great deal of hot money moves into a nation, other smaller speculators will also follow and let money go into the nation. Or, when a big player moves money into stock market, other smaller players will follow and put money into the stock market. This is the impelity for money. Since there is impelity, there is conservation of momentum for money and linear frame dragging effect. And, the impelity field of money is:

$$I = \frac{SMV}{r}$$

Thus, the impelity for money is not only depends on the amount of money but also the velocity of money. The faster the hot money moves in, the greater impelity causes. If big player puts money slowly or little by little into the stock market, it will trigger only mild impelity for the smaller players to move along. And, the impelity energy of money is:

$$E = \frac{SPp}{r}$$

Besides, Coulomb's formula can also be used to explain economic phenomenon. This can be used for good. If two nations produce same or similar goods (Q) with similar industries, then the two nations will expel each other. For example, Taiwan and Korea both produce semiconductors, and the two countries will be repulsive and competitive. If two nations produce different or complimentary goods with different industries, then the two nations will attract each other. For example, Taiwan produces semiconductors, and China/USA produces agricultural products. Then, the two nations will have attractive force for trade. The formula is:

$$F = \frac{KQq}{r^2}$$

We can see same charges repel each other and different charges attract each other like Coulomb's force. The Coulomb energy is:

$$E = \frac{KQq}{r}$$

Because Coulomb's law explains the rest charge, it is that both charges have pole strength QC or qc. (C is lightspeed) We can also use magnetic force to explain economic phenomenon. The formula is:

$$F = \frac{kQVqv}{r^2}$$

This formula can explain the economies of agglomeration or critical mass effect. For example, in Hsin-Chu industrial park of Taiwan, two complimentary companies will group each other if they both have same good flow direction (both are spin-up) such as IC design and Foundry companies will group each other. If two similar companies with same good flow direction (same buyers or customers)(both are spin-up) such as TSMC and UMC companies will repel each other. But if one big company is clockwise rotation, and other smaller companies have also clockwise rotation (same good flow direction) to orbit around the big company, then they will still attract each other. (Smaller companies don't want to compete but just share the remains of the bigger company. If two similar companies with opposite good flow direction (different buyers or customers), they still have chance to group each other. This is the magnetic effect of economics. The energy of economic magnetism is:

$$E = \frac{kQVqv}{r}$$

The field of Coulomb static force is:

$$E = \frac{KQ}{r^2}$$

That means if one nation or company has larger scale of economics, it can attract more trade or business. It will also have greater effect for economies of agglomeration such as TSMC. In addition, the field of economic magnetism is:

$$B = \frac{kQV}{r^2}$$

The pole strength(product amount\*product flow) decides the magnetic field of one nation or company to affect other countries or companies.