# Lecture 7: Equilibrium• Optimum•Margin

## Section 1: Equilibrium and Optimum

As mentioned in the previous lecture, economics has copied many concepts from physics. One case is the division of micro and macro, while here is another case of the concept of “Equilibrium” which is very important in economics.

Equilibrium in physics means that an object is in the state of static or uniform linear motion due to the force balance. For example, the mobile phone on the table is static. Why? Because it is now subject to two forces, one is gravity, and the other is the force of the table supporting it. The two forces are of the same magnitude, but of the opposite directions, so reach a balance, and the mobile phone is in a static state.

Economics has copied the concept of equilibrium from physics which refers to a state of static (there cannot be the so-called state of uniform linear motion) when the economic forces are of the same magnitude and the opposite directions. For example, the theory of supply and demand analyzes the two most conventional economic forces in the market: the buyer’s demand for commodities and the seller’s supply of them. These two forces work in opposite directions: buyer’s demand pushes the price to rise, while the seller’s supply pushes it to fall. When they are of the same magnitude, the price will stabilize and remain stationary.

However, economists later find that there are cases when there cannot be at least two economic forces to reach a balance. After all, this concept is copied from physics, and, inevitably, there will often be cases that are incompatible with it. Therefore, economists have revised equilibrium to refer to the state that under certain constraints, each economic entity will no longer adjust his behavior (i.e. remain stationary). Why do economic entities no longer adjust their behaviors? It must be because, under such constraints, they have reached the most favorable positions for themselves, so they are satisfied with staying there, not changing any more. If they have not reached the most favorable positions, the postulate of self-interest implies that they will continue to adjust their behaviors. Equilibrium used in consumer theory, the theory of firm and game theory is such meaning instead of the “force balance” directly copied from physics.

In economics, the concept of “optimum” is also often used to describe the above state that individuals adjust their behaviors according to the constraints to make themselves in the most favorable positions. Optimum and equilibrium are related to each other because equilibrium is the overall result when all economic entities have chosen the optimal behaviors. In other words, it is optimum from the perspective of an individual, while it is equilibrium from the perspective of all as a whole.

However, equilibrium in economics is problematic, since this concept in physics is a fact, while it is not in economics. Look out of the window. Cars are running roughly the road or parking on the side, and which one is in the state of equilibrium in physics? The answer is obvious: the parked cars and the running ones in uniform linear motion which can be measured with appropriate tools. However, look out of the window, is the world in the state of equilibrium in economics? No matter the answer is yes or no, what is the reason? Equilibrium in physics is a fact which is observable or at least measurable with tools, while equilibrium in economics is not a fact because it is neither observable nor measurable.

Another criticism that can give a fatal blow to this concept is that since equilibrium refers to the state when individuals all reach the optimum under certain constraints, how can there be disequilibrium? Disequilibrium should mean that individuals do not reach the optimum under certain constraints, which is a conflict with the postulate of self-interest. How can a self-interested person not reach the optimum?

Some may argue if the constraints change suddenly, the individuals who were in the original state of equilibrium will not have time to adjust their behaviors, so they are in the state of disequilibrium before they adjust their behaviors to reach the new equilibrium. However, it only means that there is transaction cost to adjust the behavior (including the information cost needed to realize that the constraints of the original equilibrium have changed), which is also one kind of constraints. It is wrong to think that individuals are in disequilibrium before they adjust their behaviors to reach the new equilibrium in that the constraint of transaction cost is neglected. In lecture 5, it has been warned that there are many mistakes in mainstream economics, one of which is precisely the neglect of the transaction cost as a constraint. Once the constraint of transaction cost is neglected, there will be mistakes conflict with the postulate of self-interest. The problematic concept of “disequilibrium” once again proves this warning.

In short, if all the constraints are taken into account, there is impossible to be disequilibrium in economics. Then what is the sense of equilibrium? Some economists, such as Coase and Steven. N. S. Cheung, have suggested altogether abolishing this concept. However, equilibrium has been used too long and too widely in economics, and intertwined with other economic theories and deeply rooted, so the cost of completely abolishing it is too high. I suggest retaining this concept, but all disequilibrium analysis must be swept out of economics because they are conflict with the postulate of self-interest. Thus the answer to the question whether the world is in the state of equilibrium is: always yes! Anyone who answers no is equivalent to claiming that he does not accept the postulate of self-interest.

With transaction cost, some seeming disequilibrium cases are equilibrium ones, which is quite similar to the cases with friction in physics. Imagine a heavy object is pushed by force, but stay still or in equilibrium. Why is that so? It is because the object is also subjected to a friction force in the opposite direction to the push, and of the same magnitude to it, so they offset each other, and the object remains stationary. However, as long as the push to the object is large enough, it will eventually be a move against the friction.

Similarly, according to the TSD in economics, if the supply or the demand has changed, the original equilibrium price should fluctuate. However, in reality, price will not change every minute with the always-changing supply and demand. Is the price in the state of disequilibrium? Have facts refuted the TSD? There are cases where the price changes every minute with the always-changing supply and demand in the stock market. It is the transaction cost of adjusting the price every minute that prevents a self-interested human from doing so unless the increase in income from adjusting the price is higher than the transaction cost. The stock prices fluctuate every minute because the stock market is precisely the place with the lowest transaction cost for price adjustment, where a complicated computer system is used to match the supply and demand automatically.

If the TSD can only be used to explain the stock price changes, how narrow its application is! In order to avoid falsification of the TSD, it needs to be supplemented with the constraint of transaction cost in price adjustment. With this constraint, a theory with much stronger explanatory power can be deduced, giving new impetus to the traditional TDS: the higher the transaction cost of adjusting price, the lower the frequency of price fluctuations, vice versa.

For example, vegetables are sold both in farmers markets and supermarkets. The prices of the vegetables in farmers markets are more flexible than in supermarkets because the transaction cost for price adjustment of the former is lower than that of the latter. The farmers are the owners of the vegetables they sold and have the complete right to set the prices. By contrast, salesmen in the supermarkets are not vegetable owners and have to report to their managers to obtain permissions if the prices need to be adjusted. It is evident that the internal decision-making process of a supermarket is much more time-consuming, so it is possible that when the day is over and the vegetables have been rotted away, the decision about price adjustment has not been made. The much more time-consuming decision-making process implies the much higher transaction cost in supermarkets than in farmers markets, which is the reason why the prices of the vegetables in the latter fluctuate more frequently than in the former.

Thus, the world is always in a state of equilibrium. The so-called disequilibrium phenomenon which seems to refute the TSD is merely due to the neglect of the transaction cost in adjusting prices. It is not a tautology; otherwise, it is also tautology that friction is used to explain why a heavy object may not be pushed to move in physics. More importantly, the above example of vegetable sales demonstrates how to identify different transaction cost by observing different phenomena. Based on these observable facts, instead of an unobservable concept like equilibrium, we can explain why the vegetables in farmers markets and supermarkets have different frequencies of price fluctuation, which rejected the statement that the vegetables in supermarkets with lower frequencies of price fluctuation are in a state of disequilibrium.

Therefore, economics only needs Static Analysis (the analysis of a particular equilibrium) and Comparative Static Analysis (the analysis of comparing two different equilibriums) which is the analysis of the difference in the constraints of the equilibriums. What is more, economics needs neither disequilibrium analysis nor Dynamic Analysis (the analysis of the process of changing from one equilibrium to another, and it is disequilibrium in the process), because they are wrong in neglecting transaction cost.

Besides, there is another reason why I suggest retaining the concept of “equilibrium”. There cannot be disequilibrium analysis, but disequilibrium can be used as a tool to help to check if a theory or explanation is right.

For example, the conclusions of any economic theories must not be a conflict with the postulate of self-interest, which means they must be in the state of equilibrium. So if the conclusions deduced from a specific theory imply disequilibrium, it must be wrong, the logic of which is equivalent to the reductio in mathematics. It is quite useful to judge whether a theory is wrong, so it is a use of disequilibrium in testing theories.

Furthermore, if there is disequilibrium in the explanation of a phenomenon, some constraints (often transaction cost) must have been neglected. As far as theories are concerned, economics is not as difficult as natural science like physics, chemistry and biology. However, the difficulty of economics lies in the applications, and mainly lies in investigating the constraints. There may be thousands of constraints relevant to a phenomenon, so it is not easy to screen out the key constraints, which means that information cost is an important constraint in the study of economics. Here disequilibrium helps to find out whether some key constraints are missing. However, it cannot directly tell what the specific constraints are, which still depends on investigations and perhaps experiences. After all, it is still a handy tool to detect omission in an explanation.

In brief, disequilibrium can be used as a tool to check if the conclusions of a theory are conflict with the postulate of self-interest and if there are omissions of constraints in an explanation.