# Section 3: The Third Version of Coase Theorem

(3) Version III: If property rights are well-delineated, and if the parties involved can reach and enforce agreements at zero transaction costs, then the final outcome will be efficient regardless of the initial assignments of property rights.

This version of Coase theorem is the most well-known and generally introduced in economic textbooks. It was put forward by Coase in his paper “The Problem of Social Cost”. It is also known as “Invariance Theorem”, because regardless of the initial assignments of PPRs, the final outcome of market transactions will be invariant in that it must satisfy the equal marginal principle or be Pareto-optimal.

Here are some examples put forward by Coase to illustrate this version of Coase Theorem.

A piece of land can be used to grow wheat or for parking. If used for parking, the wheat will be crushed by the cars. And if used to grow wheat, there will be no place for parking. Most will think it is the owner of car who has harmed the interest of the owner of wheat, but it is just because most think farmers are vulnerable, so put themselves into farmers’ shoes, which is not objective. The objective analysis should be from the perspective of the whole society. If the rent of growing wheat (the income from selling wheat in the market) is higher than that of a parking lot (the income from parking fee), the land should be used to grow wheat, and vice versa.

According to this version of Coase Theorem, as long as the rights of this land is clearly delineated, no matter whether it belongs to the owner of wheat or that of car, the final outcome of market transactions will be that the land is used for the purpose with the highest rent.

Suppose the rent of a parking lot is higher. If the property rights of the land belong to “A” who is the owner of car, of course he will use it directly as a parking lot. But what if the property rights of the land belongs to “B” who is the owner of wheat? “A” can pay to rent or buy the land from “B” and turn it into a parking lot. Will “B” transfer the land to “A”? As long as “A” pays him more than the income from growing wheat, “B” has no reason to refuse. So will “A” pay? Since the income (rent) of the land as a parking lot is higher than that of growing wheat, “A” can still have net income after fully compensating the loss of “B” without the land used to growing wheat, and he has no reason not to pay. Thus, as long as the rights of the land are clearly delineated, no matter whom they are originally assigned to, through market transactions the land must be used for the purpose with the highest rent, which will not harm anyone, so is Pareto-optimal.

Extended from the above example, there is another example. There are two adjacent pieces of land, one is used to grow wheat, and the other is used as grassland to raise cattle. The cattle on grassland often go to eat the wheat. Most may think that “A” who is the owner of cattle has harmed the interest of “B” who is the owner of wheat. However, it can be also regarded that “B” has harmed the interest of “A” by infringing on the right of the cattle to eat wheat.

If the rights of wheat belong to “B”, which means the cattle cannot eat wheat without B’s permission. The cattle can get fatter if they can eat wheat, and “A” can get higher income by selling the cattle in the market. Suppose the increase in income (marginal revenue, MR) of “A” is greater than the decrease in income (marginal cost, MC) of “B” caused by the cattle eating wheat, “A” can pay to “B” in exchange for the permission of allowing the cattle to eat wheat. As long as the payment can make up for the loss (MC) of wheat damage, “B” has no reason to refuse. And as long as the payment is lower than the benefit (MR) of “A”, he has no reason not to pay.

However, according to the law of diminishing marginal return, with the cattle eating more and more wheat, the MR of “A” is falling, and the MC of “B” is rising. The payment that “A” can agree is getting lower and lower, while that “B” will require is getting higher and higher. Eventually, when MR＝MC, “A” will stop paying to get the permission from “B” of allowing his cattle eat more wheat. In other words, “B” will not rent or sell all the wheat in his land to “A” to raise cattle, but rent it until where the MC of wheat is equal to the MR of the cattle that get fatter by eating wheat, and they will build a railing to prevent the cattle from coming to eat more wheat.

Now let us reverse the assignment of the property rights, and suppose that the rights of wheat belong to “A”, which means the cattle can eat wheat at will without B’s permission. If cattle eat all the wheat in B’s land, the MR of “A” may be lower than the MC of “B”, so now it is “B” who needs to pay to “A” in exchange for restricting the cattle from eating wheat. Since the MR of “A” is lower than the MC of “B”, they can reach agreement as long as the payment is higher than the MR of “A” and lower than the MC of “B”. With the cattle eating less and less wheat, the MR of “A” is rising, and the MC of “B” is falling. The payment that “B” can agree is getting lower and lower, while that “A” will require is getting higher and higher. Eventually, when MR＝MC, “B” will stop paying to “B” for restricting his cattle from eating wheat. Thus, they will build a railing in the same place as the above case that the rights of wheat belong to “B”.

Both the above examples are fictional, and here is the third example in reality. Pollution from factory exhausts is harmful, and most think it is the factory that infringes on the residents living nearby. However, if the increase in output (MR) of the factory is greater than the increase in harming health of the residents (MC), from the perspective of the whole society, the factory should increase pollution (increase production). As long as the rights of air are clearly delineated, through market transactions there will be Pareto-optimality that satisfies the equal marginal principle.

In reality, the rights of air are usually delineated to the residents. If the MR of the factory of increasing production is higher than the MC of residents, the factory will pay to (compensate) the residents to buy the rights to pollute the air. As long as the payment (compensation) is higher than the MC of the residents and lower than the MR of the factory, there is no reason for both parties not to agree.

On the other hand, if the rights of air are delineated to the factory, which means it is free to pollute the air, and suppose the MR of the factory is lower than the MC of the residents, now it is the residents who need to pay to the factory in exchange for reducing production. Since MR is lower than MC, as long as the payment is higher than MR and lower than MC, there is no reason for both parties not to agree.

The last example is the real case that Coase discussed in his paper “The Federal Communications Commission”. At the beginning of the 20th century, fishermen in Boston would contact with their families through radio wave when they went fishing. Many may use the same wave frequency, resulting in mutual interference. The US government then set up the Federal Communications Committee to regulate the use of radio waves.

When Coase studied this history, he found a file that recorded a parliamentarian’s question, “Why not publicly auction the frequencies of radio wave, so that the taxpayers can get the benefits?” Government will publicly auction the lands, so why not do the same to the frequencies of radio wave? This question inspired Coase to find the essence of the problem. Different people use the same wave frequency and interfere with each other, because the rights of the frequencies are not clearly delineated. If the rights of frequency are clearly delineated just like the rights of lands, regardless the initial assignments of the rights, the frequencies can be transacted in the market and transferred to those who can have the highest income from the use because they can bid the highest price.

This example is important because it not only comes from the reality, but also can easily avoid the interference of subjective emotions compared with the previous three examples. In the previous three examples, it is easy to think one party is good, while the other is bad, and the bad party has infringed on the good party. Based on such moral judgment, naturally the policy suggestion to government will be to restrict or even punish the bad party. However, in the case of frequencies of radio wave, it is clear that all are the same in using the frequencies and interfere with each other, so the essence of the problem is obviously that the rights of frequencies are not clearly delineated, and the policy to solve the problem should focus on the constraint of the delineation of rights.

There is an important prerequisite of “zero transaction costs” for the third version of Coase Theorem. However, in reality, the transaction cost is not zero, which does not mean that Coase theorem will fail. The textbooks of MSE precisely make such a mistake in welfare economics. Firstly, they talk about the market failure, then introduce Coase theorem, pointing out that there will be no market failure if the Coase theorem is satisfied, and finally advocate once there is transaction cost, there will be Coase theorem failure.

In fact, one of the economic implications of Coase theorem is precisely that if the transaction cost is not zero, different initial assignments of property rights will matter, but the final outcome will be still Pareto-optimal or the equal marginal principle is still satisfied. Specifically for the second example above, where to build the railing will be different as the rights of wheat are assigned to “A” or “B”.

The most typical example is the one of factory pollution. Why are the rights of air usually delineated to the residents nearby in reality? Not because residents are vulnerable and need protection, but because there is only one factory and there are many residents. The transaction cost of negotiating with one factory to pay to the residents will be lower than that negotiating with many residents to pay to the factory. In other words, in reality, people will choose to delineate the property rights with less transaction cost.

What is more, in reality, even if the rights of air are delineated, the transaction cost of negotiation is still too high, so there are few market transactions of transferring the rights of air, but there are usually judgments by court. The residents bring a lawsuit against the factory, and the court makes a judgment on the compensation the factory should pay to the residents. Coase’s paper “The Problem of Social Cost” has carefully examined the courts’ judgments on various infringement cases, and found that although the judges are not economists and certainly do not know the concept of transaction cost, but they do have made the judgments according to the consideration that to which party the rights are delineated is better for the society or cause less transaction cost.

As has mentioned in Lecture 14, the purpose of any institution (including market and court) is to reduce some kinds of transaction cost, but it will also cause another kinds of transaction cost to increase. Self-interested people will trade off the benefit (the decrease in transaction cost) and cost (the increase in transaction cost) of an institution, and decide whether to choose it or not. There is transaction cost of delineation of rights for market, while there is also transaction cost of judging arbitrarily for court. Unlike market transactions where there is the equal marginal principle to ensure the Pareto-optimality or social interests maximization, courts’ judgments inevitably diverge from this principle more or less without the guidance of price in the market, which implies there is transaction cost. People will trade off the benefit and cost to decide to choose market or court.

In other words, if there were no transaction cost, there would be no different institutions or the effects (benefit and cost) of different institutions would be the same, so people do not need to make choices, and their behaviors will be random and unpredictable. Thus, there is a logical contradiction in the third version of Coase theorem: with zero transaction costs, there would be no need for the institution of market, and neither is there need for a legal system to delineate the rights!

Steven N. S. Cheung has revised the third version Coase theorem as: If property rights are well-delineated, with the relative price of the market unchanged, then the final outcome of market transactions will be invariant and efficient, regardless of the initial assignments of property rights.

There is an additional prerequisite of “with the relative price of the market unchanged” for eliminating the wealth effect. Some quibblers argue that those to whom the property rights are delineated will become richer, and the use value of goods will change marginally under the wealth effect, which may cause the (relative) prices of these goods change in the market, resulting in different outcomes of market transactions.

Thus, the core content of the third version of Coase theorem can be preserved without the assumption of zero transaction costs, but only with the assumption of unchanged transaction cost or zero marginal transaction costs.