Conservation Economics
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Module 1
What is Economics?
Lecture 1
Making decisions

Namaste and welcome to this course on Conservation Economics. I am Doctor Ankur Awadhiya. I am an officer in the Indian Forest Service and your instructor for this course.

In this course, we shall try to understand how conservation and Economics are interlinked; how certain economic decisions - certain bad economic decisions - lead to issues of conservation; how they lead to environmental disasters and how we can make use of the principles of Economics to ensure that we also are able to meet our goals of conservation.

We shall also try to explore why conservation is important for the economic well being of a society. After all we require Economics - we require development - to provide certain amenities to our people. And when we do good conservation we can provide those amenities at a cheaper cost.

So, on the one hand Economics helps in good conservation. That is, good economic sense and good conservation at the same time. Good conservation helps in the development of the society which is also one of the objectives of Economics. We shall also try to explore how we can use the principles of Economics to provide funding for conservation.

These and several other issues will be discussed in this course. This course will be divided into several modules and each module will have three or four lectures. Each module will comprise those lectures that cover a thematic area in either Economics or conservation - or their interlinking.

The 1st module is: "What is Economics". In this module we will have three lectures. The first one is introduction to the course and making of decisions; the second lecture is making decisions part II and interactions, followed by interactions and working of the economy. We begin with the first lecture: "Introduction to the course and making decisions".

When we talk about Conservation Economics, the first question that comes into the mind is

"What is Conservation Economics?" That is, what is conservation? What is Economics? And how are both of these linked together?

The word conservation is derived from these word roots: con meaning together and servare which means to keep. So, essentially conservation means "to keep together." And what do you keep together? You keep together the natural environment because it is under threat. In one of the later lectures we shall explore what is causing this threat, why is our environment - and why are our wildlife - in great danger, and why we need to protect them.

We are not protecting these organisms because of our love for these organisms. We are not protecting tigers because we want to protect the tigers or because we are very much affectionate to tigers - because after all in most of the human history we have been killing tigers - because tiger is a ferocious animal. But, over time we came to this realisation that tiger also provides several benefits. Tiger protects the forest and forests provide us with several benefits such as clean air and clean water.

Forests ensure that our rivers and our streams have water throughout the year - they are perennial in nature. Forests ensure that whenever there is rainfall all the water does not just reach into the rivers causing floods and for the rest of the season the rivers get dried up. Forests have a role.

Where there are forests there will also be herbivores - animals such as deer, animals such as sambar. Now, if these animals are there in the forest - these herbivores are there in the forest - and there is no carnivore that is predating over them, that is eating them as prey - in such a scenario the number of herbivores would go up like crazy, they would eat up all the young plants.

Now, for a forest to continue it requires that the seeds of the trees get germinated and the young plants that come up are able to survive. But if herbivores eat up all the young plants then we will have a stage at which the forest will only have old trees.

And, in such a scenario, if there is any catastrophe - if there is a forest fire, if there is a disease, then this whole forest will be gone. Or even if we do not have a disease - in certain point of time those trees that are old will die off and in the absence of young regeneration the forest will not be able to come back. So, we need to keep a check on the population of herbivores.

How do we keep the population of herbivores in check? Well, we can do two things - one, we can go into the forest and we can start killing up these herbivores, but when we do that in a short time we will come to the realisation that these herbivores are also playing a role in the maintenance of the forest - because the seeds of a large number of plants require these herbivores. When these herbivores eat up the fruits, the seeds - when they pass through the alimentary canal or the gut - become more suited for germination.

So, if you just take the seed and put it into the ground it will probably not germinate, but once it has passed through the alimentary canal of these herbivores - the seed will germinate. A number of plants also use these herbivores as transporters of their seeds.

Because what happens is: if you have a tree in a location - and if all the seeds or all the fruits of this tree fall down here itself, the young plants that will come up - they will be coming up in the shade of the mother tree. And, when we say the shade of the mother tree it means that these young plants will not have sufficient sunlight and so, these plants will not be able to grow.

So, the seeds require a mechanism to transport these fruits and these seeds to other locations and one such mode of transportation is the herbivores. When the herbivores eat up a fruit - and the herbivores are moving - the plants are stationary, but the herbivores are able to move. When they move then this fruit or the seed that is within their stomach also moves with them.

And, when these herbivores go to another area and they defecate, then the seeds are able to germinate in those areas. What happens is that by using herbivores the trees ensure that the plants are coming up away from the shady areas, in those areas where they can actually grow into new plants, into new trees. So, the herbivores also have a role in the ecosystem.

Now, the question is: We need to maintain these herbivores in a quantity that is neither too high - because if it is too high then all the plants get eaten - nor it is too low - because if it is too low then also the forests are gone and when the forests are gone all the benefits that we get from the forest they are also gone. How do we maintain that? Well, we could do another thing.

We could keep a track of all the herbivores, their populations, which herbivores are where - keep a track of things and start to kill certain herbivores to maintain the numbers.

But, once we start to do that we will come into another problem because when a tiger eats up a deer, then it is eating that deer that is either diseased or it is too old because of which this deer is not able to run fast. But, when humans get into the field, once humans are permitted to get into the forest with guns to kill deers to keep the population in check, how will they know whether a deer is in the prime of the health or it is a diseased deer? In a number of cases what has been found is that whenever people were doing hunting, they were killing off the best animals - because the humans also have a desire to use things such as the hides of the animals.

So, if you permit humans to kill these herbivores to keep their population in check what will happen is that they will kill off those animals that are the best animals and in a short while you will observe that the herbivore population is now only having diseased animals. And, so, in the long run the herbivore population again will be gone which will again have negative consequences.

Now, at the same time when we use humans to keep these populations in check just think about how much amount of computations will need to be made. You will have to keep a record of each and every animal, find out which animal is healthy, which animal is not healthy and then track that animal and kill that animal, so that the population is kept in check. But, you are also killing off only those animals that are either diseased or weak, so that the herbivore population remains a healthy population.

Now, just think of how much amount of effort would be required! The other option is: just have a predator in the jungle - just have the tigers! Tigers will do everything for you. What can be better than that? When we talk about conservation, when we say that we are keeping things together, we are doing preservation - protection and restoration of natural environment and wildlife. This is not because we are very fond of tigers but this is because we need the tigers.

We need these forests, we need these wildlife because they serve purpose for ourselves. Whenever you find a new disease people will start to look for cures. Now, a large number of cures are found from different plants. You must have heard of the name of quinine. Quinine is a medicine that is used to treat malaria and quinine comes from the bark of the cinchona tree.

Now, of course, the cinchona tree is not infested with mosquitoes - the cinchona tree is not protecting itself. But, what is happening is that the cinchona tree produces the secondary metabolites to protect itself from the predators and the predators of the cinchona tree are things like insects or herbivores. When you have this quinine in the bark, then the quinine is very bitter in taste and so, the herbivores avoid it. The insects also avoid getting into this plant.

But when humans discovered that there is this chemical quinine, we extracted those chemicals and that was used as an antimalarial and once you have found this chemical you can always synthesise it in an industrial reactor. But, first of all you should know that there is such a chemical that can help you. Now, to have such chemicals it is important to have the cinchona trees. Now, whenever we get a new disease we will again start to look for the chemicals that can be used to treat this disease and where we will they get these chemicals from? From the plants! And where do we have these plants? We find them in the forest! Because when we talk about an agricultural field, then we are talking about a monoculture. People only grow paddy, people only grow wheat or there are maximum two or three crops that are grown, but when when you are looking for new chemicals you have to look for biodiversity. So, when we say that we are protecting a forest we are not protecting the forest because we love the forest. We are protecting the forest because we need the forest - because forests provide us with certain benefits.

And, when we talk about Economics, Economics is also concerned about providing benefits to people. When we say that we want an economic development, it means that you want to have more of more things. That is, we should have more electricity, we should have more vehicles, we

should have better houses - that is economic development.

But what is the premise of economic development? It is to provide comfort to people. And biodiversity is also doing the same thing! Because if you have good houses, you have good vehicles, you have sufficient electricity, but everybody is diseased - will you say that the society is a very happy society? Or when you have a medicine that treats these diseases and people are healthy? What do you prefer?

Obviously, people will prefer to have a healthy population and to have that healthy population we need clean air, we need clean water, we need biodiversity which will give us medicines, we need food, we need fibres, we need water, we need a lot number of things. And for that, we need to do conservation, that is the preservation, protection and restoration of the natural environment and wildlife.

Then what is Economics? The word Economics comes from these word roots - oikos means house and nemein is to manage. So, Economics is the study of how to manage a household and some of the best economists are the ones who are managing our households because in a household you need to make several decisions: What sort of food needs to be prepared, so that everybody is happy? You cannot have a just one thing throughout your life. So, every day you would need something different. Now, to we make that something different, you will require ,say, food grains, you will require salt, you will require oil.

Now, whenever we are having these things and we are making a food item - let us say that we are preparing dosa. Now, when we are preparing dosa we will require oil. So, the oil needs to be had in a quantity that we should always have oil available to make dosas, but we cannot also store a very large amount of oil otherwise it will get rancid. Things get spoiled if they are stored for a very long period of time. So, we need to make a number of decisions - what to buy, when to buy, in how much quantity to buy, what to produce in on different days and how to decide for whom to produce. Do you want to produce the food taking into account the children in the house or taking into account the adults in the house or taking into account the old people in the house - because they will have different requirements.

They will be happy with different things. The children might like to eat sweet items more, but the adults might want to go for more healthy food items. They want to have salads more. Now, the thing is you need to make these decisions: what to produce, for whom to produce, when to produce, how much to produce and these are the same decisions that we need to make even at the level of the society.

Economics is derived from the word roots house and manage. It is the science of managing the household or the science of managing the society, the study of how society manages its scarce resources. So, as a society as well we have these questions: what to produce, for whom to

produce, how much to produce, when to produce, and we take the same insights from the management of household to the management of the society because the principles remain the same. So, this is Economics.

Economics is a science of making decisions and these decisions are necessary because there is a scarcity of resources. Now, how are conservation and Economics related to each other? In conservation we are saying that we need to keep things together - we need to protect the natural environment. And in the case of Economics we are saying how does the society manage its scarce resources. How are they connected to each other?

Well, there is a very great intricate relationship between both of these because certain economic decisions have ruined the environment - things like pollution due to industrial revolution. Now, when we talk about what to produce in a household - what food items to produce, we are making this decision to ensure that everybody gets a sufficient nutritious food and everybody gets the food of their liking which means that we want to make everybody happy. In Economics terms, we say that we need to maximise the happiness - or the surplus.

When we are trying to do that it is possible that in the short run we make certain decisions that are not the most optimum decisions. So, for instance, a factory is being set up in your neighbourhood and you think that ok this factory is going to provide us with jobs. But once this factory has been set up you find out that it gives out so much amount of noise and so much amount of fumes and smoke and noxious gases that it is now difficult for you to even breathe in the area. Now, when this factory was being built you were in support of this factory, but once it has started its operations you think that oh we were much better before this factory was built in this area, at least we had clean air to breathe, at least we were not having this noise.

Now, the thing is that factory in itself is not a bad thing, but when we talk about implementation of things we need to know why the factory owners chose not to install noise controlling devices or not to install the smoke controlling devices. These are because of things that are known as externalities. We will have a lecture devoted to externalities which helps us understand why people make these decisions that harm everybody.

In short what is happening is that the factory owner thinks that ok, if I install this device there is a cost that is involved, but if I do not install this device then I am saving money. The consequences are being faced or are being suffered by people in the society but, I am not suffering the consequences because I live far away and there the air is good. We will observe that a large number of countries these days are taking this choice to move their polluting industries to certain other countries.

So, in that case they are saying ok let us have the profits, but we should not have this pollution in our country because we want clean air. Now, Economics also gives us options to ensure that

people install these devices and we will look at things like the Coase theorem that can help us ensure that these pollution controlling devices get installed.

But what happens is that certain economic decisions - especially bad economic decisions - ruin the environment and so, the environment needs to be protected. In the case of conservation we were talking about the protection of the natural environment. If the natural environment is getting degraded because of certain economic decisions then conservation is required. So, both of these fields are related in this way.

Another thing is some economic decisions have led to a total collapse of the ecosystems - extinction of species such as over harvesting of whales or extinction of dodo. Now, dodo was a bird that was extensively hunted for meat. It was a flightless bird. It could not fly away to protect itself with the consequence that people hunted it to such an extent that now not a single dodo remains on this planet.

This is not just the story of dodo. We are doing this every day to a large number of species in the name of economic development. In one of the lectures we shall explore what is the level of this loss that is happening. Now, remember that these species are required for the well functioning of the natural ecosystems. The dodo also had a certain role, it was required for the germination of certain species of trees and with the dodo gone those trees are also gone. There are a large number of inter linkages.

Now, probably, when we talk about a new disease there was certain chemical in that tree that could have been useful in treating the disease, but once that tree is gone you do not have any access to that chemical. So, certain economic decisions have led to a total collapse of ecosystems and for that we again need to go back to conservation. How do we bring the things back?

So, some economic decisions have led to a situation that is calling for conservation. At the same time conservation requires funding and resources. When we talk about Economics we are asking the question: how does the economy or how does the society manage its scarce resources? We have money, but we have also different things that require money. We can use the money to construct a school, we can use the money to construct a hospital or we can use the money to conserve the forest. How do we ensure that there is some amount of money that is made available for the conservation of forests? For the conservation of biodiversity?

Remember here again that we are not trying to conserve biodiversity because we love the forest - because man is a selfish being and we want to conserve the forest only because it provides us with certain benefits that we cannot have otherwise. But, these resources can come only when they are allotted for in the present and the future economic decisions.

And, so, if the conservationists and if the economists are not on talking terms then we will have a

situation where both will be at logger heads - whereas actually, both are working for the same goal - both are working to maximise the surplus of the society. The only difference is that a person who does not know about conservation will have only a limited set of choices.
A person who does not know the benefits of forest would say that ok we can construct a dam but, he would not know that we could have done the same thing for a much cheaper cost. Another example is that when we talk about tidal surges or when we talk about tsunamis then these days it is a fashion that we should construct a wall along our shores and these walls will protect against the against the sea water that is rushing in during the tsunami. Well, good enough, but then if you have mangrove forest in place of the wall you will also have the same benefit and mangrove forest will also protect your biodiversity. They will also clean up the water; they will also clean up the air. Your wall is not going to do that. So, you are getting more benefits for a lesser cost, but then to make this decision the economist needs to know what are the benefits of conservation and so, here is a relationship between Economics and conservation.

Economic decisions have the power to promote conservation - when we talk about renewable energy, when we talk about green technology, etc. Why are we shifting towards renewable energy? Well, we are shifting towards renewable energy because there is a shortage of petroleum. The price of petroleum increases and when that happens the cost of energy also increases. At the same time whenever we are talking about the use of petroleum or coal to generate electricity, it generates huge amounts of pollution. When we talk about renewable energy we can have the same energy there is no difference between the electricity that is generated by renewable sources such as solar energy or wind energy and the electricity that is generated out of a thermal power plant - the electricity is the same!

But we can have that electricity for a cheaper cost and with less amount of pollution and a number of economic decisions have been promoting conservation. So, when the government says that we should shift from incandescent bulbs to LED bulbs, the government is making this choice - or is promoting this choice - so that the amount of energy consumption reduces because we only have a limited capacity to produce electricity, but then once we do that we are also aiding conservation.

So, the thing is can we correlate both of these together so that we can have the best of both worlds? Conservation aids Economics, so that you are able to get the maximum utility at a cheaper cost and at the same time Economics aids conservation so that you are able to protect and preserve the environment. This is the relationship between conservation and Economics and this is what we are going to explore in this course.

This course will have several modules. The first one is: What is Economics. With these three lectures: Introduction, making decisions, interactions and the working of the economy. The second module will explore about conservation. Conservation in the anthropocene; anthropos is human beings and cene is a time period.

We call the current era as anthropocene because in today's era the impact of human beings on everything - on climate, on geology, on biodiversity - is much greater than any other factor. We say that that today is the man's age, but the thing is in this anthropocene - that is the age of human beings - what is the need for conservation? Do we need it or not? We will also explore human population growth and food requirements because our populations have been increasing with time and more people means that we require more resources. And, remember that Economics is the science of making decisions - about how to use the scarce resources for maximum benefit.
Now, if the number of people goes up the per capita availability of resources goes down. What can we do to ensure that the people still have access to resources? How does population grow? How do we provide it with food and other requirements? And, when we are meeting these requirements are we meeting that sustainably or unsustainably? This comes to sustainable and unsustainable development. The difference is that if you have a resource you can use it to get benefits for a very long period of time or you can use it to get benefit for a short period of time. You would have heard of the story of the hen or the goose that was laying golden eggs. Now, the farmer that was having this goose that was laying golden eggs was getting one egg every day and it was a golden egg. The farmer could have had these eggs for a very long period of time, say, for many months or say, many years. When we talk about having those eggs for a very long period of time we are talking about sustainable use. But, what the farmer did was that the farmer got very greedy and said that ok, there are eggs inside this hen or this goose so let us kill this goose and take out all the eggs. Once that was done the goose is dead and so, now, there are no more golden eggs. That is unsustainable development.

When we talk about sustainability we are asking the question that ok there is this lake; this lake has fishes. How many fishes do I take out every day, so that the fish population is also able to maintain itself and I am able to get this many number of fishes for a very long period of time?

Sustainable development is development that lasts not just for a short period of time, but for a very long period of time typically for many generations. So, we are using resources in such a manner that we are able to meet our present needs while also ensuring that our future generations are also in a position to meet their needs. We do not over exploit the resources so that nothing is left for our children and our grandchildren - that is sustainable development.

In the third module, we will talk about the modern impacts that necessitate conservation. We will talk about things like climate change, plastics, oil spills and mining. These are certain impacts because of which conservation has become an urgency. We are generating so much amount of plastics that a large quantity is being dumped into the environment and it is leading to negative consequences. We are dumping so much amount of carbon dioxide that there is a huge amount of global warming. We are observing changes in the climate today, we are observing the sea levels rise right before our eyes and if we do not do anything to solve this problem, then probably it

will be too late. So, these are the certain impacts of human beings that are now necessitating conservation as an urgency.

In module 4, we will look at threats to wildlife. We will look at push and pull factors. If you talk about any organism it has certain requirements - requirements of food, requirements of an amiable climate, the maximum-minimum temperatures, requirements of water, requirements of space. Those areas that provide these requirements give a pull factor to these organisms - that is, the organisms can live in those areas. The areas that do not provide these necessities of life give a push factor to the organisms - that is, the organisms will no longer live in this area.

Now, if you have a situation in which the organism is finding that everywhere it is getting pushed and there is nowhere to live, then the species will move towards extinction. So, push and pull factors are those factors that help us understand the threats to species and understanding these threats is important when we want to conserve these species.

And here we will also talk about ecotoxicology and developmental hazards: what are the hazards of development, what are the kinds of toxins that we are releasing in the name of development, what are the negative impacts of those toxins, and what kinds of influences do they have on the working of the ecosystems. That is ecotoxicology.

In the fifth module we will ask the question: "Can Economics help and how (can Economics help)." Because a large number of these decisions are occurring because of bad economic decisions we need to understand how economic decisions are made in the first place because once you understand Economics only then will you be able to use Economics to conserve the wildlife, to conserve the natural resources. In this module we will look at the need to understand controls. We need to understand how both of these are related and we will learn about thinking as an economist - what is the thought process that goes on in an economist's mind?

We will further look at interdependence and gains from trade. In a large number of cases these economic decisions are being made to maximise profits and these profits are coming from trade. So, trade is an essential thing that we need to understand the working of the economy. This trade happens in the markets - markets are places where Economics works.

We will explore markets in the 6th module. We will look at what is demand, what is supply, what is elasticity and how can government policies influence the market outcomes.

Suppose the market says that no, we need these materials in such a large quantity that even unsustainable development is what we will go for. Then government has the responsibility and government has the power to ensure that these market outcomes are modulated, they are tempered down so that we also ensure that everybody is able to get their due share.

What we are asking is if there is a certain group of people who says that no we are going to go for gas guzzling vehicles; we want the largest size SUVs even if we have to travel alone - in that case the pollution that gets released will cause an impact on all the people not just the person who is driving the SUV. Can the government do something to desist people from using these SUVs or desist people from using those vehicles that are not fuel efficient? This brings us to the role of government policy.

In the 7th module we will look at markets, welfare and conservation. Markets are important because they enhance the welfare of the society; they enhance the surplus of the society. We will understand what is surplus, how the surplus is measured and why do we want to go for economic development at all. And, we will look at market efficiency, cost of taxation and international trade in this context.

In module 8, we will look at public sector and conservation. In this case we will talk about things like externalities. Externalities are the impacts of one person's actions on the welfare of the bystanders. Remember that we are going for economic development to increase welfare, to increase surplus, but if there are certain actions that reduce the welfare, then those actions are known as externalities.

E.g., if one person is playing a very loud music and he is enjoying the party, but the people in the surrounding are not able to sleep, then that is an externality. How can we solve this problem of externalities? How can we come up with a solution that the person is able to hear music, but others are also not disturbed? We will look at public goods and common resources that mostly the government supplies for and the design of the tax system which pays for the public sector and conservation.

In the 9th module, we shall look at industrial organisation and conservation. A large number of bad economic decisions are to maximise the profit; they are because of cost cutting measures. Now, why do industries go for cost cutting? To understand that we need to understand how these industries make this decision of how much to produce and at what price to produce. So, in the 9th module we will look at the cost of production.

Competition and monopoly: You can have a competitive market or you can have a monopolistic market where there is only one seller. We need to understand how a seller in a competitive market makes decisions and how a seller in a monopolist market makes decisions because these are the decisions that have a ramification for conservation.

In the 10th module we will look at Labour Market Economics and conservation. In this case we will ask what are the markets for the factors of production that is what is the market for labour. The people who do work are also working in a certain market. They are providing their labour; they sell a sellable product and they are getting wages in return. That is the price that they are

getting.

What determines how much will be the wages? What determines how many people get employed? This is important because in a number of cases we have observed that when people are very poor, when their productivity is very less; then to feed the people they will want to extend their fields into the forest. They will want to cut down forests to expand their agricultural fields. This is because their productivity is less.

So, if we want to do conservation we would want to ensure that people are not poor: Everybody gets sufficient resources, so that they do not have to put a very great amount of pressure on the environment. This is what we will explore in module 10 - markets for factors of production, earnings and discrimination, and income inequality and poverty.

From modules 1 to 10 we will be working on several theoretical aspects that is we will make certain assumptions: that people are rational beings, that people want to maximise their surplus or their benefit. But in a number of cases these assumptions do not hold true because if you go to the market it is not that at all times you are trying to think that what will give me the maximum benefit.

It is also possible that your parents said that you should go and buy this particular brand of soap and you go and buy that particular brand of soap without giving a thought whether there are other soap brands that are probably better or cheaper. Now, when we have this sort of a situation, we are talking about the things like Behavioural Economics, the role of Psychology in Economics.

In the 11th module we will look at such practical issues as consumer choice. If there is an option to have two vehicles and one vehicle is say very fuel efficient - it does not give out lot of pollution, but it is a bit expensive and there is another vehicle that is a gas guzzler, but it is cheaper. How does a consumer decide which vehicle to buy? What are the psychological insights in that? When there are two parties and they do not have sufficient information how do they process? How do they make decisions when there is a shortage of information; there is a shortage of processing power? Because, remember that we had started by saying that Economics is the science of making decisions about how the society manages its scarce resources. When we are making decision and we do not have the processing power to make those decisions, how do we make decisions? We will also look at evaluation of natural resources.

The 12th module is case studies. We will look at the Economics of predicted areas and the Economics of environmental disasters followed by a summing up and discussion.

We will now touch upon how the society makes decision.

We have explored that there are certain basic questions of Economics: what to produce, how to produce, how much to produce, for whom to produce, when to produce and so on. Now, Economics helps us answer these questions and in this course we shall explore how these questions are answered, but the question is why do we have these questions in the first place.

We have these questions because the wants are unlimited, but the resources are limited. So, we want to have the best food, we want to have the best clothes, we want to have the best houses, the best vehicles, but our resource - in fact money - is limited. So, you have to make a choice. Do I want to have the best house and go with a not that good car or do I want to have the best car and live in probably a not so good house?

So, wants are unlimited, but resources are limited - which leads to a conflict. You need to make a choice because there is scarcity; there is a limitation on the society's resources both at an individual scale and at the scale of the society, which is why we need Economics to help us understand or study how the society manages its scarce resources - how you make this choice.

When we talk about scarcity, we have a trade off at all points of time. Whether you are thinking about it or not you are doing a trade off at all points of your living life. For example, now you are watching this video - you could have spent this time not watching this video and you could have spent it, say, watching a movie. Or you could have gone out with your friends, or probably you could have read a book, or probably you could have been working somewhere.

Now when you are watching this video you have given up all of those. So, there is this trade off - you are giving up something to get something and such a trade off is always there at the individual level. And it is also there at the society level. We have this classic thing that is known as guns versus butter debate. Should a society spend its resources on national security that is guns - or on consumer goods that is butter.

Why? Because if we talk about two things - you have factories that can produce aircraft and you can use this factory to produce fighter aircraft or you can use it to produce commercial aircraft. Fighter aircraft is your guns and the commercial aircraft is your butter or a commercial good. If the factory is being used to produce only the fighter aircraft that is this point, at this point the number of commercial aircraft that we have is 0. On the other hand, if the factory is producing only commercial aircrafts then the number of fighter aircrafts is 0 or the society could decide some other point so the society might say that we will have these many commercial aircrafts at this line and we will have these many fighter aircrafts.

Or the society could choose a point like this or else or the society could choose a point like this which is probably outside of the capacity of our industry. So, things such as these questions - whether to go for the fighter aircraft or the commercial aircraft - lead us to things known as production possibility frontiers. This line is the production possibility frontier.

It is giving us the option that if we were to use our factory to the fullest extent, we could choose any point on this line. If we choose a point like this, at this point we are making less number of commercial aircrafts and less number of fighter aircrafts then is possible. If we choose this point then we will have more commercial aircrafts and more fighter aircrafts as compared to this point, but if you choose a point outside then this is outside of our ability, we cannot have this point. So, this is the production possibility frontier.

When we talk about the trade-offs we have the trade-off between guns and butter, we have the trade-off between efficiency and equality. Efficiency is the property of society getting the most it can from its scarce resources. Equality is the property of distributing economic prosperity uniformly among the members of the society. When we talk about this debate, we are asking the question that there is an industry and in this industry we are making, say, biscuits. Now, these biscuits can be made using either machines or they can be made using labour. If you use machines, then probably the efficiency will be very large - the factory will be churning out a huge quantity of biscuits. This is efficiency. But in that case only the factory owner will be earning all the profits because there is no other person to share the profit with. This will create an unequal society. On the other hand, we could say that only labour intensive factories can be permitted. In that case we will have only labour because of which we will be having less number of biscuits that are produced. The efficiency goes down, but now the profit is shared by so many people and the equality is high. Economics helps us choose whether we want to go with more efficiency or more equality. And we have things like taxation and subsidies that promote equality at the cost of efficiency; there is always this trade off.

When you have trade-offs you also have cost. Cost is something that you give up to get something. When you are watching this lecture you are not able to watch a movie. So, the movie is the opportunity cost of watching this lecture. Because we have a trade-off we have a cost. And when we have costs then these costs can be explicit or implicit. Explicit cost is something that requires an outlay of money that is if you say that you want to buy a box of pencils or a bar of butter what is the money that you will have to spend. Implicit cost is a cost that does not require an outlay of money. That is, what you could have earned in a part time job, if you were not listening to this lecture. So, we have different costs.

When we talk about Economics we assume that people are rational and rational people are those people who systematically and purposefully do the best they can to achieve their objectives. That is, when we say that a person is rational then this person is trying to get all the information that he or she can, trying to process it in such a manner that they maximise their welfare and reduce their cost.

When we say that a firm is doing profit maximisation, we will say that the firm is a rational firm. In this context when you talk about rational thinking - a large quantum of it occurs at the margin.

Margin means what is the incremental change - a small incremental adjustment to a plan of action - that is margin. Marginal change is a small incremental change and a good example is, if you think about yourself, how do you think? Should I study 8 hours for the exam or not study at all? Do you think like this? Because everybody knows that if you do not study for the exam at all, you will probably fail. So, nobody thinks like this. But we normally think like this that should I watch my favourite TV show for 30 minutes and study 7 and a half hours for the exam. In place of 8 hours now we are thinking not about 0 hours, but we are thinking about 7.5 hours because whether I study for 7.5 hours or 8 hours will not make that much of a difference.

When we are thinking like this we are doing a rational thinking at the margin and a lot of rational thinking actually occurs at the margin. For example, if you talk about an airline and suppose the cost of flying a 200 passenger jet is 10 lakhs of rupees. The average cost of flying per passenger is 10 lakhs divided by 200, is 5000 rupees. Now, suppose the plane is about to take off and there are 5 seats that are remaining and there is a passenger who is willing to pay only 3000 rupees for that seat. Should the airline sell the seat for 3000 rupees or not?

If we think about an average thinking then we will say that no we are selling the tickets for an average of 5000 rupees and this person is paying 3000 so, we should not sell it. But, what happens actually is that airlines - if they are rational thinkers - they start to think at the margin. What is this marginal thinking? The airlines would think that ok what is the marginal cost of putting this extra passenger, because in any case the aircraft is about to take off.

Now there are two choices. We have choice 1 that is take off without this passenger and in this case the earning is rupees 0 because in any case the flight is going to take off. The choice 2 is to get rupees 3000 from this passenger and allot a seat.

Now, once you have this extra passenger on the aircraft, then it will also incur certain costs because there will be an increase in the weight. Now, one person on an average is like 60 - 70 kgs. So, what is the additional amount of fuel that will be required for this particular passenger? Let us say the additional amount of fuel that is required is 500 rupees because in any case you have this aircraft that is weighing several tons and this aircraft is going to take off. If you add 60 - 70 kgs extra then the change in the extra fuel will be very less say 500 rupees. When this passenger is there in the aircraft you will probably serve him with a bag of peanuts or certain snacks. What is the cost of that snack? Suppose the cost of this snack is 100. In this case the aircraft will be earning 3000 rupees. So, this is the revenue and the cost is rupees 500 plus rupees 100 is rupees 600.

In this case what is happening is that the marginal profit - should the aircraft permit this extra passenger - is 3000 minus 600 rupees is 2400 rupees. If the passenger is not permitted the aircraft the airline will not earn this profit, but with the extra passenger the airline will earn this extra profit. And, even though this is less than the average cost of selling the ticket, the airline will

probably permit this passenger because permitting this passenger is giving the airline an extra 2400 rupees.

What is wrong with that?

Now, this is marginal thinking that while on average the person is paying less than what the airlines charge, but marginally the airline is at a profit. And, so, taking a rational decision the aircraft should fly with this passenger.

To sum up when we talk about making decisions there are three important principles: one - people and society face trade-offs because there is a shortage of resources. Our wants are unlimited and so, there is a trade off. These trade-offs lead to cost and cost is what you give up to get something and what you are giving up could be in the form of money. Like you are giving up 50 rupees to buy a pen. That is the cost of this pen. Or probably you are giving out something else. Probably if you are not buying this pen you would have spent that 50 rupees on an ice cream. So, we can also say that the cost of this pen is the ice cream that you have to forgo.

So, cost is what you give up to get something and here you can also talk about the opportunity cost which is the next best alternative that you are giving up. When you say that you are giving up the ice cream that you wanted so much, then that is the opportunity cost of buying this pen.

We also saw that rational people think at the margin. Rational people are those people who take all the information, who process all the information to get to a point where they maximise their welfare. And, when they try to maximise their welfare they often think at the margin - that is small incremental changes. When the factory is thinking at the margin, the factory is asking the question should I produce one extra good? I have already produced 10000 cars. Should I make the 10,001th car?

When the buyer is making a rational choice thinking at the margin, he is asking ok I have had four chapati's should I eat the fifth chapati or not, and a lot of rational thinking happens at the margins. So, that is all for today.

Thank you for your attention. Jai Hind!

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Module 1
What is Economics?
Lecture 2
Interactions

Namaste! We move forward with our discussion on module 1, What is Economics. And in this lecture we will carry forward our discussion on Making Decisions and we will also have a look at Interactions. So, let us begin with a summing up of what we saw in the previous lecture.

In the last lecture we discussed about how we make decisions - how does a person make decisions and how does a society make decisions, and we surmised certain points about it. The first one being that people and society face tradeoffs. Whether it is at the level of an individual or it is at the level of the society there are always certain tradeoffs. What is the tradeoff? A tradeoff is something that because your resources are limited you can use your resources to get say object 1 and if you use your resources to get more and more of object 1 you will get less and less of object 2. A simple example is that suppose we have 2 objects - we have ice creams and we have chocolates and we have a limited amount of money with us. Suppose we have 100 rupees. Those 100 rupees can be used to get ice cream or they can be used to get chocolates.

If you spend your 100 rupees only on ice cream you will get 0 amount of chocolates. If you spend your 100 rupees on getting chocolates you will get 0 amount of ice cream or you can use your 100 rupees to get some chocolates and some ice creams. This is a tradeoff that we are facing at the level of an individual. Similarly society also faces certain tradeoffs primarily in the form of, what to produce, how to produce, how much to produce, whom to produce and so on. For instance, the society can utilise its resources to produce capital goods or it can use them to produce consumer goods.

The society can decide that we should put more and more amount of money into defence or it can decide that we should put more and more amount of money into health care or education. Because the resources are limited if we put more amount of money into say health care we will have less amount of money that is left for education sector. There is always a tradeoff. People and society face tradeoff primarily because the resources are limited. Because of these tradeoffs we have costs. Costs are defined as what you give up to get something.

So, what is the cost of say ice cream? If you are getting a big tub of ice cream for 100 rupees you can see that we have a cost of ice cream to be 100 rupees, but this cost can also be in terms of say time, it can be in terms of effort, it can be in terms of money, it can be in terms of certain other goods. So, for instance in place of having say 100 grams of ice cream you could have had that 200 chocolates. So, you can also say that the cost of 100 grams of ice cream is 200 chocolates.

In Economics we are always concerned about costs - what you give up to get something. And a very major cost that we need to consider is the opportunity cost, which is the cost of the next best thing that you could have had. The 3rd point that we considered was that rational people think at the margin. Economics thinks or Economics considers that people are rational.

Now, who is a rational person? A rational person is one who does all sorts of computations, keeps all sorts of information that he can have access to in his mind, before taking a decision - to optimize the decision for his or her own benefit. That is a rational person. Economics considers that people are rational. So, Economics considers that people are not taking a decision just out of nothing.

Whenever people make any decision they think about it rationally and such rational people are always thinking at the margin. When we say thinking at the margin we are saying that we are not thinking about whether I should use my 100 rupees to get only ice cream or whether I should use my 100 rupees to get only chocolates, but what we are thinking at all points of time is that suppose I have had 50 grams of ice cream should I spend my remaining 50 rupees on getting more ice cream or should I spend it on getting some amount of chocolates.

Because there is a certain amount of satisfaction that, I have already had by having 50 grams of ice cream. So, for the next 50 rupees will 50 more grams of ice cream give me more amount of satisfaction or getting certain chocolates will give me more amount of satisfaction, is something that I am always considering. This is what we mean by saying that rational people think at the margin. So, these are 3 things that we saw in the last lecture.

And in this lecture we will continue with this discussion on, how people and society make decisions. Now, an important point in making decisions is incentives. People respond to incentives. Incentive is something that induces a person to act. This inducement can be to act more or it can be to act less.

For instance if you get, say, a subsidy to start an industry you will be more inclined to start the industry, as compared to a situation where you were facing a large amount of taxation if you started an industry. So, this taxation or subsidy is an incentive that is being used by the government to induce people to do something. Another example is that in the case of cigarettes the government taxes cigarettes heavily. Now, this tax puts up more amount, or requires more amount of resources to be put in for a single pack of cigarette. And this is done so that it acts as a

negative inducement. The government does it so that people spend less amount of money or resources on getting cigarettes because cigarettes are bad for health.

So, the government can use a reward such as a subsidy or a punishment such as an excessive taxation to induce people to do something or to refrain from doing something. So, incentive is something that induces people to act in certain ways. Other examples are practicing hard so that you may win the Olympic gold medal. The incentive here is the Olympic gold medal and to get to that incentive or to get to that reward you are trying to practice more and more so that is an incentive.

Wearing a helmet for the fear of fine: here the fine is an incentive to induce people to act in terms of wearing the helmet. So incentive is something that induces a person to act. And, when we talk about incentives prices are a very major incentive in the economic system.

Prices act as incentives. How do prices act as incentives? Suppose the price of apples increases. You are using different fruits - you are using different food items and out of those food items the cost of apples has gone up. How will you respond?

There will be a certain amount of response. Probably because the apples have gone up in price you will start to consume less and less amount of apples. Or probably if you are, say, a shopkeeper, you will think that ok, the price of apples is going up so let me buy more and more apples. And I should store them so that after some time when the price goes up even further I will sell them off at a profit.

So, the price of apples is acting as an incentive for a consumer to have less and less - to consume less and less, and for the seller to hold more and more.

Suppose the price of apples increases, and the consumers try to reduce their apple consumption by, say, shifting to other fruits. So, you might say, ok, the price of apples is more I will consume less amount of apples; I will have more amount of oranges.

Producers may try to increase their apple production by, say, increasing the number of workers that are employed. Because apples are fetching a larger amount of price in the market it is going to lead to larger amounts of profits. So, the producers may try to increase their apple production. And how do they increase their apple production? By increasing the number of workers employed, or, say by getting newer machinery, or say by putting more and more amount of their land into apple production.

These are the kinds of responses that we are seeing just because the price of apples has gone up. So, the price in this case has induced persons - both the consumers of the product and the producers to act and so price is an incentive in this example. What we are saying here is that

incentive is something that induces people to act and prices in the economic system are very good incentives.

Now let us look at another example: there is a rise in the price of crude oil. Here again we are looking at the price of crude oil as an incentive. What sorts of behaviours will we see if the price of crude oil goes up? Here are some news articles relating to the price of crude oil and how people shift their actions.

The first one is "fuel prices impact daily use items like soap shampoo biscuits to become 5 to 8 percent more expensive." What is happening here is that because the price of crude oil has gone up, so a number of articles that require crude oil or its products for their manufacturing - say plastics, or for say energy use - which includes a number of other consumer goods become more expensive. The price of plastics will go up, the price of energy will go up, the price of transporting things will go up, and when all these prices go up, ultimately the price of the final produce will also go up.

This news article is saying that the fuel price impact is likely to make soap, shampoo, biscuits and other consumer goods more expensive. So how do people act? This news article says big rise in South Africans turning to credit as high fuel prices and cost of living bites.

One response is that I have less amount of money, but I want to maintain the same amount of consumption. So, I will have to borrow this money from somewhere. So, more and more people start moving towards credit and so there is a big rise in people that are turning to credit as a source of funds.

Another thing is that the rising fuel prices could increase the mobile phone bills, because here again the mobile phones towers are fuelled by, say, diesel generators or by electricity. As the price of diesel will go up the price of electricity will also go up. Now, this article says rising diesel prices may hurt the telecom sector. Why? Because the cost of providing this service of telecommunications is going up because of the increase in the price of crude oil. If there is an increase in your cost and there is not a corresponding increase in your selling price, your profits will take a hit.

So, this says that rising diesel prices may hurt the telecom sector.

How will the telecom sector respond? Probably if it was having certain plans of expanding it will put the expansion plans on hold. Or probably it will even try to curtail its operations in certain areas where it is not getting sufficient amount of profits.

So, here again the price of crude oil is acting as an incentive. Rising fuel prices are affecting Swiggy, Zomato's delivery fleet, Ola and Uber drivers because here again the cost of providing

the service is going up. This next article says Uber and Ola drivers go on a strike; demand higher fares for rising fuel cost.

So, the increase in the price of crude oil is now incentivising Ola and Uber drivers to go on strike. Because they are seeing that their profits are going down and in these situations they would demand higher fares for the rising fuel costs.

Another thing that will come up is that people will start giving you a number of suggestions on how to manage your household budget in the times of rising prices. Because we saw here that because of increase in the price of the crude oil the cost of shampoo, biscuits and soaps and other things is also going up. So, another action that has been incentivised is that people who are experts, or who are ready to give you suggestions on how to maintain your household budget - they will come forward.

And what sorts of suggestions will they say? They are asking to track every expense; lower the unnecessary expenses. When the price is going up the amount of consumption will go down. Try to raise income. People will start to look for other sources of income. Go for lifestyle changes because the price is going up and your lifestyle cannot be supported by the same amount of income that you've had so you should try to change your lifestyle so that you are able to accommodate with lesser amounts of stocks. Lower the debt outflow because nobody knows how long this fuel rise will go up.

Another thing that we see is rising petrol and diesel prices give states windfall gain of rupees 227 billion. Now, what this is saying is that because the prices of petrol and diesel have gone up so the amount of money that the government will get in the form of taxes will also go up.

Now, so far we have seen that when the prices of crude oil are going up it is acting as a disincentive for a number of people because their cost of living is going up. But in the case of certain governments this might even lead to more and more amount of money that is coming up in the form of taxes. So, what will government do in certain in these situations? The government will use this money for, say, certain activities.

The government may come up with a new program of infrastructure expansion or the government will come up with a new program of providing money to people or of providing food grains to people so that people are also better off. So, rising petrol and diesel prices to give states windfall gain of rupees 227 billion.

Other kinds of impacts are "Furious French drivers to block roads in fuel price protest." Similar to what we saw in the Indian context that the Ola and Uber drivers are coming up in protest, we also see that the French drivers have come up in protest. What happens then? This is another news: Paris police use tear gas, water cannons as protests against rising fuel taxes turn violent.

So, a rise in the cost of living is now leading to violence. Then rising gasoline prices push Macron popularity down. This news article is saying that the popularity of the president is going down because he is not able to control the prices. This is another impact of the rise in the price of crude oil.

Then it says Transport: PM Philippe suspends the fuel tax rises. The government has now been induced to act - the government has been induced to lower the taxes, so that the price of fuel comes down. So, the increase in price of crude oil has not just acted as an incentive for normal people it has also acted as an incentive for the government to reduce the taxes. This is what we are seeing here, the prime minister is suspending the fuel tax rises.

Another impact is: French fuel price revolt boosted ethanol use, say industry officials. What we are seeing here is that when the price of crude oil is going up the price of petrol and diesel are going up so now people are shifting towards alternatives. One such good alternative is blended petrol. In the case of blended petrol the petrol is mixed with certain amounts of ethanol which is ethyl alcohol.

Now, because the price of petrol has gone up so now people are shifting to add more and more amount of ethanol and to shift towards a blended petrol. This is another act that has been induced - because of the price rise the ethanol is going up. Next news article says SUVs have become classier, but here is the big bump on the road - rising fuel price.

What this news article is saying is that people normally go for large sized vehicles such as the SUVs or the sport utility vehicles. So, they have become classier. But then because they are of a large size they have a large amount of weight. They are not that fuel efficient. And when the cost of fuel goes up - when the cost of petrol, diesel goes up - then there is an incentive for people to shift away from these petrol or diesel vehicles. So, here it says that there is a big bump on the road which is the rising fuel prices.

So, now people will shift away from these SUVs which are not that fuel efficient. This is another activity that has been induced by rise in the crude oil prices. What will be the impact? People are now shifting away from the SUVs, people do not want to have a vehicle that is putting a big strain on their budget. So what happens? The sale of automobiles goes down. This news article is saying price hikes and rising fuel rates slow September auto sales.

Because of the rising fuel rates people are now less incentivised to buy newer vehicles and so the auto industry is going towards a slump. When such a thing happens the auto industry might respond by, say, shifting to different category of vehicles or probably by laying off people. The auto industry might say, ok, people are not buying our cars; we are not having a profitable year, so we we cannot afford to have so many employees. Or the auto industry can say that ok people are not buying these sorts of vehicles - why do not we give them an alternative, why do not we

give them certain vehicles that are more fuel efficient that people might be more ready to buy. This is another impact that we are seeing because of increase in the price of the crude oil.

This news article says weak consumer sentiment - no festival cheer for carmakers on rising fuel cost and interest rates. This is from November 2018. November is typically the time when we have festivals like Diwali and people generally go for a large amount of buying in those seasons. But this news article is saying that because of the increase in the fuel cost and because of increase in the interest rates people are not buying the vehicles as was projected earlier.

Next what happens? Gas prices send surge of riders to mass transit. This news article is saying that because people are coming to this conclusion that because of these large amount of of fuel prices, we will not be able to afford our vehicle; we will not be able to afford the use of our vehicle to go to our offices or other places every day, so, people are now shifting to mass transit. Mass transit includes things like railways, roadways, or public buses.

This news article is saying that because of increase in gas prices people are shifting towards mass transit. So, the gas prices are acting as an incentive for people to act in a certain manner and in this case the action is to ditch their personal vehicles and to shift to public vehicles. Another article says as gas costs soar buyers flock to small cars. Because the larger sized vehicles are less fuel efficient so people have now been induced to act in a manner - they shift from larger cars to smaller cars. Or even to scooters and 2 wheelers because scooters and 2 wheelers are more fuel efficient as compared to the 4 wheelers. So, if the crude oil price rises then people will shift from cars towards scooters. And the industry may also respond by saying that ok the gas and the crude oil prices are high so let us give people things such as electric vehicles. This is another inducement that has been brought up by the increase in the price of crude oil.

Soaring petrol prices spark interest in electric vehicles. Camel demand up as oil price soars. Now, this is a different kind of a news, but here also it says the same thing. As the cost of running gas guzzling tractors soars even toed ungulates are making a comeback raising hopes that a fall in the population of the desert state's signature animal can be reversed. What is this saying?

It says that, because the use of vehicles has become more and more unaffordable, so; now people are shifting back towards the use of camels. This is another act that has been induced by the rise in the prices. We saw earlier that prices act as incentives and all these different examples are showing the same thing. Another one says that IndiGo faces rough flight as rising fuel cost and price war hurt. Here again in the case of airlines the fuel prices - when they increase, they increase the cost of operations. And this news article is saying that the airlines IndiGo is now facing a rough time because of the increase in the fuel costs.

How will the airlines respond? Rising fuel prices: IndiGo hikes fares and other private airlines

may follow suit. IndiGo in this case is saying that ok our cost of operation has gone up and we need to remain profitable so, this cost will have to be given to someone else and in this case this someone else is the consumer. So, because the price of fuel has gone up, the ticket prices also go up. In this case the increase in the price of the ticket for the airline will now act as an incentive for other people as well.

Delta airlines to increase fares, trim flights as fuel prices rise. Here is another act that has been induced. Not only do airlines increase their fares, but they also reduce operations on those sectors that are not that profitable. Because your cost of operation has gone up so to maintain your profitability you will either increase the fare or you will reduce your operations in certain areas or you will abandon plans of expanding.

This news article says Emirates working to stabilise cost after 42 percent increase in fuel prices. Here again Emirates airlines is trying to stabilise its cost - it is trying to gain money from some other sources so that it can remain afloat. EasyJet investors worry about rising fuel costs. When the price of fuel has gone up, the airlines are not that profitable, and if the airlines are not that profitable the investors who have invested their money in the airlines will also be induced to act in certain ways. They will start thinking - ok, now the airline sector is not doing that good because their cost of operations has gone up. My money is not safe - let me take my money and put it into some other sector. So, the investors might try to reduce the amount of investment that they have made in the airline sector and shift it to some other sector.

So, EasyJet investors worry about rising fuel costs and probably they will take their money out of the airline sector. This article from the economist says: Crisis, What crisis? The airlines are suffering, but the order books of Boeing and Airbus are bulging. So even though the airlines are suffering because their cost of operations have gone up the order books of the airplane manufacturers such as Boeing and Airbus are bulging. Why is that so? This is again a very similar thing that we saw in the case of vehicles. If SUVs have become less incentivising the companies will give you certain alternatives. They will give you electric vehicles - or they will give you small sized vehicles. Similarly when the price of fuel goes up the airline industries that are making the aeroplanes - they will give the airline certain alternatives.

These would be certain aircrafts that are more fuel efficient. And so when these companies give you an alternative which is more fuel efficient more and more airline companies will flock towards these newer models. And so the order books of Boeing and Airbus are bulging because everybody now wants to have these aeroplanes that are more fuel efficient. This is another act that has been induced by the increase in the price of the crude oil. That it is now inducing the industries that make the aircraft such as Boeing and Airbus to come up with newer alternatives of aeroplanes or aircrafts that are more fuel efficient.

This article says how rising crude prices will impact Indian oil industry. Upstream oil firms

could face a higher subsidy burden while any government move to cap prices will hurt the margins of downstream companies. This article says that in the case of the petroleum industry you have certain upstream oil firms and certain downstream oil companies. Now, the upstream oil companies are those that are either extracting this crude oil from the earth or they are those industries that are buying this crude oil from other nations. And, the downstream companies are those that are using this crude oil, processing it and selling off things like petrol diesel kerosene LPG and so on. Now, this article is saying that the upstream oil firms could face a higher subsidy burden because the price of crude oil is now going up which means that the product that they are selling has increased in its price. So, their profits might go up whereas, the downstream companies - because crude oil is a raw material or a resource for these companies and they are selling off other things such as petrol and diesel, so, if the price of petrol and diesel also increases commensurate with the increase in the price of the crude oil then these downstream companies will remain afloat, but if the government tries to reduce the prices of petrol and diesel then these companies might take a hit. So, different players in the oil market will respond in different manners - the upstream companies will respond differently and the downstream companies will respond differently. So, what will be these responses?

Refiners look at cutting inventory as oil prices rise. Refiners are the downstream players. What they are doing is, they are trying to cut the inventory. They are trying to reduce the amount of crude oil that they are purchasing and they are using more and more of their inventory - the stocks that they already have because they do not want to put more money into crude oil at a time when the price of crude oil is already high. The refiners must pay for their crude oils in dollars and the soaring import costs are becoming ahead. In this case this news article says that the refiners are trying to cut in the inventory. Whereas the upstream players will try to increase the fuel storage. Why? Because this is a time when the crude oil prices are going up so the upstream company will think that ok, why don't I take more and more of this crude oil from the Earth - because the prices are going up!

So, it is incentivising the upstream companies to extract more and more of the crude oil or to procure more and more of this crude oil in the hopes that because of these rising prices they will sell them - sell this crude oil off at a larger price and at a larger profit. So, the upstream companies are trying to increase the fuel storage.

Another incentive or another act that has been induced is that solar beats oil and gas price in EU. Because the oil and gas prices are going up - because the crude oil prices are going up, so now the industry is looking at alternatives and one such alternative is solar panels, or solar energy.

With the carbon price set by the blocks emission trading scheme on the rise along with fuel - fossil fuel costs there has never been a stronger economic case for renewables. So, the act that has been induced in this case by the increase in the price of crude oil is that it is incentivising the industry to shift towards the renewable sources of energy.

The energy industry will shift from oil based or gas based power stations to more and more of say solar energy based stations or wind energy based stations or geothermal energy based stations or even say nuclear power stations because the price of crude oil is going up. And every industry is trying to reduce its cost so as to maximise its profit. So, this is another act that has been induced by the increasing price of crude oil which is more and more incentivising towards shift to a renewable source of energy.

Rotten potatoes - that is the governments answer to your rising fuel bill. Here again what it says is that while the government is hoping the rally in global rates declines soon, it is also looking at alternatives and in this case the alternative is ethanol. So, what we have seen so far is that people and society respond to incentives; incentives are those factors that induce people or society to act in certain manners. And in the case of Economics price is a very good incentive. So, if the price of something goes up we will see a large number of actions by different players.

Now, let us now look at interactions in the society. The first thing that we can discern from interactions is that trade can make everyone better off. What this says is that consider a society in which people do not trade. Everybody is trying to produce everything that he or she needs. In this primitive society suppose there is a person - she would have to grow her own food crops, she would have to raise her own cattle to get meat and milk, she would have to raise her own fibre crops, she would have to harvest all of these, she would have to make her own cloth, she would have to say make her own implements and so on; because this society is not a trading society.

So, everybody has to do everything. Now, in such a society suppose we bring in trade. When we say that we are bringing in trade what we are saying is that, suppose there are two people you and me and I am good at cultivating crops and you are good at, say, raising cattle. So, I might say that ok I am good at cultivating crops which means that my cost of cultivation is less than what it would have been if you were cultivating. Suppose in 1 hour I can grow 1 kg of wheat whereas, in 1 hour you can only grow 100 grams of wheat, whereas, your specialisation is in raising cattle. So, in 1 hour you can say produce 1 kg of milk whereas, I can only produce 200 grams of milk.

In such a situation if I were to spend say 8 hours of my day into 4 hours of making the wheat and 4 hours of making milk. How much amount of wheat and milk would I have? In 4 hours I will have 4 kg's of wheat and in 4 hours I will only have 800 grams of milk. On the other hand in your case you are also doing the same thing.

What we are saying here is that for me my rate of production is 1 kg of wheat per hour and 200 grams of milk per hour. For you theproductivity is 1 kg of milk per hour and 100 grams of wheat per hour. Now, suppose in the first case - case 1 both of us are devoting 4 hours for wheat and 4 hours for milk. How much amount of wheat do I have in 4 hours? It is 4 times 1 kg is 4 kg of wheat and 4 times 200 grams which is 800 grams of milk. Whereas, you in 4 hours you have

made 4 into 1 kg which is 4 kg of milk, but only 4 into 100 grams which is 400 grams of wheat.

This is the first case in which we are not trading. You are producing both wheat and milk for your use and I am also producing wheat and milk for my own use. And both of us are devoting 8 hours into these activities.

Now, let us look at the 2nd case. Case 2 is with trading. In this case what I do is - because I can make more amount of wheat per hour as compared to you so let me use all 8 hours to make wheat only. So, I have 8 hours into 1 kg is 8 kg of wheat, and I spend 0 hours for milk which gives me 0 gram of milk.

In your case you are using 8 hours to make milk. So, you get 1 kg of milk per hour so you have 8 kg of milk and you spend 0 hours to make wheat and in this case you have 0 grams of wheat.

In the first case the total production in the society was 4 kg of wheat and 400 grams of wheat, which is 4.4 kg of wheat and 4 kg and 800 grams which is 4.8 kg of milk. This was the total production in the society in case 1.

Whereas, in case 2 we will have total production in society is 8 kg of wheat and 8 kg of milk. So, what we are seeing here is that if both of us were to do only those things that we had a certain amount of specialisation in then we would be able to produce more amount of resources with the same amount of input.

In the first case you were working 8 hours I was working 8 hours, in the second case also you are working 8 hours I am working 8 hours. But in the first case the total production is less than 5 kg of wheat and less than 5 kg of milk for both of us combined. Whereas, in the second case it is 8 kg of wheat and 8 kg of milk. Out of this 8 kg I keep 5 kg with me and I give 3 kg to you. What do you do? Out of 8 kg of milk you keep 5 kg with you and you give 3 kg to me. Now, at the end of the day I have 5 kg of wheat and 3 kg of milk, this 5 kg of wheat is what I produced and I kept with myself in this 3 kg of milk is what you had given to me.

And you have 5 kg of milk and 3 kg of wheat. Let us compare this situation 5 and 3 with the earlier situation in case 1.

In case 1 you are only having 4 kg of milk now you have 5 kg of milk. So, the total amount of milk so that you have is more. Earlier you had 400 grams of wheat, but now you have 3 kg of wheat. So, the amount of milk that you have is more than what you had earlier; the amount of wheat that you have is more than what you had earlier.

In my case, I have now 5 kg of wheat whereas, earlier I only had 4 kg of wheat. So, the amount of wheat that I have now with trading is more and similarly earlier I had only 800 grams of milk

whereas, now I have 3 kg of milk. So, the amount of wheat and the amount of milk that I have now is more than what I had if we had not traded.

What we are trying to emphasise here is that because of trading your amount of milk and wheat has gone up and my consumption of milk and wheat has also gone up. So, you are in a more beneficial position and I am also in a more beneficial position.

So, trade is something that can make everyone better off. And why does that happen? This happens because competition permits everyone to specialise in what they have the highest comparative advantage in.

In the case of trading because none of us is constrained to make everything; so, we can focus all our time energy and resources into making those things for which we have the highest comparative advantage. What is the comparative advantage? It is the ability to produce a good at a lower opportunity cost than another producer.

In this case I was able to make 1 kg of wheat per hour and you were able to make only 100 grams of wheat per hour. So, in this case I have a comparative advantage in the case of wheat whereas, in the case of milk I was only able to produce 200 grams per hour, but you were able to produce 1 kg per hour. So, you have a comparative advantage in the case of milk. Comparative advantage is the ability to produce a good at a lower opportunity cost than another producer.

Now, let us look at the opportunity cost: opportunity cost for wheat. For me the opportunity cost of wheat is 200 grams of milk per kg of wheat. So, if I spend 1 hour to produce wheat I will there will be 200 grams of milk that is less available for me. For you the opportunity cost of wheat is 1 kg divided by 100 grams which is 10 kg of milk per kg of wheat. If you look at this portion to make 1 kg of wheat you had to give up 10 kg of milk and so forth. So, my opportunity cost is less my opportunity cost is only 200 grams of milk your opportunity cost is 10 kg of milk.

Because my opportunity cost is less so for the case of wheat it makes much more sense that I should be making that.

Now, let us look at opportunity cost of milk. Now, for me the opportunity cost of milk is 1 kg of wheat divided by 200 grams of milk which is 5 kg of wheat. To produce 1 kg of milk I would I will have to forgo 5 kg of wheat. Whereas, in your case to make 1 kg of milk you only have to forgo 100 grams of wheat per kg of milk. So, in the case of milk your opportunity cost is only 100 grams whereas, my opportunity cost is 5 kg of wheat. So, you have a comparative advantage when it comes to milk and trading would say that you should concentrate more and more of your time and resources in producing milk because you have a comparative advantage in producing milk; whereas, I should spend more and more amount of time, money and resources into production of wheat because I have a comparative advantage.

If both of us focused on what we had a comparative advantage in the society would benefit because all the things will be made at the least possible cost. So, competition permits everyone to specialise in what they have the highest comparative advantage in.

When you are only producing milk and I am only producing wheat it also leads to an increase in efficiency. Efficiency is the property of society getting the most it can from its scarce resources.

In this case the resource is time. The society - which only comprises of you and me in this example - has only 8 hours for you and 8 hours for me. Earlier the society was able to produce 4.4 kg of wheat and 4.8 kg of milk whereas, now the society is able to get 8 kg of wheat and 8 kg of milk. What is happening is that the efficiency of the society has gone up for 1 day. In 1 day earlier it was only getting 4.4 kg of wheat and 4.8 kg of milk whereas, now it gets 8 kg of wheat and 8 kg of milk.

So, the efficiency has gone up for the society as a whole. At the same time specialisation and efficiency reduce prices benefiting the consumers. So, because there is a specialisation - you are only focusing on one thing I am only focusing on one thing - the efficiencies have gone up.

This ultimately benefits the consumers as well because they will be able to get all the resources at the lowest prices. In this example both of us are both the producers as well as the consumers, but we can extend this example to the actual society as well. People can get different items at reduced prices through trade as against different items at high opportunity cost when not trading. Thus trade increases welfare. When we talk about interactions in a society - economic interactions in a society - we need to remember that if there is trading in the society then everybody is much more well off as compared to a situation when there was no trading. So, trade makes everyone better off.

But how do we trade? In this example because there are only 2 people and there are only 2 things so it is easy for both of us to sit down and negotiate, that ok I will give you 3 kg of wheat and you will give me 3 kg of milk. But then in the case of a larger society all the different producers and all the different consumers cannot sit together and so we come up with the concept of market.

Markets are usually a good way of organising economic efficiency. Market economy is an economy that allocates the resources through decentralised decisions of many firms and households as they interact in the market for goods and services.

What is the market economy? It is an economy that allocates resources, in this example the resource that is available is time or the number of hours that are put in. In the market economy both of us are taking the decisions based on the most efficient way of producing the goods.

An economy that allocates resources - in this case the time - through decentralised decisions: Now why are these decentralised decisions? Because there is nobody who is telling us that we should be doing this, it is just you and me who are sitting together and deciding that I should make more and more of wheat you should make more and more of milk. The government is not telling us that. There is no person outside of you and me - outside of the producers and the consumers - that is deciding on how much amount of resources should be allocated - so this is a decentralised decision.

The market economy allocates resources through decentralised decisions of many firms and households. In this case there were 2 producers - you and me and there were 2 consumers - you and me. In the case of a larger society - a larger market - there will be a number of firms and households and they will all interact together in the market. And there are 2 kinds of markets; markets for goods and markets for services.

When all these decisions are happening in a decentralised manner through interactions then we say that this is a market economy.

Markets are a good way of organising economic activity efficiently, because in the case of markets prices and self interest guide decisions which leads to a large autonomy. In this case when we were talking about wheat and milk we were not taking this decision based on - say - benevolence. I was not thinking that ok you should benefit and so you should be doing such and such things. You were not thinking about me. Both of us were thinking about ourselves only.

I was thinking that without the trading I was getting 4 kg of wheat and 800 grams of milk. With trading I will get more amount of wheat and more amount of milk. So, this interaction or this specialisation is beneficial to me and this is why I am ready to get into this arrangement. So, this is for my own benefit - for my own good.

Similarly in your case also earlier you were only getting 4 kg of milk and 400 grams of wheat whereas, now you get 5 kg of milk and 3 kg of wheat. So, it is good for you and because of this reason you are getting into this arrangement.

In the case of market the prices and the self interest are guiding the decision. A market ensures that because both of us are benefiting so we will wholeheartedly participate in this decision. There is a large amount of autonomy that we have because nobody is forcing us to take this decision. We are taking these decisions out of our own sweet will.

Market prices reflect the value of good to the society and also the cost to the society in making that good. The value of the good and the cost of the good is reflected by the market prices. What we saw here was that this is the market price and this is reflecting both the value and cost of the

product. Because in the case of wheat I will think that ok for making wheat I need to give up 200 grams of milk and this is also the cost that I am putting in. Similarly you can also have an indication of the value and the cost to you. For you the cost of milk is 100 grams of wheat whereas, in my case the cost of milk is 5 kg of wheat. So, in this case what will happen is that my value for milk is much greater - my value of milk is 5 kg of wheat. Your value of milk is 100 grams of wheat. Because I value milk much more than you do so if you give milk to me - it will benefit me much more then it will harm you and this is also giving me an indication of the cost.

So, looking at the value and the cost through prices both of us can make a rational decision. There is an automatic transfer of information regarding demand and supply. Why is it automatic? Because if the price of something is going up it means that the demand is going up or the supply is going down.

As you saw in the case of the market for crude oil: if the price of crude oil is going up it is also telling us that the supply is less, because of which the information gets passed on to both the producers as well as the consumers. The consumers will use this information to reduce the demand by using less and less amount of the products of crude oil, such as petrol by shifting to, say, more fuel efficient vehicles or shifting to, say, renewable energy. Whereas to the producers it will give the information that the supply needs to be increased. And market's invisible hand leads firms and consumers to desirable outcomes as against a certain central planner making the decisions.

Here it is important to note that if we think about a central planner the central planner will also have a dearth of information and it will also have a dearth of the resources to process the information. In the case of a market because the decisions are happening automatically the information is getting processed automatically, so it is much more efficient.

To sum up we saw that in making decisions people in society face tradeoffs which lead to cost. Cost is what you give up to get something. We also saw that rational people think at the margin. People respond to incentives. And we also looked at interactions - that trade can make everyone better off. And markets are a good way to organise economic activity. So, this is a summing up of what we have seen so far.

That is all for today. Thank you for your attention. Jai Hind.

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Module 1
What is Economics?
Lecture 3
Working of the Economy

Namaste! We move forward with our discussion on the principles of Economics. In this lecture, we will look at Interactions and the Workings of the Economy. Before we move forward, let us recap what we have seen so far.

The first principle of economics is that people in society face tradeoffs. Now, tradeoffs arise because our needs - or our wants - are unlimited, but the resources to get those wants are limited. So, we always have to make a choice - whether I should get more of A or whether I should have more of B? Because I have limited time, I have limited resources, I have limited money and so, I cannot have all of A and all of B.

A very easy example is the choice between having more ice cream or more chocolates. The more and more amount of money I put into getting ice cream, the less and less amount of money I have to have chocolates, and so on. We face tradeoffs on a daily basis at a personal scale depending on what we want to buy or say where to put our time into. Do you want to go out and watch a movie or do you want to go out and spend time with your friends? Because if you go and watch a movie you cannot chit chat with your friends at the same time. Your time is limited. Your time is a resource which is limited. So, we have a trade off in terms of money, we have a trade off in terms of time and these are not just at the level of the individual, but they are also there at the level of the society.

Whether the society should have more of consumer goods or whether it should have more and more of capital goods - for instance. Whether the society should put more money into defence sector or whether it should put more money into education sector, or say health sector? Whether we should promote - with the same amount of money that we have - should we promote primary health care services or secondary health care services or tertiary health care services?

These are all different tradeoffs that the society needs to make. So, the first principle is that people and society face tradeoffs, and these tradeoffs lead to costs. Cost is defined as what you give up to get something. Now, what you give up can be in terms of money, it can be in terms of

time, or it can be in terms of certain other products. So, for instance we can give a concrete example - we can say, that we have 100 rupees with us. These 100 rupees can buy, say 100 grams of ice cream, or say 200 chocolates. Now, the cost of ice cream - we can say that the cost of ice cream is 100 rupees. The cost of 100 grams of ice cream here is 100 rupees.

But, we can also say that the cost of 100 gram of ice cream is 200 chocolates because, we are either giving up 100 rupees or we are giving up 200 chocolates to get 100 grams of ice cream. We could even represent cost in terms of time. So, for instance if there is a labourer who works for one complete day and earns say 200 rupees, in that case the labourer might even say that the cost of 100 grams of ice cream is working for half a day. So, the cost of something is what you are giving up to get it, and what do you give up? You can give up money, you can give up time or you can give up certain other goods or resources. These are costs. The third principle of economics is that rational people think at the margin.

Now, one basic or one fundamental assumption that economics makes is that people are rational. And, by rational we mean that people make decisions consciously by taking into account all the information that they can have access to and they process this information. So, any decision that you make is not out of a jiffy, but you actually put an effort to make it a rational decision to maximise your utility or to maximise your benefit.

So, for example if you say that ok, I have had 70 grams of ice cream. Now I should have some chocolate. Because, I want to change the taste or because chocolates will give me much more satisfaction - because, I have already had a substantial amount of ice cream. We will say that you are making a decision. You are thinking about it, and so, this is a rational decision. Now, rational people and also a rational society - they think at the margin. When we say thinking at the margin, it means that we are not making a choice between 100 percent of A or 100 percent of B. But we are thinking that ok I have had so much amount of A. What should I do now? You are always thinking at the edge; you are always thinking at the margin. For example, a society might think that ok I have got three factories for making cars, should I make a fourth factory for making cars or should I make a fourth factory for making say television. This is a thinking at the margin. The society is thinking - or people in the society are thinking that ok we have had three factories, but we have more resources at our disposal. Should we spend those resources into making more of automobiles, or to make something else - given that we already have three factories. This is thinking at the margin.

Similarly, as we saw in the example before there is an airlines and the cost - or the average cost - of selling a ticket or selling a seat on that airlines is say 5000 rupees. Now, there is an aircraft that is ready to take off and there is a passenger who has just arrived and he says I cannot pay you 5000 rupees, I can only give you 3000 rupees. How should the airline make the decision? If the airline is not thinking at the margin the airline would say, I sell my tickets at 5000 rupees. You cannot give me 5000 rupees. So, I cannot give you a seat. But that would not be thinking at

the margin. Thinking at the margin the airlines would say that ok, if this one more person gets into the aircraft, there will be some excess cost - for certain amount of fuel - because we are adding certain weight of the passenger as well as his goods, plus we would have to serve this passenger, probably, say a bag of peanuts. The airline carrier, if it is thinking at the margin - it would do a cost computation. Of how much would this extra fuel and extra bag of peanuts cost the airlines. If the cost of of taking this passenger into the aircraft and flying them is say 1000 rupees and this person is giving the airlines 3000 rupees. So, thinking at the margin the airlines would say ok let me make a profit of 2000 rupees, whats wrong with that? And so, even though the price is less than the average price at which the airlines is selling the seats, the airlines would sell the seat to this passenger for 3000 rupees.

So, a lot of rational thinking occurs at the margin, which is why whenever there is a product that is going to get expired soon, we see a hefty discount that is offered in shops or last minute bookings for aircrafts or last minute bookings for resorts. We see these phenomena because, these people are thinking rationally and they are thinking at the margin - they are thinking at the edge.

The fourth principle that we saw was that people respond to incentives. Incentive is the inducement to do something or to refrain from doing something. People respond to incentives. It means that if you want people to behave in a certain manner you should provide them with incentives. These incentives can be in the form of reward or they can be in the form of punishment.

For instance when a teacher says that if you do homework, and if you do it properly I will give you a chocolate - the teacher is offering a positive reward as an incentive to make the pupils do their homework properly. On the other hand, if the teacher says that if you do not do your homework properly I will give you a punishment. Then, here again the teacher is providing an incentive to the pupils to do their homework.

So, the incentive can be in the form of a reward, it can be in the form of a chocolate or it can be in the form of a punishment.

And, our societies regularly make use of incentives. When the government says that we are subsidising higher education the government is providing incentive to people to go for higher education. Because otherwise, their cost would have been larger and with the subsidy the cost is reduced. Or when the government says that ok we are going to put a heavy taxation on cigarettes. This is because the government wants people to refrain from smoking, because of its negative health impacts. And so, the government would put a heavy amount of taxation onto cigarettes. So that people refrain from putting their money into cigarettes.

This is a very important principle of economics: people respond to incentives. Throughout this

course, we will have a look at what sorts of incentives are provided by the government or by the society to make people respond in certain ways.

Then, we looked at interactions and in interactions, we saw that trade is something that can make everyone better off. This is because with trading we allow people to specialise into doing things that they have the highest comparative advantage in. Comparative advantage means that if I can make something at a cheaper cost than you, then probably I am in a better position to make that good. And in that case, the society would benefit if I made more and more of that good. Here again the important thing to note is that the cost of doing something is what you give up to do something else.

So, for instance if I can spend my time to grow wheat or to raise a dairy, and in 1 hour I can make say 1 kg of wheat or 100 grams of milk. And say, another person in 1 hour - he or she can make 1 say 200 grams of wheat or 500 grams of milk. Here we can see that I am at a much better position at growing wheat. Because, in 1 hour I can make 1 kg of wheat, and this person can only make 200 grams of wheat.

So, if I specialise in making wheat, I can spend more and more time in growing wheat and then our society will have much more amount of wheat than if both of us were doing both wheat and milk production. But here we can also see that when I do a computation for wheat, then the cost of making 1 kg of wheat for me is 100 grams of milk. The cost of 1 kg or the cost of making 1 kg wheat is 100 grams of milk. Whereas, for the second person the cost of making 1 kg of wheat is 2.5 kg of milk. So, I can make wheat much cheaper than the second person.

But then if I look at the cost of making milk - for me, it is let us say the cost of making 1 kg of milk. This will be 10 kg of wheat whereas, for the second person the cost of making 1 kg of milk - in this case is 1 divided by 2.5 is equal to 0.4 kg of wheat. Now, what we are seeing here is that, if I can make wheat at a cheaper cost it would also mean that I would be making other things at a much greater cost.

So, there is always a comparative advantage between two or more people. And trade makes everyone better off by permitting people to concentrate their resources - to concentrate their time, into making things that they have the highest comparative advantage in. And when we go on doing things that we have the highest comparative advantage in, with time we also specialise. We also develop means to make things even cheaply, and the benefit of making all these things with greater efficiency ultimately goes back to the society. So, trade is something that can make everyone better off.

We also saw that markets are a good way of organising economic activity. What is a market? A market is a place where buyers and sellers come together, and there is a democratised decision making. So everybody is making his or her own decisions based on his or her own benefits. In a

market - when you go to a market you will ask the question ok, I want to get a tub of ice cream - where can I get it at the cheapest rate -the best quality at the cheapest rate. When you make such decisions you go to a seller who is providing things at better quality and at a cheaper rate. And when you buy the things from that seller, you are actually promoting that seller to make more and more things at better quality and at cheaper rates.

Similarly, in the case of a market there is no third force that is making these decisions about whether I should have ice cream or whether I should have chocolates. I make decisions based on my own free will and all these decisions of different buyers and sellers in the market are reflected in the prices that we see in the market. So, market makes it very easy for buyers and sellers to make decisions based on the prices. And so, markets are a very good way of organising the economic activity.

Moving further into this topic of interactions another principle is that governments can sometimes improve the market outcomes. Now, the question is, if markets are a very good way of organising economic activity, do we need a government? Why should there be a government? Why should government be making certain decisions? The economic principle here is that governments can sometime improve market outcomes - because the market by itself may not always result in the most optimal solution.

What is a government? A government is the group of people with authority to govern a country or state. The important point here is authority. Authority means legitimised power. So, these are the group of people who have the power and this power has been given to them through certain legislations. They have a legitimate authority to govern a country or state. When that happens they can make certain decisions. For example, if you want to go into a market or say you are a seller and you are making say ice creams. In a theoretical market you would want to maximise your profit and to do that you want to make things at the cheapest possible way. So, you are putting a lot of money into innovation - you are putting a lot of money into getting the best machines. But then once you have invested a lot of money into your factories, somebody comes and burns your factory. Now, if such a situation arises would you want to put your money into all these innovations? The answer is no. Why? Because you are not sure whether your investments would give you a profit or not.

You are working for the profit - you are working in a self interest, but your self interest will only get fulfilled if you have a proper law and order that ensures that you will get your rewards. Who will ensure this law and order? That is the role of government. The government improves market outcomes by ensuring that the fundamentals for the working of the market are there.

So, how does the government improve the market outcomes? The need of government is for enforcing rules and maintaining institutions that are a key to the market economy such as police, judiciary, and so on. If you have a good law and order system with good police, good judiciary,

you will have much more faith, you will have much more confidence that the money that you are putting into innovation - that you are putting into making your factory will not go down the drain. So, the first need of government is to enforce rules and one such rule is that nobody has the right to destroy another's property. The government makes these rules and the government enforces these rules.

The government also maintains institutions because it is not enough that you have a rule. You also need to have an institution to enforce that rule. If you have a law, but you do not have police, if you do not have judiciary, then the law will just not work.

So the government not only makes the rules, but it also maintains the institutions that will play a role in enforcing these rules.

Similarly, the government enforces property rights. Now, what are property rights? The ability of an individual to own and exercise control over scarce resources, to own and exercise control. And this demands that thefts be minimised or obliterated. Property right is the ability of an individual to own scarce resources. Scarce resources could mean things like land or things like capital. You should have the power to own land, you should have the power to own capital, then and only then will you be able to have the power to set up a factory.

You wanted to make ice creams cheaper and you wanted to make ice creams with good quality. For that you need to have an industry, but you will only be able to have an industry, if you have the power to own land and the power to own capital.

Now, suppose in a society there is a rule that nobody will own any land or any capital, only there is one king who will own all the land and all the capital. In such a society - if you live in such a society, you will not be in a position to set up the factory. So, property rights give individuals the right to own the scarce resources and not just own but also to exercise control over those resources.

Suppose you live in a society in which there is a rule that land can only be used for agriculture, it can never be used for setting up an industry. So, even though you have the land - even though you have the capital, you will not be able to set up the industry.

So, for the working of the society or for the working of the market - so that you are able to produce things cheaply and in good quality, you not only require an access to the resources - you do not only require an ownership of the resources, but, you should also have the right to exercise control or to do something with your resources. And, government provides enforcement of these property rights - the right to own and the right to exercise control over the resources. That is the need of the government. If you do not have rules, if you do not have property rights, the market cannot function.

At the same time the government is also required to increase efficiency of the market by addressing market failures. What is market failure? A market failure is a situation in which a market left on its own fails to allocate resources efficiently. Now, what does that mean? The utility of market is that it permits allocation of resources, by choosing those sellers that are making things at a good quality and at lower cost. When you buy something - when you buy your tub of ice cream from a seller, who is selling it with a good quality and at a cheaper cost you are providing more and more resources to that seller or to that producer, so that he or she can make more and more of these things at cheaper cost and with a good quality.

Now, if you have a market and it is not able to allocate these resources, which means that there is a market in which you do not know who is the seller who is providing things cheaply and at a good quality, then this market will not be able to function. And so, a situation such as this would be known as a market failure. Market failure is a situation in which a market left on its own fails to allocate resources efficiently. Why would we have such a situation?

There are things such as externalities that can result in market failures. What is an externality? An externality is the impact of one person's actions on the well being of a bystander. The bystander is not doing anything - the actor is doing something, but his action is having an impact on the bystander. This is known as an externality.

A very good example is pollution due to the use of automobiles. Now, if somebody is driving a big sized SUV, then this person is not just driving the SUV and fulfilling his or her own requirements, but is also polluting the environment - because this SUV is giving out a lot amount of smoke. Now, this smoke will not just impact the automobile driver - it will impact the society in total because when the air is polluted everybody is impacted. And so, this pollution is in externality, because the action of an actor or the action of a doer in choosing to drive a vehicle with which is giving out lots of smoke, is putting an impact on a bystander who has got nothing to do with this decision.

And things such as externalities may result in market failures. Why? Because the driver of this vehicle - the driver of this polluting vehicle is imposing a negative cost on other people - and he does not have to pay for those costs. So, for instance if I get ill because of air pollution, then I will have to pay my own medical bills - that person who is driving that polluting vehicle will not come and give me money to pay my medical bills.

If there was a mechanism to internalise this externality, then the results would have been very different. For instance if the society said that ok, if you want to drive a vehicle that is resulting in pollution, you will also have to pay for taking care of the health of all those people who are impacted by your decision to drive this polluting vehicle. If such a situation was there then this person who who is driving this vehicle would have thought of his decision in a very different

way - because remember that this person is also a rational person. He wants to maximise his or her own utility - which means that he or she wants to minimise his cost and maximise his benefit. And there is nothing like giving the cost to somebody else.

If this person had to pay money to all these different people, who were impacted because of the pollution he would have thought ok, let me just get rid of this vehicle and get something that does not pollute so much. So, an externality can result in a market failure because, the person who is making the decision is not paying the full cost. An externality can also be a positive externality - a positive externality is say things such as vaccination.

So, if you choose to vaccinate your children, then you are not just protecting your children, but you are also protecting the society. Because, the pathogens will not be able to infect your children, multiply in their bodies and then spread to other children. So, vaccination is a positive - it has a very big positive externality.

Now, if you only had to protect your child and if the society does not provide you with an incentive for the benefit that the society is receiving, then your level of commitment to vaccination might not be that great. But then if the society says that ok if somebody is vaccinating his or her child, then because the society is getting a benefit, so let us as a society subsidise vaccination. So, if you have to pay a lower cost - if you get an incentive - then because people respond to incentives you would have looked at vaccination in a very different manner.

So, externalities may result in market failures because the cost or benefit of doing something is not coming back completely to the doer. And the government can address this market failure by giving out a mechanism to address these externalities, by say subsidies or taxation. And in that way the government will aid in increasing the efficiency of the market.

Because in that case the market - again remember that the market is a mechanism for the most efficient allocation of resources, for the benefit of everybody. Now, if the action of doing vaccination is benefiting the society, then there has to be a mechanism to incentivise vaccination. If pollution is impacting the whole of the society negatively, there has to be a mechanism to reduce the allocation of resources in pollution. And the government may set up a mechanism to internalise the externality so that the allocation of resources becomes much more efficient.

For instance in the case of pollution due to vehicles the government may increase tax on petrol or diesel, or may even tax the selling of these vehicles. If there is a tax on petrol or diesel or the vehicles, this taxation will increase the price of using these vehicles. Increasing of this price will result in an incentive, it will induce people to do something. And what will be that something? It may incentivise people to use car pooling. Because the cost of transportation has increased so people would say ok four of us are going to the same location, why do not we use just one car. Or it may incentivise people to take public transportation because the cost of using your own

vehicle has increased. So, there would be a certain section of the society who would ditch their vehicles and move towards public transportation, or which may incentivise people to live closer to the workplaces - so that they do not have to buy such a large amount of petrol or diesel - or to shift to fuel efficient vehicles. Especially if these fuel efficient vehicles also get a subsidy.

So, the government may increase taxation on the polluting vehicle and the government may provide a subsidy to those vehicles that are non-polluting or to shift to hybrid vehicles or electric vehicles for the same reason. Left to themselves without the government people may keep on driving the polluting vehicles, since the quantum of the harm gets diluted due to the externality - because you do not have to pay for the health of all those people who are getting negatively impacted because of the pollution.

But if the government internalises this externality by increasing taxation, then some portion of this externality will get internalised. And this will act as an inducement for people to go for carpooling, public transportation, living closer to the workplaces, or shifting to more fuel efficient vehicles or hybrid vehicles or electric vehicles.

So, this is a role of the government. By using these mechanisms of taxation and subsidies, the government addresses market failures and increases the efficiency of the market.

Another mechanism of market failure is market power. Now, what is market power? Market power is the ability of a single economic actor, or a small group of actors to have a substantial influence on market prices. And often this substantial influence is a disproportionate influence - the ability of a single economic actor or a small group of actors, to have a substantial influence on the marketplace - on the market prices. Good examples are monopolies - the owner of a single well in a village where there is a drought. Let us consider that there is a village that is suffering from a drought condition and there is only a single well in that village. Now, the owner of that well - because he sees that there is a huge demand - so, this owner might charge anything for taking out water from this well. If the owner charges at a disproportionate rate, then it will not be a benefit of the society. This will result in a market failure, because it is leading to an inefficient allocation of resources.

And such a situation will go on propagating itself, if the government probably does not interfere. Now, how can the government interfere? The government can do a number of things. The government can say ok, even if you have a single well in a village there is a cap that you can charge. So, for instance the government might say that ok, for one litre of drinking water you cannot charge more than 15 rupees. If this situation arises then even those people who did not have a very large amount of money with them - they would have access to water. Or the government might do another thing. The government might try to break this monopoly, by say digging up a well from government funds. Or the government might give out a subsidy - the government might start a program that would say that ok, if somebody wants to dig up a well we

will provide so much amount of capital. Or so much amount of money to each person to incentivise more and more people to start digging wells. Or the government might out rightly say that ok, because the situation is so bad - because this person is charging so high, let us nationalise this well. So, that this well is now no longer a property of this particular individual, it now belongs to the government - it belongs to the society.

So there are a number of things that the government can do in these situations, where you have a single economic actor or a small group of actors that are having a substantial influence on the market prices. They are having such a huge influence on market prices that it is not to the benefit of the society and it is not an efficient way of allocating resources. The government may break these market powers - the government may break these monopolies and increase the efficiency of the market.

Another thing that the government can do is to increase equality. We saw before that the society makes a tradeoff between efficiency and equality or equity. So, you can put your resources in such a manner that you maximise the production of goods, or you can also do things to ensure that everybody has a decent share of the pie. If you only wanted to increase efficiency the society might say ok, let us give all the resources to a few people who are doing things well. And, in that case they will have all the money, they will have all the power to do everything - anything and everything and rest of the people would live a life of poverty. Or the society might decide that ok, efficiency is important, but equality is also important; equity is also important. So, the society might say that even though there are certain people who are not doing things with the highest efficiency, but they also have the right to live. They should also have access to sufficient amount of food, sufficient amount of nutrition, sufficient amount of clothes, sufficient shelter.

When the society decides this - the implementation of such a policy comes to the government - because the government has the power to influence these decisions and to implement these decisions of increasing equality. The market by itself may not ensure sufficient food, decent housing and adequate health care to all.

If you just left it to the market the market might say that ok, we want maximum profit and so, we are only going to provide health care to those people who can pay for them. Or we want to maximise the profits out of vaccines. Now, vaccine is something that has a positive externality, because not only the person who is vaccinated is protected from the disease, but the society in total also gets protection because of herd immunity.

Now, if there is such a situation then the government might step in and say that ok, we cannot let things go on like this and we need to emphasise the quality. And so, we are also going to provide vaccines to those people who cannot afford them because the society benefits if those people also get access to the vaccines. So the market by itself may not ensure sufficient food, decent housing and adequate health care to all.

But the government may chip in - the government may provide for all these different resources. Now, equality is the property of distributing economic prosperity uniformly among the members of the society. And this is also a role of the government. There are two major ways in which government impacts these market outcomes. And these two ways are price controls and taxation. Price control means that the government may set up a price floor. A price floor says that this is the minimum amount that you have to pay to get this good or service, and a good example is the minimum support price that the government sets for food grains. When we have a price floor the government is saying that we cannot let the society exploit the farmers. And so, there is a minimum amount that needs to be paid to the farmers, so that they are able to carry on their cultivation, they are able to pay for say water, pay for fertilisers, pay for insecticides and so on.

The farmer should also be able to make all these payments and still retain a decent amount of money to meet the needs of his or her own family. And so the government may set up a price flow - this is the minimum amount that you need to pay to the farmer to get these food grains. In certain other cases the government may set up a price ceiling - this is the maximum amount that you can charge to a person. When you talk about things such as the rent control act, the government says that ok you cannot charge exorbitantly for providing accommodation to people, there is this maximum amount that you can charge - this is a price ceiling.

So, the government may use these price controls to put up a price floor or a price ceiling or the government may even come up with minimum wages. This is the minimum amount of money that you need to pay to a person to make use of his or her labour or services. This is the way in which the government can impact the market outcome.

Another way is taxation. Taxation can be direct taxation, indirect taxation or even Pigouvian taxation. We can even talk about negative taxation which is the subsidies. Now, direct taxation is a taxation that is directly taken from the person and in a number of cases this is, or say a very good example is, the income tax.

Income tax is taken directly from the person who is earning this income. Indirect taxation on the other hand is taken indirectly from those people who are making use of certain products. So, when we talk about sales taxes these are indirect taxes. We also have Pigouvian taxes. A Pigouvian tax is a tax that is not put up to earn revenue for the government, but is there to change the behaviour of people. A very good example is the tax on cigarettes or taxes on polluting vehicles. This is a tax which is not primarily meant to increase the revenue of the government, but is meant to change the behaviour of the people. So, this is also another way in which the government may impact the market outcome. So the government may act through price control, price floor, price ceilings minimum wages or through taxes and subsidies which can be direct, indirect or even Pigouvian.

Now, because the government is impacting the market outcome through these interventions - and we have seen before that markets are generally a good way of organising the economic activity - so, these interventions have to be used with abundant amount of caution. And, we will see how the government or the society may make use of these interventions for conservation purposes.

Next, let us have a look at the workings of the economy. The first principle in the working of the economy is that a country's standard of living depends on its ability to produce goods and services - that is the productivity that the country has. And productivity is defined as the quantity of goods and services that are produced from each unit of labor input. So, basically what this says is that if you have a country, if you have a society and the society is very highly efficient, it is able to produce a large amount of goods and services. Who will make use of these goods and services? The answer is the society itself. So, if you make more and more of goods and services, you increase your standard of living. Because then, everybody has access to more food, everybody has access to more comfort, everybody has access to more health care and so on. So, if you want to raise the standard of living of a country or a society the primary way of doing it is through increasing the productivity of that country or the society. We can understand it in this way that more production leads to more goods and services that are available to the society. More goods and services available to every person of the society means, a higher standard of living.

So, a country's standard of living depends on its ability to produce goods and services, which means productivity. Which means that if you want to raise the standards of living you have to raise productivity. And how can you do that? You can do that by these three ways.

You can provide education to people. By providing education you can shift certain people who are working in the primary sector or the labor intensive sector, into say an information sector. Now, in the information sector because there is a greater demand for those goods so, the persons will be earning more. And earning more would raise the standard of living. Or through education you can give people access to means that raise their efficiencies. So, in place of say doing all the work manually a person might shift to using machines. But then if a person does not know what a machine is or what sorts of machines can be used, or how can they be used the person might not be that incentivised to use those machines. Education provides people with the means to use these new technologies.

So, to raise productivity you should give or the society should give education to people. But just education is not enough. There should always also be a provisioning for the tools of production of these goods and services. So, for instance as a farmer - through education I have come to know that ok, I should be using tractors. But, then if my society just does not have any tractors how will I use these tractors? So, not only is education important, but you should also have access to these tools and equipments.

So, the society needs to put in certain amount of money for the production of these goods, which are known as the capital goods. You need to have production of tractors, you need to have production of computers, you need to have production of machines, you need to have production of lathes and so on. So, to increase productivity you provide education, you provide tools and equipments for the production of goods and services.

And also you need to put in money into the production of technology, which means that there has to be innovation going on in the society. So, for instance if all the farmers have access to education, and they have access to tractors. But, then it is also possible that you could tweak your tractors in such a manner that the efficiency goes on increasing even further. How will you come up with such tweaks? Through innovation, through technology. So, technology is also something that needs to be provided to increase the productivity of people. And this productivity will in turn raise the standards of living of the society.

Another principle of economics is that prices rise when the government prints too much money. The rise in prices is known as inflation. Inflation is an increase in the overall level of prices in the economy. Now, prices can be understood in two terms, one is in terms of money and the second is in terms of other goods and services. So, let us consider that there is a society which has only 2 goods.

The good 1 is wheat and the good 2 is milk. So, in this society we have only 2 goods, for the sake of understanding. And the wheat is being sold for say 30 rupees for 1 kg. And the milk is being sold for 60 rupees for 1 kg. Now, the thing is these are the levels of prices that are prevailing in the economy at present.

So, the level of prices: for 1 kg of wheat you have to pay 30 rupees, for 1 kg of milk you have to pay 60 rupees. Now, suppose the government prints too much of money. In place of having 100 rupees in the pocket of everybody the government has printed so, much of money that now everybody has 200 rupees. Let us think that just by magic everybody has 200 - has twice the amount of money that they had previously. Now, what will happen? In this situation the price of everything will increase. In place of having - we can also understand it in by saying that the price of 1 rupee is equal to 1 by 30 kg of wheat. And the price of 1 rupee in terms of milk is 1 by 60 kg of milk.

Now, if the money has just doubled magically because the government has printed so much amount of money, the price of one rupee will go down. So, in place of having 1 by 30 kg of wheat, now person might demand much more amount of money or much less amount of wheat. When the government prints too much of money the value of money decreases, because here again in the society the value of anything is determined by the demand and supply of that thing. If the supply of money has gone up, the value of money will go down. Now, if the value of money will go down, it would mean that for every rupee you will get less amount or less quantity

of goods than you were getting previously. Because earlier the value was large, so in exchange for money you were getting a larger quantity of goods; now the value has gone down.
So now you will get a smaller quantity of goods and so, more money is needed to purchase the same amounts of goods or services which increases the price of goods and services which leads to inflation.

So, the primary cause of inflation is that the value of money has gone down, because the government has printed too much of money. How will this show up? This will show up in this manner that earlier for wheat, you were paying 30 rupees for 1 kg. Now, you will have to pay 60 rupees for 1 kg. And for milk earlier you were paying 60 rupees. Now you will have to pay 120 rupees for 1 kg. The level of prices have gone up because you now have access to double the amount of money. But this is known as a notional increase in the prices. This is notional because this is only there in name. Because, if you look at the society earlier you would find that milk is worth twice the amount of wheat. So, for one kg of milk earlier - let us put it in writing. In the earlier situation for 1 kg of milk, you were getting 60 rupees, which is equivalent to 2 kg of wheat. This is in the earlier situation. But, then after inflation what happens?

After inflation we have a situation that 1 kg of milk is now worth 120 rupees. But, the price of wheat has also gone up. So, for 120 rupees you will get 2 kg of wheat. Earlier the price of 1 kg of milk was 2 kg of wheat, after inflation the price of 1 kg of milk is 2 kg of wheat. So, there is no actual change in the prices. The change in prices is only in terms of the rupee value or the money value, which is because the amount of money that is there in the society has gone up to such an extent that the value of money has gone down.

But, the value of all other things in terms of other goods and services, they will remain the same. So, the principle of economics here says that prices rise, when the government prints too much of money. This is something that we need to keep in mind whenever we are talking about inflation.

And then the last principle is that the society faces a short run tradeoff between inflation and unemployment. The question is should we have inflation in the society or not? The answer is slight amount of inflation is good for the society. Why is that? If you have more money in the economy - why is there more money in the economy? Because, the government is printing more money. If there is more money in the economy people will spend more. When people will spend more so, in the short run there will be a more demand for goods and services. Because, earlier you were having only 100 rupees so, you were spending 100 rupees. Now, that you have 200 rupees right away you will think ok, I have more amount of money let me buy more stuff.

Because, here again rationally you are trying to maximise your utility. And, because you have more access to resources you want to have more goods and services. So, in the short run more money in the economy will lead to more spending, which is more demand for goods and services. More demand for goods and services in turn would lead to inflation, because there is a

rising cost.

So, there is now more demand for milk and so, the cost of milk rises. But, then more demand for goods and services would also mean that now the milk man would want to have more and more of the produce. So, the milkman would now try to have more cows, would try to hire more people, he would try to hire more amount of goods in terms of capital goods. And so, the more demand for goods and services would also lead to more hiring of workers to meet the demand. Now, if you have more hiring it means less unemployment. So, more money in the economy led to more spending. More spending led to inflation, but it also led to less unemployment. So, more inflation means that more people have jobs. Now, a society always wants to have people who have jobs, and inflation is the price that the society needs to pay to have those jobs.

So, this principle of economics states that the society faces a short run tradeoff. Now, this is in the short run because in the long run, because of the actual prices - here we are only talking about the notional prices as we saw in the previous slide. But, the actual prices remain the same. So, in the long term things go back to the normal, but in the short run there is this tradeoff between inflation and unemployment. And this also leads to business cycles which is the fluctuations in the economic activity, such as employment and production. So, in the short run, when the government prints more money, there is inflation which leads to more employment. And, this employment also leads to more production. But, then because of inflation after a while people are negatively impacted. And so, the government then shrinks the money back, it shrinks the economy and with that the level of inflation comes down, but together with that the employment and production also come down. So, this is a short run tradeoff that the societal always faces.

If we were to plot a curve between the rate of inflation and the unemployment, we would get the Phillips curve. The Phillips curve shows that if you have higher inflation, you have lesser amount of unemployment. If you have lower inflation, you have more amount of unemployment. So, this is a choice that needs to be made at all times.

So, these are the 10 principles of economics that we saw here.We will revert back to these principles again and again in this course and we will also try to understand: what is the impact of these principles on conservation of natural resources?

So, that is all for today. Thank you for your attention. Jai Hind!