Business Data Management
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Micro & Macro Economics: The Role of Data

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Professor G Venkatesh: Welcome to this first 4 weeks of the business data management course. In these 4 weeks, we are going to be working very closely with professor Suresh Babu, who will introduce us to the concepts that come from the area of economics. So, Suresh Babu is a professor of economics in the humanities department, IIT Madras and he will try and explain to us in Layman's language hopefully.

How economics, both micro and macro-economics, provides the context for us to discuss businesses and the data that comes up in businesses. how that data is grounded in the principles of economics and how the people in economics look at data sets and how they work with datasets. We have only 4 weeks to do it and Professor Suresh Babu has done an excellent job of putting together the material so that we can understand it in 4 weeks.

So, today, Suresh, there has to be some foundational principles with which economics tries to understand the world of business. Where do we start?

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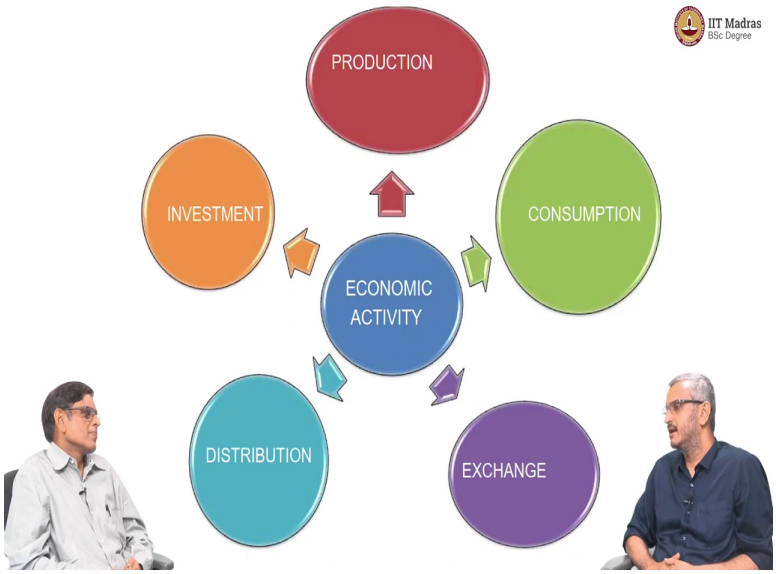

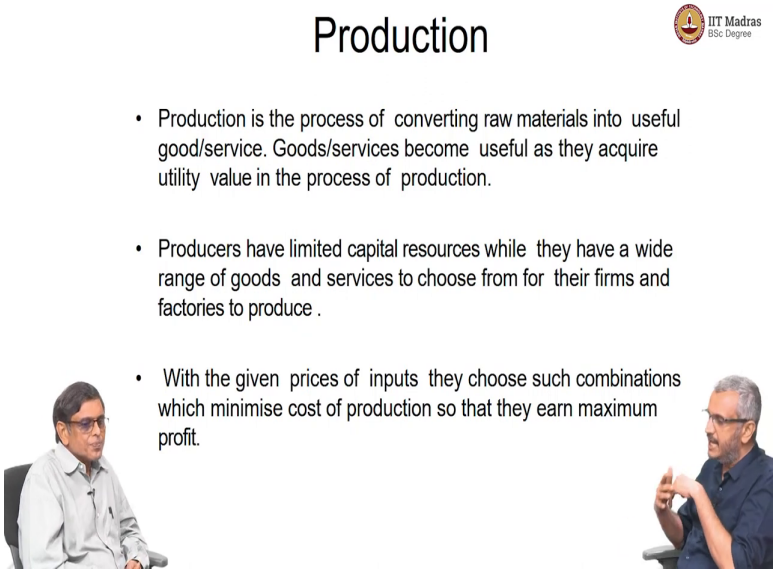

Professor M Suresh Babu: So, basically, in any economy, there are 5 activities that are taking place simultaneously. And when I say simultaneously, this is real time activities that are taking place. These 5 activities actually drive the economy at any particular point in time. What are these 5 activities? There is always production that is taking place and there is always consumption that is taking place. For this production and consumption to take place, there should be continuous exchange of goods and services.

Professor G Venkatesh: What is exchange?

Professor M Suresh Babu: Exchange means whatever is produced will be consumed by some consumers and in return, they will have to give the value of that product to the producer. This

process of exchange is extremely important because it is this process which actually drives production and consumption in an economy.

Professor G Venkatesh: But producers can also be consumers?

Professor M Suresh Babu: We will come to that.

Professor G Venkatesh: And consumers can also be producers.

Professor M Suresh Babu: We will come to that in a minute in a very simple schematic situation. But, along with exchange, there is a process of distribution that takes place.

Professor G Venkatesh: So, you will say exchanges like the battery system historically.

Professor M Suresh Babu: It can be.

Professor G Venkatesh: People used to trade spices in India. Suppose they send spices to Europe and get in return from Europe all kinds of things.

Professor M Suresh Babu: It could be exchange in terms of commodities to another commodity or it could be in terms of exchange in terms of money. There is a value for a commodity that is determined and you pay the money for that value that you have determined. Now, along with this exchange, there is a process of distribution that is taking place and that is exactly the point that you are asking Professor G Venkatesh.

When we are exchanging, goods and services are changing hands. Along with goods and services, there is the process of resources also moving. For example, when a household actually purchases something from a firm which has been produced by the firm. We see firms as producers and households as consumers. When the household purchases something the household gives the firm in return money. So, there is a process of resource distribution that is taking place. The resource that is money, which was available with the household now has gone to the producer.

Professor G Venkatesh: Producer.

Professor M Suresh Babu: So, every exchange then also has an underlying distribution which is very important because depending upon the distribution only the whole process of production as well as consumption in the economy is running. Why I say it is important because depending on

how much resources you have, you make choices regarding how much to consume and how much to save and invest and it is that investment.

Professor G Venkatesh: So are you talking about the unit in any agent?

Professor M Suresh Babu: Any agent in the economy.

Professor G Venkatesh: In the economy, it could be a producer again.

Professor M Suresh Babu: Or a consumer.

Professor G Venkatesh: Or household.

Professor M Suresh Babu: Who is consumed.

Professor G Venkatesh: Just a little diversion here. This household term. We started with a term called consumer and now you suddenly brought in this thing called household.

Professor M Suresh Babu: In an economy, we are actually identifying 3 major agents in an economy. One is the producers which are firms and enterprises. Second is the consumers which when we lump them together use households as a unit of analysis for that.

Professor G Venkatesh: Because it is easier or because they are related everything is.

Professor M Suresh Babu: There is a relation.

Professor G Venkatesh: Consumption is together.

Professor M Suresh Babu: And for consumption there is individual consumption and there are certain consumption that is joint.

Professor G Venkatesh: Joint.

Professor M Suresh Babu: So we aggregate that as a household.

Professor G Venkatesh: Household is a unit.

Professor M Suresh Babu: It is just a unit. Then there is a third agent which we know is the government. The government is also a producer as well as a consumer in an economy.

Professor G Venkatesh: As a customer.

Professor M Suresh Babu: But to start off with a very simple model, we will use the two-agent model in which there are only two clusters or two groups of agents that are firms as well as the household.

Professor G Venkatesh: Households.

Professor M Suresh Babu: Now, coming back to our earlier issue, that is the question of distribution and its implication. So, depending on the type of distribution, there will be decisions regarding investments as well as consumption. Why I am bringing investments is because it is a part of savings.

Now, what is savings? Savings at one level is nothing but consumption postponed. So, the household as an agent will try and see if I should consume at a particular point in time T or should I postpone my consumption to T+1. If I am postponing my consumption to T + 1 then I will save up whatever resource that.

Professor G Venkatesh: The reason you do that is because?

Professor M Suresh Babu: Because your valuation of consuming something might be higher in T + 1 compared to T^{th} period.

Professor G Venkatesh: Like you may be saving for a pension.

Professor M Suresh Babu: Any kind of thing.

Professor G Venkatesh: For retired life.

Professor M Suresh Babu: For example, today I am having my salary. Now, I want to own a car within 3 years. Right now I do not have any resources.

Professor G Venkatesh: You do not have the money to buy it.

Professor M Suresh Babu: So, I will save.

Professor G Venkatesh: You have to accumulate some amount of money before you can buy.

Professor M Suresh Babu: And then I will use that for my car. So, I am postponing the car. I would have loved to have the car today.

Professor G Venkatesh: If you can take a loan, you can take it.

Professor M Suresh Babu: But if I take a loan again, then I have to keep repaying. So, instead of that I will have a decision that lets me save up for 3 years and then see whether I have the resources and that point I will consume. So, the important thing to characterise the economy in this way is that depending on this distribution, whether it is skewed to households or to producers are these millions of decisions in an economy in terms of consumption, savings and investment. It is this investment that again goes back to production. So, it is actually a cycle production consumption, which is actually aided by exchange with the exchange, there is an underlying distribution process that is taking place in the economy along with the distribution.

Professor G Venkatesh: By distribution you mean how is the money going?

Professor M Suresh Babu: Distribution of resources.

Professor G Venkatesh: Resources are distributed.

Professor M Suresh Babu: And depending on that, on that process of distribution, there will be investments in the economy. Depending on the investments in the economy, there will be production in the economy.

Professor G Venkatesh: So, this is what economists study.

Professor M Suresh Babu: So, this is basically the real time activity of any economy. I emphasise on this for one important reason that these are all interrelated.

Professor G Venkatesh: What is interrelated?

Professor M Suresh Babu: All these five activities.

Professor G Venkatesh: I see.

Professor M Suresh Babu: For example, during this COVID crisis, we had a lockdown. Once when we had a lockdown, the process of exchange was not smooth, because even if I wanted to buy I could not buy the moment the exchange was actually blocked. Production also had to be blocked, while consumption was already blocked. So with these 5 kinds of activities, if 1 of the 5 activities is actually stopped.

Professor G Venkatesh: Stopped.

Professor M Suresh Babu: Then all the others.

Professor G Venkatesh: All the other activities also stop.

Professor M Suresh Babu: All might slow down or eventually stop. Now, once the exchange is stopped, then the distribution is stopped. So, some people will have resources, some people will not have resources. Once distribution is actually stopped, then investments in the next time period will also be affected.

Once investment in the next time period is affected, then the production in the next time period is affected. So, there is a kind of it is a continuous process in the economy and all these 5 are basically interrelated and any factor that is affecting one of them could eventually affect all of them.

Now, when we talk about this in a mutually interrelated kind of a process, we can view this at two levels. One level of viewing it is at a micro decision-making level. That is as a household or as an individual or as a firm, how do I organise my consumption, how do I organise my production and what is the kind of distributional mechanism that I should have to make all those decisions at the micro level.

Professor G Venkatesh: Micro level.

Professor M Suresh Babu: That becomes the subject matter of microeconomics. All these at the macro-level we can visualise. And for example, when we talk about macro-level, it is basically aggregates. Aggregated at what level is a matter of one's choice. I can view this in terms of the state level within the Tamil Nadu economy. I can view it in terms of the national Indian economy or even global economy. Because a lot of concerns came up in terms of how the global supply chains would affect actual production.

Professor G Venkatesh: And you can do a sector.

Professor M Suresh Babu: You can do a sectoral thing. So, that is basically an aggregate kind of an analysis, which is called macro economics.

Professor G Venkatesh: So if you work at the level of a household or one firm that would be micro and the decisions that are happening within households in order to make decisions on what to consume.

Professor M Suresh Babu: How to produce etc.

Professor G Venkatesh: How to manage a budget and the allocation of resources in this case would be allocating your budget amount of money to within their consumption basket. And on the other side, you have the firm which also has a large number of decisions to make in terms of what to produce and what price to produce. what price to sell it or what how to manage?

Professor M Suresh Babu: How to produce?

Professor G Venkatesh: And what are the resource allocations that they have to make, various kinds of resources that they have manpower people, capital, factory equipment, whatever it is, how do allocate that to the different activities inside the firm.

Professor M Suresh Babu: So, this.

Professor G Venkatesh: This is microeconomics.

Professor M Suresh Babu: These are two very important questions in microeconomics.

Professor G Venkatesh: The macroeconomics would be at the level where you would be discussing a sector or a state or country.

Professor M Suresh Babu: Industry.

Professor G Venkatesh: Industry.

Professor M Suresh Babu: Aggregated.

Professor G Venkatesh: Aggregated.

Professor M Suresh Babu: Industry here we will define as an aggregation of firms.

Professor G Venkatesh: Aggregation of firms as an industry. So, we have basically a collection of firms in a specific sector.

Professor M Suresh Babu: Sector.

Professor G Venkatesh: Would be an industry. And so, you could do analysis at the industry level that would be macroeconomic. And there the questions we would be answering just like this allocation, resource allocation questions.

Professor M Suresh Babu: There are also very important questions in terms of how these resources are getting utilised one. What is the kind of division in terms of these sources? For example, is the aggregate savings in India increasing or decreasing? It is very important because you're aggregated.

Professor G Venkatesh: What is the savings rate?

Professor M Suresh Babu: Savings rate in turn determines your level of investment to the economy.

Professor G Venkatesh: Yes.

Professor M Suresh Babu: Which in turn determines the level of output or production in the economy. So, those kinds of macro issues become very important.

Professor G Venkatesh: So, something like a GDP growth rate, if you take that as a macro.

Professor M Suresh Babu: Is this a micro or macro concept?

Professor G Venkatesh: What would be a macro concept? Price would be a micro concept?

Professor M Suresh Babu: Price is micro or macro?

Professor G Venkatesh: For it.

Professor M Suresh Babu: Because price is that variable that links all the micro concepts with the macro.

Professor G Venkatesh: Macro, I see okay.

Professor M Suresh Babu: And that is why the price mechanism plays a very important role in any economy. Because when we move from the micro to macro, the role of prices is in terms of the inflationary process. When we look at the prices at the micro level, it is basically welfare consequences. Because if prices are very high, then you know people cannot afford it.

Professor G Venkatesh: They cannot afford it.

Professor M Suresh Babu: Certain things affect consumers' welfare choices. So, price is an important aspect.

Professor G Venkatesh: So, the macro part of price is inflation.

Professor M Suresh Babu: Is an inflationary story.

Professor G Venkatesh: And the micro part of price is actual price setting in a market.

Professor M Suresh Babu: Actual price setting and its consequences in terms of consumption.

Professor G Venkatesh: Where does this course about data science fit into all this?

Professor M Suresh Babu: In all these variables, it is data. For example, we have to analyse production data at the micro level and at the macro level if you want to really understand the decision making process in terms of a firm. For example, we have to think of a firm as a set of contracts with certain resources. Ultimately, it is a firm where things are produced by a set of contracts and they have some limited resources. This resource allocation then is a big question for the firm.

So, we need to look at data in terms of how the firm is allocating these resources, and what is the basis on which the firm is allocating the resources. Because any resource allocation has two important questions that it answers, one is the question related to efficiency in its utilisation. Because in economics, we start with a basic premise that resources are limited and you know if we can utilise it for various other possibilities.

And that takes to the second concept which is very important, that is there is always an opportunity cost. There is a trade-off if I am going to utilise a particular resource for the production of a particular commodity. I have to weigh the options in terms of how I could utilise that for something else. So, here the concept of efficiency becomes very important. To analyse that we need data.

Professor G Venkatesh: Trade off, basically.

Professor M Suresh Babu: Trade off as well as the efficiency part of that. Now, for example, when a firm thinks about resource allocation, we have to look at the efficiency of the firm.

Professor G Venkatesh: For which you need data.

Professor M Suresh Babu: We need data.

Professor G Venkatesh: So, its firm level data means data about what is going on inside the firm.

Professor M Suresh Babu: Inside the firm. And that is basically captured in various efficiency parameters. It could be in terms of energy efficiency, in terms of certain productivity parameters or in terms of labour productivity etc.

Professor G Venkatesh: Or they could be just profitability.

Professor M Suresh Babu: Ultimately.

Professor G Venkatesh: Final outcome.

Professor M Suresh Babu: Ultimately, that is what matters for the firm.

Professor G Venkatesh: Or growth.

Professor M Suresh Babu: So, here we are assuming that the issues in terms of profitability as well as productivity are actually related. An efficient firm can be productive and profitable. And an inefficient firm might not be able to be productive and profitable, unless and until there are certain market structures within which they operate and they can afford to be inefficient and then continue.

Professor G Venkatesh: So, similarly this allocation you talked about resource allocation at the firm level and so can you speak about the household now?

Professor M Suresh Babu: In terms of household.

Professor G Venkatesh: Data in household.

Professor M Suresh Babu: We all know that households have limited income, whatever may be the kind of income generation activity there is an upper bound. Well, it depends on the kind of activity that you undertake to generate income. In certain activities, incomes are higher, in certain other activities incomes are below. But there is an upper limit and upper cap.

So, then a household has to really think in terms of how to utilise this income that is generated. For example, I took my own example at the beginning. You know that I have my limited monthly salary. Now I have the possibility of buying a car. I already have a small car, but I want to upgrade to a bigger car. Should I use my money for that or should I use my money to put my son in a slightly better school, that is a decision which I have to make? At a Mundane level, every day, every household is making a decision.

Professor G Venkatesh: Decision of this kind.

Professor M Suresh Babu: In terms of consumption.

Professor: But are they using data for this?

Professor M Suresh Babu: There are two levels it operates, certain decisions we use data, but we do not organise that. For example, we go to the supermarket and we purchase things, we look at the MRP or whatever it is, and then we compare sometimes across products. That is the data processing we are using, so that is why in a lot of decisions unknowingly we are consuming the data.

In certain other decisions, we really go out and collect the data. For example, the moment I decide to buy a car, I will go to various dealers and I will look at what the models are. I will discuss with them and I will find out what kinds of discounts they can give me. What is the bonus or what is the exchange and offer? Perhaps I might write it down and then I will decide. So that is a little more organised. So, in every decision there is data. The only thing is that the formal analysis of data and the informal analysis of data is different in each of these contexts.

Professor G Venkatesh: And this is relational also, right? The guy who is producing needs data to find out whether or not his firm is efficient, but he also needs data about the consumer, right?

Professor M Suresh Babu: Yes.

Professor G Venkatesh: Because then only he will know what to produce.

Professor M Suresh Babu: Yes.

Professor: And how much to produce of each thing.

Professor M Suresh Babu: Yes.

Professor: So, he needs the consumption data of the household.

Professor M Suresh Babu: Yes.

Professor G Venkatesh: So, so something has to give him some method that has to be there by which he can get hold of this consumption data as well.

Professor M Suresh Babu: So, basically the decisions regarding what to produce and how much to produce is a function of the information that the producer has at any particular point in time. How

do we collect it? There are various methods of collecting that from very simple kinds of market surveys, to slightly complicated or sophisticated demand estimations that we can use.

Now, market surveys as we know are that people go out to the market and then they fill out this questionnaire and then they see what are the kinds of products that are demanded. Then they come back and analyse that. Typical survey reach would be smaller and coverage in terms of geographical area might also be sometimes less. But, at a national level and the aggregate level there are various agencies which collect data, and one could use those data and then perhaps arrive at broad trends in the economy and then make your decision in terms of what to produce and how much to produce.

Professor G Venkatesh: So, what are these national level data sources?

Professor M Suresh Babu: In India, we have the national sample survey consumption data, which is released by the Central Statistical Office CSO, and this data can be utilised to understand the consumption trends in India over time. And then we can see and there is the basis on which we really say that, in another 5 years consumption of certain commodities might actually be increasing while certain other commodities might come down. There is a large-scale survey across all states in India.

Professor G Venkatesh: And it covers everything?

Professor M Suresh Babu: It covers either of various rounds of it. And in each round, there are very specific surveys as well as there is a general.

Professor G Venkatesh: So, we would know for example how many people are using cooking gas? How many people are using coal?

Professor M Suresh Babu: Yes.

Professor G Venkatesh: We will know that.

Professor M Suresh Babu: Yes. And we will also know how much of your money is spent in terms of food consumption. Within food how much is spent for pulses or greens or egg or meat or whatever consumption.

Professor G Venkatesh: I see, we will know whether AC's are being sold in summer.

Professor M Suresh Babu: AC's are being sold for mobile phones.

Professor G Venkatesh: Will we know if they are sold in summer or winter more?

Professor M Suresh Babu: No, for that we cannot use that data because these are some kinds of annual surveys, so the timing might not be sometimes appropriate, for that you need specific market research kind of data.

Professor G Venkatesh: But we know how many refrigerators are sold?

Professor M Suresh Babu: Yes.

Professor G Venkatesh: How many refrigerators are sold?

Professor M Suresh Babu: Or for sure we will know how many households in India have a refrigerator.

Professor G Venkatesh: How many were having it 10 years back and how many are having it now.

Professor M Suresh Babu: Now. So, if you can compare it over time, then we will know the market well.

Professor G Venkatesh: People are becoming richer.

Professor M Suresh Babu: Market is actually growing and we are actually consuming more and so, when we put.

Professor G Venkatesh: This is interesting. So, the broad picture I got is that in economics we have micro, and macro. What explains the linkage between micro and macro is price.

Professor M Suresh Babu: Right.

Professor G Venkatesh: Maybe some other variables also.

Professor M Suresh Babu: Yes.

Professor G Venkatesh: But price is one important variable that links micro.

Professor M Suresh Babu: Obvious and it is seen to us.

Professor G Venkatesh: Whether you do micro or macro, both read data and there are sources for data.

Professor M Suresh Babu: Yes.

Professor G Venkatesh: And hopefully we will see some of this data.

Professor M Suresh Babu: Yes.

Professor G Venkatesh: And we will poke through the data and try to make sense out of it.

Professor M Suresh Babu: Some of the trends we can do that.

Professor G Venkatesh: Okay, nice. Let us see.