Business Analysis for Engineers
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Lecture -37
Introduction to GDP

Last class, I ended up stressing on, the importance of National Output. Because, it is the volumes of output, that is more important than the quantities of money, that has been circulated. You might print a lot of currency, but collectively, it might be worse off, if the National Output declines. So, we need to understand that, it is the National Output, that is more important. And, it is important because, that characterises a nation's strength.

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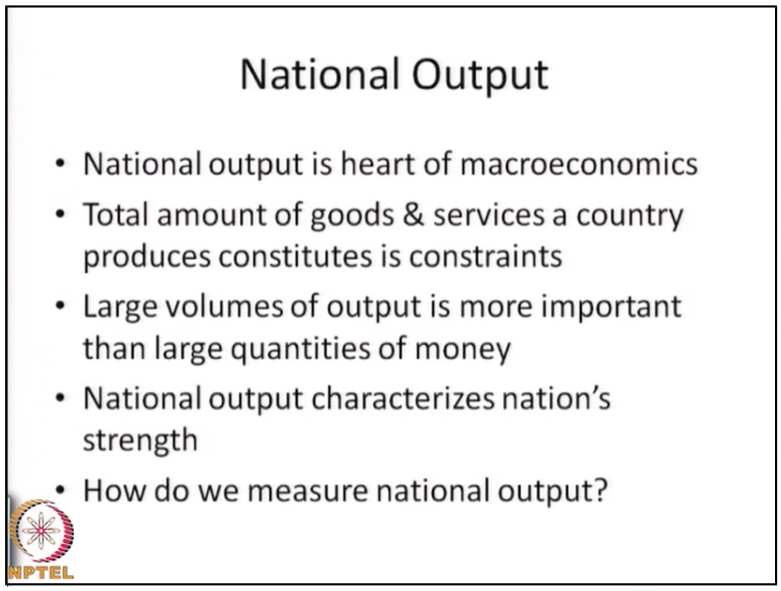

So, how do we measure, the National Output, is the question.

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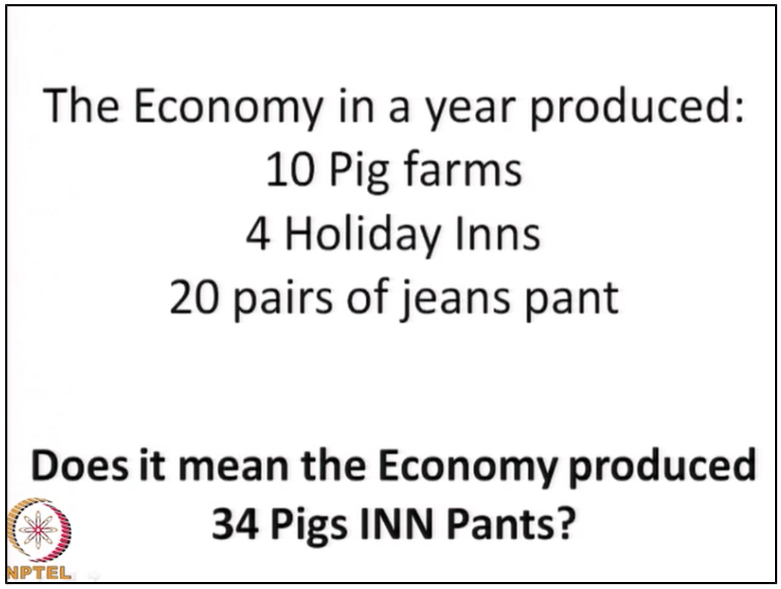

We need to understand, what constitutes output. Now, let us for example take, a nation's economy in a year. And, let us say, throughout this year it produced, 10 Pig Farms, 4 Holiday-Inns, and 20 pairs of Jeans Pant. And, this is the economic activity, of a given nation, in a given year. So, does it mean that, that at the end of the year, that the economy produced, 34 Pigs and Pants. No, it is not. It is not just, a mere collation, an aggregation of all the economic activities, in to one big sum, that signifies the nation's output. So, what do we do next? How do we still find, the nation's output, in an accepted quantifiable form? Then, we need to add, monetary value to it.

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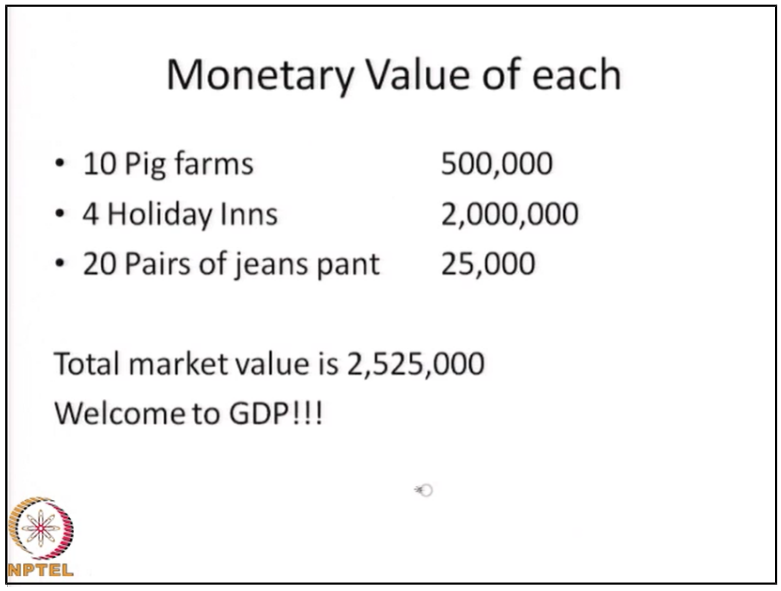
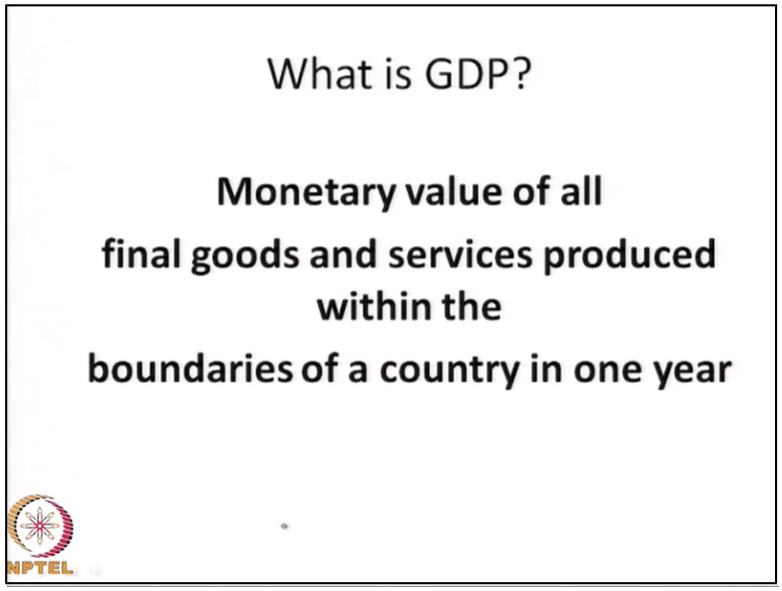


Now, let us say, these 10 Pig Farms was valued at 500,000, these 4 Holiday-Inns for 2 Million, and the Jeans Pant for 25,000. So, the total market value is, 25.25 Million. Now, whether it is the total market value, or whether it is the value-add, that happens in the intermediate goods and services, again is a question, that needs to be answered. So, to understand the intricacies of calculating, the monetary value of the goods and services, that are being produced, the most



widely accepted measure of a National Output is, its Gross Domestic Product.

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Fundamentally, the definition for GDP is, the monetary value of all the final goods and services, that are produced, within the boundaries of a country, in one single year, constitutes the GDP of a country.

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Now, when we calculate the GDP of a country, there are different things that we should have in mind, what actually constitutes the GDP. We need to remove, the intermediate goods. Because, intermediate goods are the ones, that become part of the final good, that is being sold. So, we

need not take into account, the monetary value of intermediate goods, because any way, that is going to get factored, in the final goods of which, the intermediate goods is a part

By doing this, we are eliminating, the double accounting for the monetary value. Which, we otherwise would have done, if we had taken, the value of intermediate goods also, and then again taking, the value of the final good. Let me just give, a small example, for you to understand this. Suppose, let us say, I am a Forestry company. So, I just fell wood, cut trees, and give wood to somebody who finishes it, in the form of a Furniture.

And, that Company again, gives it to a Retailer, who sells this Furniture, to an end user. Suppose, I sell the wood, to the Company-B for 1000 Rupees. And, then Company-B makes, fine additions, converts it into a table or a chair, and then sells it to a Retailer Company-C, for 2500 Rupees. And then, that Company-C also makes, some value adds, and then finally sells it to end-user, for 3000. So, in calculating the total output, if we just add the sales, of every transaction, in this case, it is 1000 + 2500 + 3000, the result would be 6500.

And, this would overstate, the amount of the output, because of the simple reason, that it would have calculated, the value of the lumber, 3 times. Because, in all, three transactions have happened. And, the value of the Carpentry, twice because, it has happened in two transactions. So, a good way to avoid, this over counting, is to just focus on the value-add. Now, let us see, how we do this? I will just give you a small example, so that you will understand, what I am trying to explain.

Now, suppose the same transaction, we are just go in to, concentrate only on the value-add. Because, Company-A sold the raw wood, it had cut for 1000 Rupees, and had purchase no material inputs. So, whatever it has added, is just the 1000 of the value, that it has sold to Company-B. And, then Company-B, adds value to the extent of 1500, and sells it to Company-C, which adds another 500 Rupees value, before it sells it for Rupees 300, to an end-user. So, suppose we calculate the total output.

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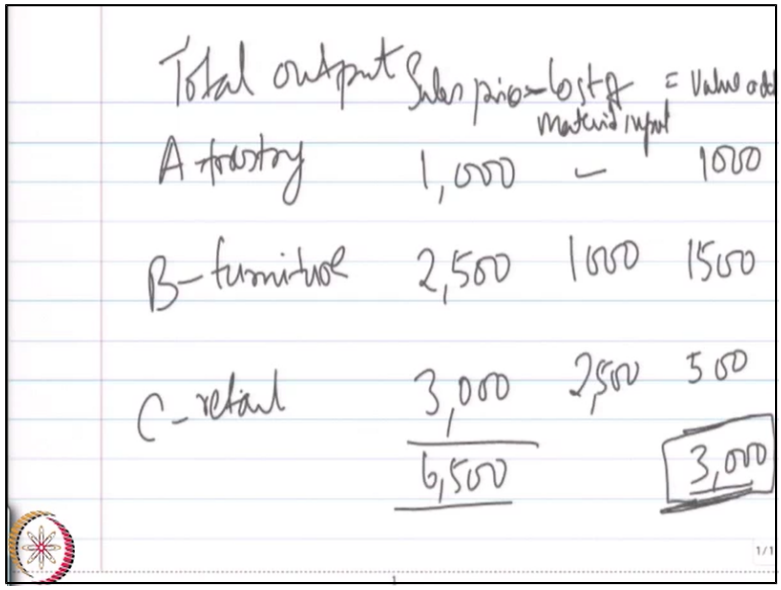
Now, suppose we take this example, to calculate the total output. We know that, there is a



Company-A, in this case, is the Forestry Company. Company-B, which is the Furniture Company. And, Company-C, just a retail outlet, that sells it. And then, you have a sales price, cost of material input. And, the difference between these, is the value-add. Now, in the first case, there was no cost of material inputs, so the difference is 1000. But, Furniture Company-B sells it to C for 2500, by buying this for 1000, from Company-A.

And, the resultant value-add, that it has created is, 1500. And, Company-C sells it. After buying it for 2500 from Company-B, it sells it for 3000. Because, it creates a value-add of, 500. So, the total value-add, that is created, is 3000, while the total transaction value, is 6500. As I told you before, this 6500 captures, the intermediate goods for more than one time, as a result of which, there is double counting. To eliminate this, if you are just capturing, the value-add at each stage, then we are doing a correct estimate of, calculating the actual output, which in this case, is 3000.

So, a good way of estimating, the output. And, let us say, a nation's economy, it is an aggregation of such output, from different industries, from different sectors of the economy, services, or agriculture. And, each of them calculated, in this way. And, if we just calculate the value-add, this 3000 in this case, let us say, this represents a nation's economy, then this 3000 is the value of the National Output. But, it is extremely difficult, to calculate the value-add at each stage because, the nation's economy is not as simple as this.

So, the best way to estimate that, is to calculate the value of the end-use product, that is getting sold. So, the end product that is getting sold, is for a particular value, and if that value is captured, that represents the correct value, of the nation's output. We will discuss, different ways of calculating the GDP, in the subsequent slides. Now, it is very important for you to understand that, the example that I gave you just now, it is just for you to understand, that intermediate goods should not be included, in calculating the GDP of a country.

Second hand sales, should also not be included, because there is no value-add in this. And, not to be, actually explicitly told, it is a good understanding that, the black market economy never constitutes, an integral part of a nation's output. A volunteer work, or own work done, inside the house, let us say, you are moving your garden, in the process, you are not creating any economic value. So, that does not constitute a nation's output, or does not constitute a part, of the nation's output.

Or, pure financial transactions like, buying bonds or stocks, because this is just a mere transfer of ownership, without creating any economic value. That also, does not constitute, a part of the nation's output. And, transfer payments like, the social security scheme, or the welfare schemes, which just transfer of money from, the Government to, the other end user. So, they do not result in any final production. So, that is also not included, in calculating, a country's GDP.

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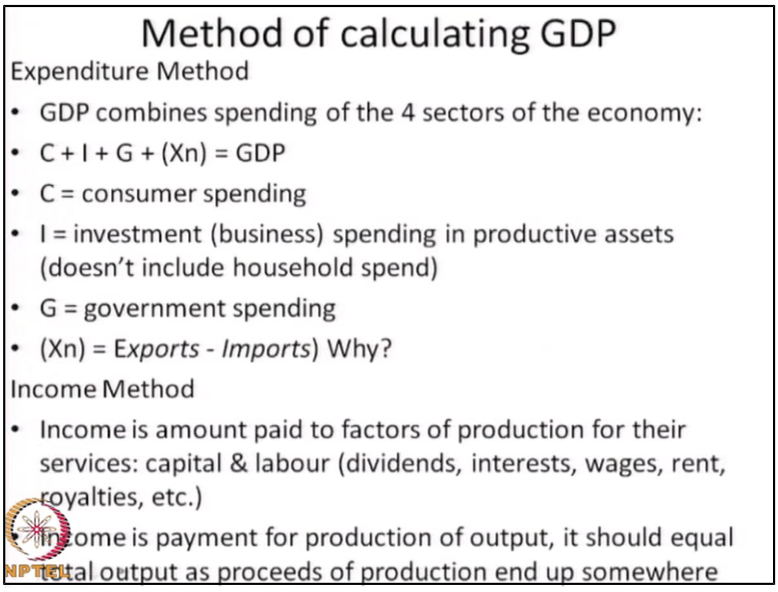

Now, how do we calculate, in that case, the GDP of a country. Now typically, the first method, is the Expenditure Method. Which, as I said before, it just calculates, the end value of the goods or services, that is being delivered, instead of calculating, the value addition at each stages. And, this is popularly called, the Expenditure Method. In this Expenditure Method, it divides expenditure on final goods and services, into 5 Groups. And, it combines these 5 Groups in calculating, the GDP. These 5 Groups include, C, which is the consumption by households.

That is the consumers spending. I, which is the Investment in Productive Assets. And, this Investment is done by, business spending for Productive Assets. G is the Government spending on goods and services. The net of Exports and Imports. Now, these form the five important, is the net of Exports and Imports + the consumer spending + the investment in productive Assets by businesses, and the Government expenditure, this constitutes the GDP, calculated based on an Expenditure Method.

The important thing, that we have to remember, is that, all of these categories are designed to avoid, the double counting. Although, consumption includes, almost all spending by households, business investments do not include, all spending by business. It does not include, all the spending by the firms. If it includes, then it would end up in double counting. Because, many of the things that the firms buy, such as raw materials, are ultimately sold to the consumers.

So, we are just interested in capturing the investments, done by businesses, in creating productive Assets, that are more long-term, not short-term. For example, as a Carpenter, I buy an electric saw, then it is a business investment for me. But, the wood and other raw materials that I buy, is not a business investment because, any way that is going to get sold later, which is captured in the consumer spending.

So, we are interested in only capturing, the business spending in productive Assets. The Exports and Imports are also calculated, in calculating the GDP. The reason, that we are eliminating Imports in the process, let us for example say, an Indian consumer, he buys television from japan. Now, we should be very Careful, in not counting this because, this expenditure is purchased in a foreign soil, and does not create any domestic value.

So, we need to actually, deduct the Imports from this, and likewise add Export. Suppose, our goods and services are purchased by somebody, outside the country, that needs to be added. And, the net of Exports and Imports, together with consumer spending, investment, and Government spending, actually constitutes the GDP.

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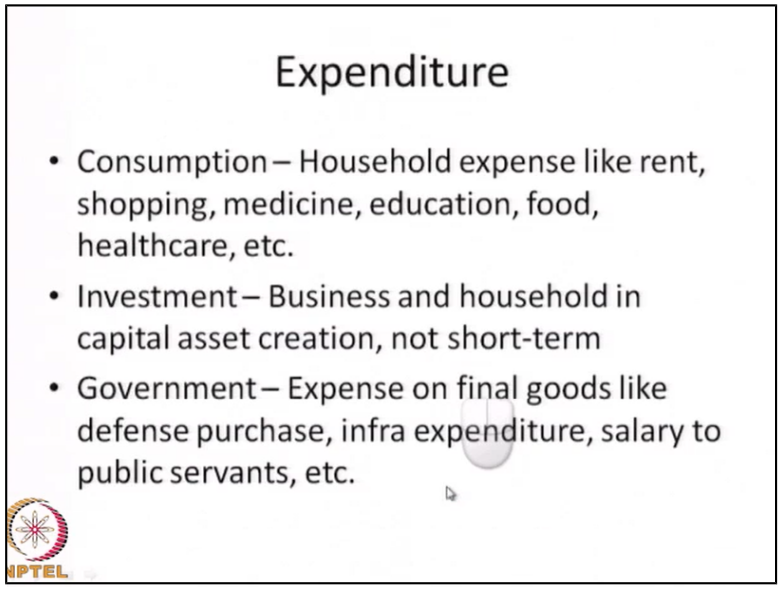

And, Government spending will include, the expenditure on final goods like, the Government spending on, Defence, or Infrastructure, Salary to its Public Servants. These all constitute the, Government expenditure. Now, before that, another method that is also used, to measure the total output, is to focus on income. What do I mean by income? Now, this Income Method assumes that, income is the amount that is paid, to the factors of production, for the services that they have rented. Factors of production here, I mean it is the, capital and labour.

Typically, the Services, is repaid in the form of, Wages, Interests, Dividends, Rent, Royalties. Now, these are all the income, that is paid to the factors of production. Now, since income is just payment for the production of output, it does definitely makes sense to assume, that the total income, should ultimately equal, the total output. Because, the proceeds of production, ultimately have to end up somewhere, either in my pocket, or in somebody else's pocket.

But, it is very safe to assume, that the total income, should be equal, to the total output. But, by

enlarge, the most popular method, the convenient method, that is used to calculate the GDP of a country, is the method that I explained before, which is the Expenditure Method. Which just captures, the consumption driven expenditure, which is the household expenses. The investment, which is driven by businesses, for the purpose of long term, and not short-term. Government expenditure + the Exports - the Imports, this constitutes, the GDP of a country.

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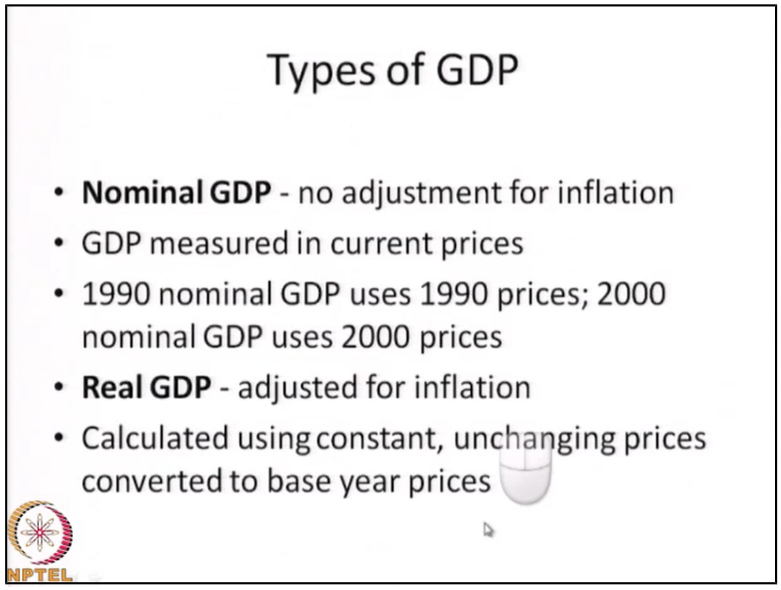

Now, while calculating the GDP of a country, we need to have in mind, there are different terminologies, that you will encounter. You would see a newspaper, reporting the Nominal GDP, Real GDP. We need to understand, the difference between, the Nominal GDP, and a Real GDP. A Nominal GDP is one, that does not adjust for inflation. Which just measures, at a certain price level.

Now, let us say, in 1990, the Nominal GDP uses, 1990 prices. In 2000, the Nominal GDP uses, 2000 prices. So, does not adjust for inflation. Whereas, in a Real GDP, the adjustment for inflation is also made. It is using some constant base price. Now, let me just give you an example, for you to understand this.

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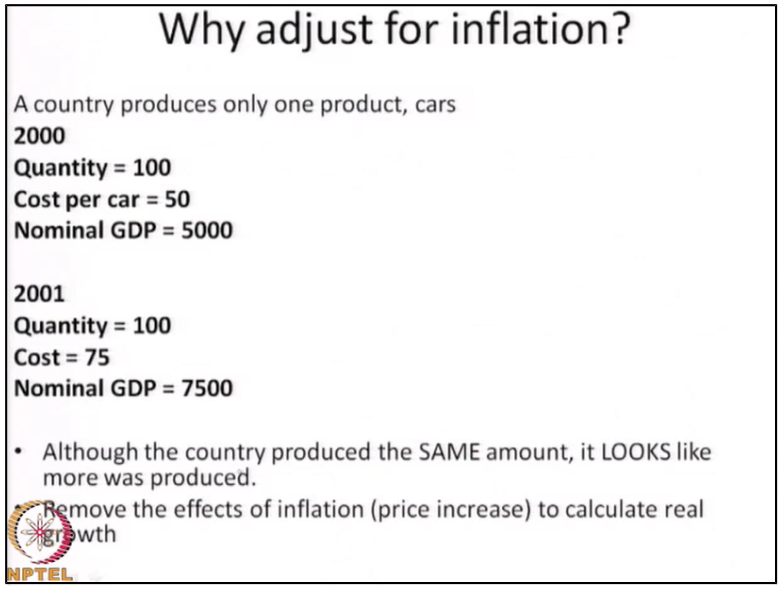

Now, let us say, the economy of a country is just, in its producing Cars. Now, let us say, at a given year, 2000, that it produced 100 Cars. And, the cost of the production was, 50 per Car. The Nominal GDP is 5000. So, the at the end of year 2000, the Nominal GDP, is 5000. Now, let us say, in 2001, the quantity of Car produced, did not change. It is the same 100. But, the cost of producing that Car, increased to 75. And, the Nominal GDP in this case, is 7500.

Now, we would tend to assume that, the GDP has increased. As a result of which, the output has increased, there is increase in the economic value. But, on the contrary, although the country produced the same amount, it actually looks as though, more was produced. On the contrary, it is because that, the cost of production has increased. And, it is that increase in the cost of production, that has actually caused, the increase in the value. So, we need to remove, this effect of inflation, to calculate, the Real Growth in the economy.

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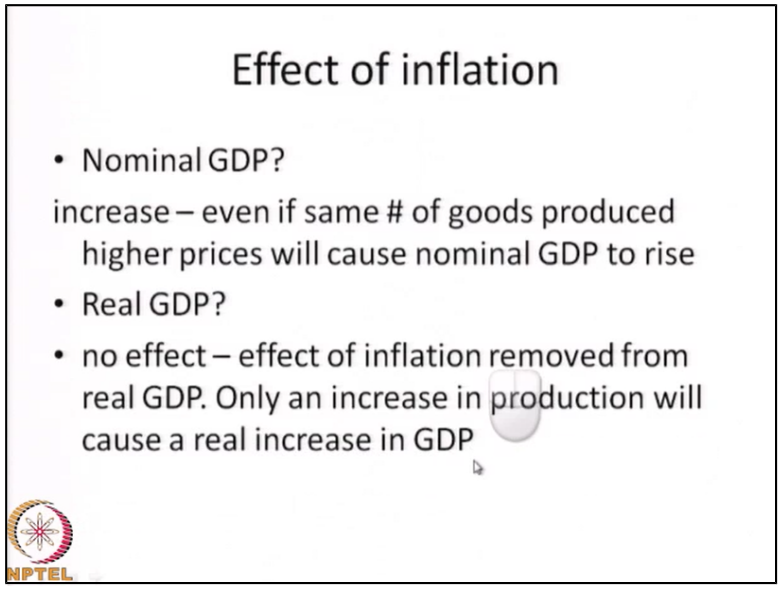

And, that is why, a Real GDP is essential, for the basis of understanding, the Real Growth of an economy, vis-a-vis, a Nominal GDP. Because, in a Nominal GDP, even if the same number of goods are produced, higher prices will just cause, an artificial increase in the GDP. Whereas, in a Real GDP, the effect of inflation is removed from the Real GDP, only an increase in production. Which means, an increase in the real output, will actually cause, a real increase in GDP. So, we need to actually understand, the difference between, a Nominal GDP, and a Real GDP.

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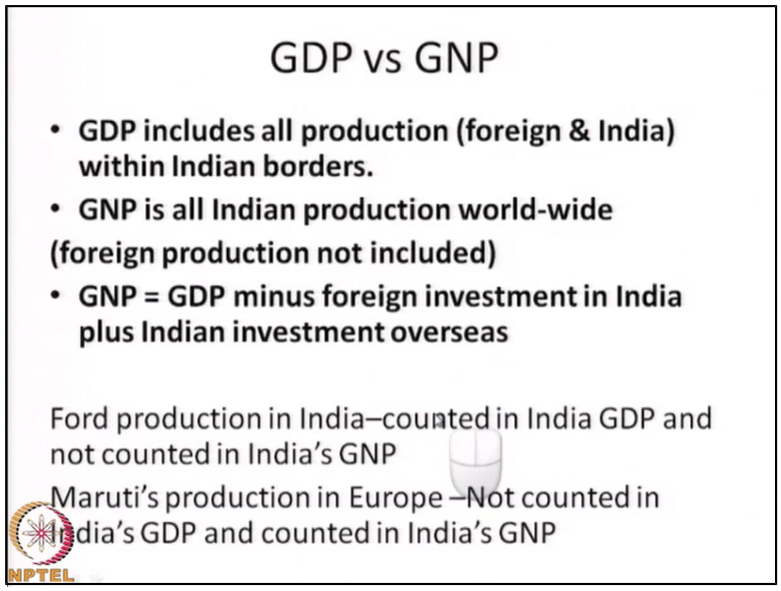

Now, there is also another terminology, that you need to understand, this is called the Gross National Product, a little different from, GDP. GDP includes, all production, within a given

country. Let us for example, take India. Now, whether it is a foreign firm, or an Indian firm, the monetary value of all goods and services, produced by anybody within the country, constitutes GDP. Whereas, GNP is the monetary value of all Indian production, that is made worldwide.

So, if we need to understand it from a different perspective, GNP is, GDP minus Foreign Investments in India, plus Indian Investment Overseas. For example, if ford, is producing Cars in India, it is counted in India's GDP, but not counted in India's GNP. Because, ford is not Indian. Likewise, if Maruti is engage in producing Cars in Europe, it is not counted in India's GDP. Because, the production does not happen, inside India.

But, it is counted in India's GNP. Because, it is India's production happening, outside India. So, you need to understand, the difference between, GDP and GNP. GNP is also an important economic indicator. But usually, the strength of a country's economy, by measuring its GDP, and not GNP. But, it is essential that, you understand, what GNP is all about.

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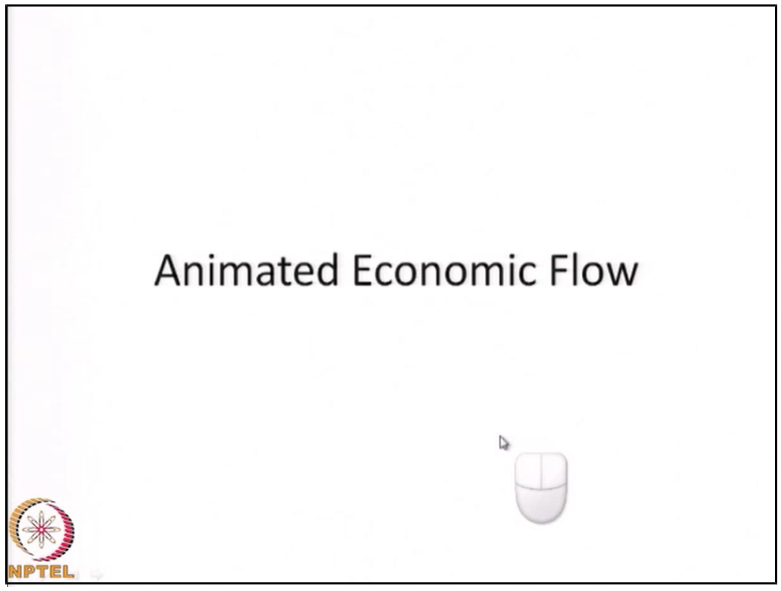

Now, I will give you a small economic flow, for you to understand, what happens, within a nation's economy.

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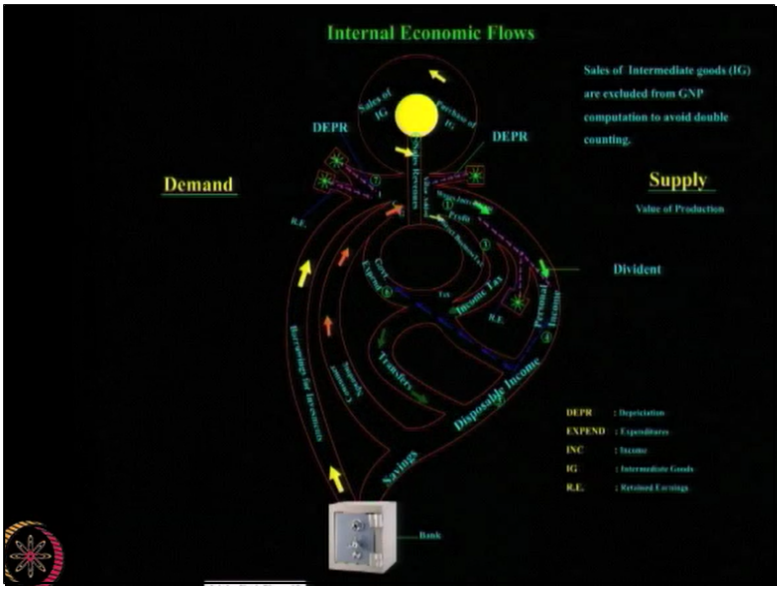

Now, if you look at this, this animation illustrates a country's internal economic flows. It shows the relationship between, the various elements, in the economic value addition process. And, the expenditure components, that come in the form of, consumption, investments, and Government spending. So, I will just trace, the path of this economic flow, for you to understand this, better. The value-add, that you see here, it is the sales, minus, the purchase of intermediate goods. Because, that is the real value-add, that has been created, as we saw in the previous example.

Now, the value-add is constituted. Before that, if you just calculate, the total income minus the total value-add, the sales revenue minus the value-add. It is given in the form of these, wage, interest, rent, the profit, the depreciation, the rent, the indirect business taxes. Now, actually what we are doing is, the GNP here in this case, is the total value added, which actually removes, the purchase of intermediate goods, to avoid double counting, as they represent sales of one business entity, to another.

Now, the total income minus the total value-add, which is represented by the resultant is, the depreciation, the wages, interest, rent, business profits. All of this constitute, the value-add. Now, if you closely look, what happens here, the value-add, Depreciation, the wage, rent, the profit, the indirect business tax. Now, the wage, rent, all this gets into the Personal Income. Or, also gets into RE here, which is the Retained Earnings. And, the profit that the firm gets, distributed. The firm pays, income tax for that. And, after that, gets into the retained earnings.

Other indirect business tax, indirect business tax, income tax, and then the personal income tax, gets into the Government's revenue. After which, the consumer has disposable income. And then, some Government transfers, enhances the disposable income of the consumer, who engages in consumer spending. And, the remaining goes to banks, in the form of savings. And, it is from this bank, that borrowings are done, for investments.

So, business investments come from, borrowing from these investments. The retained earnings. The depreciation, that constitutes I. This C, comes from the consumer spending. The G, is the Government's expenditures. So, this I + C + G + The Export – Import, constitutes the GDP. So, this economic flow, just gives you an illustration, of how various variables, flow within the economic system. And, how at different points of time, it reaches different places.

And, all of them again, aggregate together, in different forms. Either, in the form of an investment, which is driven by, borrowings from banks, or the internal surplus, that is generated through retained earnings, or depreciation, which is added back. These are, investments from businesses. Or consumer spending, which is that part of the spending, that a consumer does. And then, the Government Expenditure + Exports – Imports. So, this is how, the economic flow works, in any nation's economy.

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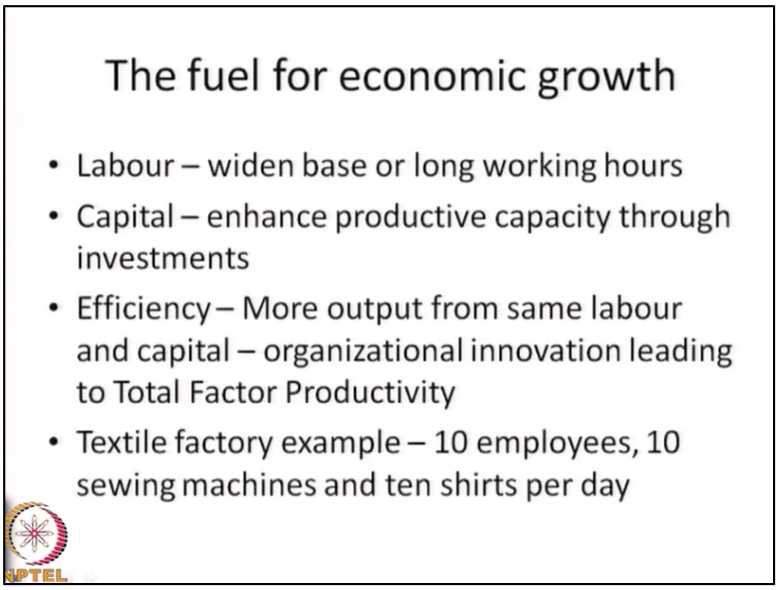

Now, after understanding, what constitutes an economy, and how it has been measured, we need to understand, what actually fuels the economic growth. There are three important factors, that actually fuel the growth of an economy. Labour, capital, and efficiency. Now, labour can result in economic growth, if we are able to add more, in to the labour workforce, or widen the employment workforce. Or, the same workforce, working for longer work hours.

Capital can enhance, the economic activity, if we are enhancing productive capacity, through investments. And, thirdly, efficiency. Without enhancing labour or capital, if more output we are able to generate through organisational innovation, then we are increasing the economic growth. And, this we usually call it as, the total factor productivity. I will just give you an example, for you to understand this better. Let us say, there is a textile unit.

And, there are 10 employees, and 10 sewing machines. And, each employee can make, you know, one shirt per day. So, at the end of the day, we are able to produce 100 shirts, using the 10 machines, and 10 employees. And, let us say, this constitutes, the National Output. This is the economy of a nation. Now, how do we increase, the economy of this nation. One, we increase the labour, by either adding more, or asking them to work for more hours. Or, we increase the capital, by purchasing more sewing machines.

Or, let us say, we do both. We add 10 more people into the workforce, and buy 10 more sewing

machines. As a result of which, the economic growth happens, to the extent of 200 shirts per day, as against 100 shirts before. In this case, we just increased, the number of people available, and the number of machines available. An alternate option is to increase the efficiency, by just changing, the process of making these shirts, by doing some study, that can optimise the manufacturing process.

As a result of which, more number of shirts could be made, by the same number of employees, using the same number of sewing machines. In the process, we have just increased, the efficiency. Now, this way, we are also increasing the nation's output. So, we need to understand that, either by increasing labour, or by increasing the productive Assets through addition of capital, or by doing both, or by increasing the efficiency, we are able to create more economic value, and create economic growth.

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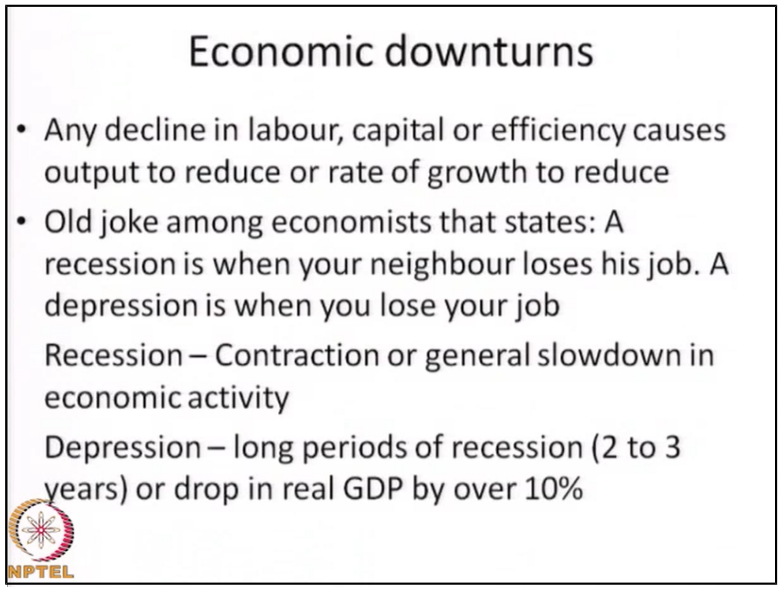

Now, just as economic growth is possible, there is also times where, there are economic downturns. And, just as, labour, capital, and efficiency, cause increase in economic activity, it is the same, labour, capital, and efficiency, that causes output to reduce, or the rate of economic growth to reduce. The lack of labour, the drop in efficiency, or the lack of access to capital, will cause an economy to contract. And, economic downturn is characterised usually by, words like, recession or depression.

And, there is an old joke, to differentiate between, recession and depression. Now, recession is when, your neighbour loses his job. A depression is when, you lose your job. A recession in an economic definition means, that there is a contraction in the economic activity, there is a general slowdown in the economic activity. If the growth in GDP, was 6% in the previous quarter, and if it has fallen down, there is a general contraction in the economic activity, then there is recession.

The one, that differentiates, depression from recession is, the period of recession. Long periods of recession. Let us say, the contraction in economic activity happens, for a longer period, 2 to 3 years, then we are in a state of depression. Or, if the Real GDP, has dropped by over 10%, then we say that, the economy is in a state of depression. So, whether it is recession or depression, the understanding is, that the economy is contracting.

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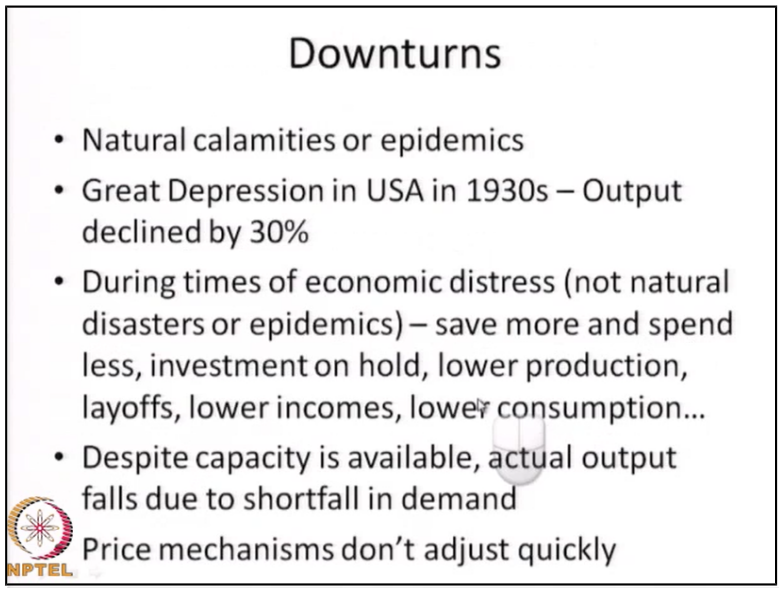

Now, such economic downfall, downturns, can happen because of a number of reasons. One could be, because of natural calamities like, war, or earthquake, or epidemics, which can create a total fall in the economic growth. Or, a general fall in the demand for goods and services. In the US, after the war, the great depression in the US in the 1930's witnessed, the economic output falling by 30%. And, during times of economic distress, which is not because of natural disasters or epidemics, the tendency is to save more and spend less.

Because, once we realise that, there is an economic distress, we are little insecure about our

future. So, we tend to save more, and spend less. And, when we spend less, the incentive to invest, and produce more, is also missing. So, investment by businesses, is also on hold. And, when you consume less, there is lower production, there is layoffs, which again causes, lower income levels, distribution, again lower consumption. And, this spiral, keeps repeating itself.

But, mind you that, this economic contraction, has not happened because, the capacity to produce more is missing. This is despite the fact that, there is capacity, the actual output fall, is because there is a shortfall in demand. And, when such shortfall in demand occurs, and the pricing mechanism do not adjust quickly, then there is this economic downturn, which is not again because of the supply side, because the capacity to produce is always there, but it is from the demand side, that has caused the shortfall, in the demand.

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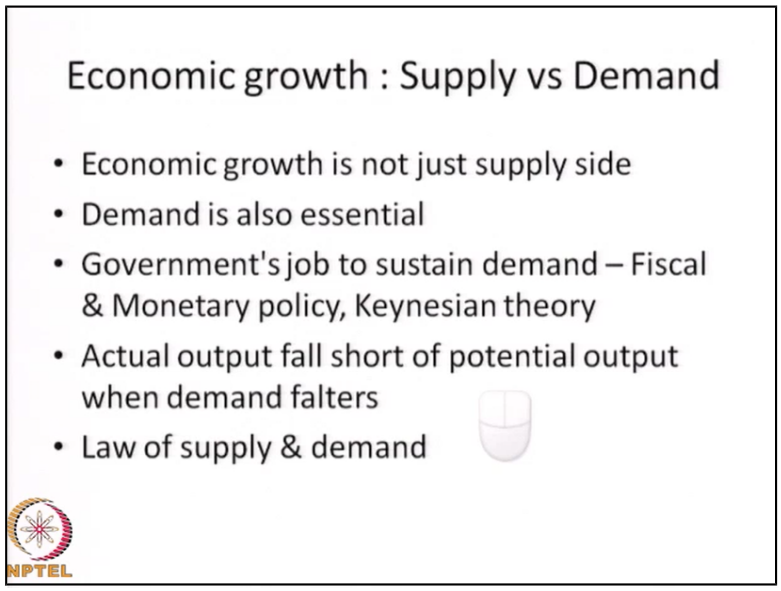

So, we should be understanding that, the economic growth is just not the supply side. We also need to understand that; the demand is also essential. And, at times of great depression, it becomes the Government's job to sustain this demand, through its fiscal or monetary policy. And, this forms the basis of the famous Keynesian Theory. Which says, it is the Government that has to create, a demand, by investing, during times of great recession or depression.

So, we need to understand that, there are two sides, to the Economic Theory. The supply side, and the demand side. The actual output will actually fall short, of the potential output, when the

demand falters. There is capacity to produce, but if the potential to consume the capacity reduces, because of changing demands, then we need to know how, the supply and demand need to be adjusted. And, there are good theories, the law of supply and demand, which ensures, that there is a balance between, the supply and demand.

When, the supply side and the demand side are balanced, to the optimum extent, then we have a good economic architecture, in place. But, it is not as easy, as it is said. There are various variables, that change the relationship between, the supply and demand. And, the characteristics of demand and supply also, varies across different types of goods and services, that are being used. Some services are very critical, that whatever be the price, people need it.

So, the classic theory, the classic law of demand and supply will not hold good, for critical services. So, we need to understand, what are these types of services? How the demand and supply, all things being equal, change with variations in price? And, are there goods and services, that have a constant demand, or remain unaffected, even if prices changes? Why is that so? And, how other economic variables, change the behaviour of the quantity supplied, and quantity demanded, vis-à-vis, the price?

Now, these are things, that we will try to understand, in next class, when I just bring in the concept of, the supply demand characteristics. And, to understand how, the supply, or the demand of a particular product, keeps changing, with the price of the product, or the service, that is being delivered. And how, later we will see, how various policies of the Government, be it the monetary or the fiscal policy, actually tries to control, regulate, the supply, and also stimulate, the demand.

Now, before I end this class, I will also show you a small video, that gives you, a quick capsule of the economics, understood at a very broad level, what is economics, and what is GDP. So, all of that, that I told you in the last two sessions, I will try to capture that, in a small video, of 5 to 6 minutes, so that you will better understand, and appreciate, what economics is? And, how that a nation's output, which is actually calculated, by way of GDP? And, how GDP is being calculated? And, what constitutes GDP? So, next class, I will get into, the characteristics of

supply and demand, and its behaviour with price. Thank you.