Microfoundations of Macroeconomics
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Lecture – 17
Search and Unemployment II

Welcome back. We were discussing the search and unemployment theory, and we looked at certain angles of one-period model. We will be further expanding this particular idea and looking into the two-sided model, but before that, we just started understanding the certain dimensions of comparative statistics that what happens to the macroeconomic variable like unemployment when we have an increase in the welfare or the unemployment benefit from the government. We will be starting from there and then we will move to the two-period model.

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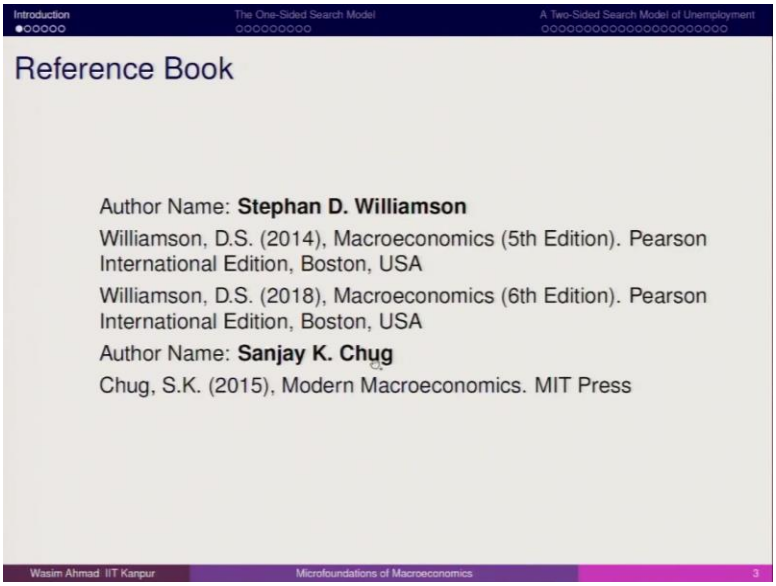

The reference remains the same - Williamson and Sanjay K Chug. If we go back and look at then we were talking about here.

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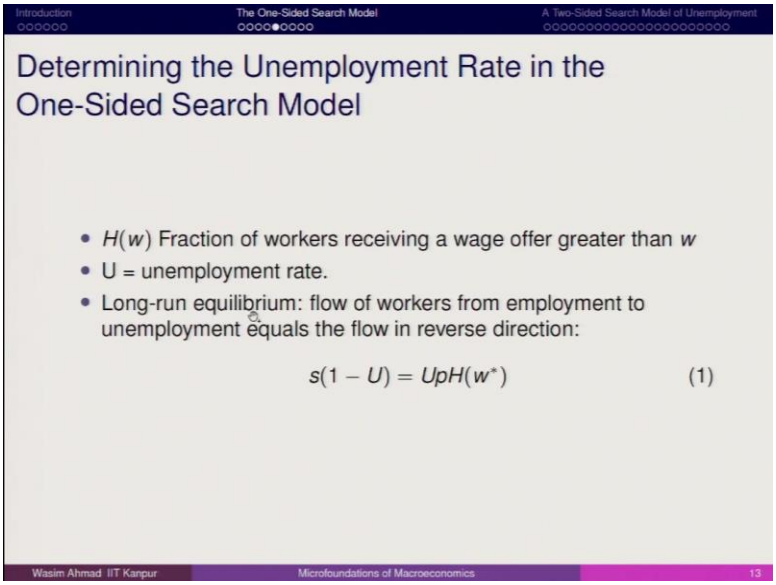

Let us first go by the long-run equilibrium. What we see that here the people who are moving from employment to unemployment is represented by $s(1 - U)$. The people who are coming from unemployment or those who are moving from unemployed to employed it is represented by this.

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By chart, the equilibrium looks like this and on x-axis, you will see that here we are measuring the wage rate, but here it is not the wage rate it is the unemployment. Here deciding upon the unemployment in the economy here.

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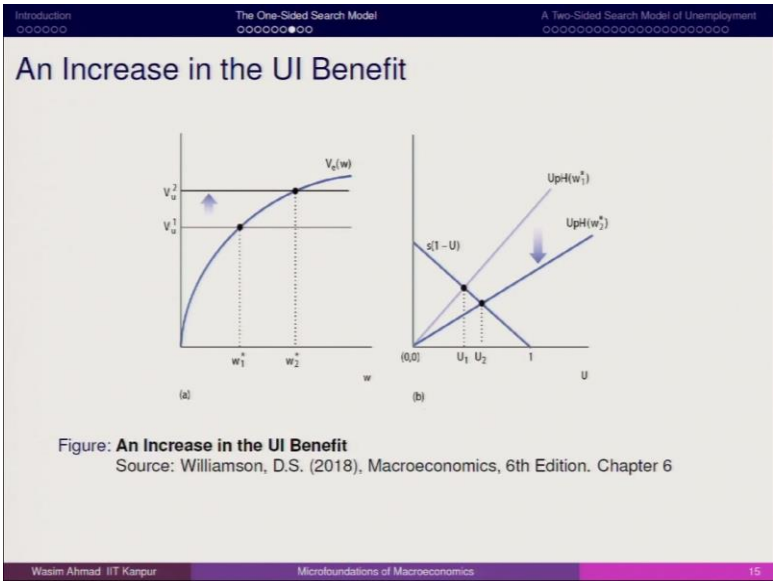

Figure: **An Increase in the UI Benefit**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition. Chapter 6

Now here we have the comparative statics for the first variable which is very important that what happens when we have an increase in the unemployment insurance benefit, UI benefit that we say. Here when we see an increase in the unemployment benefit it moves up and then here we have the $V_e(w)$. When we have this side so we can see that this is the equilibrium that we have.

Now we are seeing that it has moved from $UpH(w*_1)$ which means that if you have the unemployment insurance benefit going up we see more bargaining happening with the labour market. Wage rate has also gone up because by this amount it has gone up from $w*_1$ to $w*_2$ star and this has resulted in increase in unemployment. now you can see earlier the employment was U_1, but now it is U_2.

Whenever we see increase in unemployment insurance benefit so this is a good learning for those countries who provide enough employment insurance benefit especially in Europe and Canada where we see high rate of unemployment. One of the reasons could be this that when you provide enough unemployment insurance benefit to the individuals and when they know that this becomes the benchmark for bargain so they will always be looking for higher wages that may not be available immediately in the economy.

The worker will remain on the unemployment benefit for a longer period as compared to the smaller period that is the short term benefit that we always provide with unemployment insurance benefit. In some cases it may also happened that this particular consumer or the

unemployed worker who would not like to accept the offer because he knows that he is getting higher unemployment benefit compared to what he is getting in the market.

The immediate impact is that there will be a positive impact on the unemployment, your unemployment in the economy will increase and this will create further equilibrium in the labour market. In India you will find that because of the rural employment scheme some of the economists have found that because of the employment guarantee scheme it has become very good barometer for the labour to seek or decide about the higher wage rate which means that under employment guarantee scheme if labour is getting Rs. 200 per day he would not like to work below this wage rate because he knows that under employment scheme I am going to get this amount for sure.

Until and unless someone offers me beyond Rs. 200 per day I will not be working. The similar analogy can be applied in most of the countries wherever you have the unemployment insurance benefit, but it also does not mean that we should not have such policies. Such policies are important. We have seen that in case of US economy how during the first wave of COVID-19 millions of people had applied for such benefits those who had lost their jobs.

The unemployment insurance benefit from the welfare side it has lot of positive effects, but from the labor market side it also has some negative effects that this particular model highlights and it is important to note.

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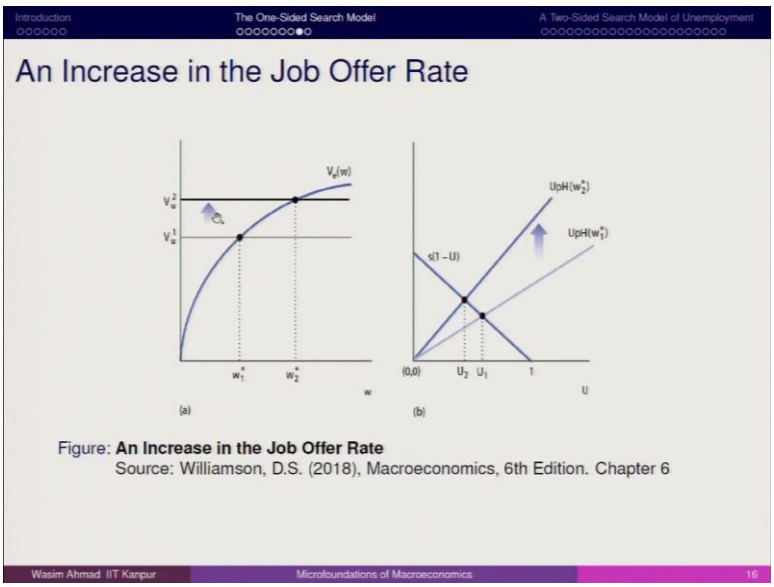

Figure: **An Increase in the Job Offer Rate**
Source: Williamson, D.S. (2018), Macroeconomics, 6th Edition. Chapter 6

Now here we have the job offer rate. If you have a job offer rate it means that if the firms are posting jobs the unemployed worker will have opportunity to apply for those jobs and get the opportunity.

And at the same time if you have a lot of vacancies coming there is high chance that the firms will be ready to pay even higher than the unemployment benefit because they have to employ, they have to produce the output, they have to supply, they have to meet certain requirement. So, they will be willing to pay higher than the increase in unemployment benefit. What is the impact of that?

The impact of that is that it reduces your unemployment. Now you are moving from U_1 to U_2 so it is leftward. Here you can see the line is moving up. The underlying learning is that if you are offering unemployment insurance benefits then the country should also look for the creation of more jobs. If we have more posting of jobs in the market then this creates a positive impact on unemployment.

And unemployment gets reduced which means that unemployment if I am saying about the positive impact so it is not that this will increase, but I am saying that the wage rate will increase. Once you have the wage rate increasing then this will help reduce the unemployment so this is what we are mentioning. I hope these two comparative statics help you understand the functioning of the labour market.

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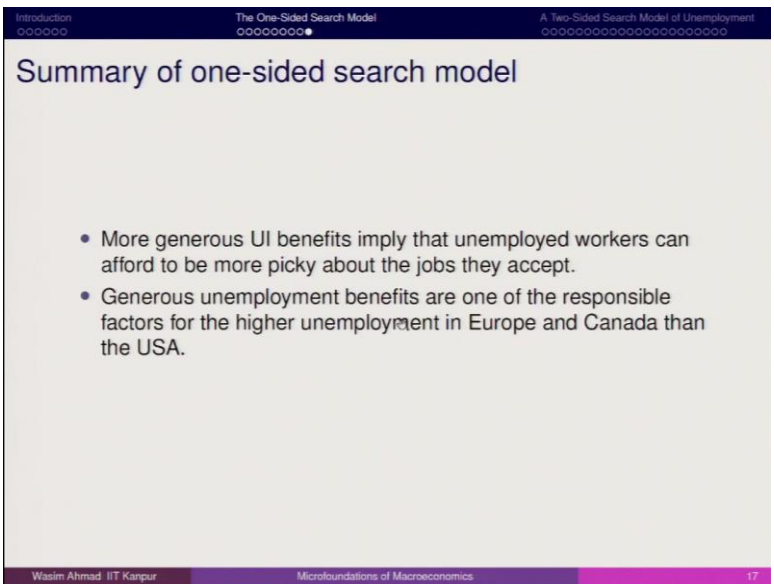

More generous unemployment benefit implies that unemployed workers can refer to be pickier about their jobs which means that even if you have a lot of vacancies in the market it may also happen that the unemployed worker will be simply waiting for a very high jump in the wage rate then only, he will be accepting. Some kind of here I would say because of this unemployment benefit some kind of moral hazard may also come into the picture that this particular individual is not bothering about how much burden the economy is experiencing because of him not accepting the offer.

And how the tax payers are burdened rather he is looking for his own welfare, not about the economy as such. In a shorter sense, it can be applied. The generous unemployment benefits are one of the responsible factors for the higher unemployment in Europe and Canada than the USA because these are the countries where we often experience and these are very welfare-oriented economies.

And we often find that these two countries have higher unemployment rate. I hope this particular summary has helped you understand the labour market dynamics in a much stronger way than we normally see in the case of the conventional labour market understanding and unemployment understanding and here we are basically trying to look at how we can understand the behavior of unemployment with certain macro variables which we do not discuss or analyze on a regular basis.

Those not discussed variables are important to understand in this context. Now here we have the two-sided search model of unemployment.

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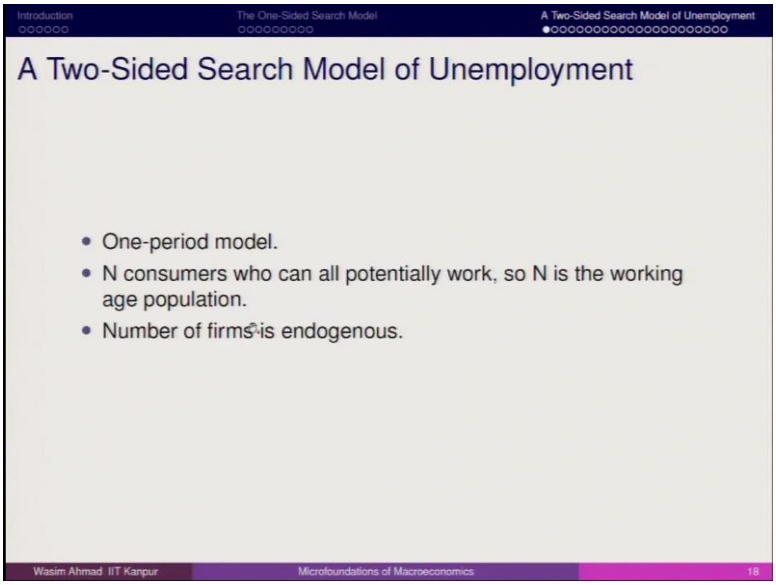

Here now we are going to introduce the firm. Once I am going to introduce the firm then it becomes really important to note that here we are having just one period. We are not saying what happens if this representative consumer is not going to or this unemployed person is not going to get a job even after a continuous period. We are not looking at those dynamic angles because that will further complicate the matter.

But yes if you want to look at it so this particular session may become a reference and then you can think about reading some more about this particular model. Here we have the N consumers who can all potentially work so N is the working-age population. Number of firms that we are introducing now so far what we have discussed about the labor market so here we are considering the N as a labor who is looking for work.

N is the working population right. The number of firms that we are introducing is coming from the demand side. The number of workers coming from the supply side, and the number of firms are coming from the demand side. Those firms how these two economic entities in tract and what is the equilibrium that we will be talking about.

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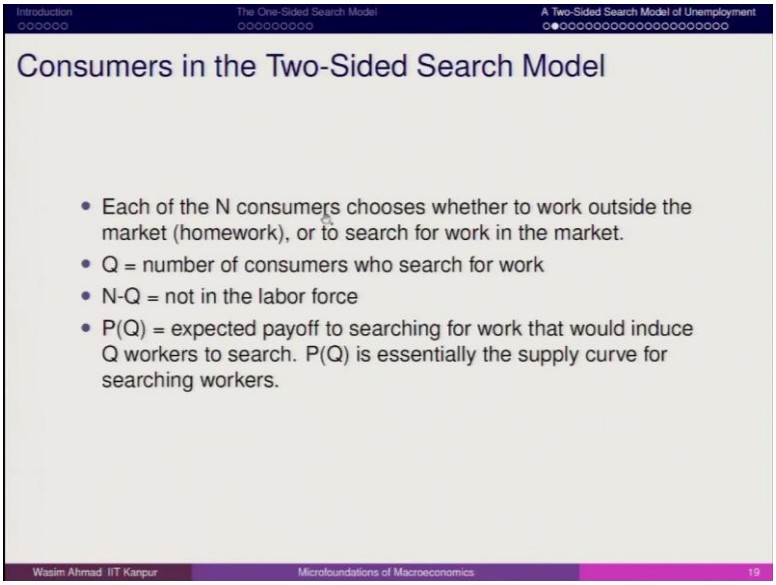

Each of the N consumers that we have the working-age population that I mentioned here chooses whether to work outside the market, do homework or search for work in the market. Here you have Q as the number of consumers who search for work so let us talk about this Q. So, $N - Q$ once I am mentioning $N - Q$ it means that these people are not interested in looking for a job maybe they are self sufficient or they are interested in only living a miserable life or more than decent life.

Let us not discuss about that here we are talking about only those who are interested in getting the job. $P(Q)$ is the expected payoff to searching for work that would induce Q workers to search which means that if the Q worker is going to search for the job so associated payoff is $P(Q)$and $P(Q)$ also is the supply curve. It will also have the upward slope.

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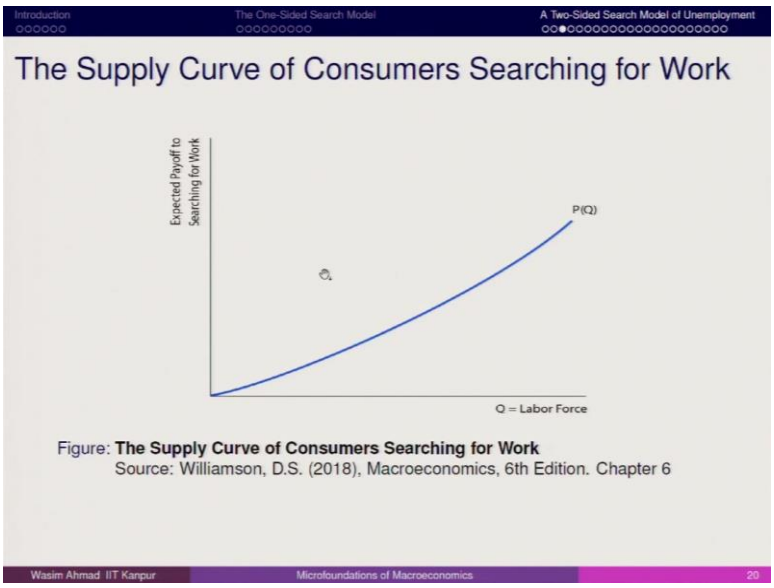

So if he is going to work he is going to get more benefit economic benefits which means that so labour force is bound to increase if you have the payoff high. So of course, anyone would like to go for a more kind of work because economic activities provide incentives so it talks about this. Basically, it shows the supply side of the labor who is searching for jobs so here we are looking at.

Now since we have already introduced this part in the one-sided model and have discussed in detail. Those variables or those dimensions are also important. That is why we are cutting short the description on the labor. Here we have the firm so here if I am mentioning about labor so here is the consumer that we are discussing about.

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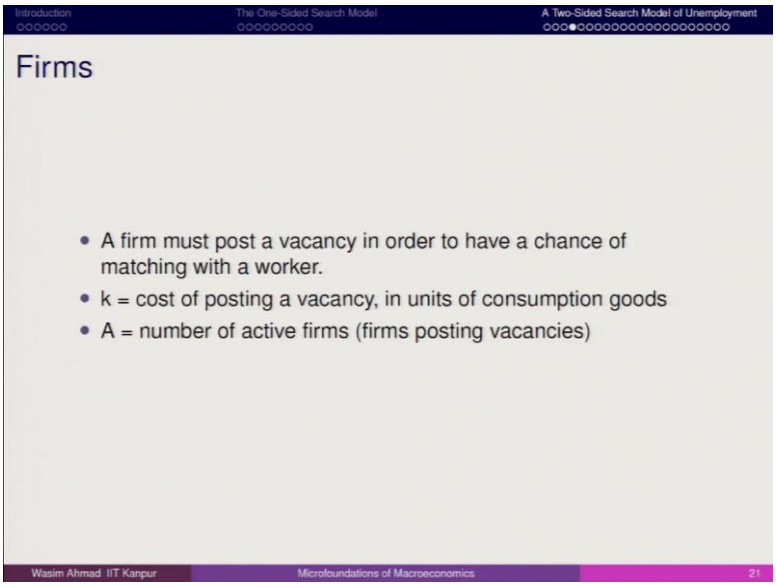

So here we have the firm, a firm must post a vacancy in order to have a chance for matching a worker. Now here since we are introducing for the first time the firm so let us understand the behaviour of the firm and how this firm is going to play. Here we have the firm which posts a vacancy. Now in the modern era with the help of technology, the internet and software and then you have a lot of web portals and companies, and agencies involved in hiring folks for the companies.

You can think about if the company is going to post a vacancy then it also incurs cost and that cost is represented by k. Whenever a firm posts a vacancy in order to have a chance for matching with the worker. This is represented in the unit of consumption good so k is the cost of posting a vacancy. Here the company maybe, hiring a consulting firm or job search firm, and this firm maybe, helping the firm to get the labour.

And the consultancy firm maybe charge the firm for posting the jobs and sorting out the applications, providing short-listed candidates, the list of short-listed candidates, and the final recruitment is facilitated by this particular firm. He must be charging some cost and when I am saying about the number of firms looking so here we are also including or studying only those firms who are interested in posting jobs.

The firms which are not interested we are not going to consider that. A is the number of active firms who are posting regularly vacancies. If the company is posting vacancies so then we are counted here. I hope it is clear that here we are introducing a firm who is looking for skilled workforce whenever the firm, post the job then this particular firm incurs the cost k which is being paid to the consultancy firm and A is the number of firms that we are looking at.

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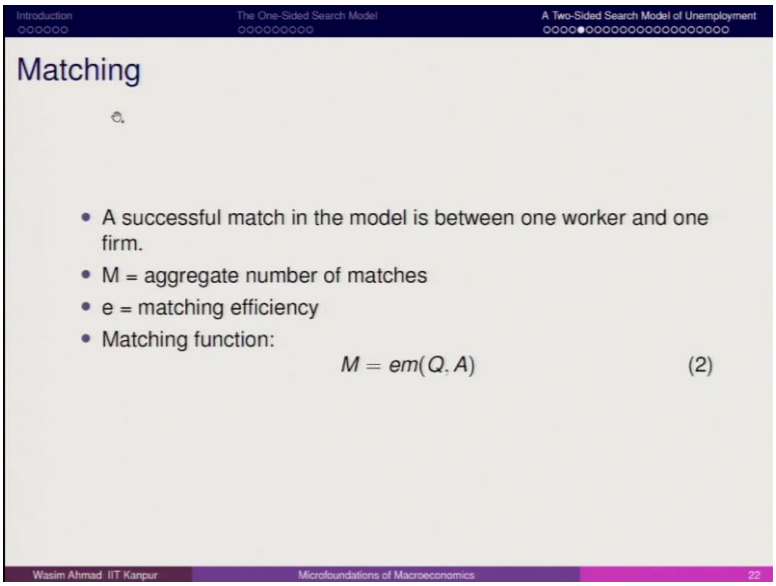

Now here we have the matching, so what is the matching look like? Here we are saying that when I am using it a matching, matching in the sense that the unemployed person who is looking for a job the skilled worker when the firm is looking for the skilled worker how these two are interacting with each other. That is what we are matching. The individual is looking for job and the firm is looking for the labor and how they interact when the matching takes place.

So here we have a successful matching in the model is between one worker and one firm. M is the aggregate number of matches. It may happen that the firm has received the application of

100, but only 10 are suitable so which are meeting the criteria of the firm to be hired. In that case it becomes really important to note how are we going to decide about.

If we are talking about matching efficiency so e is the matching efficiency and M is the aggregate. Here

$$M = em(Q, A)$$

Q is the number of individual who are looking for job A is the number of firm which are posting the job. So matching function is decided by this.

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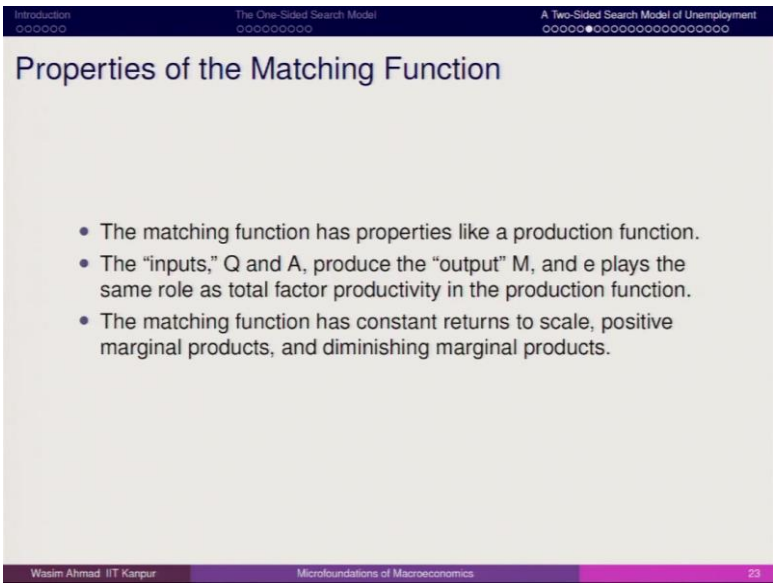

The matching function has properties like a production function, input Q and A produces the output M and e plays the same role as total factor productivity. It measures about the efficiency of the matching. e basically measures the efficiency if e is higher then you have higher matching or otherwise it is not and it is linearly decide so you are assuming that it has the constant return to scale characteristics.

We have the positive marginal product and diminishing marginal product we are deciding about.

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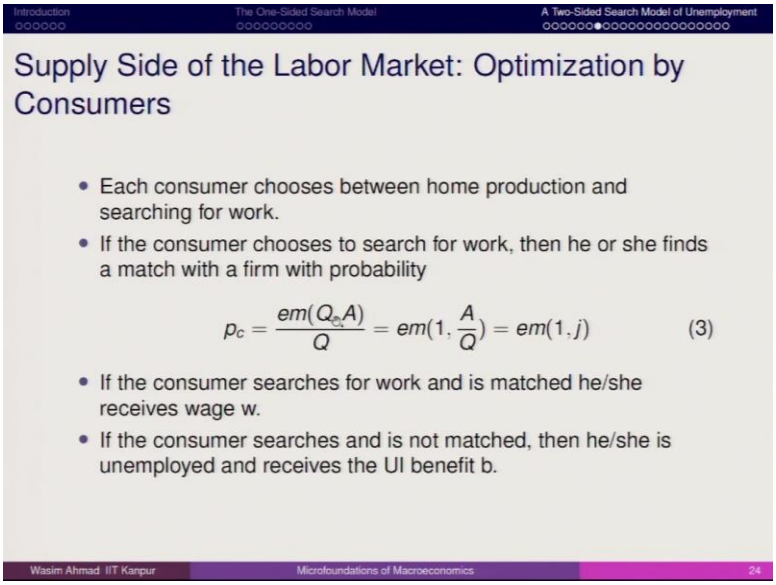

Now if the consumer is choosing to work which means that if he is deciding to search for work then he or she finds a match with a firm with a probability of this which is nothing,

$$p_c = \frac{em(Q,A)}{Q} = em\left(1, \frac{A}{Q}\right) = em(1,j)$$

The probability of getting employed which means if there is a chance that this representative consumer will be employed which means it is attached with the probability then it becomes em Q upon Q gets cancelled so it is 1.

This j is nothing, but it shows about the labor market tightness that how frequently matching is taking place because here you have the A and here you have the Q if A is increasing Q remains same for the worker it is always a good opportunity that we have more number of firm positing vacancies and you have a limited number of people looking for job.

If A is lower Q is higher which means that now the posting is less, individuals are more to look. The bargaining on the wage rate will be much lower, but if A is higher Q is lower bargaining is bound to be higher which means that wage rate will shoot up. If the consumer searches for work if it is matched then he or she receives wage w if the consumer searches and he is not matched then he or she is unemployed and receives UI benefit.

And it is the same unemployment insurance benefit that we have mentioned, it is coming from one-sided model. This UI benefit b it is coming from the one-sided model which we have finished. What is the inference that we are seeing that this is very smooth, but whenever we introduce the unemployment benefit then it becomes some kind of hindrance for the firm to

hire the labour because labour will now set the benchmark that until and unless you give higher than this then only I will be deciding to work.

Here the supply side of the labour market the optimization by consumer the title mentions it mentions about this that the amount of A and amount of k will decide about how much this particular the labour market tightness will depend upon A and Q.

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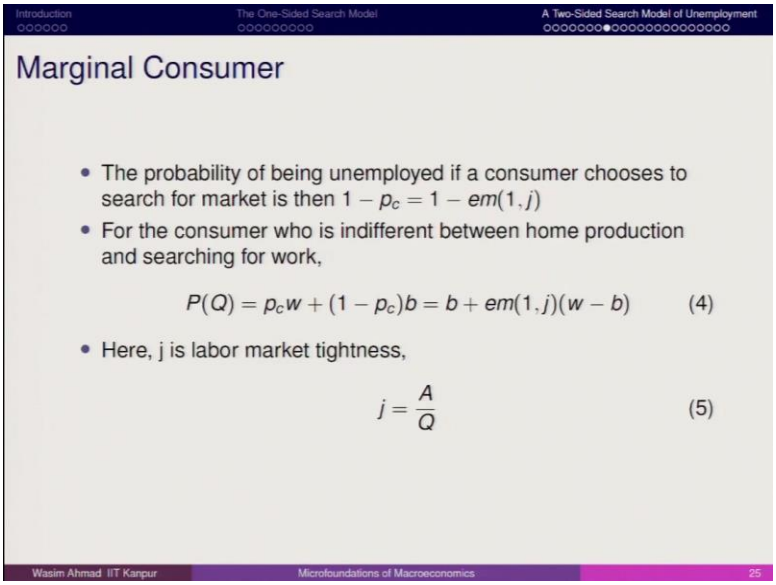

Here we have the marginal consumers so here we can think about the probability of being unemployed if a consumer chooses to search for market is then $1-p_c$ so this is what we say. If he is getting matched then it is $em(1, j)$ if he is not getting matched then it is $1 - em(1, j)$ which means that for consumers who is indifferent between home production and searching for work.

From where home production is coming that the consumer is having the option that he can either go to work or he can simply sit at home, but the equilibrium condition that you are mentioning here it is this. For the consumer who is indifferent between home production and searching for work is

$$P(Q) = p_c w + (1-p_c)b = b + em(1, j)(w - b)$$

Here we have $b + em(1, j)(w - b)$ if you just think about it so here we can write it as we have mentioned about $em(1, j)$. So here we have $p_c w + (1-p_c)b$ that we are mentioning about it can be derive from here $em(1, j)$. So $em(1, j)$ multiplied by w and this if you just go for

simplification this is how it looks like $b + em(1, j)(w - b)$ and if you think about the labour market tightness.

Labour market tightness as I mentioned about A and Q so here it is labor market tightness which means that the overall aggregation that how much pay off of the individual is he is having two scenario. If he gets employment he gets the w wage rate. If he does not get the employment then here it is $(1-p_c)$b which is equivalent to $b + em(1, j)(w - b)$. $w - b$ will play very important role as long as the gap is larger w is greater than b.

It is not good for the consumer if w is less than b then that is not acceptable because b is the threshold. He can only think about working when it is higher.

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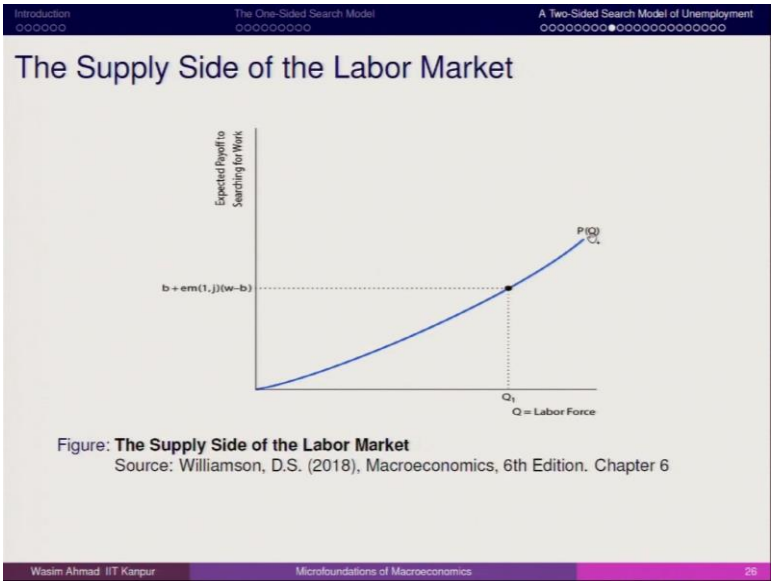

This is how we are working so you can think about this is the labour supply that we have and this is how we are arriving at the labour force and this is the expected payoff which we get is this $b + em(1, j)(w - b)$ so this is the equation that mention about.

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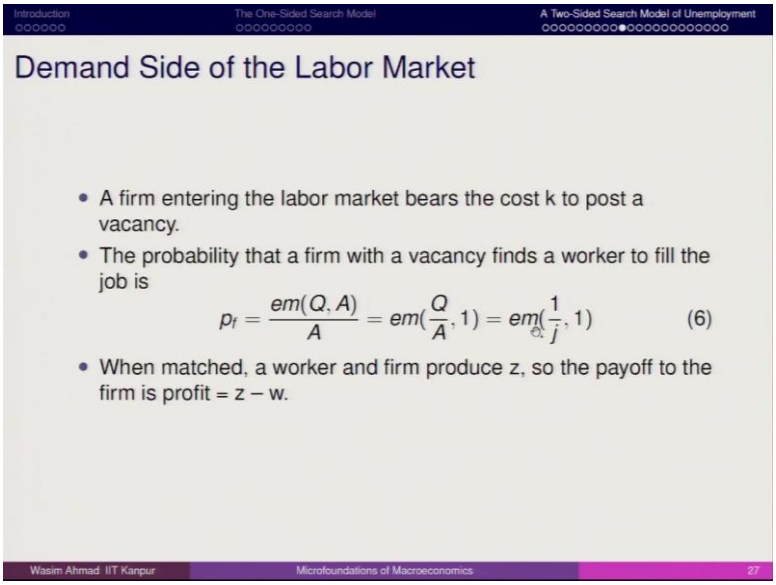

So this one is coming from the supply side. So this we have looked from the labor side let us look from the firm side. How firm is now behaving in this. Now firm is entering in the market by posting the job vacancy so this is how we have a firm entering in the labor market bears the cost k to put a vacancy. The probability that a firm with a vacancy finds a worker to fill the job with this

$$p_f = \frac{em(Q,A)}{A} = em\left(\frac{Q}{A}, 1\right) = em\left(\frac{1}{j}, 1\right)$$

and here we have if we just go for solutions.

When the worker is matched a worker and firm produces output z so this is what when matching happens and the payoff to the profit is nothing, but how much the worker has produced and how much it has got as a wage. So this is the difference that we see.

Labour market tightness that I just mentioned here it is just the opposite so j decide about the labour market tightness that we have mentioned.

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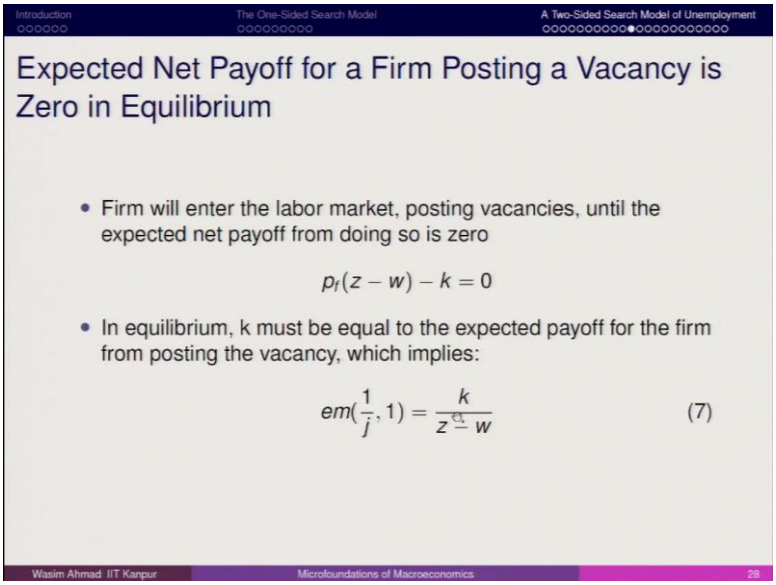

And in order to arrive at the expected net payoff so this is how it looks like that for the firm we will enter in the labor market only when p_f which means that the probability of hiring which means that the firm is willing to or find a worker then this worker how much it has produced and how much the firm has paid minus the cost of posting the vacancy. So $p_f(z-w)-k=0$ decides about.

Now in equilibrium what we are finding that k must be equal because k is the cost that this firm is incurring. So k must be equal to the expected payoff for the firm for posting vacancies so here we have

$$em\left(\frac{1}{j},1\right)=\frac{k}{z-w}$$

As long as k is higher for the firm it is costlier. So from here we will start in the next session and we will be discussing further. I hope it has made it clear to all of you those who are introduced to this topic for the first time that when we are discussing about the one sided model it is more or less clear.

When we are entering the firm then firm is also having certain scenarios to look at and it is also looking for the objective of maximizing profit. We are also trying to see the cost k is playing very important role. This we will understand in the next session. Thank you so much.