

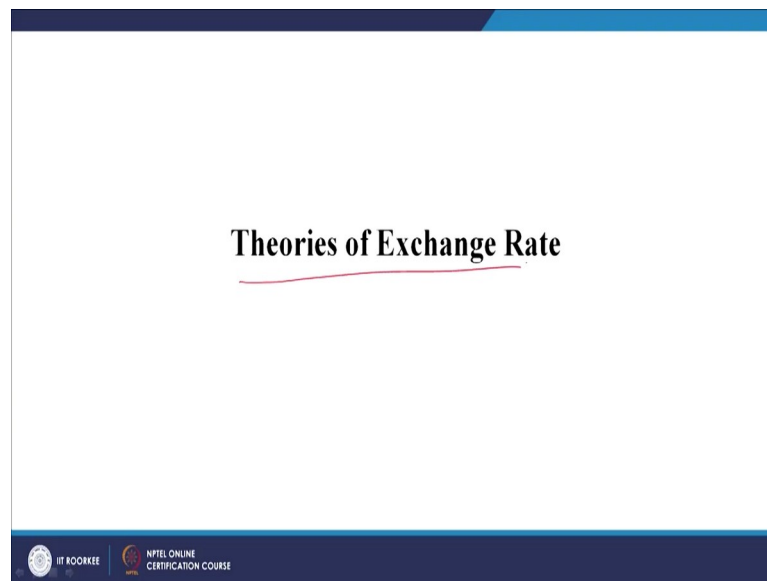
International Business
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Lecture - 34
PPP Theory, Interest Rate Parity Theory, Fischer Effect, Numericals

Hello friends, welcome again to the class on International Business. So, this is something like you know which always interests us and even challenges us what is the exchange rate and how exchange rate is determined.

So, in the last few lectures, we have been discussing about them right what is exchange rate, what factors affect the exchange rate and why exchange rate is so important for international business.

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And today in the last lecture also we discussed about the theories of exchange rate right, So, and when we talked about the theories of exchange rate, so the first theory we talked about was the purchasing power parity right.

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Economic theories of exchange will give us a deeper understanding of how exchange rates are determined.

The theories are:

1. Purchasing Power Parity Theory (PPP)
 - Absolute PPP
 - Relative PPP
2. Interest Rate Parity Theory (IRP)
3. Fisher Effect (FE)

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So, in this theory, we talked about two conditions; one is the absolute PPP which is very less dynamic right in comparison to the other one which is the relative PPP right and we tried to understand right.

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Usefulness of PPP

- Develop reasonably accurate economic statistics to compare the market conditions of different countries.
For example, purchasing power parity is often used to equalize calculations of gross domestic product. Because purchasing power can vary from country to country, the statistic for GDP based on purchasing power parity is often different than nominal GDP -- GDP as described by currency exchange alone.
- Compare quality or standard of living in different countries which may not be possible if one just looked at per capita income. A lower income may allow a good quality of life in a country where prices are low.

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So, continuing that, then we will have these two right. But let us continue with the purchasing power parity. What is the use or advantage of the PPP? So, since you have understood this, let us see so, what it does is it develops the PPP develops reasonably

very accurate economic statistics right to compare the market conditions of different countries. First this is the basic advantage.

For example, the PPP is often used to equalize calculations of GDP right. Because purchasing power can vary from country to country. I will show you an example now. The statistics for GDP based on purchase power purchasing power parity is often different than the nominal GDP right.

So, GDP as described which is nominal as described by the currency exchange alone right and second advantage is that the it compares the quality or standard of living in different countries which may not be possible if one just looks at the; looks at the per capita income. A lower income may allow a good quality of life in a country where prices are low. So, that it will not have a much of any impact rather it the understanding will be very different. So, let us; let us look at one case now.

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How does India overtakes Japan in PPP terms?

- Under the regular method of GDP calculation, India's economy is well behind Japan. The Indian economy is only \$2.6 trillion compared with Japan's \$4.87 trillion in 2018. However, price levels in Japan are much higher than that of India or in the US.
- When IMF adjusts the national income of the two countries in terms of PPP exchange rates using US dollar, Indian economy was at \$9.45 trillion in 2018 because of lower prices while Japan stayed at \$5.42 trillion.
- Essentially, it means that in total two countries have the same purchasing power, but because of its much lower population average Japanese is way ahead of average Indian in purchasing power.

Countries by GDP		
Country	Nominal GDP	GDP (PPP)
The United States	\$19.39 trillion	\$19.39 trillion
China	\$12.01 trillion	\$23.15 trillion
Japan	\$4.87 trillion	\$5.42 trillion ✓
Germany	\$3.68 trillion	\$4.17 trillion
United Kingdom	\$2.62 trillion	\$2.91 trillion
India	\$2.61 trillion	\$9.45 trillion ✓

Source: IMF's World Economic Outlook Database, April 2018.

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How does India and Japan stand when it comes to PPP right? So, look let us read this. Under the regular method of GDP calculation, India's economy is well behind Japan. So, the countries are United States, China, Japan, Germany, United Kingdom and India so, this is sources April 2018.

You see in terms of nominal GDP, United States in 19.39 trillion, China 12.01, Japan 4.87, Germany 3.68, United Kingdom 2.62 and India is just at the sixth point 2.61 trillion

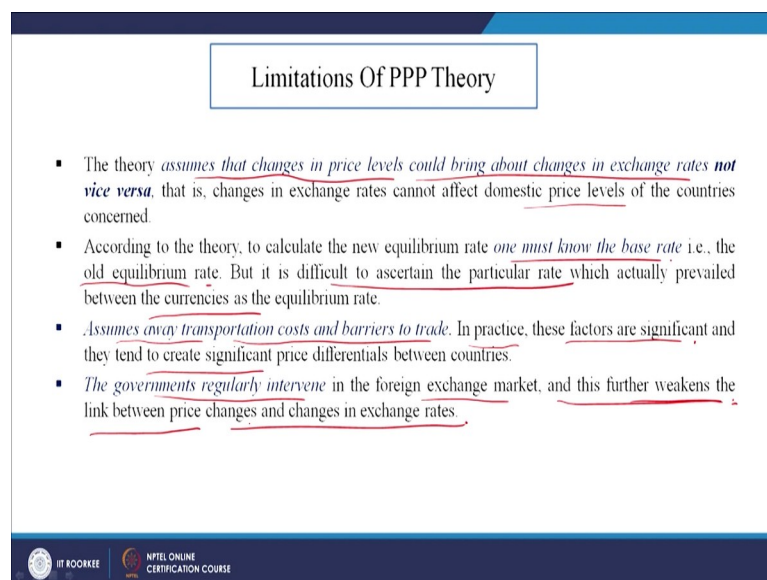
right. But does it remain the same when we look at the purchasing power parity? We will see that right.

So, however, price levels in Japan are much higher than that of India or in the US. So, if you buy something in India the same product, you may have to pay much higher in comparison to India.

So, when the IMF adjust the national income of the two countries in terms of PPP exchange rate using US dollar. Indian economy was at 9.45 trillion this one right this condition in 2018 because of the lower prices while Japan stayed at 5.42 trillion. Now, if you look at this now ratio, India stands at what position 1, 2 and 3 so, the top country becomes China followed by United States and then India right.

Essentially, it means that in total two countries have the same purchasing power, but because of its much lower population average Japanese is way ahead of average Indian in purchasing power right. So, basically what it helps you is to give a very realistic picture of what is happening. So, in this case, India easily overtakes the Japan in terms of PPP, but it has its own limitations also. PPP has limitations what is it?

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The slide is titled "Limitations Of PPP Theory" and contains four bullet points. The text is underlined in red in the original image. The first bullet point states that the theory assumes changes in price levels could bring about changes in exchange rates, but not vice versa. The second bullet point says that to calculate the new equilibrium rate, one must know the base rate (the old equilibrium rate), which is difficult to ascertain. The third bullet point notes that the theory assumes away transportation costs and barriers to trade, which in practice create significant price differentials. The fourth bullet point states that governments regularly intervene in the foreign exchange market, further weakening the link between price changes and exchange rates.

Limitations Of PPP Theory

- The theory assumes that changes in price levels could bring about changes in exchange rates not vice versa, that is, changes in exchange rates cannot affect domestic price levels of the countries concerned.
- According to the theory, to calculate the new equilibrium rate one must know the base rate i.e., the old equilibrium rate. But it is difficult to ascertain the particular rate which actually prevailed between the currencies as the equilibrium rate.
- Assumes away transportation costs and barriers to trade. In practice, these factors are significant and they tend to create significant price differentials between countries.
- The governments regularly intervene in the foreign exchange market, and this further weakens the link between price changes and changes in exchange rates.

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So, the first limitation is this theory assumes that changes in price levels will bring in changes in the exchange rate. What? Change in price level will bring in changes in the exchange rate, but not vice versa.

That means, change in exchange rate brings in what kind of effect on price that is not known right. So, that is changes in exchange rate cannot affect domestic price levels of the countries concerned. So, this is an assumption which might not be true right.

Similarly, according to the theory to calculate the new equilibrium rate one must know the base rate. So, we are comparing as per the base rate. So, that is the old equilibrium rate, but as you have understood by now so, it depends on so many factors how do you decide that base rate right.

But it is difficult to ascertain the particular rate which actually prevailed between the currencies as the equilibrium rate. So, that rate to actually find out because it is so dynamic. It is every minute, every second it is changing. So, to exactly ascertain to find it is very very complex task. So, some assumptions have to be made right.

Third, it assumes away transportation costs and barriers to trade. Now that is only a very hypothetical situation. In practice, these factors are significant and they tend to create significant price differential between countries right. So, what kind of trade barriers are there, what kind of transportation costs they will entirely change the price right which again will have an effect on the exchange rates.

Finally, the governments regularly intervene in the foreign exchange market right and this further weakens the link between price changes and changes in exchange rate. Now, that is we know that the government tries to intervene to you know make the trade in its favor. So, these conditions will always create a disruption right and it further weakens the link between price and changes in exchange rate. So, these are some of the limitations of the PPP theory right.

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Important terms

Spot market ✓

- In the **spot market**, the delivery of the foreign exchange has to be made "on the spot" usually within two days of the transaction.
- The exchange rate at which the transaction takes place is called the "**spot rate**".
- The spot exchange rate is determined by immediate market demand and supply of foreign exchange.

forward market ✓

- In the forward market, the foreign exchange is bought and sold for delivery at a future date at an agreed rate today. It is called as **forward contract**.
- The rate at which the forward exchange contract is agreed upon is called the "**forward rate**".
- Used to insure against unfavorable changes in exchange rates.
- The usual forward exchange contract signed for 1 month, 3 months, 6 months, 9 months most common.
- **For example:**
 - ✓ I could enter into an agreement today to purchase €100 three months from today at \$1.01 = €1. \$.99 / 1.02
 - ✓ Note that no currencies are paid out at the time the contract is signed (except for the useful 10% security margin).
 - ✓ After 3 months I get €100 for \$101, regardless of what the spot rate is at that time.

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Now, we will look at some important terms before moving further right. So, one is the spot market and the forward market. Spot market you just have understood now before we were talking about spot right something on the spot. In the spot market, the delivery of the foreign exchange has to be made right on the spot. Usually, within 2 days of the transaction. So, that means, any transaction is being made the delivery has to be made immediately.

The exchange rate at which the transaction takes place is called the spot rate. So, whatever the exchange rate with at that point of time is called the spot rate. The spot exchange rate is determined by immediate market demand and supply of the foreign exchange. So, what is the at the moment so, it is so dynamic. So, what is the current moment at which I am let us say exchanging.

So, I am going to let us say buy some dollars because I am going abroad. So, when I am going abroad, and I am buying what is the current value at that point time of time is called the spot exchange rate.

But during business, while doing business, many a times we need some extra time period right. So, for that came the comes the forward market. Now what is the forward market? It says the foreign exchange is bought and sold for delivery at a future date at an agreed rate today. That means, we have agreed for a rate today which we will pay later on this is called as a forward contract.

The rate at which the forward exchange contract is agreed is called the forward rate right. Now why it is done? You must have heard the word hedging. Sometimes, it is important that we do not, we cannot exactly find out what will happen to the you know values. So, it may go up, it may go down. So, in order to avoid a loss in such situations, it might be a profit also, but if it is a loss it is more dangerous for us right. So, we will go for a more safer side. So, to do that we use this forward rates.

It is used to insure against unfavorable changes in the exchange rate. If it is a favorable exchange rate everybody will be happy, but what if it is an unfavorable the entire business may go bankrupt. So, to ensure this is done. The usual forward exchange rate is signed for 1 month, 3 months, 6 months, 9 months which is most common right. Let us look at this.

I could enter into an agreement today to purchase 100 euros three months from today. So, I have made a contract, I have made a agreement that I will purchase 100 euros at a price this that 1 euro is 1.101; 1.01 dollars right I have agreed to buy at this price. Note that, no currencies are paid out at that time. So, today I am not paying, today as this date I am not paying any amount, the contract is signed except for 10 percent maybe security margin ok.

After 3 months, I get 100 euros for 101 dollars, so this is it. Regardless of what the spot rate is at that particular time. Maybe the spot rate is actually come down to 0.99 or it has gone up to 1 euro is dollar is now 0.99 or it is 1.02 whatever. So, I am not concerned now ok.

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The slide is titled "Interest Rate Parity Theory (IRP)". To the right of the title, the equation $A - B = FR - SR$ is written in red. Below the title, there are four bullet points:

- **Interest rate parity (IRP)** is a theory in which the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate.
- Forward exchange rates for currencies are exchange rates at a future point in time, as opposed to spot exchange rates, which are current rates.
- It plays a crucial role in Forex markets. ✓
- The interest rate parity presents an idea that there is no arbitrage in the foreign exchange markets.

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So, this is we will use now these words that is why we did it. So, now, coming to the second theory right, the second theory in exchange rates is called the interest rate parity theory. Now what is this interest rate parity? It is a very interesting. So, this theory says that the interest rate differential between two countries is equal to the differential between the forward exchange rate and the spot exchange rate. Let us go back and understand.

What it says? IRP is a theory in which the interest rate differential, interest rate differential means the difference between two countries A and B right is equal the interest rate difference is equal to the difference between the forward exchange rate; forward rate and the spot rate this is what it says right. Forward exchange rates for currencies are exchange rates at a future point in time, as opposed to the spot exchange rate which are current, we have already learnt it.

It plays a very crucial role in the forex markets right because of its you know favourable and unfavorable situations or the extreme change dynamism right. The interest rate parity presents an idea that there is no arbitrage in the foreign exchange markets right. It presents an idea that there is no arbitrage right.

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The Formula For Interest Rate Parity (IRP) is ✓

$$\frac{F_o}{S_o} = \frac{(1 + I_a)}{(1 + I_b)} \quad \checkmark$$

where:

F_o = Forward Rate
 S_o = Spot Rate
 I_a = Interest rate in country a
 I_b = Interest rate in country b

Example

- Borrowed amount=\$100000 ✓
- Interest rate prevailing in India =12% ✓
- Interest rate prevailing in US = 7% ✓
- Anyone would try to take advantage of the situation
- By borrowing in US at 7% per annum and
- Investing in India at 12% per annum
- Thereby earning the net differential interest of 5% ✓

this is not so simple ✓

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So, the formula for the interest rate parity is something like this. So, what it says, forward rate divided by spot rate is equal to interest rate in country A right by interest rate in country B right. So, this is you have to remember.

Now let us see this. Suppose the borrowed amount is 100000 dollars ok. Interest rate prevailing in India is how much? Let us say 12 percent. Interest rate prevailing in US is 7 percent ok. So, when you see this difference, what comes to your mind like anybody who is does business, you will think there is a difference so, why not take advantage of it.

So, anyone who try to take advantage of the situation. So, by borrowing in US at 7 percent per annum, I take extra loan right at 7 percent per annum and I would invest in India 12 percent per annum simple right.

Thereby, earning the net differential interest of 5 percent this is very much theoretically possible. But essentially, this is not so simple. It does not happen that way. Now, why it does not happen? Theoretically we are seeing it is happening. So, let us see why it is not happening.

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- In fact as per interest rate parity theory in this is not possible by the end of the year
- the exchange rate between rupees and dollar would have changed adversely in such a way that the interest rate differential so earned shall be compensated by the exchange loss arising on repayment of US loan.

let's extend the above example
assume, Spot rate is \$1 = ₹64
Hypothetical. Resulting gain = \$100000 X 64 X 5% = 320000

Lets determine one year forward rate

$$F_0 = S_0 \times \frac{(1 + I_a)}{(1 + I_b)}$$
$$F_0 = 64 \times \frac{(1 + .12)}{(1 + .07)} = 66.9907$$

In fact, as per the interest rate parity theory, this is not possible right why? The exchange rate between rupees and dollar would have changed adversely in such a way that the interest rate differential so earned shall be compensated by the exchange loss arising on repayment of the US loan this is US; US loan right. So, he had taken loan from US market right at 7 percent. So, let us extend the above example.

Assume the spot rate is 64 rupees = 1 dollar right. So, somebody now would take a loan at 7 percent from US so, hypothetical now. So, the resulting gain is he takes a loan of 100000 which is 64 rupees in India, and he gets a 5 percent advantage. So, how much is the advantage 320000 rupees right, this is rupees 320000.

Now, let us determine the 1 year forward rate. So, what is it? Now F_0 is equal to look at this from here only. So, $F_0 = S_0 * 1 + \text{interest rate} + \text{interest rate in the B country}$. So, how much it is becoming? So, $64 * 1 +$ in India interest rate in India is how much? 0.12 and this is 0.7; 07. So, this value actually now becomes how much? Now this becomes so, the forward rate is now 66.9907.

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Add.	Amount borrowed	\$ 100000
	Interest @ 7%	\$ 7000
	Total amount payable	\$ 107000 ✓

Amount payable as per spot rate prevailing at the beginning of the year
= $\$107000 \times ₹64 = ₹68,48,000$

Total amount payable at the year end
= $\$107000 \times ₹66.9907 = ₹71,68,000$

Excess payable due to changes in exchange rate
= $₹71,68,000 - ₹68,48,000 = 3,20,000$

As per interest rate parity theory the resulting exchange loss has completely off set the gain made through interest rate differential

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Now, what is happening because let us take this total in totality. So, the amount borrowed is this much, interest paid is 7000 dollars right 7000 dollars; obviously, 7 percent in the US market. So, total amount payable is this much at the end of the year.

Amount payable as per spot rate prevailing at the beginning is how much? He would have paid 1 lakh 7 * 64 right so, in Indian rupees it is this much ok. Total amount payable at the end year end is how much? Now the it has changed so, 1 lakh 7 * this much. So, 7168000. Now, the excess payable due to the this difference right this difference = 3 lakh 20.

So, now that means, what has happened? Whatever the benefit you would have got has been all lost or compensated by this increase in value right. So, as per interest rate parity, the resulting exchange loss has completely offset the gain made through interest rate differential. So, this is what it says ok.

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$F_0 - S_0$


Implications of the theory

- If this difference (forward rate minus spot rate) is positive, it is known as a **forward premium**; a negative difference is termed a **forward discount**.
- If IRP theory holds then arbitrage is not possible. No matter whether an investor invests in domestic country or foreign country, the rate of return will be the same as if an investor invested in the home country when measured in domestic currency.
- If domestic interest rates are less than foreign interest rates, foreign currency must trade at a forward discount to offset any benefit of higher interest rates in foreign country to prevent arbitrage.
- If foreign currency does not trade at a forward discount or if the forward discount is not large enough to offset the interest rate advantage of foreign country, **arbitrage opportunity exists** for domestic investors. So domestic investors can benefit by investing in the foreign market.

If the forward rate is above the present spot rate, foreign currency is said to be at **forward premium**. ✓

If the forward rate is below the present spot rate, the foreign currency is said to be at a **forward discount** with respect to the domestic currency.

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Now what are the implications? If this difference is positive, forward rate minus spot rate so, F_0 minus S_0 right it is known as a forward premium. A negative difference is termed as forward discount right. If IRP theory holds then, arbitrage is not possible; it is not possible. No matter whether an investor invests in domestic country or foreign country, arbitrage is not possible, and you know arbitrage the difference basically. The rate of return will be the same as if an investor invested in the home country when measured in domestic currency it says.

If domestic interest rates are less; if domestic interest rates are less; that means, the Indian for example, then foreign interest rates, foreign currency must trade at a forward discount to offset any benefit of higher interest rates in foreign currency to prevent arbitrage.

So, what is happening? If foreign currency does not trade at a forward discount which it is right or if the forward discount is not large enough to offset the interest rate advantage arbitrage opportunity would exist for domestic investors. So, domestic investors can benefit by investing in the foreign market in that condition.

So, if the forward rate is above the present spot rate, foreign currency is said to be forward premium we have said this because this is the same you know. So, these conditions are so volatile and so dynamic that sometimes they compensate for each other

right and at the end, the gain is to be very it has to be to calculate this gain is very difficult also right.

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- If domestic interest rates are more than foreign interest rates, foreign currency must trade at a forward premium to offset any benefit of higher interest rates in domestic country to prevent arbitrage.
- If foreign currency does not trade at a forward premium or if the forward premium is not large enough to offset the interest rate advantage of domestic country, arbitrage opportunity exists for foreign investors. So foreign investors can benefit by investing in the domestic market.

Limitation

In many cases, countries with higher interest rates often experience it's currency appreciate due to higher demands and higher yields and has nothing to do with risk-less arbitrage.

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If domestic interest rates are more. So, what happened here domestic interest rates were less. So, there was an arbitrage opportunity. If domestic interest rates are more than the foreign; that means, in India it is more than US, foreign currency must trade at a forward this forward premium right to offset any benefit of higher interest rates in the domestic country to prevent arbitrage.

If foreign currency does not trade at a forward premium or if the forward premium is not large enough to offset the interest rate advantage of the domestic country, arbitrage opportunity exists for the foreign investors. So, what happens? The foreign investors now can benefit by dominating in the investing market in the domestic market.

So, could you understand? So, depending on the how much is the difference and what is the interest rate if this is close, then it is a state of equilibrium. If one is more than the other, then there is an opportunity for arbitrage that exists, and the price differential would be taken up by the domestic or the foreign investor ok.

What is the limitation? In many countries with higher interest rates right often experience it is currency appreciation or appreciate the currency appreciate due to higher demands and higher yields and has nothing to do with riskless arbitrage right.

So, because of the higher interest rate, that the currency demand is going. So, the appreciation is happening right. So, because of the higher demand and higher yield and not due to the arbitrage which is generally thought off right.

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The slide is titled "Fisher Effect" and contains the following content:

- The **Fisher Effect** is an economic theory created by economist **Irving Fisher** that describes the relationship between inflation and both real and nominal interest rates.
- According to the Fisher Effect, the real interest rate is equal to the nominal interest rate minus the expected rate of inflation. $r = i - \pi$
- The **real interest rate** adjusts the observed market interest rate for the effects of inflation and takes purchasing power into account.
- **Nominal interest rate** refers to the interest rate before taking inflation into account.

The Fisher Equation:
Real Interest Rate = Nominal Interest Rate - Inflation Rate
 $r = i - \pi$

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The third exchange rate study is through the Fisher effect. So, this is an economic theory created by Irving Fisher that describes the relationship between inflation and both real and nominal interest rate. This is also interesting, very interesting. So, according to the Fisher effect, what is it saying? The real interest rate is equal to the nominal interest rate minus the expected rate of inflation. So, what it is saying? $r =$ nominal interest rate or i right so, $i - \pi$ is inflation basically is shown as inflation.

Real interest rate adjusts the observed market interest rate for the effects of inflation and takes purchasing power into account. So, what is it doing? The real interest rate adjust for the inflation effect and takes the purchasing power into account. The nominal interest rate does not do that. It refers to the interest rate before taking inflation into account. So, it does not take the inflation. So, what is the Fisher equation saying? So, real interest rate = nominal interest rate - inflation rate, $r = i - \pi$.


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Fisher theorem:

$$(1 + \text{Nominal rate}) = (1 + \text{Real rate}) (1 + \text{Inflation rate})$$
$$(1 + i) = (1 + r) (1 + \pi)$$

- The result, in practice, is that as inflation rates go up, real interest rate go down, when nominal rates don't increase at rates equal to those of inflation. This effect is not always immediately visible, but over time, it is a consistent economic pattern.



So, he gave his theorem which says that $1 + \text{nominal rate} = 1 + \text{real rate} * 1 + \text{inflation rate}$ this is the Fisher theorem. So, $1 + i = 1 + r * 1 + \pi$ right. So, the result in practice is that as inflation rates go up so, this is inflation real interest rate go down right.

So, in order to when nominal rates do not increase at rates equals equal to those of inflation to in order to keep this constant so, if this increases, so this has to come down obvious right. This effect is always, not always immediately visible, but over time it is a consistent economic pattern. So, this is very important, we will see in the example in the next slide. So, what it is saying that the nominal interest rate = the real is affected by the real and the inflation real interest rate right.

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The Fisher Equation Example

Example:
Suppose you own a firm having the real rate of return to 3.5% and expected inflation to 5.4%. According to the above formula, the approximate nominal rate of return can be calculated as
 $0.035 + 0.054 = 0.089$, or 8.9% ✓
Therefore, substituting the value of i and r in the formula for the Fisher equation,
 $(1+i) = (1+r) * (1+Pi)$
the value for the nominal rate of interest is 9.1%. $(1+r) (1+Pi)$

- Therefore, the approximate relationship between the real interest rate and the nominal interest rate can be shown as follows:
 $i \approx r + Pi$

So, the real interest rate obviously, there is their equation, so they affect each other. Suppose let us say this example. Suppose you own a firm having the real rate of return to 3.5 percent right and expected inflation to 5.4. So, what is it saying? The real rate of return is 3.5 and the expected inflation is 5.4.

So, according to the above formula what happens? The approximate nominal rate of return can be calculated as how much now $0.035 + 0.054$ by normally if you go by it, then it should be 0.089 so, the real rate of return + the inflation right so, = 8.9. Substituting the value of i and r in the formula in this formula, now you will see that what is happening? So, $1 + r$ so, $1 + r * 1 + pi$ now that makes if you multiply these two so, that would actually give you the nominal interest rate as 9.1 and not 8.9 right.

So, what it is saying basically? The Fisher equation is saying that therefore, the approximate relationship between the real interest rate and the nominal interest rate can be shown as follows what is it? Now, i the nominal interest rate is approximately = $r +$ the pi r plus pi here pi right. So, r plus pi so, real plus pi . So, now what are the implications right.

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Implications

- Nominal interest rates tend to run parallel to inflation rates so that monetary policy is effectively neutralized (due to Fisher effect). More specifically, when the money supply is increased by a central bank, and expected inflation rises, that central bank also increases interest rates. And when nominal interest rates increase simultaneously with inflation rates, that means that there is little practical effect. ✓
- The *Fisher effect* is an important tool by which lenders can gauge whether or not they are making money on a granted loan. Moreover, according to Fisher's theory, even if a loan is granted at no interest, a lending party would need to charge at least the inflation rate in order to retain purchasing power upon repayment.

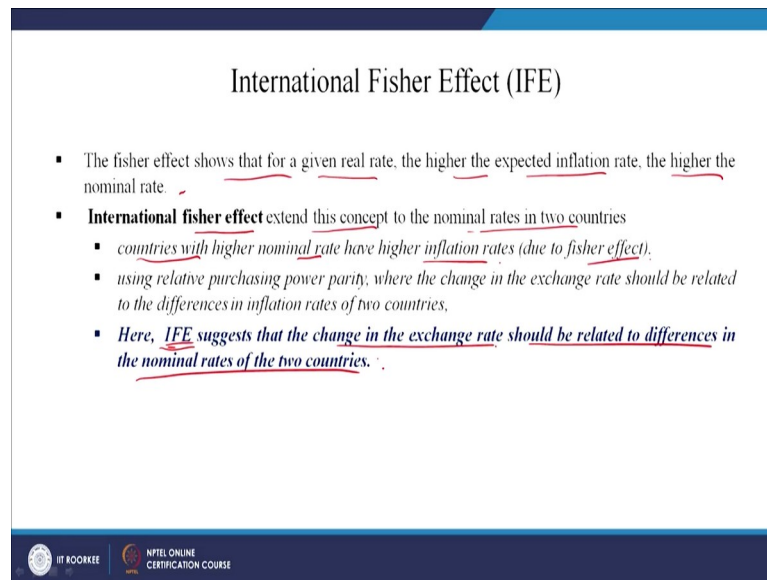
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So, when the nominal interest rate tend to run parallel to inflation; when the nominal interest rate runs parallel to the inflation rates so that, monetary policies effectively neutralized due to the Fisher effect. Re-read and think about it. More specifically, when the money supply is increased by a central bank let us say the RBI.

If the RBI is increasing the money supply and expected inflation rises so, the inflation tend would tend to rise, that central bank also increases the interest rates. So, when money supply is increased, the central bank by central bank expected inflation rises, that central bank also will increase the interest rates. Now, when nominal interest rates increase simultaneously with inflation rates; that means, that there is little practical effect. So, the practical effect is negligible.

The Fisher effect is an important tool by which lenders can find whether or not they are making money on a granted loan. So, are you really making money? So, the Fisher effect can help you in finding out. Moreover, according to the Fisher's theory, even if a loan is granted at no interest let us say no interest, a lending party would need to charge at least the inflation rate in order to retain the purchasing power upon repayment right. So, this is what the Fisher theory talks about right.

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International Fisher Effect (IFE)

- The fisher effect shows that for a given real rate, the higher the expected inflation rate, the higher the nominal rate.
- **International fisher effect** extend this concept to the nominal rates in two countries
 - countries with higher nominal rate have higher inflation rates (due to fisher effect).
 - using relative purchasing power parity, where the change in the exchange rate should be related to the differences in inflation rates of two countries.
 - Here, IFE suggests that the change in the exchange rate should be related to differences in the nominal rates of the two countries.

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So, international Fisher effect now. There is another you know view to that what is it saying? The Fisher effect shows that for a given real rate, the higher the expected inflation rate, the higher the nominal rate. Now international Fisher effect extends this concept to the nominal rates in two countries. Now what is it saying?

Countries with higher nominal rate have higher inflation rates due to the Fisher effect right. Now using relative purchasing power parity where the change in the exchange rate should be related to the differences in inflation rates of two countries.

Now what it is saying? Using relative purchasing power parity where the change in the exchange rate should be related to the differences in inflation rates of two countries. Here, international Fisher effect says that the change in the exchange rate should be related to differences in the nominal rates of the two countries. So, this is what the IFE says right.

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Conti...

The equation of IFE

$$e_f = \frac{(1 + i_h)}{(1 + i_f)} - 1$$

$\approx i_h - i_f$

Where

e_f = expected change in the exchange rate

i_h = nominal rate in the home country

i_f = nominal rate in the foreign country

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Now equation look something like this. So, this is how the equation looks like this. So, expected change in the exchange rate right is equal to 1 + nominal rate in the home country by nominal rate 1 + nominal rate in the foreign country and - 1 and this is approximately equal to the same right again.

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Example

Suppose the nominal interest rate on a one-year insured U.S. bank deposit is 9% and the rate on one-year insured British bank deposit is 10%. What does the IFE predict will happen to the exchange rate.

$$e_f = \frac{(1 + 0.09)}{(1 + 0.10)} - 1 = -0.00909 \approx -0.909\%$$

Solution : the British pound (£) to depreciate by a little less than 1%.

Implications of the international fisher effect

It suggests that currencies with higher interest rate will have high expected inflation (due to the fisher effect) and the relatively the high inflation will cause the currencies to depreciate (due to the PPP effect)

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Suppose the nominal rate interest rate on a one-year insured US bank deposit is 9 percent take this example and the rate on one-year insured British bank deposit is 10. So, this is 9, this is 10. What does IFE predict will happen to the exchange rate right? So, if

you look at it so, this is the let us go back to the formula. So, i h home and foreign right. So, when you do this; this; this is the final value which is coming.

So, what it is saying the solution? The British pound to depreciate by little less than 1 percent. Implications of the international Fisher effect it suggests that currencies with higher interest rates will have high expected inflation due to the Fisher effect and the relatively the high inflation will cause the currencies to depreciate due to the purchasing power parity effect right.

So, this is all we have for today. So, I these are the three different methods through which you can find the exchange rate and you can, if you start solving little more problems and you know work on this.

You will find finally, get a connect between how these different parameters are connected to each other and then only one can be a good adviser to somebody to and maybe suggest what should be the you know future agenda, future strategy or policy for a company or a for a nation or for even an individual, how it should you know look at the benefits that it can make by understanding this different scenarios right.

So, this is all we have for the day. Thank you very much. We will meet in the next lecture right.

Thank you.