International Economics

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Lecture No. # 05

To cover the new topic, exchange rates and the current account. And we will discuss the Marshall-lerner condition, which says that depreciation or devaluation will improve the current account balance. If the sum of foreign and a home import demand elasticity, there is a small correction. Elasticity is greater than 1, if the sum is less than 1, then appreciation of currency will improve the current account balance.

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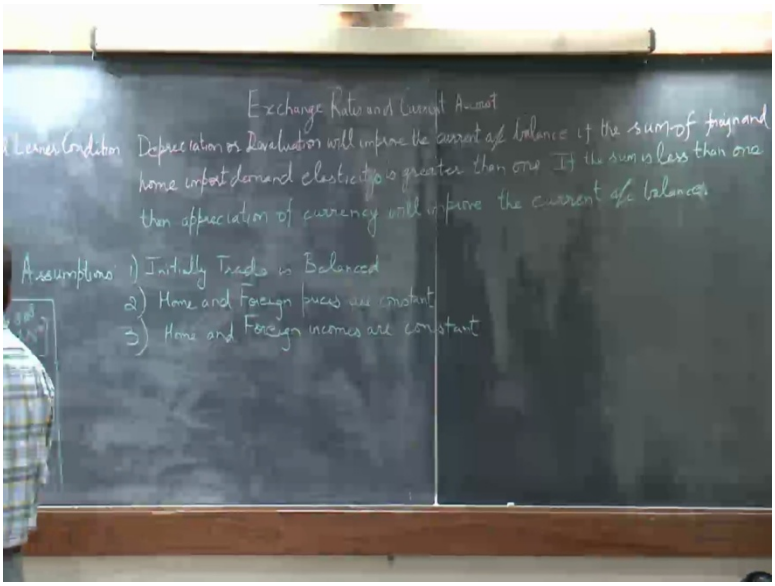

So, when we were discussing the closed economy multiplier, we said that the autonomous changes in net exports have an impact on the changes in incomes, and they directly impact the current account balance. But here we did not go into the linkage between the autonomous change in net exports, and the current account balance. When I say the linkage I mean that if there is a switch in expenditure from domestic to foreign, or foreign to domestic, it tends to have an impact on the current account balance. If d N a increases; that means, if there is a switch in expenditure from foreign to domestic goods,

then d N a increases and it tends to have an impact on the incomes, sorry on the current account balance.

But we did not read the process through which this switch in expenditure has an impact on the current account balance. That gap is provided by the marshall-lerner condition, it links the switches in expenditure to the current account balance, and it states that depreciation or devaluation will improve the current account balance, if the sum of foreign and home import demands elasticity's. So, we are bringing in elasticity, if it is greater than 1, then only you will see an improvement in the current account balance. So, it is not natural that if there is a switch in expenditure from foreign to domestic goods, it will improve the current account balance. Certain conditions have to be made, and those conditions are that the foreign and home import demand elasticity should together workout to be greater than 1.

So, I will try to prove it using both diagram and then do it mathematically, the mathematical portion is given in the appendix of the canon's book. It has very interesting appendix notes. So, it comes with very stringent assumptions. The trade is balanced that exports are equal to the imports initially, home and foreign prices are constant, home and foreign incomes are constant. So, I will go straightaway, prove it using the diagram and then we will use the some mathematics to prove, how devaluation improves the current account balance. Now when I say it improves the current account balance, it improves the current account balance both in terms of domestic currency and foreign currency. So, here are set of diagrams, you will have four diagrams. There will be an upper panel, a left panel, right panel, there will be a panel below left and right. The upper panel will show the exports and imports in terms of domestic currency, the lower panel will show the exports and imports in terms of foreign currency.

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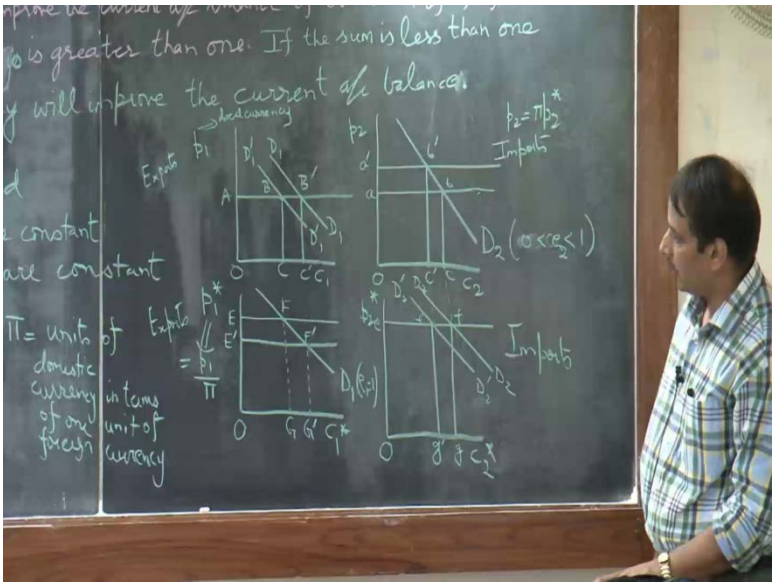

So, here are the panels, this star denotes foreign country.(no audio 05:49 to 08:20). So, try to understand this diagram, as I said you have an upper panel. Look at the left most panel, you have price of exports in the domestic market, and this is the amount demanded in the domestic market. So, you producing something, it has its price, it has it demand in the local market also. It is meant for export, but there is demand in the local market also. Say for example, you are producing leather products, it is meant for exports, but there is a demand in the local market also, and there is a price. So, that is price in local currency and there is a demand for it, which is C 1.

And then there is a corresponding price of the same exported good in the foreign market. And see it is equal to P 1 by pi, why because say for example, pi is rupees 50 right and its hundred rupee product that you are exporting. So, say 1 U S dollar is rupees fifty. So, say 1 rupee worth of thing, would be 1 by 50 dollars in the international market. Rupees 50 is 1 U S dollars, say rupees 1 rupees would be worth 1 by 50 dollars, or rupees hundred, product would be priced two dollars in the international market. So, there is P 1 star the price of the exports in the international market, and there is a demand in the international market for your exports, which is C 1 star. So, this is demand, this is not in the foreign currency, this is physical quantity. This is in foreign currency, P 1 star is in foreign currency. So, these two panels, these are for the exports, this panel is for the imports. P 2 is the price of imports, there is a demand for imports in the local market. And C 2 is the amount demanded, the demand for the imported good. So, this demand

curve, is the demand curve of the foreigners. This demand curve is ours for the imported good. P 2 is the price in local currency and there is C 2 which is amount demanded.

Look at this, the right most lower panel, P 2 star is the price of imports in terms of foreign currency P 2 star. And C 2 star is the amount demanded of the imports in their country, and P 2 if you wish to convert P 2 star, the price at which they are selling. They are selling their exports, their products if you convert it into local currency, it will be pi P 2 start. So, P 2 is pi P 2 star, this d 1 - the demand curve of the foreigners, foreign import demand curve. This is d 1, it has an elasticity of 1. So, I can call it e 1 star, to denote foreign elasticity which is 1, and then you have the home import demand elasticity which lies from, it can be any value line from zero to one. So, then the sum of foreign and home import demand elasticity's is greater than 1 because its 1 foreign import demand curve its 1 this is anything lying between 0 and 1. So, the some of the foreign and home import elasticity is greater than 1.

Now, see what devaluation does, you depreciate you currency. So, you have a fixed exchange rate, it is not floating. No country has a freely floating exchange rate, it is a utopian type of concept. So, you have a fixed exchange rate. For various reasons, we are not going into the reasons, you decide to depreciate your currency. It was 1 U S dollar 45 now you move to 1 U S dollar to 55. There is lot of homework on what should be the rate as I told you, it is a function of many right hand side variable differential interest rate, differential inflation rate, differential output rate, differential money supply. How are the other currencies moving.

So, we are not going into that aspect that, how much would be the new rate, but you decide that you would depreciate you currency. So, when you depreciate your currency, see what happens. The imported price in terms of local currency goes up, 1 U S dollar was 45, 1 U S dollar becomes 55. So, the imported price in terms of local currency goes up, but there is something else which happens. In the export markets, the price of your product in foreign currency goes down, 1 U S dollar was 55 it becomes 55. So, 1 rupee worth of thing would be priced lower after depreciation, and the hope is that if you decreased the price in terms of the foreign currency. One believes that one follows the law of demand if price goes down, then the demand would go up. How much will it go up, it will depend on the responsiveness, the elasticity. That is why, someone ask is

elasticity not important? Elasticity's are important and that reflected in the marshall-lerner condition.

So, let us first concentrate on the foreign markets. Before I do, look at the supply curves, there is 1 peculiar thing about the supply curves, that they are perfectly horizontal. Reason, because this set of prove, comes with certain stringent assumptions that home and foreign prices are constant. So, look at the price of the exports in the local market, it is constant right. So, you have a perfectly horizontal supply curve. Here also you have the price P 1 star, this is fixed initially. So, you have a horizontal supply curve, can you let me know what can be the economic interpretation of this, that we have made an assumption that home and foreign prices are constant. So, you have horizontal supply curve, why do you see a horizontal supply curve, say in the export markets. If I say that the initial price is 0 e, and you have a perfectly horizontal supply curve. What does it signifies, assumptions are that prices are constant, but there has to be an economic meaning.

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(( )) manufacturer does not have (( )) production

No it means that, he is the only supplier who is providing this much of exports to this market. He is the sole whole producer, and he is providing this at a given price. So, he can provide anything, all the supply at this price. This is what it means. If this is fixed zero is fixed in the imported price, then foreigners are that 1 foreigner that 1 country is providing you the entire supply. So, that is why it is fixed. So, that is how you would look at the assumption that prices are fixed.

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What is…

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So, you are providing exports. So, it is your product going to the foreign country, this is the demand for that curve, that product. It is the foreign import demand curve. So, whatever is your export is, their export, their demand curve and this is the price at which you are selling, this is fixed; that means, you are the one who is providing the entire

product, is not that there are many countries involved, you and your partner is there. That is why the exchange rate is between you and me. In reality, there are many countries. So, if you have to prove the marshall-lerner condition, then you have first come out with an exchange rate which has to be a weighted average of all the bilateral exchange rates, where the weights would be the trade share. So, in India you have two exchange rate, it is nominal effective exchange rate, and you have real effective exchange rates. And it is and it is formed on the basis of five country and 36 countries, it is a weighted average.

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So, the assumption is that, the prices the only way the price can change is through the change in the exchange rate. There is no incentive to change the prices, because home and foreign prices are constant. it is a very stringent assumption home and foreign incomes are constant. It is a very stringent assumption. It is like, those assumptions that you make in the classical model, that the income is at the full employment level, so something of that sort, so the only way to change the prices through the change in the exchange rate. And what you do is that, you depreciate you currency. So, the price at which you would sell in the international market in terms of the foreign currency, it goes down. That is what happens, and if you are moving along the demand curve whose elasticity is 1.

The import volume of that country increases from 0 e f g to 0 e dash f dash g dash, and please sees that even star is 1. So, you have unitary elasticity, and the price go down, the import volumes go up. Question is that given that the elasticity is 1, what can you say about o e dash f dash g dash and o e f g. So, remember when you have unitary elasticity if you decrease the price, the value remains the same, because its unitary elasticity. So, your export precedes in terms of foreign currency remains the same, because you have elasticity of 1.

Let us look at the imports in terms of the foreign currency. Now see, how the exporters will interpret this depreciation. When there is depreciation, there is an increase in the price of the imports in terms of the local currency. So, when the price goes up, you move along the demand curve and. So, the exporters will interpret this as an inward shift of the demand curve. 1 U S dollar was 45, 1 U S dollar becomes 55, now the importers realize, they have to pay higher in terms of the local currency. The foreigners would interpret as

a leftward shift of the demand curve. So, what happens to the import volume, it was 0 f g o earlier, because of this rise in the import price in the terms of local currency. The import proceeds in terms of the foreign currency goes down to e 0 e f dash g dash. So, see what happens, the export precedes remains the same in terms of foreign currency, the import proceeds shrinks in terms of foreign currency. So, exports remains the same, imports go down. So, there is an improvement in the current account balance in term of the foreign currency. Look at the current account balance in terms of the local currency

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D 2 is the demand of (( )).

D 2 is the demand for the imports in the home country.

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So, when this price increases, they would interpret they that this is a leftward shift of this demand curve. If you have understood this, then look at what the exporters would think in terms in India. That, when there is a depreciation of the currency 1 U S dollar was getting you 45, now it will get you 55. They will interpret as a rightward shift of the demand curve, so your export proceeds which were here. Now goes up to a b dash c dash o. So, your export proceeds go up, because the exporters interpret as a rightward shift of the demand curve, whose demand? Their demand, we are talking of only home and foreign import demand elasticity. So, exports proceeds in terms of local currency goes up, can you say something about the import proceeds? Remember what has happened, 1 U S dollar 45 now 65 or 55.

What you think will happen to the import proceeds, it was 0 a b c, now with an increase in price its 0 a dash b dash c dash given that the elasticity is lies from 0 to 1. Remember, if it is inelastic demand and if there is an increase in prices, what will it do, will it increase total revenue, will it decrease total revenue, or will the total revenue remains the same. Remember, the elasticity percentage change in demand due to percentage change in price, so its inelastic demand which is lying between 0 and 1. So, percentage change in demand is less than percentage change in price. What you think will happen to the total revenue? What will happen to the total revenue?

The total revenue would go up. If it were elastic demand, total revenue would have gone down. So, here is peculiar case, export proceeds are going up, import proceeds are also going up and we wish to comment whether there will be an improvement in the current account balance in terms of foreign currency. And then I say that, there will be an improvement in current account balance, because the increase in imports cannot be as large as the increase in exports. So, please think about the reasons, you will still see an improvement in the current account balance, even if the import proceeds are going up, because the increase in import proceeds would be less than the increase in export proceeds. Why?

Now, look at this 0 a dash 0 a, the proportion at which the exchange rate changes is equal to 0 a b dash c dash 0 a b c the changes in the export proceeds, but this is greater than 0 a dash b dash c dash divided by 0 a b c. Think of the changes here, you can see in the diagram also. Diagrammatically, it means this is the increase, this is the increase, and here this is a downward sloping demand curve. So, even if this is greater than this, this increase cannot be greater than this increase. So, even if this portion is greater than this portion, this increase cannot be greater than 0 a b dash c dash. Because of the following that, the change in the exchange rate is equal to this change, and this change is greater than this. So, the maximum increase in imports is less than the maximum increase in exports and therefore, you would see and improvement in the current account balance in terms of the local currency as well.

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No. That is what it says, that hit improves the current account balance in terms of local currency, and it improves the current account balance in terms of foreign currency, provided the sum of the foreign and home import demand elasticity is greater than 1. So, to answer it more than you need to go for the mathematical result. It will be it.

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Foreign home foreign and home import demand elasticity.

So, that should be (( )).

So, exports and imports in terms of local currency, exports and imports in terms of foreign currency. So, here we saw the export proceeds the same, but the import proceeds going down, because the foreigners would interpret the increase in the imported price as a leftward shift of the demand curve. And this is demand curve of us; it is demand curve of ours, which they will think that it is a leftward shift because the prices have gone up, so the demand is going down and they would interpret this as a leftward shift of the demand curve. Interestingly, will be a case were the supply curve are not horizontal, you would say that if the supply curves are upward sloping, this MLR condition becomes a sufficient. That means, even if, remember the sufficient condition, there is some necessary and sufficient condition. So, even if the marshall-lerner condition is not satisfied in case of upward sloping supply curves, you can still see an improvement in the current account balance.

So, now let us prove this mathematically, you could have always word this out to be, say 0.8 and this to be 1 or 0.7, 0.8, the sum should be greater than 1. And you could still prove that you will see an improvement in the current account balance. You could also start with the case where the trade is not balance. Think of a real situation where you have deficit, and then you can always prove that if there is the sum of the foreign and home import demand elasticity's are greater than 1, you will see an improvement in the current account balance. Try it back home, try it as an exercise. Think of a real situation when there is a deficit in the county. Can that deficit be wiped out and then current account balance is become positive. You can still prove it using the simple diagram also. So the proves goes as like this.

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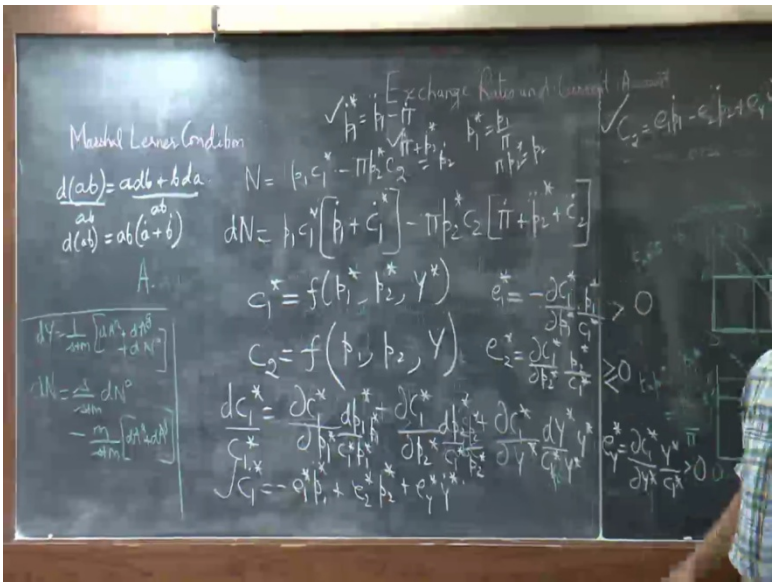

So the trade was balanced, because trade is balanced when exports are equal to imports. So, earlier 0 a b c was equal to 0 small a small b small c, exports were equal to imports. Here 0 e f g was equal to 0 e f small g, exports were equal to imports initially. Then something happened, when you depreciate your currency, the price of exports in terms of foreign currency goes down, the price of imports in terms of local currency goes up. And therefore you see that your import balances will change, the value of imports will change whether it will go up, go down, remain the same depends on the elasticity. Whether your export that value will go up, remain the same or go down it will depend on the demand curve.

But the proof is that if the elasticity of both work out to be greater than 1, then you will see an improvement in the current account balance. So marshall-lernerrobinson, its MLR, marshall-lernerrobinson condition all of them derived independently this condition that the sum of the foreign and home import demand elasticity, if it is greater than 1, devaluation will improve the current account balance. If the sum is less than 1, then you have to appreciate your currency. So, look…

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So, they started with this thing that initially trade is balanced. What I am saying is that, you can prove this, you can do as an exercise that had been a case where you have to deficit; deficit would mean that imports were greater than exports. Now if you work this

out you will see that the change in imports will be much greater than, it will depend on the deficit that you have initially, higher the deficit, higher will be the changes in imports. So, that at the end, if there is depreciation you will see, theoretically you can prove that there will be an improvement in the current account balance. So, imports are greater than exports, but workout the deficit, the change that you will get will be an increasing function of this deficit. Higher the deficit larger will be the change in imports. So, that ah you would get an improvement in the current account balance, that is what happens. So, then think whether the elasticity is greater than 1equal to 1 or less than 1, but…

Why should (( )) how would deficit how would demand (( ))

So, you it will be not very apparent here, what you are asking; it will not be very apparent from the diagram that I have drawn, but then bringing in the concept of elasticity and the changes, you can prove that. I have not gone into that question, but I know that will depend on the absolute the deficit amount.

(( )) deficit (( ))

So, the changes in the imports would be such that it will be it will become a function of that deficit. So, larger the deficit, larger will be the changes in imports such that at the end, you will see an improvement in the current account balance. So, I have to put my mind into how to prove it using this diagram. May be tomorrow if I can come back and answer that.

So the proof is the, is little cumbersome, but it is easy to understand. So, look at the trade balance, you do not have exports of services, you do not have investment incomes, you do not have transfers, you just have exports. P 1 is the price of exports in local currency, C 1 star is the demand for the exports in the foreign country. But then this is the value of exports in local currency, this is the value of imports in the local currency. This is the trade balance. So, the change in the trade balance is, now when I put a dot, it means proportionate change, dot means proportionate change. So, it P 1 dot would mean, d P 1 by P 1, C 1 dot star means d C 1 star divided by C 1 star. And why is this equal to this, because if it is a b d a b is a d b plus b d a divide by a b.

So, you get d a b to be a b a dot plus b dot. d a b is a b a dot plus b dot, where a dot is proportionate change in a, b dot is proportionate change in b. Because you are talking of the demands, so C 1 star is a function of P 1 star, P 2 star, and the incomes; the prices which prevail in the foreign country right and the incomes. So, P 1 star is the price of the exports in the foreign country, what is P 2 star. Remember there were two goods, there is imports, there is exports. So, P 2 star is that price and then you have incomes. And you have C 2 which is a function of our import demand; our demand is a function of P 1, P 2, and the incomes. What is P 2, it is the price of the import good; when I say price of the import good, I mean import competing goods. This is the price of export good, and this is income. So, then using the total differential rule, you get d C 1 del C 1 star del P 1 star d P 1 star plus del C 1 star del P 2 star d P 2 star, and del C 1 star del y star d y star.

Now, define three types of elasticity's; this is the own price demand, elasticity this is the cross price demand elasticity, this is the income elasticity. Now del C 1 star by del P 1 star if there is, if you if there is an assumption of law of demand, this is negative del C 1 star del P 1 star, if you put a negative sign. So, this is greater than 0, this is cross price elasticity. You do not know, it depends on whether the goods are compliments or substitutes. And you have the income demand elasticity which is greater than 0 because it is a normal good. Remember normal good, higher the income higher would be the demand for that product, it is not an inferior good, inferior good is higher the income lower is the demand for that product.

So, we have this equation which is total differential rule, if you have to bring in elasticity, see what I do I divide by C 1 star I divide by C 1 star I multiply and divide by P 1 star I divide by C 1 star I multiply and divide by P 2 star I divide by C 1 star y star y star. So, you get C 1 dot star to be equal to minus e 1 star P 1 dot star plus e 2 star e 2 dot star plus e y star y dot star and C 2 to be equal to e 1 P 1 dot minus e to P 2 dot plus e y dot.

So, tomorrow we will see what happens, if you put this and the value of C 2 in this equation and further observe that P 1 star is P 1 by pi and pi P 2 star is p 2. So, P 1 dot star is P 1 dot minus pi dot and pi dot plus P 2 dot star is P 2 dot, 1 and 2 and three and four, we going to put it back in the equation and then we going to use the assumptions those stringent assumptions that, there is no change in price, there is no change in income, what you would finally would be something like this, you would get something

like this. pi dot, the proportionate change in the exchange rate e 1 star, the foreign home the foreign home, the foreign import demand elasticity e 2 the home import demand elasticity's. So, these are demand elasticity's foreign import demand elasticity, home import demand elasticity minus 1. So, if these two works out to be greater than 1 and you see a depreciation in the exchange rate, that is pi dot is greater than 0, then only you will see an improvement in the current account balance. If this is less than 1, then you better appreciate your currency rather than depreciating to improve the current account balance.

So, we will come back and prove finally this, and then you would see another interesting result that this change in trade balance is a function of the real exchange rate, where the real exchange rate is e p star by p, this is the price in the, in foreign country this is the price in the domestic country, it is a reciprocal of the terms of the trade. So, you will see the d N, the change in trade balance is a function of the real exchange rate - real exchange, rate real incomes. So, then once we prove that, you will see another interesting result coming in, that if there is a change in the nominal exchange rate, but if the prices change and there is no change in the real exchange rate, you may not see a change in the trade balance even if the marshall-lerner condition get satisfied.

So, when most of the countries, the handout that I given, you can also see that many countries which tried depreciation, they found that it hasn't impact on the domestic prices. Because when you depreciate the domestic price goes up, you may not see a change in the real exchange rate, and it does not affect the current account balance. So, even if the nominal exchange rate is changing, but you see that the prices also go up in your country, they will be no change in real exchange rate, this will not have any impact on d N. So, your whole exercise become fruitless, if there is an impact on the prices. So, the message is that if you have to change your exchange rate, it has to be supplemented by changes in the expenditure policies, to take care of the changes in the prices. So, many latin American countries which tried to depreciate their currencies, and did not had a supplementary fiscal and monitory policy. They saw no changes in the trade balance.

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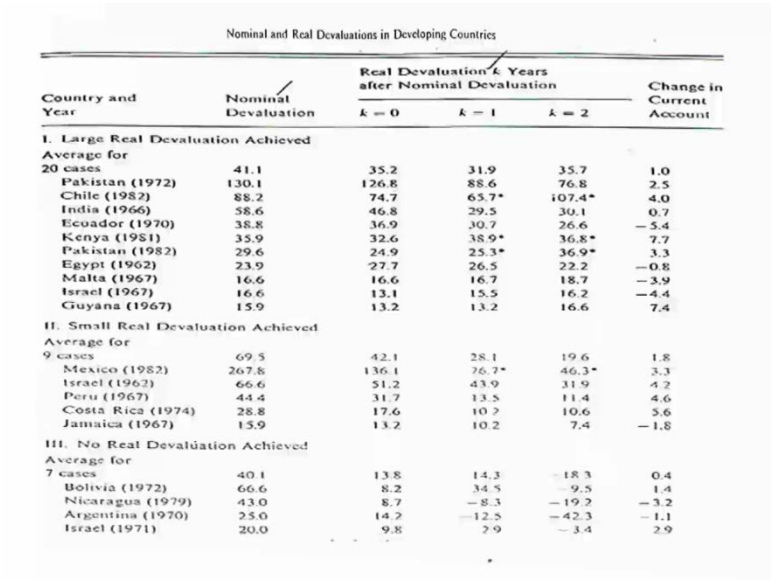

Nominal and Real Devaluations in Developing Countries

Country and Year	Nominal Devaluation	Real Devaluation, k Years after Nominal Devaluation			Change in Current Account
		$k = 0$	$k = 1$	$k = 2$	
I. Large Real Devaluation Achieved					
Average for 20 cases	41.1	35.2	31.9	35.7	1.0
Pakistan (1972)	130.1	126.8	88.6	76.8	2.5
Chile (1982)	88.2	74.7	65.7*	107.4*	4.0
India (1966)	58.6	46.8	29.5	30.1	0.7
Ecuador (1970)	38.8	36.9	30.7	26.6	−5.4
Kenya (1981)	35.9	32.6	38.9*	36.8*	7.7
Pakistan (1982)	29.6	24.9	25.3*	36.9*	3.3
Egypt (1962)	23.9	27.7	26.5	22.2	−0.8
Malta (1967)	16.6	16.6	16.7	18.7	−3.9
Israel (1967)	16.6	13.1	15.5	16.2	−4.4
Guyana (1967)	15.9	13.2	13.2	16.6	7.4
II. Small Real Devaluation Achieved					
Average for 9 cases	69.5	42.1	28.1	19.6	1.8
Mexico (1982)	267.8	136.1	76.7*	46.3*	3.3
Israel (1962)	66.6	51.2	43.9	31.9	4.2
Peru (1967)	44.4	31.7	13.5	11.4	4.6
Costa Rica (1974)	28.8	17.6	10.2	10.6	5.6
Jamaica (1967)	15.9	13.2	10.2	7.4	−1.8
III. No Real Devaluation Achieved					
Average for 7 cases	40.1	13.8	14.3	18.3	0.4
Bolivia (1972)	66.6	8.2	34.5	9.5	1.4
Nicaragua (1979)	43.0	8.7	−8.3	−19.2	−3.2
Argentina (1970)	25.0	14.2	12.5	−42.3	−1.1
Israel (1971)	20.0	9.8	2.9	−3.4	2.9

So, this is a handout which tells you, cases for twenty cases where you had large real devaluation achieved, nine cases were some real devaluation achieved, and no real devaluation achieved in seven of the cases bolivi, (( )) and israel. So, here you had nominal devaluations, but it affected the prices as a result you saw a minor change in the current account balance or a case where you had negative current account balance. So, as a researcher it will be an interesting for you to look at this aspect, because this is from canon's, in the canon's book this is Sebastian Edwards looking at this type of data in 89.

So, you can look at the different countries wherein you see the nominal devaluation, and check what the real devaluation is. After k years and then see the changes in current account whether devaluations have helped countries to improve the current account balance. So, you should have 2 columns, one is of the devaluations, the other is the changes in the current account balance, may be you can just find correlations or you observe the data, you will get some idea of the fact that whether, a depreciation improves the current account balance or it deteriorates the current account balance. So, final message is that this switching, expenditure switching policies have to be supplemented with the expenditure changing policies to have a greater impact on the changes in the trade balance. So, that is what we will see in tomorrow's class.