[SQUEAKING]

[RUSTLING]

[CLICKING]

RICARDO CABALIERO: So now we're going to go back to the first part of the course in the sense that we're going to go back to the short term. So we're going to essentially do the IS-LM model again, but now in the context of an open economy.

But before I get into that first model of this part of the course, I want to finish the previous lecture in which I was introducing the concept of openness and the key relative prices in open economy. And we stopped after discussing this and says, well, one of the things that opening an economy means is that now you can buy goods, both at home or abroad.

So you need to be able to compare these two different kinds of goods and controlling for quality and all these differences and all that. At the end of the day, you want some sense of relative prices, which good is more expensive than the other one. And we said for that, we use what is called the "real exchange,"

And we define the real exchange rate as well, essentially it's the relative prices of goods at home versus abroad. But we have to put them in a common currency. That's the reason we couldn't just directly compare the prices at home versus the prices abroad. We have to convert the prices at home to the unit of account of the other country. And then we could compare these two things. And that's what we call the real exchange rate.

When that thing goes up, we call-- that's a real appreciation of the local currency, of the local economy. And that means that the goods-- domestic goods-- become more expensive relative to international goods. When that epsilon goes down, then we call, we say the real exchange rate has depreciated. And that means that the domestic goods become cheaper relative to foreign goods.

So as a key concept in what it means when you open an economy, you need to have this price is very important to decide whether you're going to, again, whether you and foreigners are going to buy goods abroad or domestically.

The second concept of openness that we're going to explore in this course is openness in capital account, in financial market. And openness in financial market means something very similar, which is now you when you have a to invest-- financially invest, not physical investment, not real investment-- well, you can decide whether to invest in domestic assets or foreign assets. We're going in this-- later on, we're going to talk about equity. But for now, bonds.

So suppose you have a domestic bond and a foreign bond. Well, you can decide whether to invest in the domestic bond or in the foreign bond. Now to make that comparison, it's not enough to have the current exchange rate because it doesn't mean much if I tell you that the British bond is more expensive than a domestic $1 bond. What you really need in order to decide where to invest is some sense of what is expected relative return of these two things.

Do I expect to make more money in the dollar bond or in the pound bond? And that's the comparison I need to be able to make. There are also risk considerations and so on that we're not going to discuss in this course. But the very basic comparison is not the value of things when you're talking about financial, but what is the return you expect to get in one or the other.

So this is what you need to do. Suppose you have a dollar to invest and you have two options. One is you buy $1 bond. The dollar bond gives you an interest rate of it. So you know that, say, 5% nowadays, more or less, that if you have a dollar today and you invest it in a dollar bond, you're going to get next period, you're going to get a-- how much is it, $100? So suppose you have $1, then you're going to get a $0.05 on that dollar at the end of the year.

And so that's what you get if you invest in the dollar bond. Now, you're giving now an option because we are oper to financial markets, to also invest in a British bond, in a pound bond that is as safe as the US bonds, say. And so we're going to call that the UK bond. And I know, for example, that the UK bond is offering a 10% interest rate. So suppose that I think i star is 10%.

Then I asked you the question, well, that does mean that obviously, since you want to compare returns that you should be investing in the pound bond, in the UK bond rather than the US bond. So suppose this is 5%, and that's 10%. And I'll tell you, where do you want to invest your money? Do you want to invest it in the US bond or in the UK bond? What is your answer? I told you, you know, they pay you 10%, the other one pays you 5%.

AUDIENCE: [INAUDIBLE] as well?

RICARDO CABALIERO: Exactly. Why do I need to know that?

AUDIENCE: [INAUDIBLE]

RICARDO CABALIERO: Excellent. So this is not enough information for me, because it may happen that what I get in terms of return, I lose on the currency exposure, for example. So let's see how that can happen. So how would I do this? I have $1 of wealth that I want to invest. And suppose I want to go the UK bond route. So the first thing I have to do is I have to convert the dollar into pounds today to buy my dollar, which is my UK bond, which will be in pounds.

So the first thing I have to use is suppose that I get a 0.8 pounds per dollar, then I can invest 0.8 pounds in, UK bonds with my dollar. That will give me 0.8 times 1.1, plus i star tomorrow, but what are the units of this? What do I get there? Next year, what do I get next year? I invested 0.8 pounds and I got 0.8 times 1.1, say, pounds back. I just told you.

So what I get next year is pounds. I cannot compare a return in dollars, which this was $1.05 with a return on pounds. I need to be able to convert those pounds in the future to dollars in the future. And the best I can do here, we're not going to open four world markets or anything, is well, I can-- that means I have to divide by the exchange rate next year to convert from pounds to dollars.

I don't the exchange rate of next year, so the best I can do is use expected exchange rate. So I divide this by the expected exchange rate next year and then I get-- thus, my return in dollars of having gone the UK bond route. And so what I need to compare in order to decide where do I want to put my money is that return here versus that one there. That's in the same units of account is I invest the same today, $1, and I get dollars tomorrow. So now I can compare.

And as you correctly pointed out, this thing here therefore requires that you think about what the exchange rate is likely to be tomorrow. So, for example, in my example here, when I said suppose i is 5% and i star, the interest rate in the UK bond, is 10%. Is it obvious that I should invest in the UK bond? And the answer is no, not so fast. Because I know I'm going to make 5% more in terms of return of the bond. But then when I convert it back to dollars, I may lose all that gain because the pound has depreciated vis-a-vis the dollar.

In particular, is the pound, I expect the pound to depreciate relative to the dollar or if I expect the dollar to appreciate relative to the pound by 5%, then I'm indifferent. Yeah. In one case, I'll get-- because if I go the US bond route, I get 5% next year from this year to the next. If I go to the UK bond route, I get 10% in return on the bond minus 5% in the capital loss due to the appreciation of the dollar. So net I get 5% as well. That's what appears here. That's what I've done here.

So what I did here is says if the markets are very integrated and the function fairly well, those two returns should be more or less similar in equilibrium, because prices are going to adjust, exchanges are going to adjust and so on. So there's two ways of investing are more or less the same. And I'm going to take the extreme assumption that they are exactly the same here so that this holds.

That in equilibrium, we have to find that equilibrium, these two things are going to be equal. That's called-- and it's a very important concept in international finance-- the "uncovered interest parity condition." Don't ask me why it's uncovered, but it's the interest parity condition. And again, that one in particular is called the uncovered interest parity condition.

If you do a little bit of-- and this just tells you that in equilibrium you have to be indifferent between investing in one bond or the other. If you do a little algebra here of the kind that we have done in the past, like 1 plus i is i is approximately equal to 1 over 1 minus i or this one, 1 plus i star is approximately equal to 1 over 1 minus i star, and so on. That's a kind of approximation, Taylor expansion, when these terms are small.

Then you can write this as this expression here. And this says exactly what I just said in words. It says, look, if the interest rate in the US bond is lower than the UK bond's interest rate, that's OK in the sense that we can be indifferent when we do those things as long as you're expecting an appreciation of the dollar. That is equivalent to the difference in these two interest rates. So that's what's called the interest parity condition. The two, in equilibrium, the two are going to be the same once you adjust for the expected appreciation or depreciation of the currency.

So in my example before, we had this interest rate of 5%, that was 10%. Then the only way that that's going to be in equilibrium is that if we also expect the dollar to appreciate by 5%. OK, so dollar appreciation, remember, is this guy going up. So if this is 5%, then it's fine to have 5% here, 10% there, because they both gave me the same return in expectation, at least. If I do it in dollars, I say I'm going to get 5% either way investing in American dollars, or through the UK pound because in the UK bond and the bond, I'm going to get 10% and then lose 5% because of the currency.

Or I can do the comparison in pounds and then I say, well, I'm going to get 10% in pounds directly. And if I go the US way, I'm going to get 5%, but I'm going to get also 5% in the currency appreciation. And that gives me 10%. Key concept.

Anyways, so these are the two senses of opening that we can have, opening in goods market, opening in financial markets. And the key relative prices and things that are going to equilibrate both markets. And one is the real exchange rate in the goods market, and this one is the uncovered interest parity condition.

I want to shut down this part of openness for a lecture or so, and I'm going to focus now on the goods market opening only. And then I'm going to come back to this. But I just wanted to show you the two senses of opening.

So now let's forget a little bit about financial opening and let's just focus on opening the goods markets to international trade. So that means we're going to have now imports and exports floating around. So this is, we'll go back again to our IS-LM model to-- actually, we're going to go back to our goods market only model, the very first model we saw in this course. But we're going to bring back a couple of terms that we shut down there.

Now something that will be-- that we didn't need to worry about, but what we're going to have to worry about here a lot, is that there is a distinction between the demand for domestic goods and the domestic demand for goods. This can be tricky. But there is a difference between demand for domestic goods versus the domestic demand for goods. This is what residents say, US residents, households firms, government demand in terms of goods.

This is how those same agents, plus the rest of the world, demand of domestically-produced goods. That's the distinction. When the economy was closed, they were the same, but now they're not. So the domestic demand remains the same as before. Domestic demand is whatever the households demand-- consumption-- plus firms investment, plus government expenditure. That's the same we had in closed economy. This hasn't changed.

The domestic demand is the same. It's a function of the same behavioral functions that we had there. And the only behavioral function that was-- the only two that we had was the consumption function and the investment function, remember? So that remains the same. Nothing has changed.

What does change is that this is no longer what determines the demand for domestically-produced goods. And remember, that's very key in the short run, because this is a Keynesian model with very sticky prices. Demand determines output activity. So if we're going to determine domestic production from demand, we better be very careful about what is the demand for domestically-produced goods.

This is demand for both domestically-produced goods and foreign-produced goods. Some of those demands will be satisfied by imports. That's not demand for domestic production, and therefore we will not be determining equilibrium output domestically. So this is going to be a new concept, which is demand for domestic goods.

And demand for domestic goods is the same as demand-- as domestic demand for goods that-- the thing we have in a closed economy-- minus that part of demand that is satisfied by imports. So minus imports and divided by the exchange rate because imports may be priced in euros, say, and I have to convert them into dollars. That's the reason. It's very, very changing. But don't worry about this for now.

So I have to subtract from that imports. Because that's demand by residents, US residents. That doesn't go to demand for domestically-produced goods. Is demand for BMW, whatever. So that's not going to affect the demand for Ford cars and therefore, will not affect the production of Ford cars because it's not demand for that.

But against that, we also have a component of demand for domestically-produced goods that we didn't have before, which is what foreigners demand from the US. Part of the demand that US would-- probably not Ford a lot, at least. Part of the demand that US goods perceived-- US production perceived-- is not due to residents, it's due to foreigners that are importing US goods.

Apple sells a lot of phones to the rest of the world. That's determined by foreign demand for domestically-produced goods. That's what I call X, exports. So this is our new key concept here, Z. We're just the same as we used to have. But now we need to understand two more terms-- the export, and that's going to be a function, and the imports, which also will be a function. So let me introduce that.

So exports, we're going to assume to simplify things, but it's a sensible behavioral assumption. We're going to assume that exports are increasing in foreign output. That's what Y star means. And it makes sense. It's the rest of the world. I mean, emerging market, the commodity-producing economies today are very excited about the recovery in China. China is reopening so it's a big boom domestically. That's great news for the emerging markets, commodity producers, because that will increase the demand from China for goods produced around the world, in particular in commodity-producing economies.

So that's what this is capturing. It's an important trading partners' output goes up, income goes up, then they're going to consume everything, their domestic goods, but they also going to consume the goods they import, which are our exports. So that's the reason this is increasing.

Exports are decreasing on the real exchange rate. That's a sensible assumption. Why do you think it's a sensible assumption? So why do you think that exports-- US exports-- are decreasing on the real exchange rate? [INAUDIBLE]?

AUDIENCE: Major [INAUDIBLE] for foreign customers to buy?

RICARDO CABALIERO: Exactly. Because then US goods become more expensive relative to foreign goods. That's where the real exchange rate appreciation is. And therefore there is less demand for domestically, for US goods. That's the reason we have that. What about imports? Well, imports are the dual of that, meaning of the export function. Is actually, our imports is what the other countries sees as their export.

So our imports will tend to go up when domestic output goes up, because if domestic income goes up, domestic consumers will both consume more goods at home, but they will also consume more goods abroad. They're going to scale up their consumption and they're going to consume from both places. So imports is an increasing function of domestic output.

What about the real exchange rate here? Well, imports are an increasing function of the real exchange rate. Why is that? It's the same argument of exports, but seen from the other side. Remember when-- why do we use this epsilon for to decide where do we want to buy our goods? If epsilon goes up, it means our goods become more expensive. If our goods become more expensive for any given level of domestic consumption, where do you think you'll buy your goods? You'll buy more abroad, because they're cheaper. So then that's an increasing function of epsilon. Good.

Any question about that? Because these are the only sort of new behavioral equations that we're going to have for this model. No? And what I'm going to do next is I'm going to start from the same model we had in, I don't know, lecture 2 or 3. And I'm going to add these terms and see how things change. Good? Good. So let's do that.

So remember, I think the first curve that we-- the very first diagram we had in this class was this one. This was just a demand for domestic demand, sorry, which was just C plus I plus G. It's an increasing function here because consumption and investment are increasing function of output. And then in closed economy, what we did is we had a 45-degree line here and we said in equilibrium, output equal to demand. And therefore, the intersection of this curve with the 45-degree line gave us our equilibrium output. That's what we had.

We need to change things a little bit. We're going to put the 45-degree line in the next slide. But we first need to-- this is not the relevant demand for domestically-produced goods. So we need to go from here to the demand that is relevant for domestic producers. So the first thing we need to do is we need to subtract imports. Because part of that demand will go for foreign goods. And so that's what I'm doing here. To this domestic demand, I'm subtracting, the part that is going to foreign goods, not domestic goods, because this is not demand for domestically-produced goods.

So obviously, this is a shift down, but there is also a rotation. Why is that? You see? Obviously, we're subtracting imports from domestic demand, so that moves us down here. But it also is not a parallel shift. This curve becomes flatter. Why is that? In other words, the decline is larger for the difference. The gap is larger for high levels of income than for low levels of income, or output. Why is that?

AUDIENCE: [INAUDIBLE] dependent on output?

RICARDO CABALIERO: Exactly. It's because there is a positive marginal propensity to import. And so you'll import more if the output is higher. And that's the reason we have this curve. Notice that this also means, well, let me get to the end of that and of these diagrams and then I'll get back to this.

So one step more. Still, this is not what I need to integrate with my 45-degree line because this is not the demand that domestic producers will face. We still have to add the demand that comes from foreigners, and that's exports. So to this AA function, I have to add exports. And exports is a parallel shift because it didn't depend on domestic output. It depends on foreign output. So foreign output is going to be a parameter in this curve, but it's not-- it doesn't change the slope of that curve.

So here we went from the DD curve to the new curve, which is the relevant for equilibrium domestic equilibrium output, which is this ZZ curve. OK? Now notice two things, or one thing about this ZZ curve relative to DD. What is the most obvious difference between these two curves? No, this is the one we use in lecture 2 or 3, I don't know. And then what we did yesterday and all that. And this is the one we're going to use now, the ZZ. It's flatter. Yeah, why is that?

Flatter is low. Slope will mean lower multiplier. Why is the multiplier lower then, in open economy?

AUDIENCE: Because part of the demand falls on foreign goods.

RICARDO CABALIERO: Exactly. Because part of the-- remember the way we got to the multiplier is that income went up, consumption went up, that increased income again and so on and so forth. But if part of that increase in consumption is going to foreign goods, that's not reflected in demand for domestically-produced goods, and therefore there is less of a multiplier. And that's one characteristic of an open economy, is that the multipliers are smaller.

The other distinction is that-- you don't see it here, but we have more parameters. In particular, a very important parameter here is Y star, Y star. We didn't worry about what was the income in Germany When we look at the IS-LM, the closed economy model. Now we worry about what the income of our main trading partners is. There is an extra parameter there. OK, good.

Now we still haven't found equilibrium output, but there is a point that is already interesting here, which is this one. What do I know of this point? Well, in this point, domestic demand for goods is the same as the demand for domestically-produced goods, for domestic goods. And that also means that the trade balance is zero, meaning at that point, exports is exactly equal to imports. So net exports are equal to 0.

OK, so that's what I'm plotting here, actually. This is the net export function. The net export function is simply that minus that divided by the exchange rate. So that's what I'm plotting here. Is a decreasing function of output. Why is that? Why is this decreasing in domestic output? Remember, this is export minus import divided by the exchange rate. But we're not moving the exchange rate for now. Why is this decreasing? That means here, exports exceed imports, here, imports exceed exports. So here you have a trade deficit. Here you have a trade surplus. Why is that? Why is that the shape? Why is it downward sloping?

AUDIENCE: Because import grows when outgrossed by exports.

RICARDO CABALIERO: Exactly. Exports is not a function of domestic output. It's a function of foreign output, while imports is an increasing function of domestic output, and net export is exports minus imports. OK, so that's why this is decreasing. And this point here happens to be when the two things are exactly balanced. Thus, trade balance happens to be the point where DD is equal to ZZ. That's just-- there's no reason why equilibrium output should be at that level, I'm saying. That's the point where that happens.

OK, now we're going to find the equilibrium output. And to find equilibrium output, I'm going to erase all these extra curves here. And I'm just going to keep the ZZ here, because that's the demand for domestically-produced goods. And I'm doing short run here, so I know that domestic production-- that is the Y-- is going to be equal to the demand for domestic goods. It's a demand-determined model. That's what the short run is all about.

So erase all these curves, and I'm going to just keep the ZZ curve there. There you are. So now I have my 45-degree line because in the short run, equilibrium output is equal to aggregate demand. Aggregate demand for what? For domestically produced goods. That's the reason I'm using ZZ, not DD. OK, but there you are.

Then you do exactly the same as we did before. That's our equilibrium output. And here you can do all sorts of experiments and you're going to get the same type of things that we did there, the multiplier, it's a small multiplier, but you're going to still get a multiplier and all these kind of things.

Now, this is just-- in this example, it happens that this equilibrium output, this country has a trade deficit. I just made up that. So this is the equilibrium condition is output equal to Z, output equal to domestic demand plus exports minus imports. And then the net export is just, I'm plotting this term here. That's what we have here.

But equilibrium is just Y equal to Z. Is not this equal to 0. You can think about equilibrium. But this is what it is, given that that's equilibrium out. This is clear? I mean, this is the start diagram of this part of the course. So you need to understand this diagram. Go over it. Play with it. Think, what is a parameter in there, and so on. I'm going to do a little bit of that now, but make sure that you understand this.

So there's a few things here. So let's do things that we did in closed economy. So suppose that you have a fiscal expansion. So what did we do when we had a fiscal expansion in lecture 2 or 3? Well, that moves the ZZ curve up. Output will go up, and then there will be a multiplier. So output will go up by more than the initial increase in government expenditure. No? That's what we had before.

It will go up by more, but not as much as it did in the closed economy. So the increasing output will be more than the increase in government expenditure, but it will be not as much as it would have been had we had a closed economy. Why is that? Why is the last part true? Why not as much as it would have been in the closed economy?

Well, you can read it here. It's because part of that extra energy, the demand for consumption, will go to foreign goods. So it will not come back to demand more domestic production. And that's reflected in the trade deficit. In this particular example, we start with a situation where the trade was balanced. We had no-- net export was equal to zero and we ended up with a trade deficit. That trade deficit is exactly the same reason why we got a smaller multiplier is because part of the extra demand that came from the extra income that's created by the additional expenditure, by the aggregate demand effect of additional expenditure went to the demand for foreign goods.

Good. So do the same things we did in closed economy and just practice here. Increase taxes, do things like that, increase [INAUDIBLE] and see what happens both with the equilibrium output. Qualitatively it will be exactly the same as you had in closed economy, except that the effects are going to be smaller, but you're going to get something new, which is what happens to the trade deficit as a result?

This is a shock we couldn't do in the closed economy case, which is what happens if foreign demand comes up? That's what I'm saying, even when it's jubilant in emerging market world because China's output is going up. So what are all these economists thinking and say, well, China's output is going up. That means they're going to import a lot more from us. That is, they think our exports are going to go up because Chinese consumption is going up.

Well, exports going up means that our ZZ curve moves up. OK, so then what do you get? Well, you get now an increase in exports for any given level of income means that eventually you're going to get higher output immediately. But higher output also has a multiplier, although smaller. But at the end of the day, you're going to get higher equilibrium output. So it's great news. That's the reason they're so happy. It's great news that China is expanding because that also leads to an expansion in the rest of the world.

That's what you get. So in that sense, you know, that if China decides to do an expansionary fiscal policy, it also expands US output or more important, for Chilean output. It does that. So it's the same-- Chile could have done it by having their own fiscal policy that would also have expanded output. But it's wonderful that China decides to do it because that expands output as well, with one advantage-- two advantages. What is-- but there's one that you can see here, which is what?

Why is it that they prefer that China does therefore rather than me? What looks better here? Assume that they're of comparable size and so on in terms of the impact in the top diagram. Suppose you generate the same increase in output as a result of one policy, which is by domestic expansion in G, which is what we did in the previous slide, or because China goes into a boom and it starts importing a lot? That is, we can export a lot to them.

So suppose we get the same increase in output. What looks a little better? Not a little better, it can look a lot better. There are two things, but one is in this diagram, which is, remember, if I did government expenditure, the net export function wouldn't have moved and I ended up with higher output. I would have ended up with a bigger trade deficit. OK? In this case, it's export-driven, so it's the opposite. Because now the net export function is shifting up.

You know, if I move Y star up, I'm moving exports up. That means the net export function is moving up, shifting up. And then I'm losing some of that because in increasing domestic output goes into imports. But at the end of the day, in this case, I end up with a trade surplus rather than a trade deficit. So lots of-- that's the reason when you open the world, there's a lot of free riding here. You want the other one to do the policies for you because then you're a lot better. And you can get the same increasing output. But here you end up with a trade surplus rather than a trade deficit.

And there is a second thing that I'm not showing you here. There is a big difference between doing it domestically by increasing government expenditure versus the other one doing it for you and then pulling you through export. What else will look better in the US in this case, relative to the previous slide?

AUDIENCE: Do interest affect it?

RICARDO CABALIERO: But that's too sophisticated. We're still keeping the interest rate constant. Aha? That's even more sophisticated. This is short run, completely sticky prices. Forget all that.

Fiscal deficit. In the other one, I need to increase G so I had a fiscal deficit. Here, I don't need to do that. And in fact, in reality, taxes are typically indexed to output-- domestic output. So that probably will improve the deficit in the US. So anyways.

The last point I want to talk about is another variable that we didn't have in the closed economy, which is the role for the exchange rate, what the exchange rate can do. And so for this, we need to look at, you know, the only term that depends on the exchange rate is this net export term. It's the exports minus imports.

So what you know from net exports, it's very clear what happens to net exports when we increase Y star. We did an experiment before. That's what increased exports. So net exports will increase if you increase Y star. We also know that net exports will decrease if domestic output goes up because imports increase. But from this expression, it's a little ambiguous what happens to net exports when there is a-- when the real exchange rate appreciates.

And it's a little ambiguous for the following reason. The volume expression is clearly increasing in the real exchange rate. If US goods become more expensive, you want to import more. That's what we discussed before. But the value may not be such because if you are importing those goods in euros and now the euro is cheaper for you, than you are paying less for each unit you import.

Now, we're going to assume from now on that this second effect is not as strong as the volume effect. And that's a very realistic assumption except for the very, very, very short run. So that's going to be our assumption. Our assumption will be that net exports decrease when the currency appreciates.

If your goods become more expensive, then on net, you're going to have less net exports. That's an assumption. It simply says that this guy in the numerator responds more strongly than the denominator to a depreciation-- to an appreciation of the exchange rate. So the quantities effect is much more important than the price effect.

Again, I'm not going to have three questions about this or anything. I'm going to assume that from now on. That's your assumption. If I make a mistake and I try to trick you in the quiz for that, you can charge me the points. I don't intend to do that. Just as I did in a spot when one of the TAs sort of wrote something there. And because this is a very realistic assumption. Good.

So now let's see what happens, then, when the exchange rate moves. And let me use it. Suppose that you are in a situation where you want to reduce the trade deficit. What would you do to-- so the experiment I have here has two components. But let's talk about the first one.

Suppose that your country has a big trade deficit and you want to reduce that, and the only tool you have is the exchange rate. What would you do? Because suppose you have a trade deficit, you don't like that. And you can move the exchange rate around. What would you do?

Yes, you depreciate. You make the domestic goods cheaper relative to the rest of the world. So depreciate your currency, which is the prices are completely sticky, fixed. Then nominal depreciation means also real depreciation. And that will increase net exports. So what that will do if you depreciate, the exchange rate is also a parameter in this net export function. And given my assumption, when you depreciate the exchange rate, that then moves the net export function up.

Now, the problem is that if you do that, that's also going to be expansionary because now you have certain equilibrium level of output. And now there's going to be expenditure switching all around the world towards your goods. So you're going to end up producing more. And so suppose that you didn't want that extra production. You just wanted to fix your trade balance. Then you have to set that. And that's what I've done here.

So typically-- that's very typical. So suppose you're in a situation where you have very large trade deficit, but you're OK with the equilibrium level of output you have. Then a typical package is you depreciate your currency, but you also reduce government expenditure. Because the depreciation of the currency is expansionary. It's expansionary. It improves the trade deficit, but it's also expansionary because you relocate expenditure, both of residents and foreigners, towards your good. That increases demand for your good, increases output.

But I mean, if I don't like that, I have many ways of setting that. One of them is by reducing government expenditure. So that's what I've done here.

Again, this is a great package. You see, this is doing-- remember I told you here that people tend to prefer. Remember I said, this is one way of increasing output. If you want to increase output. And another way is to do it by exports rising. If I don't want to increase out, but this is better because this increases the trade balance, well, suppose I do-- which is what is [INAUDIBLE] is I do the converse.

Suppose I don't want to change output, but I want to increase the net export. Well, these two charts, this and the previous one, tell me exactly how to do it. I use this for the expansion of output and to improve the net exports. And I use the other one to offset the effect on output, but with the opposite sign. I use this, but with declining G. That's exactly what I did here.

So that's very tempting for a country to do, to depreciate the currency and at the same time, if you think that you need to cool off the economy, then you can use some other instrument, domestic instrument to.

For a long time, China was accused of doing just this. It was called the mercantilist policies of China. And especially sort of in late '90s and 2000s and so on, China had massive amounts of exports and the US had a huge trade deficit. It was called the time of the global imbalances because big deficits in the US, big surpluses in China. And the rest of the world kept accusing China of really maintaining their currency at artificially low levels with the purpose of doing that.

And anyways, I'm not going to take sides on that. I think that-- but the reason why the currency, the Chinese renminbi was so depreciated was different from that. But that's a different story. But the result was this. It was that they had very large trade surpluses. And so the result was this, that they had very large trade surpluses. And they grew a lot because they had this. But it was very export-driven. It was the rest of the world pulling.

In fact the domestic economy in China, they were saving a lot. So domestic consumption was very low, but they had massive amount of exports, and that's what was pulling their output up. So open economy, you get new tools. OK, so that's all that I want to say for today. So summary.

A very important demand for domestic goods is no longer equal to domestic demand for goods because part of the latter will go to foreign goods. And also, part of the former will come from foreign demand. So that's what is new of this part. You have an extra component. And then the other thing that is new of this part of the course is that, well, these extra components, the exports and the imports, are functions of things that we didn't have before. For an output, the exchange rate, in particular.

So equilibrium output, again, is determined by a output-- domestic output-- equal to that, not to that. The difference between the two is reflected in the trade balance. So the trade-- another way of thinking about the trade balance is simply the difference between the demand for a domestic goods and the domestic demand for goods. So the trade balance is nothing else than that DD minus the ZZ curve. That's the trade balance, OK?

Sorry. The ZZ minus the DD curve. That's net exports. OK? Sorry. Let me write that down here. So remember that we started from the demand, which was C plus I plus G. That's the domestic demand for goods. We went to Z is equal to demand plus net exports.

So what I'm saying is that net exports is just equal to Z minus Z. So that's the reason you can-- very early on when I want to show you this thing here-- the distance between ZZ and DD is this net export here. That's the reason when the two of them are the same, that also means that the export is equal to 0.

Very important also, message from this part of the course is that a depreciation improves the trade balance and increases the demand for domestic goods. Again, that's why it's called expenditure switching mechanism. The expenditures-- both of domestic residents and foreigners switches towards domestic goods. And that's also very important.

For a given exchange rate, changes in aggregate demand in one large country induced by policy or the private sector-- in this case, China reopening-- affects other countries through Y star, through exports.

So I'm going to stop here. And in the next lecture, what we'll do is we'll integrate this with the financial opening. And that will get us to what I think is one of the most important models in this course, which is called the Mundell-Fleming model.