

[SQUEAKING]

[RUSTLING]

[CLICKING]

**RICARDO**

**CABALLERO:**

So remember what has been happening to the US economy. As economy-- and it happens similarly with a few lags and leads and differences in sizes but around the world, in most economies around the world, as the economy began to reopen from COVID, we had a situation where we had too much demand for supply. The potential output, using the terminology you have in the IS-LM-PC model, it was slow in picking up because we still had lots of bottlenecks in the supply chains, and in different sectors of the economy, some people didn't want to come back to work, to the labor force for a while and so on.

So the supply side was very still impaired. Not as impaired as in the middle of the COVID in 2020, say, but it's still impaired, while demand was very strong because people were fed up of staying at home. They had saved a lot during the COVID recession and they wanted to spend. OK? And there had been lots of fiscal support and monetary policy support and so on, so people feel wealthy and felt rich and so they wanted to spend.

There is a big demand, but supply is not there. That starts introducing inflationary pressures. Say we have a negative output-- a positive output gap, output above potential output. That puts immediate inflationary pressure. That's what we learned from the Phillips curve and all that. OK? And now for a while, the Fed did not want to react to this because they thought that this was going to be mostly a temporary phenomenon, that supply would recover pretty rapidly, and that people would, after taking one trip, well, they wouldn't want to take a second one.

Fiscal support was winding down and so on, so they thought this would go away, and they didn't want to cool off the economy because they thought they didn't want to fight a temporary fight. Now as a result of new shocks, the war and things like that, but also that the initial call was not right, was incorrect, that there was a lot of inertia in demand and that pick-up in demand lasted a lot longer than they expected. Is that inflation really began to rise, and the Fed was really caught what is called behind the curve.

They should have started-- at least exposed, it's easy to see it that way. Remember what you have. If you have a situation where output is above potential output, the interest rate is supposed to be rising. So the Fed is supposed to be increasing the interest rate, but they didn't for a while. Assuming that the forces that were bringing potential output down and demand up were transitory. When they discovered that wasn't the case, they had to start catching up. As a result of that, they began to hike interest rates very, very rapidly. OK? Unusually rapidly for an economy like the US.

There are many reasons why policymakers, especially monetary policy makers, prefer to be gradualist, meaning to move things in small steps rather than in one big bang, especially in the way up. It is to cut rates, they're very willing to be very aggressive in cutting rates. But raising rates is something they tend to be reluctant to do very, very rapidly. And one of the main reasons they are reluctant to do that very rapidly is because something may break in the process, and there are certain things that are very important if it breaks.

There are certain other things that are not very important if they break. But one of the things that is very important if they break is banks. OK? And that's typically where you run into trouble when there is episodes of very fast hikes in rates. Now, because the US banking sector, especially the large banks, were very resilient, they had lots of capital and so on, there wasn't a lot of concern that that would be an issue in the US because, again, the big banks looked very healthy. Deposits were flowing out of big banks, but it was happening all at a normal pace.

It's normal that deposits go out of the banking sector when interest rates start to rise. But there was no sign of any trouble. Well, that changed a month ago, as you well know, and something broke finally. The major episode there was the Silicon Valley Bank. We saw a big bank run there and eventually that bank collapsed. And since then, things have looked a little more complicated. So here you have, for example, commercial bank deposits. As I said, as the Fed began to hike-- so focus on the red line.

The Fed began to hike rates, then deposits began to-- people began to move their money out of deposits into US treasuries, money market funds, things of that kind. But that was normal. OK? And that didn't lead to a big cut in lending, which is what you worry about when banks lose funding. But things began to change quite rapidly, well, in the second half of 2022. This was felt mostly by large banks. And when deposits decline gradually in large banks, that's not such a big issue because deposits are not the only funding source that big banks have. They have many other sources of funding.

But then that's what happens this year. Things accelerated very, very quickly this year. And so this is different. This is a different animal from this sort of very controlled decline in deposits as interest rates were hiking. This is a very sharp decline in deposits. OK? So that's a problem because that unavoidably will hit lending. OK? So that's going to show up in terms of the models we have had. If you were to use your IS-LM-PC model, it would show up as an increase in  $x$ . Remember, we had risk premium and stuff like that. Well, that's the way you probably could model what is happening right now.

Now, one of the-- as I said before, these are in different scales. So small bank deposits on the left, large bank deposits on the right. As I said before, through most of these episodes in which deposits were declining in the banking sector, it was mostly a phenomenon that affected large banks, and it was very gradual. OK. But what happened since a month ago is essentially small and medium sized banks experienced a very large run in deposits. Part of that went to money market US treasuries and part of it-- you don't see different scales and so on, but it went actually to large banks. It was relocation. That's called flight to quality. OK?

Now even if this has been a full relocation of deposits from large banks-- from small banks to large banks, and so no deposit would have declined in the whole banking sector, that would have consequences for the economy because these type of banks don't lend to the same type of people. Small banks, small, especially regional banks, lend a lot to people that-- to businesses and people that do not have other sources of funding. They tend to be small businesses and so on. The only way they can borrow is either from the family or from a bank. But they cannot issue bonds and things like that, no? And so they don't have other sources of funding.

And so that's a problem because what you see here is naturally when you start seeing deposits going out, there have been also losses experienced by the banks because they had to recognize the losses in the asset side once they lost deposit is that they had to cut lending. And you can see here what has been happening to lending. Large banks, they began to slow down here, but it's a gradual slow down. But you have seen a very sharp decline in lending over the last three or four weeks. OK? So we're in the early phases of what we like to call, as described as a credit crunch. OK?

Now that's a problem, as I said before, because those banks, these banks, the banks in gray here, are the banks that lend primarily to small and medium sized businesses. So you see here the share of commercial and industrial loans by bank size. And this is loans to small businesses, loan to larger businesses. These are the banks that are in gray or below \$250 billion, and you see that they have a large share of loans to small businesses. OK.

So those sectors are going to suffer a lot. So there's going to be a contraction in the economy, and it's going to be very concentrated on small businesses, medium sized businesses, and so on. And again, it's more problematic, a contraction in lending to those businesses because they don't have alternative sources of funding. That's it. OK?

It's either return earnings, the family is really, really small, or banks. Again, big corporations, these guys, probably are borrowing from 10 different banks and they have issued corporate bonds and they even have commercial paper. This is entirely different life when you live here and when you live here. If you look by sectors, that also is going to have implications for sectors.

So this is going to be clearly contractionary, but it's not going to be equally contractionary. It will depend on the composition of your sectors. Not all sectors have the same share of small businesses and medium sized businesses. You see here the construction service has a very large share. More than half of the businesses in construction are really small or medium sized businesses. OK? Big contrast with utilities where they are all big businesses and so on. OK.

So big dispersion, and so this is going to be a contraction that is going to be very felt-- is felt very strongly here at the top. So that's what is happening right now. And from the point of view of the aggregate, essentially where we have gone is from a path like this to a path like that. So the economy was overheating, so we needed to slow down the economy. There's no way around that. Output was above potential output. That was causing inflationary pressure. We needed to bring this stuff down, and the economy was slowing down.

But it was happening at a very slow pace. And that was a bit exasperating for the Fed, but it was happening very, very slowly. Among other things, because the balance sheets of the household sector and corporations in general was very healthy. But now things are accelerating very quickly because once you introduce credit crunch, credit constraints, and things like that, the same declines in wealth that we were experiencing before that were driving aggregate demand down have a much larger effect. And so we're changing from a world that looked like that to a world that's going to look a lot more like this.

And that's a tricky for the central bank because now the Fed needs to-- before there was no way around. They had to hike interest rate, because the main problem was inflation. Now they know that as they hike interest rate-- they still need to hike interest rate, I think, unless there is a big mess, because inflation is still way above their target. But they have to be very worried that this stuff doesn't become too steep. Things get to be very non-linear when the financial sector is involved.

And so probably that means that on net, they already did it. In the previous meeting, everyone anticipated 50 basis points of hikes. Once SVB happened, the bets went down dramatically and the realization went down to 25 basis points. And so that's where we are now. Now if everything works as planned-- and more or less that's a forecast at this moment. There isn't any panic and so on. Is that we're going to experience not a technically a recession, but a significant slowdown in the next quarter or so. OK?

That's sort of the consensus expecting to see as a result of all these combined forces. A Fed that still needs to tighten because of aggregate demand reasons and the very negative effect of the credit crunch, especially in certain parts of the economy. OK? If everything, again, works as planned means things continue to go fairly smoothly, then it's certainly not going to be a good year for economic activity but it shouldn't be a disaster either. That's sort of where we are at.

And the tension is, well, if the financial crisis leaks into the larger banks, then these numbers are going to get a lot worse, of course. But that's the concern at the moment. But it doesn't seem like the central scenario. Now, there are also some good news happening because remember that the problem we had-- the problem we have comes from two sides. One side is too much demand, and that the Fed can affect very quickly. That's what it's doing by hiking interest rates. Not as quickly as they would like, but still, they have an impact on that. But the other problem was aggregate supply.

And in particular, it's that the labor market looked very tight. And remember when we did the Phillips curve and all that, the labor market is very critical in all the process of generating inflation and so on. That's the reason you try to generate more unemployment, essentially to lower wage pressure, because that means less pressure on prices and so on and so forth. And one of the problems is that, again, is very nice in principle, that we have very low unemployment rate.

But it's very difficult to lower wage pressure if unemployment is so low. Having said this-- and this is the part that I say is fairly good news. Having said this, in the model we simplify things and we just put unemployment as the only variable that could adjust and that was important for wages aside from some institutional. Things in practice, there are many other indicators. And really what really matters is employment. What happens is we took a fixed  $n$ , we took a fixed the participation rate, and that's the reason unemployment was the variable to summarize everything.

But what really puts pressure on labor market is shortage of workers. If you have an unemployment rate that is constant but there are lots of workers coming into the labor force, then that doesn't put as much pressure on wages, and therefore less pressure on inflation. And this is exactly what we're beginning to see in the US economy, and I think that's very good news. It gives us hope that this inflationary process may come down a little faster. So this is labor market participation. Remember?

So this unemployment number spiked a lot, but it underrepresented how much contraction there was in labor, in employment, and so on, because many people simply exit the labor force and those, remember, we don't count as unemployed OK? And so that happened. It was a very sharp decline in the labor force, in the labor participation rate, so the decline in the labor force. And then that recovery is one of the things that happened much slower than the Fed anticipated.

That was part of the mistake is they thought that this was going to come back quickly and that for potential output was going to rise very quickly, and it didn't. That was one of the mistakes, the forecast mistakes. But now it's clearly that it's coming back to levels that are more consistent with historical levels. If you look at the employment to population ratio, also a big decline for similar reasons. But if you look at employment to population ratio today, it's clearly getting back to the trend it had before.

OK. So that's very good news in the sense that even if unemployment doesn't move a lot, this reduces-- well, it's good for output. It expands and so on. But it also lowers inflationary pressures in the economy. And another component actually that I think I mentioned a couple of times in the lecture is immigration. In a market like the US, a lot of the labor forces comes from immigration. OK? And that stopped for a while for a variety of reasons, but certainly COVID had a big effect.

So that meant about 500,000 less people a year coming into the US labor force, and that has big impacts, especially in some sectors of the economy. OK? And that's clearly been fixed now. OK? We may have other problems. People may fight for political reasons and these things and whatever, but from the point of view of macro, this is certainly helping. OK? In fact, if you look at where the wage pressure is really coming from in the US economy, it's coming from those sectors where immigrants play a big role.

Accommodation, food services, stuff like that, you see that their sort of wages rose pretty dramatically because there was a massive shortage there for two reasons. One, people didn't want to go back to those sectors to work, close contact and stuff like that. And the other one is that the important flow of supply of workers into that had slowed down quite dramatically. OK? So that's where we're at. And as a result of all these good forces, despite the fact that we have very low unemployment, you can see that wage pressure is beginning to decline in the US. OK?

So it was very high there, but those numbers are very distorted by composition effects and stuff like that. But these were the numbers that were very worrisome. I mean, with wage inflation of 6%, it's going to be very difficult to bring inflation to 2% down. You need much lower wage inflation. But you see that is beginning to decline. 2% is still too high for a steady state if you want to go back to 2% inflation rate because you can have an increase in real wage, but that has to be more or less aligned with the rate of growth of productivity.

Which is much lower than that. I mean, at best it's 1%, 1 and 1/2 sometimes. So you could live with 3.5% real nominal wage growth, but 4, 4 and 1/2 is a bit too much. OK. Anyway, so that's the state of the economy. Any questions about the state of the economy? Open question. No? No? You're happy with it? Doing fine? OK. Good. So what I want to do next is so this was a summary and all that I did here I did close economy economics.

All my description, I didn't need to tell you what was happening in the rest of the world and so on. That would have been a lot harder to do if this was Singapore, for example, because Singapore depends a lot on the rest of the world and it's very difficult to tell a story that just depends on what happens in Singapore. The US is pretty unique in that you can tell most of the story based on what happens in the US. Most. Not all, but most of the story. And that's what I just did. Almost anywhere else, you need to think about-- even if you're in Japan. Big economy and so on.

Effects will play a big role. And so when you describe the state of the economy, you're going to be talking about the yen. Very high, very low, or not. Here you don't worry much about the dollar. The US is very unique on that. I think no other country in the world has that feature. OK? So now we're going to open up the economy, and again, perhaps it's the least important for the US but anywhere else it's tremendously important. More so it's becoming increasingly important for the US.

It has been becoming increasingly important in the US. Now we're in the middle of a deglobalization mess. We shall see where we end up. So there has been a bit of a reversion of a very strong trend towards integrating the economies of the world through many different channels. And so I want to talk about what are the key variables when you integrate an economy to the rest of the world and things of that kind. I'm going to start with some definitions. What are variables that we're going to be talking about that we weren't talking about up to now?

So one of the things that's going to be very important in an open economy is the exchange rate. OK? And here I'm giving you-- I'm going to define things very formally later on, but here you see an example of the US dollar vis a vis the main trading partners. The US trades with many different parts of the world, and there's bilateral effects between those things. And this measure here is something that weights by the amount of trade that we have with different economies of the world, trades the different effects and says, well, is the dollar strong, weak, or whatever. This is a matter of convention.

There's many ways you can-- no, there are two ways in which you can do it, but we're going to do it the following way. What these effects will reflect is the price of the domestic currency in foreign currency terms. So that means when this goes up, means the dollar was becoming very expensive. OK? And that's a very sharp-- I'll get back to it, but we call that an appreciation of the currency. OK? So here the dollar was becoming very expensive in terms of other currencies.

The opposite happens starting the second half of 2022. Now we have had some cycles here during this year. That's going to be a very important variable, the effects. We call it the effects, the exchange rate. Another variable that we haven't talked about but that is going to be important here is-- and that politicians argue a lot about it with the wrong arguments, but they do, is the trade balance of goods and services. Of goods and services.

So this, the trade balance of goods and services, is simply the difference between the exports, so what a country sells to the rest of the world, versus its import. That is how much it buys from the rest of the world. OK? So this is monthly data for the US. The US nowadays of runs a deficit, a trade balance deficit of the order of \$70 billion a month. That means exports to the rest of the world about \$70 billion less than it imports. Sorry. Sorry. Yeah. 70 less than it imports. Perfect.

OK. You have seen that this is pretty sustained, actually. Here it looks pretty balanced, but the US, on average, has a situation like that. OK? The US tends to export less than it imports, and then that's when politicians get all very worked out. They say, this is unfair competition from the rest of the world and so on and so forth. I think in general, it has very little to do with that. It has to do with the fact that the US likes to save less than the rest of the world. But let me not get into that until much later in the course.

But anyway, that's the situation for the US. This is obviously a blip that has to do with COVID and so on, but you see that we're now more or less back to where we were before. This was a period, actually, of lots of global political tensions because it had one counterpart that was very big. It was China. OK? The time of the global imbalances in the US was learning very large trade deficit, and then China in particular was running very large trade surpluses, and so there were lots of political quarrels because of that.

So obviously the US has many, many trading partners, and with respect to many of them, it has very large deficits. So on net. And here are the main-- I ranked the 10 main deficits for the US. So I don't know when was this. But anyways, it looks like that for the last eight or so years. Remove COVID, it looks more or less like this all the time. And you see that the US, indeed, large exports to China, about \$153 billion a year, and it imports about \$536 billion a year.

So the net deficit is \$380 billion a year. That's the reason this is a big political thing. OK? It sounds like a big deficit. But there are other countries. With respect to Mexico, \$130 billion, and so on. The US exports a lot more to Mexico. Vietnam. A lot of what happens from Vietnam is really Chinese exports in disguise. But there you see it. OK? There are many others. Germany is always a problem, but-- a problem for somebody that sees deficits as a problem and so on. OK.

Now that's on the good side. What I was saying here is that one sense of openness is in the goods and services market. So you buy goods from the rest of the world, the rest of the world buys goods from you. Sometimes these things are balanced, sometimes they are not. When at the aggregate level, they are not balanced for a very long period of time, unless you're the US, that often causes problems. But at the bilateral level, if you look at any country, we'll have situations like this. Some countries where they export a lot to and import very little from and vice versa. But that's the way the US looks.

Another sense of openness, which is very important is financial openness. Meaning that you can also buy or save using foreign assets or domestic assets. So you can buy foreign assets-- perhaps not you directly or most of you directly, but you can do it through a broker and so on. You can buy foreign assets, and foreigners buy lots of US assets. OK?

That's a sense of openness in financial markets, that you can buy-- you're not stuck with your country's financial assets. You can also invest in other countries' financial assets and vice versa. Those things probably you as-- I mean, you know this trade openness a lot more probably than financial openness because you're all the time buying imported goods and stuff like that, while you're probably not involved in a lot of transactions of international financial instruments and so on. But they are very large. OK?

So pension funds and so on, they're all involved in very large transactions. In fact, transactions in financial markets are an order of magnitude larger than transactions in the goods market. Very large. And here you have an example by origin, the foreign holdings of US assets. And this is in billions. So these guys here-- this, China and Canada have the largest, and the UK, those have on the order of \$2 trillion of US assets they're holding Japan should be here also. Yeah, there it is. Yeah.

Now in these two countries here, a lot of those holdings actually-- well, particularly in China more than in Japan. In China it's a little less than Japan. Japan, they save a lot so they need to buy lots of financial assets and the US is the main producer of financial assets in the world. They save a lot on that. But also the central bank, because of currency intervention and so on, buys lots of US treasuries.

China, this is mostly the central bank buying US treasuries, foreign reserves, large amounts of reserves. Canada is private sector, pension funds and so on, probably. But you see, Brazilians also buy lots of assets from the US. Again, central banks play big roles in all this. Australia is less a central bank, much more private sector. UK is all private sector, and so on.

And in Europe. OK. But the point of that picture is that there are lots of countries in the world or residents of different countries in the world that buy US financial assets and in big amounts. OK? I don't know what the total number today is. Probably-- eh. Actually, let me not make up that number. You may find it.

But it is certainly in the \$20 trillion or something like that of assets held-- US assets held by foreigners. You can check it and tell me. It's probably more. Here's the other way around. US residents holdings of foreign assets. OK. You see, US residents hold lots of Canadian assets and mostly developed economies, but there you have India, China, and so on. Lots of Latin American assets and so on. OK.

So the US-- so it's not only that the rest of the world demands US assets, but US residents-- perhaps not directly, most of you, but indirectly demand lots of foreign assets. OK. There are some very fascinating facts that happen here because the type of assets that foreigners tend to demand from the US are very different from the ones the US demands from the rest of the world.

In fact, one of the things that-- the reasons the US can afford running those chronic trade deficits is because it tends to get much higher returns on the assets it buys abroad than foreigners get on the assets they buy in the US. The difference allows you to fund systematic trade deficits. And the reason for that is a lot of the US assets that foreigners buy, they do it for safety reasons. They are buying US treasuries, very safe instruments. Just in case there is a big mess, they want to have those assets, so it's almost for insurance reason.

The US treasuries are sort of perceived as a main safe assets in the world. So they hold it for that reason. While the US mostly holds assets abroad for risky investments. Either foreign direct investment or equity, stuff like that. And typically most fixed income investors in the US-- a lot of what you see here is just US residents reaching for yield. Brazilian sovereign bonds, the equivalent of the US treasuries give you 9%, 10%.

It's a lot higher than the US tends to give. 14% even now, and so on. So on net, the US tends to make-- has less assets in the rest of the world than foreigners have of the US and it still makes sufficiently more return, higher return on average on an asset it holds on the rest of the world that it has a surplus which it can finance the trade deficit. This is complicated. You don't need to know the details, but just to tell you what the kind of things are happening.

So there's three senses in which you can have openness. The two that have described implicitly already, goods. In goods market you can buy foreign goods and you can sell goods to the rest of the world. And the second one is financial markets, which is what I just described. You can choose between domestic and foreign assets. The main impediments to the former typically are tariffs and quotas, and you have heard a lot about tariffs and so on these days.



The main impediments for financial markets is what is called capital controls. Very rarely developed economies impose capital controls, but emerging markets do it regularly. OK? Limit the amount of-- especially capital outflows. When lots of capital is live in the country, they try to stop you from doing more of that. And they sometimes do it in the way in because they want to avoid the macro instability that comes from the big reversal of capital flows, so they don't let lots of capital flow in during the boom just to prevent a reversal later on.

Thus capital controls. And there is a third way of opening to the rest of the world, which is factor markets. OK? Which is that firms can choose location. I mean, some plants-- we're seeing Japanese plants that do not export Toyotas directly from Japan. They have the plant here either in Canada or somewhere in the US and they sell locally.

So that's relocation of factors of production. Japanese capital that relocates to some place in Canada or in the US, and labor. You can also have workers that move from one place to the other. That's another form of openness. Free factor mobility. In this part of the course we're not going to talk about this. OK? We're going to focus on these two.

The first model we're going to look at is going to be a model of the goods market, and that's going to be very much like the IS-LM but with an open economy. And then we're going to bring in interest rates, but now once you-- remember what we did in the closed economy first? We looked at the goods market, then we look at interest rate determination. That was our LM. And then we put the things together, we came up with IS-LM.

Here the tricky thing is that there is not only one interest rate. There are really two. You have to decide between the domestic and the foreign interest rate, and then there is an exchange rate in between which will also affect. So that's the reason it's going to get a little more complicated, because you're going to be having two different prices, two different goods you can buy. You're going to have also two different assets you can buy. And the effects is going to affect all those things. Whenever I say effects, I mean the exchange rate. OK?

Foreign exchange. That's the reason sometimes it's called FX. Now one thing that happens is that because economies are so integrated in goods and financial markets is that business cycles tend to-- especially large ones tend to be very synchronized around the world. You see here emerging markets. Sorry. Yeah. This is the world. That's emerging markets and that's advanced economies.

You can see the kind of things we discussed in the growth section, which is these countries tend to grow faster than these countries because they're catching up. That's the reason they're called emerging. But the level of the business cycle, they're very synchronized. I mean, there's 2008, 2009. The recession was a recession globally. This one doesn't have COVID, but, well, COVID very naturally was very synchronized around the world.

The point I'm making here is that once you're very integrated to the rest of the world, you're also exposed to a new source of shocks. It may help you in many instances, but you're also exposed to things that come from the rest of the world. And the evidence is that business cycles are very synchronized. It's very difficult for the rest of the world to be immune to a US recession, for example. It's very easy for the US to be immune to an Argentinian recession. That's a different story.

But when things are large, involve the large economies, typically that will leak into the rest of the world. China has changed a little bit the composition. It used to be the case that that was always the case. If the US sank, then everyone sank. And now you have China, which stabilizes-- it's different. It's not completely correlated with the US, and so that has been stabilizing, actually, for many especially commodity producing economies and so on. But it's still the case.

Big mess is a big mess everywhere. If the economies were closed, there would be no reason unless you have some exogenous shock. COVID, even if the economies were completely closed, would have been a mess because as long as the virus is spread, then it's a mess regardless. But that's not the case here. This recession was caused by a financial shock in the US. OK? And still, the global economy as a whole suffer a lot. So things become very synchronized because of that.

Another thing that has been happening is that everywhere-- again, we shall see where we end up after this COVID things. There was a slight reversion of that. But everywhere, even the US, which is one of the closed economies in the world-- one of the closed of the significant economies, there has been a sort of-- there was a steady trend rise towards higher integration to the rest of the world. And the same is happening in financial markets. This is just an order of money larger.

But you see here in the US, you see that imports and exports as a share of GDP, they were both rising over time. Here shows you what I showed you before, which is the deficit, chronic deficit that the US has had. But still, even exports have been rising for a while. Now this number here, you know that about 20% of the US produced goods of 15% of GDP, The US has about 15% of GDP in imports and in exports. Some people use that, the sum, for example, of imports plus exports over GDP as a measure of openness, how open is an economy.

And it's OK for comparisons, but it's clearly underestimated how open economies really are. I mean, many of the goods that are considered-- that the US does not import are produced domestically so they don't count as part of imports or anything. Their price is really determined by international competition. OK? The price of a Ford is very different with foreign competition than not.

So we don't count the Fords produced here as imports or anything and it was part of the non-tradable. Not non-tradable. It wasn't part of this measure of openness. But it's clear that the price and even the quality is being affected by exposure to international competition. So there are very few sectors that are not really exposed to international competition. Yeah, haircuts. They're not. I mean, you're not going to-- unless you live in some county at the border of Canada and there is a town right on the other side, that's not going to happen.

OK. So trend is upward, and even more so than those numbers suggest. If you look across the world, here is what I showed you before-- what I said before is that the US actually certainly looks very close relative to others. If you look across large economies, Japan, which is also very closed economy for a variety of reasons, it's still more open than the US, UK, little Chile here. One thing that this shows, this dimension here shows is that the smaller you are, the more open you're likely to be.

And it makes sense. It's harder to produce all the goods if you have a small country. So that's a pattern. The smaller you are, controlling for a variety of factors, you tend to be more open. You need to import and export more. Import more, in particular. Now, that pattern is disrupted when you look in this direction, no? So all these countries, which are clearly much larger than Chile in terms of GDP and so on, have very high export ratios. Why do you think that's the case? Yeah?

**AUDIENCE:** Europe.

**RICARDO** Exactly. They are in Europe. Europe is very special. Europe as a whole is as closed as the US. So if you look at the whole area together. But there is lots of intra-Europe exports and imports, especially in the Eurozone. I mean, you have lots of things that have the same currency. It's right next door. So they're very open, but they're very open within Europe, not so much with the rest of the world

**CABALLERO:**

But this doesn't differentiate intra-Europe exports and imports versus total. That's the reason you see these numbers are very, very large. But even here, within here, you see that the smaller countries tend to be very open. Much more open than bigger countries. OK? Good. So as I said, so terminology. This picture looks very similar to the picture I showed you earlier on, but it's not. There it was a trade weighted dollar, and here it's just one particular bilateral exchange, which is the dollar-yen exchange rate.

What happens is when the dollar appreciates, typically it appreciates against everything and so on. That's the reason the pictures look very similar. But this was pretty dramatic. There was a very sharp appreciation of the dollar-- well, strike what I said. So anyways, this is the pattern of the number of yen's per dollar's. Meaning we decided that that's the way we're going to define exchange this the price of the domestic currency in terms of foreign currency.

So the price of the US dollar goes up when they pay you more yen's per dollar. And it went up very rapidly from close to 100 to 150. That was massive. There were massive interventions here because it was clear that this was getting totally out of hand. But anyway, so that was-- OK. And we say in this case-- so when a currency gains in value, we call that, in terms of other currencies-- there's no sense of a currency gaining value in terms of nothing. It has to be in terms of other currency.

That's what an exchange rate is. So we say that the currency is appreciating. OK? So in this case, it's a nominal exchange rate, so it's dollars per dollar. When the dollar is going up here, we say the dollar is appreciating relative to the Japanese yen. OK? That means the dollar is becoming more expensive. They have to give you more gains per dollar.

You can look at it from the point of view of Japan, and then the picture would look the other way around and it says in this same picture, I know that the Japanese yen is depreciating relative to the US dollar. OK? So depreciation is when your currency loses value. Appreciation is when your currency gains value. I mean, if I tell you-- unless you more or less know the prices in the different places, if I tell you that the Japanese-- the US buys 130 Japanese yen, you can tell me-- and then I ask you, where would you like to buy your car?

I assume that the car is the same quality. No transport costs and so on. And I tell you, look, the Japanese yen is-- for each dollar you get 120, 130 Japanese yen. Where do you want to buy your cars? That's the right answer. You have no clue. That doesn't tell you anything. The nominal exchange it tells you the relative value of currencies, but to make the decision of where you buy your car, you need to know which car is more expensive.

That's not enough to know the exchange, the nominal exchange. You need to know what is the price of the car in each place in its own currency. And then I'm going to use the exchange rate to translate them into some common currency. Suppose I tell you now that the price of-- I do the opposite experiment. I say, look, the price of the same car in Japan is a 150,000 yens. Well, there you all have lots of zeros, but a 150,000 yens, and in the US is 1,500. This is a used car. \$1,500.

And then I ask you a question. Where do you want to buy your car? You can't answer either because you don't know how to compare. Unless I give you the nominal exchange as well, you don't know how to compare those 150,000 yens versus the \$1,500. So you need both. And that concept that captures both is what is called the real exchange rate. The real exchange is the sign for that, to capture where are you going to do your imports and exports. OK? And it's a relative price of two not currencies but goods.

So that's what the real exchange is. It's the price of domestic goods relative to foreign goods. How many Japanese cars you give me for one car, US car? That's the real exchange rate, which is different from the nominal exchange rate. Now, it's related to the nominal exchange rate. It happens that in practice a lot of the volatility of that price is as a result of the volatility of the nominal exchange rate. Let me end this. With this, I will stop. So let me call epsilon the real exchange rate.

Let me see how we're going to get to that expression here. So we want to compare here is the relative value of two goods, because that's what will matter for my consumption decision or my purchase decision. So suppose we're talking about this car, and suppose I know that the price of the car in the US is  $p$ . And now I want to compare it with-- well, do I buy it here or do I buy it in Japan? For that, I'm going to have to compare them in the same currency.

So the first thing I'm going to do is I'm going to translate my US dollar price to Japanese dollar-- to yen pricing. OK? So say that I'm going to have simple numbers and they want there. So price of the car in the US costs \$10,000. Suppose that for each dollar you get 10 yens. Then \$10,000 times 10, that means it's 100,000 yens. So if I buy the car in the US, I pay 100,000 yens. And so now-- ah, sorry. This was not Japan in this example. It's the UK. Well, the same story. OK. And it's even simpler. It's say then the car in the US cost \$10,000.

Each dollar buys \$0.80 or \$0.80 of pounds, so that means 8,000 pounds. So the US car cost 8,000 pounds. Now compare it with a car in the UK, say, the same car, and the ratio of these two things is what we call the real exchange rate. So it's the price of the domestic good times the exchange rate divided by the foreign price, and that's the real exchange rate. If the price of the car in the UK was \$9,000 and I could buy the car in the US for \$8,000, I would probably buy it in the US. In practice, there are difference between the two currencies.

That's the kind of thing that the real exchange means is the relative price of goods. OK? But the way to go from that is you have to multiply the nominal exchange rate times the price, because that converts it into the same currency as the price. And then you can compare them. That's the idea. So let's stop here. We're going to continue talking about open economy next week. On Wednesday, what I'm going to do is a review of IS-LM-PC and growth.