



A podcast about the economics of trade & policy  
with Chad P. Bown

## Episode 192. Will more farm trade cause more deforestation?

[Episode webpage](#)

October 22, 2023

Transcript

(lightly edited)



**Chad Bown:** Deforestation and trade policy are coming together in some new and controversial ways.

In June of 2023, the European Union's brand new Deforestation Regulation entered into force.

**News:** *The European Union is taking a huge step forward when it comes to tackling environmental destruction, after the European Parliament voted on Wednesday to ensure that products on the EU market are deforestation free...*

**News:** *...So the products covered will be coffee, cocoa, wood, cattle, palm oil, soya, and also products fed by or used by those things such as leather from the cows, chocolate from the cocoa, furniture from the wood, and that type of thing...*

The Deforestation Regulation applies to products sourced not only from European countries but to goods imported from all around the world.



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It's not just the Deforestation Regulation. The EU's recent trade deal with Brazil and other MERCOSUR countries has not yet been implemented in part because of Europe's concerns over deforestation of the Amazon.

The European Union is not alone. Concerned with deforestation, the United States has also recently blocked imports and threatened tariffs on Peru and Vietnam over illegal logging.

This episode explores the economic linkages between deforestation and trade in agricultural products. Is more farm trade good or bad for the fight against deforestation? When it comes to this part of climate change, how do the trade policy details matter?

To tackle all of this, I will be joined by a very special guest.

**Farid Farrokhi:** Farid Farrokhi, Purdue University, currently visiting Princeton University.

**Chad Bown:** Farid Farrokhi is an economics professor at Purdue University and a Kenen Fellow at Princeton University. He is an expert on agricultural trade, and Farid has a brand new paper on the tradeoffs associated with farming, deforestation, and exports, that he is going to share with us today.

Hi, Farid.

**Farid Farrokhi:** Hi, Chad.

**Chad Bown:** You are listening to an episode of *Trade Talks*, a podcast about the economics of trade and policy. I'm your host, Chad Bown, the Reginald Jones Senior Fellow, at the Peterson Institute for International Economics in Washington.

## THE EPISODE

**Chad Bown:** Farid, to begin, describe for us some of the details of the world's deforestation problem.

**Farid Farrokhi:** Between 1990 and 2020, the global forest area fell by 7 percent. To put this number in context and to show how big it is, that's about the size of a country like Argentina, or four times the size of Texas.



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However, the experiences of countries – in terms of deforestation – have been vastly different. For example, in tropical areas, the forest area that we have lost has been enormous.

In Brazil and Congo, we have lost more than 15 percent of their forest cover in this period between 1990 and 2020. In Indonesia that has been about 25 percent. These are big numbers.

However, the rate of deforestation in some other countries has been lower. More importantly, some countries experienced reforestation, meaning that forest area increased in these other regions, including China and parts of Europe.

**Chad Bown:** Are all forests the same when it comes to climate change and carbon capture? If one country loses a forest and another country plants trees to reforest an area of the same size, do these changes just cancel each other out?

**Farid Farrokhi:** When it comes to climate change and carbon emissions not all forests are alike. The reason is because the amount of carbon that forests hold or store per hectare of land is also vastly different between different types of forests.

Tropical forests, like the ones in Brazil or the Congo Basin or Indonesia, are much more important for storing and capturing carbon from the atmosphere.

So that means that cutting down trees in the Amazon is going to be three to four times more important than cutting down trees in the boreal forest, for example, in Russia.

**Chad Bown:** Why is the Amazon – a tropical forest in Brazil – so much more important for the climate than a forest in Russia or Europe or the US?

**Farid Farrokhi:** In the US, when we go hiking in the woods or a forest we typically find our way because there is enough room for us to walk. However, in the Amazon, that's almost impossible to do. The reason is because, per hectare of land, there are many more trees, the trees tend to be thicker or taller, and it's not just the carbon-based biomass above the ground. It is also the carbon that is stored below the ground, like the roots that store carbon there.

The implication is that it is not just about the total forest that we have lost but also what type of forest we have lost – whether it is in tropical areas or in the boreal forest that are less dense in carbon.



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**Chad Bown:** The next thing I want to talk about is agriculture, or food. At the risk of asking a super silly question, why is agriculture so important?

**Farid Farrokhi:** Agriculture is important because we all need food. And the thing is that these days, particularly in rich countries, we take food for granted because it is just so easily available to every one of us. However, if you look at other countries that are much poorer than a country like the US, or if you put this into historical perspective, then hunger, famine, and food security have been big issues.

So from 1950 to 2000, the world population more than doubled. However, agriculture area increased by only about 25 percent. What really was the force that was at play was the increase in agricultural productivity – i.e., our ability to produce more with less. Meaning that if I have one unit of land, with that unit of land, now I can produce much more.

**Chad Bown:** Over that 50 year period – the second half of the 20th century – how did the world start getting so much more food without using up as much land?

**Farid Farrokhi:** There are a number of reasons why this happened. All are related to technological improvements in agriculture: the use of fertilizers, better seeds, irrigation systems, etc. That made us able to produce more output with the same amount of land.

This episode of history is sometimes referred to as the Green Revolution, and a figure who is very important here to mention is Norman Borlaug, who was an American agronomist. He was very influential in developing high yield varieties in wheat and taking them to developing countries, such as Mexico or India, in order to fight against global hunger.

For his contributions to the Green Revolution Norman Borlaug, in fact, won the Nobel Peace Prize in 1970.

**Chad Bown:** If Norman Borlaug and the Green Revolution solved this problem, why then is this still an issue today?

**Farid Farrokhi:** Today is even worse. Number one, we still face the growing population problem. We are at 8 billion people now, and the UN projection sets the world population at around 10 billion by 2050. That means 25 percent more people, so at a minimum we need 25 percent more food.



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At the same time, reason number two, we face the issue of climate change.

If we keep cutting forests in order to expand agricultural land so that we can produce more food to satisfy the global demand, then we are going to lose more forests. But these forests around the world are so valuable in capturing carbon and helping the issue of climate change.

If you put these two reasons together – the growing population and climate change – then how we satisfy the global demand for food is going to be ever more important.

**Chad Bown:** That takes us to your research, which is going to help the world understand the tradeoffs associated with global food production on the one hand and stopping deforestation and climate change on the other. How do you start?

**Farid Farrokhi:** We may think that we are in a flat world, and that we are at the peak of globalization. There is some good truth to that for manufactured goods – i.e., many we have by means of imports like laptops or cell phones.

However, for agriculture, there can be a lot more trade than there currently is.

There are a lot of trade barriers in the agriculture sector. And it's not just one country, it's many countries we are talking about. These are import tariffs, quotas, export bans, domestic subsidies – all of these forms of protection in agriculture are prevalent all around the world.

These large trade barriers in agriculture mean that if they are removed, or if they go down, then we are going to have a lot more trade in agriculture.

What we do in our research is examine what the implication would be for deforestation and for climate change from having a lot more trade in agricultural products.

**Chad Bown:** The world does not have as much trade in farm products as it could. Border barriers in farm products remain extremely high in most countries – not all of them, but most of them.

If countries around the world reduced those barriers stopping trade, what do our basic models of international trade suggest would happen?

**Farid Farrokhi:** When countries open up to trade, then each country is going to do more of what the country is good at, and less of what the country is not good at. Basically, each country



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is going to produce more in the industry in which it has a comparative advantage. So if you have a comparative advantage in agriculture, meaning that you are relatively good at producing agriculture, then you're going to expand your production of agriculture and export to others. And if it's the other way around, then you're going to import from others.

Overall, what we learned from the basics of trade theory is that we end up having a more efficient allocation of production around the world. And so there are going to be efficiency gains from trade, and the world is going to be able to produce more food.

**Chad Bown:** Opening up to international trade means more food production overall. That helps deal with the global problem of food insecurity. Yet we also know from the experience of getting rid of trade barriers for manufactured goods that opening up to trade means the world will change. Who produces what will change. Who farms what will change. What do those sorts of changes mean for deforestation?

**Farid Farrokhi:** It depends. If opening up to trade means more farming in your country, that may translate into deforestation, so less forest for you. If it means less farming for you, that may mean that you gain forests.

Now, remember that not all types of forests are the same. Some of them are more dense in the amount of carbon that they hold. And some of them are less dense. The details of where deforestation is going to happen become important.

**Chad Bown:** And keeping track of the details of where the deforestation takes place is something you emphasize in your formal economic model.

Earlier, you mentioned Norman Borlaug – the Nobel Peace Prize winning agronomist – who was such an important part of the Green Revolution in the 20th century. Why is some of his work so relevant for your research?

**Farid Farrokhi:** What Norman Borlaug had in mind – and now we call it Borlaug's hypothesis – is that when agricultural productivity increases, then we may end up saving forests. That may sound a bit counterintuitive, so let me put it into context.

Let me first explain what I mean by agricultural productivity. There we mean that with one unit of land – i.e., with one hectare of land – how much output of rice or wheat or soybean can be produced. We call this “yield,” and yields can go up in different ways. For example, if you have



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better seeds or fertilizers and pesticides or farm machinery, like tractors, then you can boost your yield. One way that you can increase your agricultural productivity is by means of international trade.

For example, suppose you are a farmer in Brazil. Then, when Brazil opens up to trade, the farmer can have better access to fertilizers that the country imports, pesticides, farm machinery, all sorts of agricultural equipment like tractors or combines, that can be used to increase your agricultural productivity.

**Chad Bown:** Borlaug's hypothesis was that more productive farming could actually save the world's forests and help the climate. One way to improve farm productivity is through trade, importing inputs like fertilizers, pesticides, seeds, and farm equipment, and learning about better techniques of farming that may be generated in other countries.

Now let's turn to the farming country's exports, because that is going to be crucial for your analysis. Your research examines projections for a world opening up to trade for these farm exporting countries under a couple of different scenarios.

Let's start with the bad scenario.

**Farid Farrokhi:** The bad scenario is partial liberalization of trade – i.e., the type of trade liberalization that happens toward one country, and that one country happens to have the type of forest that stores a lot of carbon, like Brazil. Now, suppose that the world opens up to trade in agriculture with only Brazil. Then in this case, what happens is that there will be incentives by agricultural producers in Brazil to export more to the rest of the world.

Think about soybeans. There is a lot of production of soybean that can happen in Brazil because Brazil is so good at soybean production. However, there are other countries that are also good at producing soybeans, like the United States.

Imagine you are a farmer in Brazil and your productivity has increased, perhaps because trade helps you be more productive. Now you can offer a little bit lower price for your soybeans to the rest of the world – i.e., to consumers in Europe or China. Because the American soybean and the Brazilian soybean are close substitutes, then consumers in Europe or China are going to switch and shift their demand from the US to Brazil. That creates a lot of incentives in Brazil for farmers to expand their agricultural land. That translates into more deforestation.



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This is a bad scenario. Because the carbon density of the Amazon – the forest in Brazil – is so high, it is in fact extra bad for climate change. In this bad scenario, Borlaug's hypothesis doesn't happen.

**Chad Bown:** The problem here is the *partial* trade liberalization – i.e., the world is opening up toward only Brazil's farm exports, not toward soybean exports from other countries like the United States. But Brazil's massive increase in soybean production comes at the expense of really valuable tropical forests. And what the world gets back on climate – from, say, reforestation in the United States due to US soybean farmers producing less – is just not as valuable as the Amazon. That is the bad scenario, Borlaug's hypothesis does not work.

Is there a better scenario for trade in which Borlaug's hypothesis could work?

**Farid Farrokhi:** The good scenario is where major countries like the EU or China open up to trade in agriculture, not just with Brazil, but with many countries – including the United States, African countries, Asia, Australia, etc.

One key reason for why Borlaug's hypothesis can work in this situation is that the increase in demand for food from Brazil or from the US or from Africa is going to be quite limited. What happens is that if the increase in productivity of farmers in exporting countries is larger than the increase in demand, which is now quite limited, then we can end up saving land globally.

**Chad Bown:** Why does the increased demand for food from a place like Brazil end up being more limited in this good scenario? At the risk of getting really technical, tell us more about how this could be different from the bad scenario case where the world only opened up to farmers from Brazil.

**Farid Farrokhi:** The reason is that, in the Brazil example, there were a lot of incentives in Brazil to cut forest because there was some substitution between Brazilian soybeans and American soybeans. And that substitution was easy to do for customers. Here, because it's happening everywhere, the type of substitution that becomes relevant is no longer substituting agricultural products from the US with agricultural products from Brazil, but instead agricultural products overall with non-agricultural products overall – products like cars, electronics, and education.

**Chad Bown:** With higher productivity and more efficiency, yes people globally want a bit more food, but they also want more other stuff – they want goods like cars and electronics, and





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services like education. So while even a country like Brazil will produce and export more food than it does today, removing trade barriers has much less of an impact on deforestation. Increased land use is more spread out and not limited to forest-critical countries like Brazil.

Removing trade barriers and increasing trade could save the forests and help prevent climate change. But again, as your research makes clear, what policymakers of big consuming countries need to watch out for is that they don't open up to trade in a discriminatory way that shifts farming onto lands that are the most important for climate.

OK, this is amazing, but like all economic models, your research is forced to only tackle a slice of the problem. Tell us about some of the limitations. What else do policymakers need to worry about that isn't being captured by your model?

**Farid Farrokhi:** As countries become richer, they may form a larger demand for meat products, and we know that meat production is a very land intensive type of economic activity. In that case, you would expect to see even more deforestation.

Furthermore, agriculture is not the only thing that matters when it gets to deforestation – e.g., logging also matters. For agriculture, you cut forest, the forest is gone, then you use the land for producing agriculture. But in logging activity, in fact, you want to keep some level of trees. So you want to regrow some amounts of trees to keep your business going.

Another consideration is the political economy of this problem. How will countries in coming decades act on the climate agenda – will they set carbon prices, are carbon prices going to be low or high carbon? And so these domestic environmental policies that countries may adopt or not can also play an important role and whether the way that they do so is a reaction to trade agreements in agriculture is an important aspect of the problem.

Lastly, beyond costs and benefit analysis that we did, we are all humans, and there are other things that we may care, and in this case, it's the issue of biodiversity. That some of the species of animal and plants, when deforestation happens, may go extinct. And that's irreversible. It's a hard thing to put a number on, but I think that's something that we should also consider.

**Chad Bown:** This is such an important area, and there are a lot of moving parts. If you wanted to leave policymakers with one big lesson from your research, what would it be?



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**Farid Farrokhi:** The main takeaway of my research is a call for multilateral trade agreement in the area of agriculture. Because there can be a case with which we can gain a lot in terms of efficiency gains by having more trade in agriculture. And also we can minimize the impact on deforestation.

**Chad Bown:** Farid, thank you very much.

**Farid Farrokhi:** Thank you very much.

**Chad Bown:** To wrap things up, I wanted to highlight what I think is a big contribution of Farid's research.

There is a need to stress multilateral cooperation and the multilateral, nondiscriminatory reduction of trade barriers for food. Trade can be a potentially huge positive contributor both to global food security and to mitigate the effects of climate change, including by halting deforestation. But the type of change to trade policy and hence trade flows really matters. Selectively opening up to farm exports from only countries with really important tropical forests – like Brazil, Indonesia and Congo – could lead to really perverse effects that end up harming the climate.

The subtle point is that the world needs multilateral, nondiscriminatory action – reducing trade barriers toward all of the agriculture exporting countries – to incentivize farming to be done in its most productive places to get the amount of food the world needs and to do so through use of the least amount of land that would take away from climate-important forests.

And of course we need the right domestic policies as well – convincing countries to put a price on carbon emissions and to reward the benefits of carbon capture.

## **GOODBYE FOR NOW**

**Chad Bown:** And that is all for *Trade Talks*.

A huge thanks to Farid Farrokhi at Purdue University, and currently visiting Princeton University. For more on trade and deforestation, do check out his paper with Heitor Pellegrina at



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University of Notre Dame as well as Elliot Kang and Sebastian Sotelo at the University of Michigan. The paper is titled “Deforestation: A Global and Dynamic Perspective.”

On the importance of imported inputs and agricultural productivity, do check out Farid’s separate article published in the *Journal of Political Economy* title “Trade, Technology, and Agricultural Productivity.”

I will post links to the research on the episode page of the *Trade Talks* website [www.tradetalkspodcast.com](http://www.tradetalkspodcast.com) .

Thanks to Melina Kolb, our supervising producer. Thanks to Sarah Tew, on digital. As always, thanks to Collin Warren, our audio guy.

Do follow us on Twitter or X, we’re on @Trade\_\_Talks. That’s not one but two underscores, @Trade\_\_Talks.

<insert super funny double underscore joke here>. ■

#### **Read more...**

- Farrokhi, Farid, Elliot Kang, Heitor Pellegrina, and Sebastian Sotelo. 2023. [Deforestation: A Global and Dynamic Perspective](#). Purdue University manuscript, June.
- Farrokhi, Farid and Heitor S. Pellegrina. 2023. [Trade, Technology, and Agricultural Productivity](#). *Journal of Political Economy* 131, no. 9: 2509-55.