THE BROOKINGS PODCAST ON ECONOMIC ACTIVITY

"Cut demand or cut supply? Rethinking climate policy"

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Episode Summary:

Should cutting greenhouse gas emissions target the consumption of fossil fuels or their extraction? A new BPEA paper argues the answer is a portfolio of policies, not an either/or choice. Because fossil fuels are traded globally, pricing both emissions and extraction can limit how much emissions "leak" to other countries, and the paper makes the case for public support of clean energy R&D to reduce emissions abroad. On this episode of the Brookings Podcast on Economic Activity, Sanjay Patnaik talks to the paper's author, Ryan Kellogg of the University of Chicago, about the tradeoffs between demand-side and supply-side climate policy.

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EBERLY: Welcome to season nine of the *Brookings Podcast on Economic Activity*. I'm Jan Eberly, the James R. and Helen D. Russell Professor of Finance at Northwestern University. And this season, we'll be listening to discussions about papers from the fall 2026 *Brookings Papers on Economic Activity* conference, hosted by Brookings in September.

STEINSSON: And I'm Jón Steinsson, Marek Professor of Public Policy and Economics at the University of California, Berkeley. We are the co-editors of the *Brookings Papers on Economic Activity*, a semi-annual conference and journal that pairs rigorous research with real-time policy analysis to address the most urgent economic challenges of the day.

EBERLY: Once again, we have a great lineup of timely topics, energy markets, inflation, migration's effects on labor and housing markets, financing AI, and more. Over the course of this season, we'll hear a lot more about the conference papers and importantly, how decision-makers should be thinking about the topics they explore.

[1:10]

STEINSSON: This episode wades into a debate that's been dividing climate advocates for quite some time. Should we focus on cutting fossil fuel demand or cutting fossil fuel supply? Sanjay Patnaik, director of the Center on Regulation and Markets at Brookings, speaks with the author Ryan Kellogg of the University of Chicago's Harris School of Public Policy on his new paper, "Economics of Demand-Side and Supply-Side Climate Policies."

EBERLY: This maps into a real debate happening right now in the U.S. and globally. Keep it in the ground and reduce supply? Or shift the incentives so that consumers instead demand more clean energy?

Kellogg's answer is refreshingly practical. It's not either/or. He argues for a portfolio approach and shows that trade is key. Because countries trade fossil fuels directly, reducing extraction in one location raises prices and encourages extraction elsewhere. That's what they call "leakage" in the paper. So, it's more effective to shift consumption toward cleaner fuels together with a reduction in extraction. One tool in one country is just not effective in a global economy. Otherwise, emissions leak through other markets and other countries.

STEINSSON: One particular tactic that he discusses is blocking specific pipelines or export terminals to keep oil in the ground. An example of this is the Dakota Access Pipeline. Kellogg finds that blocking this pipeline would not have kept much oil in the ground at all. Most of it would have just moved to railroads instead, actually increasing local pollution rather than reducing it.

EBERLY: And the paper also has a genuinely surprising detour into China, where Kellogg argues that the country's green industrial policy, heavy government support for solar, batteries, and EVs may have actually paid for itself economically along the lines of an infant industry before you even count the climate benefits.

STEINSSON: Let's hear more from the author. Over to Sanjay.

[3:22]

PATNAIK: Thanks so much, Jan and Jon. Hi, Ryan. Thank you for talking with me about your paper today.

KELLOGG: Happy to be here, Sanjay. Thank you for taking the time.

[3:29]

PATNAIK: Let's dive right in. There's a real debate between keep it in the ground and abundance- style climate policy. Where does the economics actually land on that debate?

[3:39]

KELLOGG: So, the economics actually lands on, I would call it an all of the above strategy, for reasons that are not actually terribly obvious ex ante. Like, if you think about the the simplest possible model you could think of about the economics of climate change and reducing emissions, like, the sort of model you would teach undergraduates in a intro to microeconomics class, that model would point to saying that really all you need to do here to deal with this problem—the fact that burning fossil fuels to get the energy that people need, releases these emissions that cause climate change—there's one simple trick to solve it. All you need to do is put a tax on emissions.

That is basically you need to price carbon, probably do it on the demand side, not the supply side. And that's the one simple trick you need to do to solve all your problems. That's like the very EC 1 model of of the problem.

And then you call it a day and said, you're done. We've solved the problem. We've priced emissions. That's going to drive emissions down, and we're going to, you know, solve the climate change problem that way.

That model is, like, really elegant and really simple, but it misses a lot of the complexities that are part of the real world that really call for a portfolio of climate policies, not just a simple carbon pricing fix.

[4:55]

PATNAIK: Can you elaborate a little bit more on those complexities?

[4:58]

KELLOGG: So, I think the biggest one, really, comes from the fact that a lot of climate policy is local. It's city level, state level, even national level, even the EU, a collection of nations. They have a very vibrant emissions trading system. They price carbon emissions.

In some sense, even that I would think of as being a local policy relative to the global problem. And the climate problem is global simply because, and this is just a fact

about the way the climate works, when a ton of CO2 gets emitted from burning oil, gas, and coal and goes up into the atmosphere, the climate does not care at all whether that ton of CO2 came from a tailpipe where I'm sitting here in Chicago, whether it came from a tailpipe in London or Paris, or whether it came from a tailpipe, say, in Cape Town, South Africa. All causes the same climate change; it all causes the same climate damages.

An implication of that fact is that, whenever you're a climate policymaker trying to implement some local climate policy, the thing you should be thinking about constantly is how does the policy I implement here at home affect emissions everywhere else in the world? And then once you actually really do internalize that, that really has a profound effect on should I be doing demand-side policy? Should I be doing supply-side climate policy? Or should I be doing a combination of both?

And that's going to come as a consequence of, from the fact that the world is interconnected. We trade fossil fuels; we trade goods and services. So, anything I do at home is going to change trade balances and affect emissions everywhere else in the world. And things I do at home might also have an effect on technology that might be adopted elsewhere in the world.

[6:40]

PATNAIK: Great. And you point out that countries trade a lot of oil and gas directly, not just goods made using energy. Why does that matter for climate policy?

[6:48]

KELLOGG: Yeah. So, let's think about it that way. Suppose I'm the U.S., and the U.S. starts to aggressively price carbon emissions, with a carbon tax, a cap-and-trade program. Parts of the U.S., in fact, already do this. California has had a vibrant cap and trade program for several decades now, as have the northeastern states. Canada has done this on and off as well.

If you start pricing emissions, what is that going to do? Well, it's going to drive down the demand for carbon. People are maybe going to drive less, maybe they're going to substitute to electric vehicles. Electric generators are going to substitute away from coal and natural gas to renewables, maybe more nuclear, et cetera. You're going to drive down the demand for fossil fuels.

But the three major fossil fuels, coal, oil, natural gas, they're all traded in global markets. And we've seen a ton of evidence for that throughout 2026, and particularly if you think about the oil market, once the conflict between the U.S. and Iran began in the winter, in February, that closed the Strait of Hormuz, that didn't just affect local oil markets and markets for diesel and gasoline in the Persian Gulf. That affected worldwide oil and gas markets. Prices for fuels went up all around the world.

Turning back to climate policy, if we do emissions pricing in the U.S., it's going to have the opposite effect. That is going to push down prices of fuels throughout the world. Where that leads to a problem for, say, an emissions pricing only policy comes from the fact that if the price of oil, the price of coal, the price of gas falls everywhere else in the world, consumers there are going to demand more of those

fuels. They will start burning more of those fuels, some of which will be coming from exports from the U.S. And those basically emissions increases everywhere else in the world are going to offset, at least in part, the emissions decreases in the U.S., and that's something that climate policy people and economists call emissions leakage.

[8:36]

PATNAIK: That's very interesting. Can you talk a little bit about leakage?

[8:39]

KELLOGG: Yeah. So, leakage is a problem, and this comes about in a lot of ways when one jurisdiction implements a climate policy of its own through trade linkages everywhere else in the world, you get offsetting emissions increases up elsewhere. Some of that comes directly through trade and fossil fuel itself. If I do carbon pricing, that pushes down the price of fossil fuels, oil, coal, and natural gas, that's going to increase emissions elsewhere. Some of it also comes through trade and energy intensive goods, steel, aluminum, cement— products made from the, made from those basic raw materials.

If the U.S. does emissions pricing or if the EU does emissions pricing, that's going to put its manufacturers at a competitive disadvantage relative to manufacturers elsewhere in the world—China, India, Latin America, you name it. And what winds up happening then is that those other manufacturers start to actually be the ones who start producing more of the cement, the steel, the aluminum, all of those goods that actually involve quite a lot of carbon use.

And say the U.S. as the sort of the country or the local region implementing climate policy is going to start importing those goods from the rest of the world, and that those emissions increases everywhere else are going to offset the reductions at home.

[9:52]

PATNAIK: Great. Thank you for that. The U.S. also hasn't really tried taxing carbon extraction directly. So, what would that actually look like, and why might it be more effective than just taxing consumption?

[10:03]

KELLOGG: So, I'll start with the second of those questions, like why tax carbon extraction? And just as sort of a statement of fact, if you look around the world at carbon pricing programs that exist, they pretty much all focus on taxing emissions. That's what the EU Emissions Trading System does. By far the most prominent system out there. Nobody's really taxing extraction.

Taxing extraction can be useful because instead of pushing down the price of fossil fuels, taxing extraction reduces supply, and it's going to push up the price of fossil fuels, oil, coal, and gas, basically countering the price depression that you get from taxing emissions.

The policy that actually really works to combat leakage involves a combination of both emissions pricing and extraction pricing. Basically, what you want to do is you want to use both policies, tax emissions, a demand-side policy, and tax extraction, a supply-side policy. Do some of both so that you're not really moving around global coal, oil, and gas prices too much, and that's how you solve the leakage problem, or at least a big part of it.

Ideally you want to be doing some of both. Nobody out there is really taxing extraction. In principle, like administratively, it's actually not something that's terribly hard to do. Basically what it would involve, say, say we did that in the U.S., all that would mean is simply whenever, say, a ton of coal comes out of the ground, or a barrel of oil, or 1,000 cubic feet of natural gas, find the first point of sale, and simply apply a sales tax at that point of sale, regardless of whether that point of sale is to a domestic customer or to an international customer, say if the oil's being exported.

It's a relatively straightforward tax to implement. Actually, state governments more or less do this kind of tax all the time., Even if you say think about Texas, a lot of oil and gas production in Texas is coming from privately owned land. Nonetheless, the state of Texas imposes a, what they call a severance tax. A lot of states do this on produced oil and gas, even when it comes from private land. It's not a big tax. It's not a tax that has anything to do about climate change. It's about collecting revenues.

But it's basically a tax that's applied at the first point of sale whenever oil and gas come out of the ground. An extraction tax, a broad extraction tax would work in exactly the same way.

[12:17]

PATNAIK: So, you're suggesting basically to come at it from both sides of the market, from the demand and the supply side?

[12:22]

KELLOGG: Exactly. And again, really all you're trying to do is, like, solve the problem that a demand side, demand side carbon pricing on its own, whether it's a carbon tax or pricing that comes from cap and trade, leads to leakage because it pushes down global prices of coal, oil and gas.

An extraction tax on its own would also have a problem. It would push up the prices of coal, oil and gas, and you'd lead to leakage just from the opposite direction. You'd induce producers elsewhere in the world to produce more. You solve the problem by doing some of both. So, you're not moving around the prices of coal, oil, and gas too much.

[12:56]

PATNAIK: Well, that's super interesting. You're pretty skeptical of a popular tactic, blocking pipelines and export terminals to keep it in the ground. Why doesn't that work as well as people think it does?

[13:05]

KELLOGG: So, the problem there is, like, what you've described is sort of an alternative type of supply side climate policy, where we want to keep it in the ground, but we're not going to price extraction broadly in the way that sort of I described as being useful for a way to help solve the leakage problem.

Instead, what you're going to do is target very specific infrastructure, blocking pipelines, blocking liquefied natural gas terminals, LNG terminals, and that sort of thing.

And the problem you run into in the economics if you use sort of that more sort of narrow supply side approach of targeting transportation infrastructure in particular, is that you're not sort of broadly targeting extraction. You're targeting sort of a narrow choke point. And the economics of getting oil and gas out of the ground and consumers are just such that there's just so much value there that producers are going to really try to find a way to find substitutes to get to market.

So, for instance, if you think about blocking a pipeline, say Keystone XL, which has been successfully blocked, or the Dakota Access Pipeline— this is a pipeline that was in fact completed in 2017; it moves oil about half a million barrels a day, so a lot, from North Dakota to the U.S. Gulf Coast. This is coming from the Bakken Shale in North Dakota.

Had that pipeline been blocked, the oil moving through that pipeline, half a million barrels a day, it wouldn't just be bottled up and stay in the ground. Instead, most of that oil would instead be coming out through another means, namely railroads. It's a tool that exists. It's easy for transporters, for oil producers to use.

Yes, it's a little bit more expensive than pipelines, but not that much more, and producers would in fact use it, and in fact did use it before the Dakota Access Pipeline was completed.

So, I have a paper on this with my co-author Tom Covert, and basically what we find is that if you had blocked that pipeline, about 80% of that half million barrels a day that's currently flowing through it would not stay in the ground. It would just come out through the railroads instead. Which actually causes all sorts of other problems because you have these trains running down the railroad, basically mile-long unit trains of nothing but crude oil being pulled along by big diesel locomotives. Those diesel locomotives emit a lot of local air pollution like nitrogen oxides and things like that.

The locomotives also kind of by design, where do we put railroads? We put them through urban areas so that you have basically diesel locomotives emitting a bunch of nasty stuff now going through urban areas instead of oil going through a pipeline, which is much cleaner.

[15:43]

PATNAIK: No, that's actually very ironic, and I'm really glad you're making that point because I think oftentimes when you look at the debate, people forget that if you try

to block supply, that doesn't mean the demand goes away. Right? And so there will be other ways where this demand will be met, and in your case, as you said, it will be transported in different ways that are even more environmentally damaging.

[16:01]

KELLOGG: Exactly. And, the way to do supply side policy, so you don't get these sort of nasty substitution problems is to... like, you don't want to be sort of narrowly targeting, all right, we're going to block this pipeline, or we're going to block this export terminal, or we're only going to stop drilling on federal lands, but do nothing on state and private lands. If you want to be successful on supply side policy, it really, really, really needs to be broad.

That is, you need to be pricing carbon extraction wherever it comes out of the ground and for every single fuel: coal, oil, gas. Otherwise, these substitution problems really make it hard for those kinds of supply side policies to be effective.

[16:39]

PATNAIK: I want to shift gears a little bit for my final question, which is China has become the dominant global producer of solar panels, batteries, and EVs largely through government support. They have huge subsidies for a lot of their industries. Is that a model other countries, including the U.S., should be following? We've seen these arguments quite a a lot in the public sphere. Is that something that is feasible, that is realistic, that is a good use of taxpayer money?

[17:03]

KELLOGG: At the very least, it's something we should be thinking seriously about. Like, if I start to think about, like, what has, what have been the major developments in energy and climate over the over the past 20 years, I can think of a handful of things. You know, one I think of kind of pushing in the anti-climate direction but a big issue in energy has been the shale oil and gas boom in the United States, and how that's really revolutionized fossil fuel markets.

And the other is what you mentioned, which is, the the just unbelievable rise of China as this manufacturing and export powerhouse for solar PV, for batteries, and for electric vehicles, EVs.

And that exporting powerhouse has come about through a lot of government support. Some of it direct subsidies, a lot of it sort of more implicit types of subsidies, loan guarantees. There's a lot of research and development support that's been done in China. And all of that has just massively driven down the costs of production of PV, of batteries, and electric vehicles.

From the perspective of the climate, all of that work, and this may sound trite, but it's not crazy to describe it as just this massive gift to the world, in the sense of, like, all of a sudden, PV in a lot of places is cost competitive with electricity generated by fossil fuels, at least up to a point. The intermittency problem with solar is still an issue, and battery technology still needs to get better for that to work effectively as a reliable source of power.

We are seeing massive increases in electric vehicle penetration in the parts of the world that have opened themselves to electric vehicles from China, and that includes low-income countries and rich countries. So, you're starting to see a lot of EVs get imported to, like, low- and middle-income countries in Latin America. There was an article, it was in *The New York Times* or *Wall Street Journal* in September, that pointed to Australia, which doesn't really have an auto industry of its own, is really starting to ramp up its imports of Chinese electric vehicles.

[18:57]

All of that is serving to reduce emissions and doing it in a very substantial way and sort of ties into this idea that the climate change problem really is global. And what China is doing is not just reducing its own carbon emissions by its own adoption of its own PV and electric vehicles, it is pushing down emissions everywhere else in the world.

I do think there's a big open question, and researchers are starting to get at this, of whether all the public spending that China did to build these industries actually paid off within China itself. There's starting to be some evidence that the answer might actually have been yes. But even putting that aside, it is 100% clear to me that Chinese public industrial policies for green technologies have had massive benefits for the global climate and certainly for global energy consumers.

Other global producers of solar PV and batteries and electric vehicles might have something else to say about it. They're getting pushed out. But from the consumer's perspective and the climate perspective, it's been a massive, massive win.

[20:01]

PATNAIK: What about the national security and economic security perspective? Because a lot of countries then actually might become dependent on Chinese suppliers, and and this causes a lot of geopolitical problems by swapping out dependence on, on Middle Eastern oil, for instance, for EVs or, solar panels from China. How do you think about that?

[20:19]

KELLOGG: Yeah. So, the single sourcing issue is indeed a problem. Basic energy resources, solar photovoltaics, PV, electric vehicles, they're pretty critical to, you know, just the functioning of economy. I do think this is something importers are really going to have to wrangle with and think about how do we get to a point where the world is not simply dependent on China for these technologies.

I do want to highlight, like, one important difference between, say, oil dependence versus dependence on China as a supplier of equipment for PVs and EVs and batteries. If you think about oil dependence, a big reason why oil shocks have historically been so painful, and we've seen evidence of that throughout 2026 for oil and gasoline and diesel consumers throughout the world, is that oil is consumed as a flow commodity. The world goes through about 100 million barrels of oil a day, you know, give or take.

And, like, if we suddenly cut that flow off, there's a lot of very acute pain that takes place. You can't transport people and materials to where they want to go because we're just continuously burning through this massive amount of oil every single day.

PV and EVs are different because they are capital goods. You don't flow consume them. What that means is that if all of a sudden we face a disruption in the supply of solar PV or electric vehicles, that doesn't really necessarily lead to the same amount of immediate pain. Eventually it does because you start to reduce the turnover in the EV fleet. You can't start putting up more solar farms, all of those kinds of things, but it doesn't lead to the same immediate acute pain that, say, a cutoff of oil production would lead to.

PATNAIK: Great. Wonderful. This is super interesting. I want to thank you so much for taking the time to speak with us today and sharing this fascinating research. All the best for your future endeavors.

KELLOGG: Thank you so much, Sanjay.

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STEINSSON: Once again, I'm Jón Steinsson.

EBERLY: And I'm Jan Eberly.

STEINSSON: And this has been the *Brookings Podcast on Economic Activity*. Thanks to our guests for this great conversation.

EBERLY: As always, you can find the full papers and the Brookings Papers on Economic Activity conference proceedings on our website at Brookings dot edu slash BPEA.

STEINSSON: And thank you to the team that makes this podcast possible: Ike Blake, supervising producer; Fred Dews, senior producer; Ranga Krishnamurthy, co-producer; Teddy Wansink, video editor; Chris Chang, audio editor. Show art was designed by Katie Merris, and promotional support comes from our colleagues in Brookings Communications.