

Research: Negative leakage could be key to reducing carbon emissions

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(Phys.org) -- The unilateral efforts of a single country or region to reduce the emissions of greenhouse gases could reduce exports, increase imports and lead to higher emissions elsewhere – what economists call “leakage.” Unilateral efforts could, however, work better if other sources of energy were used as substitutes, thereby creating “negative leakage,” according to research by University of Illinois energy policy experts.

Don Fullerton, a finance professor and former deputy assistant secretary of the U.S. Treasury Department, says the fear of any one country raising its own costs of production through a carbon tax, and thus making itself less competitive with its neighbors, is somewhat unfounded.

“Other researchers have missed this ‘abatement resource effect,’ or what we call ‘negative leakage,’ ” said Fullerton, a researcher in the U. of I. Institute of Government and Public Affairs and in the Center for Business and Public Policy in the College of Business.

Fullerton, who co-wrote the paper with Kathy Baylis, a professor of agricultural and consumer economics at Illinois, and Dan Karney, a graduate student in economics at Illinois, says the omission has led to overstated fears about the leakage from a unilateral carbon policy.

“What we show is that, in some cases, those fears are overstated, and leakage may not be that bad,” Fullerton said. “With some concentration on those favorable cases, one country might be able to undertake some

good for the world without the fear that it is going to lose business to other countries or other sectors.”

Fullerton says positive leakage arises when consumers can easily shift their purchases away from the taxed country or sector’s output to the same traded – but untaxed – good.

“If the context were two countries that produce the same traded good, like steel produced by the U.S. or China, then a carbon tax in one country always increases imports from the other country,” he said. “That creates positive leakage.”

If the two goods are quite different, however, then consumers might still demand the good produced by the taxed sector.

“Given these conditions, the taxed sector draws resources away from the unregulated sector or region, which could reduce their output and [emissions](#),” he said.

So if producers can shift their inputs easily – away from greenhouse gas emissions to windmills, solar cells and other energy-efficient machinery and vehicles – then that taxed sector could draw resources away from the other sector, Fullerton says.

“If that effect is large enough, the result might shrink those other sectors’ operations overall, and thus possibly shrink emissions elsewhere,” he said. “But even if overall leakage is still positive, it may be overstated in models that do not allow for substitution in production. If consumer flexibility is low compared to producers’ ability to abate pollution by use of other resources, then we show that overall leakage may be negative.”

The best possibility for negative leakage might be a tax or permit price

for carbon emissions only in the electricity-generating sector within one country.

“Demand for electricity is usually thought to be inelastic, which means consumers buy almost the same amount of it even as the price rises,” Fullerton said. “If firms need to produce almost as much electricity, while substantially reducing their greenhouse-gas emissions, they would have to invest a lot of labor and capital into windmills, solar panels and carbon capture and sequestration technologies. With any given total number of workers and investment dollars in the economy, then fewer greenhouse-gas emitting resources are used to produce all other goods.”

Fullerton cites California’s unilateral effort to enact a carbon tax as an example.

“They are a small open economy and, depending on how they do it, they might be able to get away with it,” he said. “Electricity is a good that doesn’t really transport all that well. In other words, it’s possible for California to buy electricity from Nevada or Oregon, but not from Iowa. So California might be able to put a carbon tax on electricity because people buy nearly as much electricity as they did before, and it provides some incentives to companies to build alternatives like windmills and solar cells.”

If California had a carbon tax, the question then becomes what does it do at the border for any imports, Fullerton says.

“What they would like to do is tax any import according to its carbon content, which is called a border-tax adjustment,” he said.

But the reason that’s tricky is that you don’t really know the carbon content of the electricity – or any other good – that was produced somewhere else.

“It’s hard to know how to do that, exactly, except maybe for oil or coal,” Fullerton said. “Who knows how much carbon dioxide was associated with the production of, say, a washing machine, toaster oven, or some other widget.”

Although it seems somewhat esoteric, the concept is important, Fullerton says.

“Every economist who studies leakage seems to assume it must be positive,” he said. “They just can’t fathom any way in which it can be negative. They automatically assume that anyone who unilaterally imposes a carbon tax must be raising the cost of their own production, thereby putting themselves at a competitive disadvantage and handing business over to some other country who, when they increase their output, will increase their emissions. Therefore the [carbon tax](#) doesn’t do any good. But that’s not necessarily the case.”

Provided by University of Illinois at Urbana-Champaign

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