

Balancing indirect land use change mechanisms: empirical evidence from biofuel mandates and pan-tropical deforestation

Preliminary draft, please do not circulate.

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Abstract

Agricultural supply and demand shocks can have severe, unintended consequences as they propagate across commodity markets, space and time according to mechanisms that have been vastly simulated but have barely been verified empirically. In this paper, I provide causal evidence of these indirect land use change (ILUC) mechanisms within an original unified, observational framework. I apply this framework to pan-tropical deforestation and to the maize-ethanol mandates under the United-States Renewable Fuel Standards, one of the largest permanent shock on global crop demand. Concretely, I estimate deforestation responses to the interactions of the mandate shocks with agro-climatic exposures to these shocks for various commercial crops. The causal interpretation grounds essentially on the pre-determination of the RFS agenda. This approach allows to relate deforestation to remote shocks, accounting flexibly for any potential mediation. To isolate evidence of specific mechanisms, I map mechanism-crop predictions and leverage crop-specific exposure variation. The results support the prevalence of both demand substitution and land use displacement mechanisms over attenuation from ethanol by-products, yield responses, or consumption shifts. Overall results confirm that land-related policies around the globe do have indirect effects on tropical forests, which can severely lessen their sustainability.

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