Trade, Trees, and
Contingent Trade Agreements

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Trade vs. the Environment

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- **Not groundless**: With a larger market, trees are logged, land is burned, cattle enters, soy is planted.

- Empirically, deforestation has increased when regional trade agreements have been signed (Faria et al., 2016; Pendrill et al., 2019; Abman and Lundberg, 2020).

Trade vs. the Environment
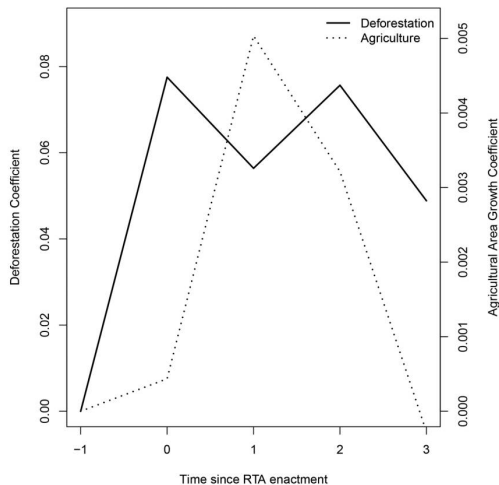
Source: Abman and Lundberg (2020)

The EU and TSD

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The EU and TSD

- France and the Netherlands: In a recent "non-paper" (May 2020), they point to: "*The lack of progress in compliance with... the Trade and Sustainable Development (TSD) Chapters.*"

- They recommend that the implementation of trade agreements should proceed step-wise and hinge on the gradual implementation of sustainability requirements:

- "*Parties should introduce, where relevant, staged implementation of tariff reduction linked to the effective implementation of TSD provisions and clarify what conditions countries are expected to meet for these reductions, including the possibility of withdrawal of those specific tariff lines in the event of a breach of those provisions.*"

A Model of Trade

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- Follow Maggi (2007) in assuming quadratic $u_{ij}(c_{ij})$ with bliss v_{ij}:

$$u_{ij}(c_{ij}) = -\frac{(v_{ij} - c_{ij})^2}{2a_i}.$$

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- We can permit: marginal production cost, $\kappa_S \geq 0$, cost of clearing the forest and convert it to agriculture, $\varkappa_S$, and marginal value of the lumber, ν_S. S's decision on X_S will depend on $k_S := \kappa_S + \varkappa_S - \nu_S$.

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- The total marginal cost of increasing the capacity X_N, and to produce X_N, is k_N.

- The transport cost to i can be $t_i \geq 0$.

- **The key assumption:** While X_N is decided on by price-taking private investors, X_S is decided on by S's government, recognizing the effects on tariffs and prices.

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- Welfare in i is thus the consumption utility minus damage:
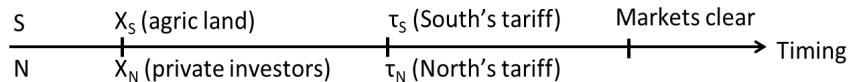
$$U_i - d_i(X_j), \; i \in \{N, S\}.$$

Timing
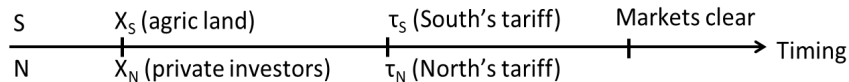
S	X_S (agric land)	τ_S (South's tariff)	Markets clear
N	X_N (private investors)	τ_N (North's tariff)	

→ Timing

1. S takes into account the effects on tariffs and prices when determining X_S; private investors in N take future prices and tariffs as given.
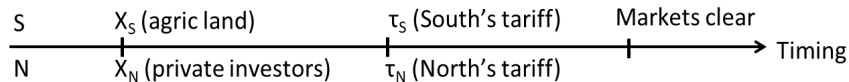
Timing

1. S takes into account the effects on tariffs and prices when determining X_S; private investors in N take future prices and tariffs as given.

2. The government in every $i \in \{N, S\}$ decides on the tariff $\tau_i \geq 0$ to improve its terms of trade.

Timing

| S | X_S (agric land) | τ_S (South's tariff) | Markets clear |
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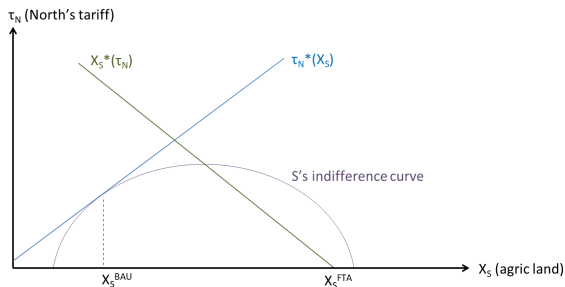3. Price-taking consumers make their decisions and payoffs are realized.

Business as usual

Business as usual: Tariffs
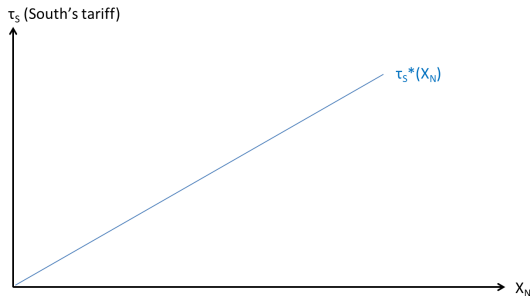
- It is more important for j to improve its terms-of-trade if X_i is large:

$$\tau_j^{BR}\left(X_j\right) = \frac{\overline{v}_{ji} - \overline{v}_{ii} + X_i}{3a_i}.$$

Business as usual: Capacity in S

- S reduces X_S^{BAU} because of the tariff, the endogenous price, and the endogenous tariff.

Free Trade: Corollaries

FTA

(1) Largest effect on private investments

(2) $X_S \uparrow$

(3) If $\bar{v}_{NS} \uparrow$, $X_S \uparrow$

(4) If $d'_N \uparrow$, value $\downarrow$

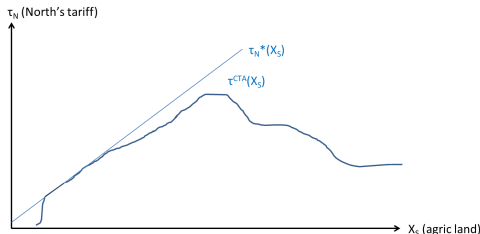**(5)** If $d'_N \uparrow$, S transfers more to N

Contingent trade agreement

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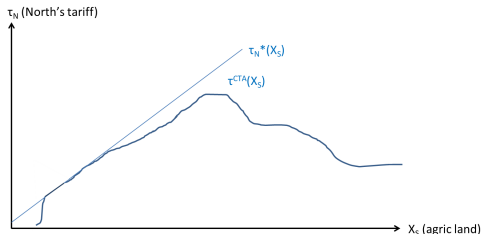
- For the CTA to be credible, $\tau_j^{CTA}(X_S) \leq \tau_j^{BR}(X_S)$.

Contingent trade agreement

τ_N (North's tariff)

$\tau_N{}^*(X_S)$

$\tau^{CTA}(X_S)$

X_S (agric land)

- For the CTA to be credible, $\tau_j^{CTA}(X_S) \leq \tau_j^{BR}(X_S)$.
- DEFINITION 1: *A contingent trade agreement (CTA) specifies*
  $\tau_j \in \left[0, \tau_j^{BR}(X_i)\right]$ *for every* $X_S \geq X_S^0$, $X_N \geq X_N^0$, *and* $i, j \in \{N, S\}$.
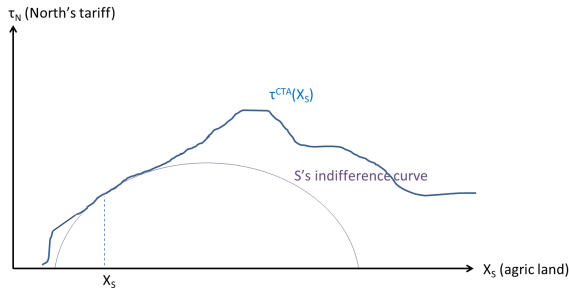
Contingent trade agreement

|		**FTA**	**CTA**
	(1)	Largest effect on X_N	Only effect on X_S
	(2)	$X_S \uparrow$	$X_S \downarrow$, if optimal
	(3)	If $\bar{v}_{NS} \uparrow$, $X_S \uparrow$	If $\bar{v}_{NS} \uparrow$, $X_S \downarrow$
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	(5)	If $d'_N \uparrow$, S transfers more	If $d'_N \uparrow$, N transfers more

Contingent trade agreement

- Given $\tau_N^{CTA}(X_S)$, S selects X_S.
- A CTA can motivate S to keep X low (to keep the tariff low).

Contingent trade agreement
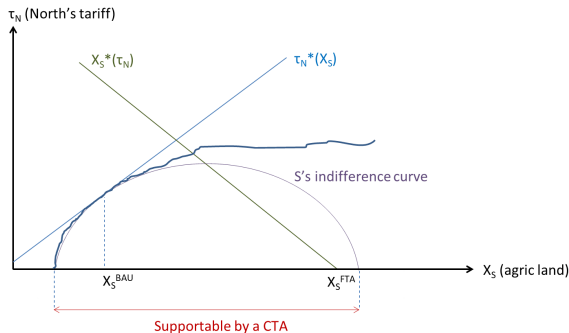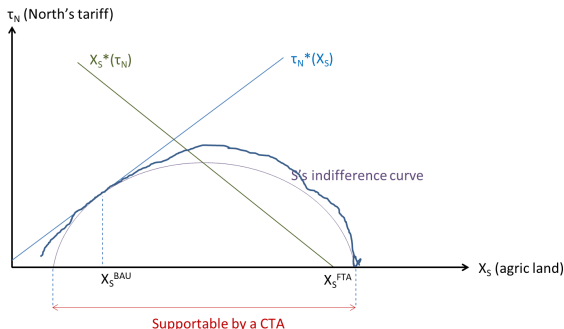

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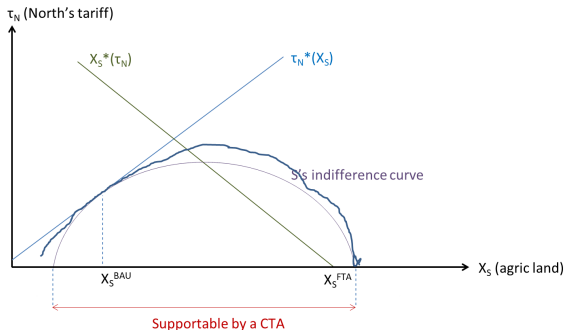
- Given $\tau_N^{CTA}(X_S)$, S selects X_S.
- A CTA can motivate S to keep X **high** (to keep the tariff low).
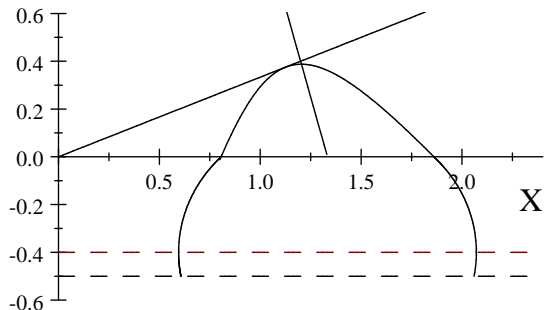
Contingent trade agreement

- Every $X_S \in \left[\underline{X}, \overline{X}\right]$ can be implemented by a CTA^0 with $\tau_N(X_S) = 0$.

$$\underline{X} = X_S^{FTA} - \overline{v}_{NS}\sqrt{10}/6 \approx \overline{v}_{SS} - 0.19\overline{v}_{NS},$$
$$\overline{X} = X_S^{FTA} + \overline{v}_{NS}\sqrt{10}/6 \approx \overline{v}_{SS} + 0.86\overline{v}_{NS}.$$

Cross-Contingency

- N's tariff is measured on the upward-sloping axis; S's tariff on the downward-sloping axis.
- By permitting a larger $\tau_S^{CTA}(X_S)$ (up to some level), S is willing to conserve more.
- With more gains from trade ($\overline{v}_{NS} \uparrow$ or $\overline{v}_{SN} \uparrow$), $\underline{X} \downarrow$ and $\overline{X} \uparrow$.

Multiple Products

PROPOSITION 7: *Suppose S exports ζ goods to N, while N exports η goods to S.*

(i) With free trade in equilibrium, the CTA^0 can implement every $X_S \geq X_S^0$ if $X_S \in \left[\underline{X}^\zeta, \overline{X}^\zeta \right]$, where $\underline{X}^\zeta$ decreases, and $\overline{X}^\zeta$ increases, in ζ. (Both are independent of η).

(ii) With positive tariffs in equilibrium, the CTA can implement every $X_S \geq X_S^0$ if $X_S \in \left[\underline{X}^{\zeta\eta}, \overline{X}^{\zeta\eta} \right]$, where $\underline{X}^{\zeta\eta}$ decreases, and $\overline{X}^{\zeta\eta}$ increases, in ζ and in η.

(iii) The addition of a new good decreases $\underline{X}^{\zeta\eta}$ by more, and $\overline{X}^{\zeta\eta}$ increases more, if it is produced by S and not N.
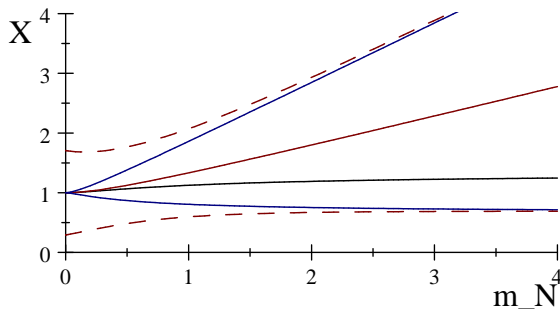
Multiple Consumers
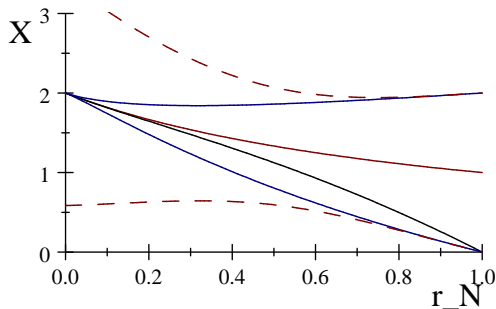
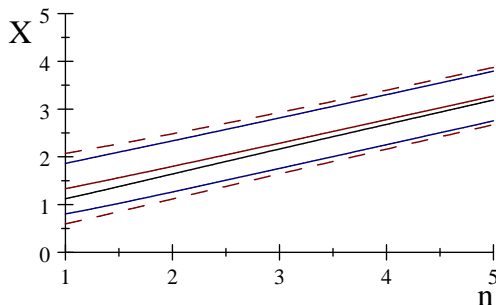- Different consumer masses: When N is relatively smaller, it is more important to permit cross-contingency.

Multiple Consumers

- Fixing S's size: If N is larger, more is produced in BAU and FTA, but CTA^0 can conserve more.

Multiple Countries

- With more (equal-sized) countries, quantities increase in BAU and FTA.
- CTA continues to motivate conservation (of capacity expansion, if there is no damage).

Multiple Collaborators
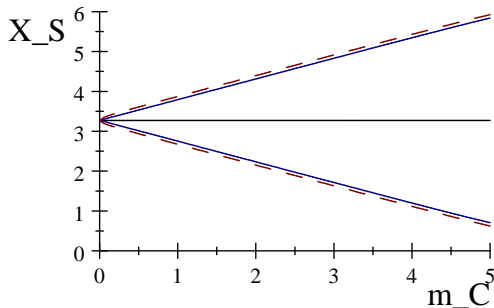
- If the countries importing from S has a consumer mass of 5 (relative to S), then: The larger is the mass in countries offering the CTA, the more is conserved.
- Biden recently proposed that US&EU cooporate on how to offer trade agreements with Brazil/Mercosur.

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1.27	1.18	1.15	1.10	1.07

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    - In India, the regional forest cover has, since 2015, been part of the central government's allocation of tax revenue to its 29 states (Busch and Mukherjee, 2018).
    - "*This represents the first large-scale ecological fiscal transfers for forest cover, and could serve as a model for other countries*" (Angelsen et al., 2018:51).

Literature

- I connect:

1. Trade vs. the environment (Markusen '75; Dasgupta et al. '78; Chichilnisky '94; Copeland and Taylor '94; Brander and Taylor '97; '98).

   - Leading to the *second-best* solutions: Trade sanctions (Barrett '97), border tax adjustments (Hoel '96; Elliott et al. '10; Al Khourdajie and Finus '20), output-based rebates (Fischer and Fox '12), climate clubs (Nordhaus '15)...

2. Trade-specific investments: Krugman (1987), McLaren (1997), Baier and Bergstrand (2007), Bond and Park (2002), Bond (2006), and Guriev and Klimenko (2015).

   - Then, it becomes natural to set tariffs contingent on the capacity.

3. Shallow vs. deep trade integration (Antras and Staiger, '12; Bagwell and Staiger, '16; Grossman et al.) With local environmental externalities, "deep agreements are very controversial" Maggi and Ossa (2020:1).

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