Trade Agreements and the Nature of Price Determination

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January 5, 2012

Introduction

- Terms-of-Trade Theory of Trade Agreements:
  - in the Nash equilibrium, tariffs are inefficiently high but domestic policies are internationally efficient.
  - negotiations over tariffs alone, coupled with a "market access preservation rule," can bring governments to the efficiency frontier – **"shallow"** integration.
- This paper: nature of international price determination is important for these predictions:
  - **"deep"** integration needed when prices are not fully disciplined by market clearing (bilateral bargaining).

Market Clearing with Perfect Competition

- Perfectly competitive trade model: **F**oreign ('$*$') exports a single good to **H**ome.

- Measure $\frac{1}{2}$ of H consumers with demand $D(p)$.

- Measure $\frac{1}{2}$ of F consumers with demand $D(p^*)$.

- Measure 1 of firms in F with increasing-concave production technology $y^* = F(L^*)$.

- Measure Λ of workers in each country paid a wage of 1 (pinned down by outside sector).

Market Clearing with Perfect Competition

- H has import tariff τ, F has both export tax τ^* and labor subsidy s^* (applied only to the export sector), all defined in specific terms.

- Governments are social welfare maximizers (W and W^*).

- Efficient policies maximize world welfare and deliver $T^e \equiv \tau^e + \tau^{*e} = 0$, $s^{*e} = 0$. No surprise (no frictions).

- Nash policies: FOCs $\Rightarrow \tau^N = \hat{p}^*/\eta^*_E$, $\tau^{*N} = \hat{p}/\eta_M$ and $s^{*N} = 0$ (where all prices and elasticities are evaluated at the Nash policies).

- Why isn't s^{*N} distorted? τ^* is first best for terms of trade manipulation in this setting.

Market Clearing with Perfect Competition

- **Shallow integration:** Suppose H agrees to eliminate its tariff and F agrees to eliminate its tariff and in addition F agrees to a **"market access preservation" constraint** on its future choices of s^*:

$$\frac{d\tau^*}{ds^*} = \frac{-d\hat{p}/ds^*}{d\hat{p}/d\tau^*}.$$

- Then F solves

$$\frac{dW^*}{ds^*} = \frac{\partial W^*}{\partial s^*} - \frac{\partial W^*}{\partial \tau^*}\frac{d\hat{p}/ds^*}{d\hat{p}/d\tau^*} = 0$$

with W^* evaluated at $\tau = 0$.

- Delivers $s^{*R} = 0$ and $\tau^{*R} = 0$. Hence, with $\tau = 0$, efficiency frontier achieved.

Market Clearing with Market Power

- A monopoly firm in F; H and F markets segmented.
  - special form of imperfect competition, but insights are more general.

- Efficient policies $T^e = 0$, $s^{*e} = 1/\eta_D^*$: No role for tariffs, but F subsidizes labor to ensure that price in each market is equated to marginal cost.

- Nash policies: FOCs $\Rightarrow \tau^N = -\hat{x}/\left(d\hat{x}/d\tau\right) - \hat{p}/\eta_D$, $\tau^{*N} = \hat{p}^*/\eta_D^*$ and $s^{*N} = 1/\eta_D^*$ (with all prices/elasticities evaluated at the Nash policies).

- Note: $s^{*N} \neq s^{*e}$, but conditional on trade volume s^{*N} (and s^{*R}) is efficient.

Market Clearing with Market Power

- **Shallow integration:** Suppose H agrees to eliminate its tariff and F agrees to set its tariff at a level $\bar{\tau}^*$ s.t. $\hat{x}(s^{*N}, 0+\bar{\tau}^*) = \hat{x}(s^{*e}, T^e)$, and F agrees to constrain its future choices of s^* according to

$$\frac{d\tau^*}{ds^*} = \frac{-d\hat{x}/ds^*}{d\hat{x}/d\tau^*}.$$

- Then F solves

$$\frac{dW^*}{ds^*} = \frac{\partial W^*}{\partial s^*} - \frac{\partial W^*}{\partial \tau^*}\frac{d\hat{x}/ds^*}{d\hat{x}/d\tau^*} = 0$$

with W^* evaluated at $\tau = 0$.

- Delivers $s^{*R} = s^{*e}$ and $\tau^{*R} = 0$. Hence, with $\tau = 0$, efficiency frontier again achieved (key: $s^{*R} = s^{*e}$ *conditional* on efficient trade volume).

Matching Model

- Measure 1 of consumers each matched with measure 1 of producers; no possibility of rematching (0 outside option of the agents).
  - extreme assumption but results generalize to any pricing not fully disciplined by market clearing.

- Each producer produces an amount of x with the production function $F(L)$ in anticipation of payoff obtained upon matching.

- Consumer utility $u(x)$, where u is increasing and concave.

- With cost of producing x sunk at time of matching, consumer and producer Nash bargain over the surplus, with producer capturing share $\alpha \in (0, 1)$.

Matching Model

- **International match**: F seller takes her good to H market; tariff costs not sunk at time of bargaining, so ex-post surplus over which parties negotiate is

$$S\left(L, \tau+\tau^{*}\right) \equiv u\left(F\left(L\right)\right)-\left(\tau+\tau^{*}\right) F\left(L\right).$$

- Labor L hired by F selling to H is then determined by maxing $\alpha S\left(L, \tau+\tau^{*}\right) - \left(1-s^{*}\right) L$, which defines $\hat{L}(s^{*}, \tau+\tau^{*})$ and trade volume $F(\hat{L})$.

- **Local (F) match**: tariffs irrelevant to bargaining surplus, so labor hired by F selling to F is $\hat{L}^{*}(s^{*})$ and production for local sales is $F(\hat{L}^{*})$.

Matching Model

- Efficient policies $T^e = 0$, $s^* = 1 - \alpha$: no role for tariffs, and F labor subsidy resolves the under-investment in L.

- Nash policies: FOCs $\Rightarrow \tau^N + \tau^{*N} > 0$, $s^{*N} > 1 - \alpha$.

- Hence, $T^N > T^e$, but now s^{*N} is inefficient **even conditional on trade volume**.

Matching Model: Shallow Integration

- Consider F's preferred τ^* and s^* to deliver efficient trade volume.

- Efficient trade volume is $F(\hat{L}(1-\alpha, 0))$, so starting from efficient policies changes in τ^* and s^* must satisfy

$$\frac{d\tau^*}{ds^*} = -\frac{d\hat{L}/ds^*}{d\hat{L}/d\tau^*}.$$

- Then F solves

$$\frac{dW^*}{ds^*} = \frac{\partial W^*}{\partial s^*} - \frac{\partial W^*}{\partial \tau^*}\frac{d\hat{L}/ds^*}{d\hat{L}/d\tau^*} = 0.$$

- Delivers $s^{*R} > s^{*e}$. Hence, shallow negotiations **cannot** achieve the efficiency frontier.

Matching Model: Another Interpretation

- "World"/exporter price:

$$\hat{p}^w = \frac{\alpha u(F(\hat{L}))}{F(\hat{L})} + \underbrace{(1-\alpha)\,\tau^*}\, -\alpha\tau.$$

- But $\frac{-d\hat{L}/ds^*}{d\hat{L}/d\tau^*} > 0$, so F maintains trade volume with **an increase in** τ^* and s^* while raising $\hat{p}^w$ and improving its terms of trade.

- Shallow integration cannot fully eliminate terms-of-trade manipulation when international prices are determined through bargaining.

- But if negotiations impose $s^* = s^{*e}$ (i.e., **"deep" integration**), then efficiency frontier is immediately achieved.

Conclusion: Some Open Questions

- How much are international prices disciplined by market clearing?
  - Antràs and Staiger (AER, forthcoming): arguably less and less so with the increase in offshoring.
- How sensitive is the performance of the market-access/shallow integration approach to the nature of international price determination?
- And how sensitive is the performance of reciprocity/non-discrimination rules to the nature of international price determination?
  - Antràs and Staiger (AER, forthcoming): novel "political externalities."
  - Important questions for the architecture of the WTO moving forward.