Trade Agreements and the Nature of Price Determination

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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: Foreign (‘*’) exports a single good to Home.

- 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 $\Lambda$ of workers in each country paid a wage of 1 (pinned down by outside sector).
Market Clearing with Perfect Competition

- H has import tariff $\tau$, F has both export tax $\tau^*$ 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? $\tau^*$ 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 $s^*$:

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

- Then $F$ solves

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

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 $\Rightarrow \tau^N = -\hat{x}/(d\hat{x}/d\tau) - \hat{p}/\eta_D$, $\tau^*N = \hat{p}^*/\eta_D^*$ 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

\[ S(L, \tau + \tau^*) \equiv u(F(L)) - (\tau + \tau^*) F(L). \]

- Labor \( L \) hired by F selling to H is then determined by maxing \( \alpha S(L, \tau + \tau^*) - (1 - s^*) L \), 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 \textit{conditional on trade volume}. 
Matching Model: Shallow Integration

- Consider F’s preferred $\tau^*$ and $s^*$ to deliver efficient trade volume.

- Efficient trade volume is $F(\hat{L}(1-\alpha,0))$, so starting from efficient policies changes in $\tau^*$ 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 $s^R s^* > s^e$. Hence, shallow negotiations cannot achieve the efficiency frontier.
Matching Model: Another Interpretation

- "World"/exporter price:

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

- But \( -\frac{d\hat{L}}{ds^*} > 0 \), so F maintains trade volume with an increase in \( \tau^* \) 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.