Trade Agreements, Incomplete Contracts and Offshoring

A Mini Course: CESifo Munich

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Introduction

- Three self-contained but related lectures
  - Lecture I. Trade Agreements as Incomplete Contracts
  - Lecture II. Trade Disputes and Settlement
  - Lecture III. Trade Agreements and Offshoring

Lecture I

Trade Agreements as Incomplete Contracts

Rules, Disputes and Renegotiation

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Introduction

- Many puzzling features of real-world trade agreements
- ...Design of rules
  - mix of rigidity and discretion (GATT/WTO: tariff bindings, escape clause, domestic policies, national treatment)
- ...Settlement of disputes
  - role of court (GATT/WTO: interpretive, gap-filling, modification)
- ...Prominence of renegotiation
  - against backdrop of property and liability rules (GATT/WTO: quantitative restrictions, domestic subsidies)
- Hard to square with complete contracts perspective

Introduction

- Can design and operation of trade agreements be understood from *incomplete contracts* perspective?
- Trade agreements are obviously incomplete contracts
  - WTO agreement fills 24,000 pages and is still far from anything resembling a complete contract
- Focus on
  - rules (Horn, Maggi and Staiger, 2010)
  - disputes (Maggi and Staiger, 2011)
  - renegotiation (Maggi and Staiger, Forthcoming)

Rules (Horn, Maggi and Staiger, 2010)

- Real-world trade agreements display an interesting combination of *rigidity* and *discretion*
- Consider the GATT/WTO
  - trade instruments bound; domestic instruments largely left to discretion, but must satisfy National Treatment, and now (WTO) regulation of subsidies
  - bindings rigid, but with "escape clauses" (e.g. GATT Article XIX)
  - bindings stipulate ceilings, so governments have downward discretion
- Why?
- An incomplete contracts perspective can account for these features

Sources of Incompleteness

- A number of possible sources of contract incompleteness
- Focus on two features of fundamental importance to trade negotiators
- Wide array of trade-relevant policies
  - border instruments but also internal/domestic instruments
  - controlling opportunism requires *comprehensive policy coverage*
- Uncertainty about future economic/political conditions
  - calls for agreements that are *highly contingent*
- Trade-law literature emphasizes contracting implications of costs associated with these features

Approach

- Introduce *contracting costs* explicitly into economic analysis of trade agreements
- Study their implications for the structure of the optimal (incomplete) agreement
- Show that contracting costs can help explain some of the core features of the GATT/WTO

The Model

- Partial-equilibrium analysis
- Two countries, H and F, two non-numeraire goods, 1 and 2
- H a natural importer of good 1/exporter of good 2
- Sectors 1 and 2 are mirror-image, so focus on sector 1
- Illustrate main points with linear demand/supply case
  - Demand: $D(p) = \alpha - \beta p$; $D^*(p^*) = \alpha^* - \beta^* p^*$
  - Supply: $X(q) = \lambda q$; $X^*(q^*) = \lambda^* q^*$
- H chooses tariff τ, separate consumption taxes on domestic and foreign products (t_h and t_f), production subsidy (s)
- F does not intervene in this sector

The Model

- Arbitrage $\Longrightarrow q^* = p^*;\ \ p^* = \ p - \tau - t_f;\ \ q = p - t_h + s$
- The price relationships more compactly:

$$p = p^* + T;\ \ q = p^* + T + S$$

where $T \equiv \tau + t_f$ and $S \equiv s - t_h$

- Market clearing $\Longrightarrow p = p(T, S); q = q(T, S); p^* = q^* = p^*(T, S)$
- Importing country H experiences a negative consumption externality equal to $-\gamma D$ with $\gamma > 0$
- Governments maximize welfare, so (with focus on sector 1):

$$\begin{aligned} W &= CS + PS + T \cdot M - S \cdot X - \gamma D \\ W^* &= CS^* + PS^* \end{aligned}$$

Efficient and Nash Policies

- Globally efficient policies maximize $W^G \equiv W + W^*$, yielding

$$T^{eff} = \gamma; \;\; S^{eff} = -\gamma$$

- Nash equilibrium policies:

$$\begin{aligned} T^{NE} &= \gamma + \frac{p^*}{\eta^*} \\ S^{NE} &= -\gamma \end{aligned}$$

- Note: $T^{NE} > T^{eff}; \;\; S^{NE} = S^{eff}$
- Nash trade taxes inefficiently high: ToT manipulation
- Nash domestic instruments set at efficient levels

Uncertainty

- To simplify, focus on one-dimensional uncertainty
- Consider two possible sources of uncertainty
  - consumption externality (γ)
  - import demand level (α)
- Timing:
  (1) The agreement is drafted
  (2) Uncertainty is resolved
  (3) Policies are chosen subject to the constraints set by the agreement

The Costs of Contracting

- Focus on *instrument-based* (not *outcome-based*) agreements
- Key idea: more detailed agreements are more costly (similar to Battigalli and Maggi, 2002)
  - c_p: cost of including a *policy* variable (τ, t_f, s, t_h)
  - c_s cost of including a *state* variable (γ, α)
- Cost of writing an agreement: $C = c_s \cdot n_s + c_p \cdot n_p$, with n_s (n_p) the number of state (policy) variables in the agreement
- Let $\Omega \equiv EW^G(\cdot)$ denote expected gross-of-contracting-costs global welfare
- An *optimal agreement* maximizes expected net global welfare, $\omega \equiv \Omega - C$

Optimal Agreements

- To state first result, recall: $T = \tau + t_f$; $S = s - t_h$. Hence T and S the relevant policy variables, with cost $2c$ for each

Proposition 1: An agreement that constrains the effective subsidy S (even in a state-contingent way) while leaving the import tax T to discretion cannot improve over the Nash equilibrium, and therefore cannot be an optimal agreement.

- Broad intuition: contracting over S alone is useless because inefficiency in the NE concerns T, not S
- In world of costless contracting, Proposition 1 irrelevant, but gains relevance when contracting costly
  - if contracting costs lead to incomplete policy coverage, focus of contract will be on import taxes, not domestic instruments

Uncertainty about the Consumption Externality

- Assume γ uncertain
- Note: $\{FB\}$ agreement is $\{T = \gamma; S = -\gamma\}$, which costs $4c_p + c_s$
  - if c_p and c_s small enough, $\{FB\}$ optimal
  - if large enough, empty agreement (NE payoffs) optimal
  - What happens between these two extremes?
- Two ways to save on contracting costs relative to $\{FB\}$
  - agreement can be *rigid* (i.e. non-contingent)
  - and/or it can leave some policies to *discretion*
- For now consider only agreements that impose separate equality constraints on T and S (e.g. $(T = \gamma)$ or $(S = 10)$)

Uncertainty about the Consumption Externality

- By Proposition 1, can focus on three kinds of agreement (aside from $\{FB\}$ and $\{\emptyset\}$)
  - $\{T, S\}$ (rigidity)
  - $\{T(\gamma)\}$ (discretion)
  - $\{T\}$ (both rigidity and discretion)
- Basic trade-off:
  - rigid agreement prevents ToT manipulation, but Pigouvian intervention only "on average"
  - discretion creates scope for manipulating ToT, but achieves state-contingency "for free"
- Two basic questions
  - When is it optimal to leave S out of the contract (discretion)?
  - When is it optimal to leave γ out of the contract (rigidity)?

Discretion over Domestic Instruments

- Benefits of excluding S from the contract
  - saves $2c_p$
  - achieves state-contingency in S "for free" (a benefit if contract is *rigid*)
- Costs of excluding S from the contract
  - comes in form of S distortions to manipulate ToT
  - higher when S a good substitute for T for ToT manipulation
  - higher when monopoly power in trade higher
  - higher when import volume higher
- $\Longrightarrow$ Possible explanation for GATT/WTO evolution toward regulation of domestic instruments: rising trade volume
- $\Longrightarrow$ Possible explanation for why WTO exempts developing country members from many domestic instrument commitments

Rigidity

- Large uncertainty in γ makes it less likely that optimal agreement is rigid: unsurprising result
- But surprising result when consider uncertainty in trade volume (α)
- Suppose γ now fixed at $\bar{\gamma}$ and α uncertain
- $\{FB\}$ agreement is rigid/non-contingent: $\{T = \bar{\gamma}; S = -\bar{\gamma}\}$
- Can focus on two kinds of agreements: $\{T(\alpha)\}$ and $\{T\}$
  - $\{T(\alpha)\}$ can be optimal as a way to manage incentives to distort S
  - novel interpretation of escape clause (import volume effect)
- If uncertainty over α grows large enough, optimum can switch from $\{T(\alpha)\}$ to $\{T = \bar{\gamma}; S = -\bar{\gamma}\}$
- $\Longrightarrow$ Surprising result: large uncertainty in α can make it *more* likely that optimal agreement is rigid
- $\Longrightarrow$ More broadly, source of uncertainty matters for tradeoff between rigidity and discretion in optimal agreement

National Treatment

- Return to world of uncertain γ and consider rationale for NT clause
- Extend feasible set of agreements by allowing for an NT clause, that is a constraint $t_h = t_f$, costing $2c_p$
- An *NT-based* agreement includes the NT clause
  - the price relationships are now: $p = p^* + \tau + t$; $q = p^* + \tau + s$
  - recall for non-NT: $p = p^* + T$; $q = p^* + T + S$
- $\{NT, \tau, s\}$ costs less than $\{FB\}$ and ties down producer price wedge $q - p^*$, leaves consumer price wedge $p - p^*$ to discretion
  - not possible with non-NT agreements
- NT-based agreement optimal if low substitutability between t and τ
  - gets close to first best ($\{t^{eff} = \gamma, \tau^{eff} = 0, s^{eff} = 0\}$) by achieving state-contingency "for free" via discretion over internal taxes

Summary

- A first step in the analysis of trade agreements as *endogenously* incomplete contracts
- Provides a novel explanation for:
  - the emphasis on border instruments in real world trade agreements
  - "escape clauses" in response to surging import demand
  - the National Treatment provision in GATT/WTO
  - the emphasis on weak bindings (see paper)
- Possible directions for future research:
  - consider *outcome-based* agreements
  - consider export-sector policies
  - consider a multi-country setting to examine the potential appeal of the MFN rule and exceptions for FTAs/CUs
  - consider a commitment role for trade agreements
  - **consider the potential appeal of a dispute settlement body, as a mechanism to "complete" the incomplete contract**
  - more explicit modeling of contract costs

Disputes (Maggi and Staiger, 2011)

- Most models of trade agreements treat disputes as synonymous with enforcement
- But in a typical WTO dispute, DSB rarely called on to enforce an unambiguous obligation under the agreement
  - disagreements over what was signed on to: *Interpretation*
  - instances where legal text of the agreement is silent: *Gap-filling*
  - DSB might even grant exceptions to rigid obligations: *Modification*
- Typical role played by DSB amounts to "completing" various dimensions of an incomplete contract
- Evaluate potential role of DSB in completing an incomplete contract
- Highlight interaction between design of contract and design of DSB

Approach

- Building on Battigalli and Maggi (2002), two forms of contractual incompleteness: *rigidity* and *discretion*
- Introduce a third form of contractual incompleteness: *vagueness*
- The three possible (non-enforcement) roles of the DSB
  - can *interpret* aspects of the contract that are left *vague*
  - can *fill gaps* where the contract is silent and therefore leaves governments with *discretion*
  - can grant exceptions and thereby *modify* aspects of the contract that are *rigid*
- Or, the DSB can serve none of these functions and simply enforce contractual obligations that are unambiguous
- What is the combination of contract form and DSB role that maximizes the ex-ante joint payoff of the governments, i.e., the optimal *institution*?

The Model

- A single industry; importing government chooses $T \in \{FT, P\}$ to maximize $\omega(T; s)$, where $s \equiv (s_1, s_2, ..., s_N)$ is a state vector
- The exporting government is passive in this industry; its payoff is $\omega^*(T; s)$
- Each state variable represents a binary event, such as "there is/is not an import surge" or "the domestic industry does/does not shut down"
- Importing government's gain from protection: $\gamma(s) \equiv \omega(P; s) - \omega(FT; s) > 0$ for all s
- Exporting government's loss from protection: $\gamma^*(s) \equiv \omega^*(FT; s) - \omega^*(P; s) > 0$ for all s
- Joint (positive or negative) gain from protection: $\Gamma(s) \equiv \gamma(s) - \gamma^*(s)$; $\Gamma(s) < 0$ for $s \in \sigma^{FT}$ and $\Gamma(s) > 0$ for $s \in \sigma^P$

Contracts

- State variables s_i are verifiable, but too costly to describe in a contract
- Consider the following possible contracts:
  - *Rigid* (R) contract: $T = FT$ for all s
  - *Discretionary* (D) contract: P allowed for all s. (Same as no contract)
  - *Vague* (V) contract: P is allowed if and only if v (where v is a vague sentence such as "there is substantial injury to the domestic industry")

The truth function of v is the following:

$$\text{Sentence } v \text{ is } \begin{cases} \textit{True} & \textit{if} \quad s \in \mathbf{T} \\ \textit{False} & \textit{if} \quad s \in \mathbf{F} \\ \textit{Undefined} & \textit{otherwise} \end{cases}$$

where $\mathbf{T}$ ($\mathbf{F}$) a set of "extreme" states where v clearly true (false)

- Assume $\mathbf{T} \subset \sigma^P$ and $\mathbf{F} \subset \sigma^{FT}$ and truth function of v is common knowledge to govs and DSB

The DSB

- DSB operates within mandate (if no applicable mandate, not invoked)
- Enforcement role of DSB kept in background
- If the DSB invoked to settle a dispute, the exporter (complainant) incurs cost c^* and the importer (defendant) incurs cost c
- If invoked, DSB observes s and a noisy (unbiased) signal of $\Gamma(s)$, and it issues a *ruling*, T^{DSB}
  - attempts to complete contract as govs would have, by choosing T^{DSB} to maximize the expected joint payoff of govs given the signal
  - ruling automatically enforced
- DSB recommends the wrong policy with probability $q(s)$
  - let $q(s) \equiv qk(s)$ where $k(s) \in [0, \frac{1}{2}]$ for all s and $q \in [0, 1]$

Candidate Institutions

- The contract can be silent (D), rigid (R) or vague (V)
- The DSB can be given an "activist" mandate to
  - *fill gaps* (g) where the contract is silent and therefore leaves governments with *discretion*
  - grant exceptions and thereby *modify* (m) aspects of the contract that are *rigid*
  - *interpret* (i) aspects of the contract that are left *vague*
- Or, the DSB can be given a "non-activist" mandate (n) to simply enforce contractual obligations that are unambiguous

Contract / DSB Role	Silent	Rigid	Vague
Non-activist	D_n	R_n	V_n
Activist	D_g: DSB fills gaps	R_m: DSB allows exceptions	V_i: DSB interprets

Timing

Stage 0 The institution is designed

Stage 1 The state of the world s is realized

Stage 2 The importer gov chooses policy $T \in \{FT, P\}$

Stage 3 The exporter gov decides whether to file with the DSB

Stage 4 If invoked, the DSB issues a ruling $T^{DSB} \in \{FT, P\}$

Stage 5 Payoffs are realized

Analysis

Disputes with an Activist DSB

- Exporter gov files a complaint iff $T = P$ and

$$\Pr(\text{DSB ruling is } FT \mid s) \cdot \gamma^*(s) > c^* \qquad \text{(F)}$$

- Importer gov chooses $T = P$ if either (F) fails, or if (F) holds but

$$\Pr(\text{DSB ruling is } P \mid s) \cdot \gamma(s) > c$$

- Focus on small filing costs:

$$\frac{1}{2}\gamma^*(s) > c^* \text{ and } \frac{1}{2}\gamma(s) > c \text{ for all } s$$

Disputes with an Activist DSB

- Consider the D_g institution
- In states $s \in \sigma^{FT}$: if $qk(s) < \frac{c}{\gamma(s)}$ then $T = FT$ and DSB not invoked; if instead $qk(s) > \frac{c}{\gamma(s)}$ then $T = P$ and DSB invoked
- In states $s \in \sigma^{P}$: if $qk(s) < \frac{c^*}{\gamma^*(s)}$ then $T = P$ and DSB not invoked; if instead $qk(s) > \frac{c^*}{\gamma^*(s)}$ then $T = P$ and DSB invoked
- Notice: equilibrium motives that trigger DSB filing are inefficient from an ex-ante perspective
  - *off-equilibrium* impacts of activist DSB are efficiency-enhancing
- Notice: two kinds of disputes
  - importer opportunistically exploits incompleteness of contract, tries to "get away with protection"
  - exporter opportunistically exploits incompleteness of contract, tries to "get away with forcing free trade"

The Optimal Institution

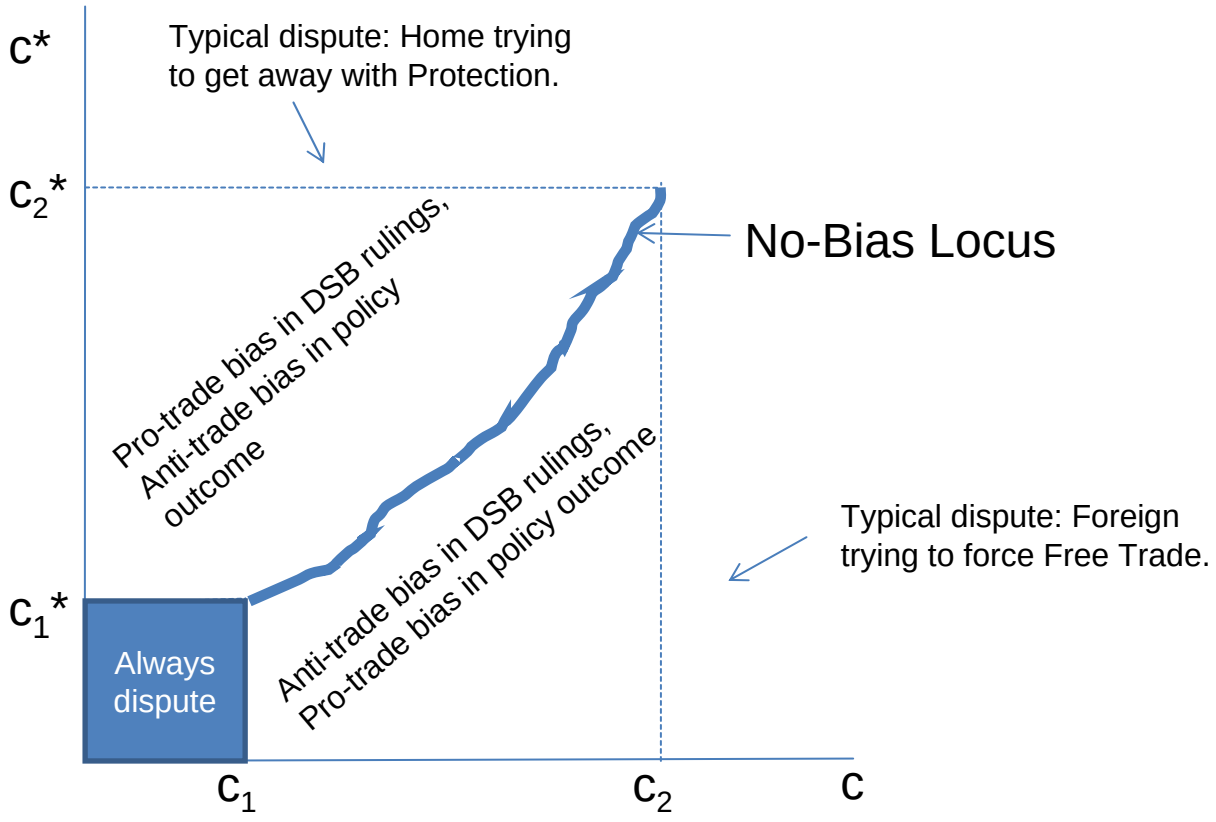
Proposition 1 *There exist critical levels q_1 and q_2 (with $0 < q_1 \leq q_2 \leq 1$) such that: for $q < q_1$ the optimal institution is D_g; for $q_1 < q < q_2$ the optimal institution is V_i; and for $q > q_2$ the optimal institution is either V_n or R_n.*

- Leave governments with greater discretion and provide DSB with mandate to reign in that discretion the better the DSB information
- If q sufficiently small, the first-best outcome achieved even though
  - the contract is highly incomplete
  - the use of DSB is costly
  - DSB rulings are imperfect
  - but DSB must be given activist mandate
- No "modification" role for the DSB in the optimal institution
- Non-monotonic relationship between frequency of equilibrium disputes and performance of optimal institution relative to first best

A Pro-Trade Bias in the DSB?

- Empirically, an apparent "pro-trade bias" in DSB rulings
  - both under the GATT (82%) and the WTO (88%) complainants have mostly won their cases
- What can account for this?
- Consider the direction of the *selection bias* in DSB rulings (and assume away other sources of bias)
- When c^* is high relative to c, DSB *rulings* exhibit a "pro-trade bias" (i.e. the DSB ruling is FT with prob $> 1/2$)
  - because then disputes mostly triggered by importer trying to get away with protection
- But notice: in this case the *equilibrium policies* exhibit an "anti-trade bias" (i.e. the equilibrium policy is P with prob $> 1/2$)
- Fig 1

Figure 1


c*
Typical dispute: Home trying to get away with Protection.
c2*
No-Bias Locus
Pro-trade bias in DSB rulings, Anti-trade bias in policy outcome
Typical dispute: Foreign trying to force Free Trade.
c1*
Always dispute
Anti-trade bias in DSB rulings, Pro-trade bias in policy outcome
c1
c2
c

Precedent Setting

- Should DSB rulings set legal *precedent* for future rulings?
  - govs create the contract ("civil law") and provide DSB with a mandate
  - DSB can help complete the contract within its mandate through precedent-setting rulings ("common law")
- Consider a two-period version of the static model developed above
  - in a prior *Period* 0, the institution is created
  - *Period* 1 and *Period* 2 then proceed as in the static model
- The state s is *iid* across the two periods
- Discount factor: $\delta \geq 0$ (since the "future" is collapsed into *Period* 2, δ may be arbitrarily large)
- If rulings set precedent, a *Period*-1 ruling for the realized state s' will apply also in *Period* 2 if the realized state is again s'

Precedent Setting

Disputes with an Activist DSB

- Consider the D_g institution
- For $s \in \sigma^{FT}$:
  - if $qk(s) < \frac{c}{(1+\delta p(s))\gamma(s)}$ then $T_1 = FT$, DSB not invoked in *Period* 1
  - if $qk(s) > \frac{c}{(1+\delta p(s))\gamma(s)}$ then $T_1 = P$, DSB invoked in *Period* 1
- For $s \in \sigma^{P}$:
  - if $qk(s) < \frac{c^*}{(1+\delta p(s))\gamma^*(s)}$ then $T_1 = P$, DSB not invoked in *Period* 1
  - if $qk(s) > \frac{c^*}{(1+\delta p(s))\gamma^*(s)}$ then $T_1 = P$, DSB invoked in *Period* 1
- Trade-off: precedent induces more filings (bad); saves on duplicative filing costs in states where filing would occur anyway (good)

Precedent Setting

- Let $k(s) = \frac{1}{2}$ for all s, so DSB signal goes from perfect to uninformative as q goes from 0 to 1

Proposition 3: *Consider a given activist DSB role (g or i). As q increases from 0, first the introduction of precedent has no effect, then it becomes strictly undesirable, and finally it is strictly desirable as q approaches 1.*

- Intuition:
  - when DSB sufficiently well-informed, little chance of equilibrium filing absent precedent, so little expected savings of duplicative filing costs
  - when sufficiently poorly informed, DSB invoked in most every state, so little chance that precedent will induce additional filings

Proposition 4: *There exists an intermediate range of q such that, for a given activist DSB role (g or i), it is optimal to give the DSB precedent-setting authority if δ is sufficiently low, while it is preferable not to do so if δ is sufficiently high.*

- Intuition: high δ magnifies additional filing that comes with precedent

Summary

- Design of contract and design of DSB modeled as components of an over-arching institutional design problem
- A contract that has gaps or is vague, and a gap-filling/interpretive DSB, is optimal if quality of DSB information sufficiently high
- A contract that is vague or rigid, and a non-activist DSB, is optimal if quality of DSB information sufficiently low
- A non-monotonic relationship between observed frequency of DSB disputes and performance of optimal institution
- Selection effects can explain "pro-trade bias" in WTO DSB rulings if dispute costs are high for complainant relative to defendant
  - but same conditions imply an "anti-trade bias" in policy outcomes
- Giving the DSB precedent-setting authority is sub-optimal unless:
  - the DSB is poorly informed/govs care little about the future
- Extensions: more sophisticated DSB; enforcement; other legal systems

Renegotiation (Maggi and Staiger, Forthcoming)

- When govs make international commitments, what is the optimal structure for their contract?
- In answering this question, important to allow for *renegotiation*, especially given its empirical relevance in GATT/WTO
  - contract does not directly determine policy outcome
  - but w/ transaction costs it does so indirectly by shaping disagreement point for ex-post negotiations: hence, efficiency consequences
- Existing models of trade agreements abstract from renegotiation
- Study optimal design of trade agreements in presence of renegotiation
- Focus on a distinguishing transaction cost of trade-agreement setting:
  - gov-to-gov compensation takes form of "self-help"/tariff retaliation
  - $\Longrightarrow$ transfers entail DWL

Property Rules v. Liability Rules

- Broadly speaking, commitments can take one of two possible contractual forms
- One type of contract assigns *rights*, e.g., right to protect assigned to importer or right of free trade to exporter
  - rights can be transferred between govs only through voluntary transaction – a renegotiation
  - in effect, assigns *ownership* of rights concerning trade policy: a *property rule* in the legal literature
- The second type of contract presents importer with option to practice free trade, or to protect and pay *damages*
  - assigns entitlement of free trade to exporter, and while voluntary renegotiation can always occur
  - importer can also remove this entitlement unilaterally by paying damages ("efficient breach"): a *liability rule* in the legal literature
- A vast law-and-economics literature on this issue in domestic setting. Initiate formal analysis in context of international trade agreements

Approach

- Considerable research more generally on optimal design of contracts in presence of renegotiation
- We follow broad approach of this literature:
  - non-verifiable information, contract designed ex-ante, can be renegotiated ex post through Nash bargaining
- But two departures:
  - gov-to-gov transfers involve DWL, so utility is non-transferable
  - focus on binary policy choice; do this for tractability; but captures many trade-related policies that are discrete in practice

The Model

- A single industry; importing/Home gov chooses a binary policy $T \in \{FT, P\}$
- b a pos/neg transfer from Home to Foreign; $c(b)$ the DWL associated with b (borne by Home); $c(0) = 0$, $c(b) > 0$ for $b \neq 0$, smoothly convex; $b + c(b)$ increasing in b
- Home gov's payoff is $\omega(T, b) = v(T) - b - c(b)$
- Foreign gov is passive in this industry; its payoff is $\omega^*(T, b) = v^*(T) + b$
- Joint payoff of the two govs: $\Omega(T, b) = v(T) + v^*(T) - c(b)$
- Home gov's gain from protection: $\gamma \equiv v(P) - v(FT) > 0$
- Foreign gov's loss from protection: $\gamma^* \equiv v^*(FT) - v^*(P) > 0$
- Joint (positive or negative) gain from protection: $\Gamma \equiv \gamma - \gamma^*$

The Model

- "First best" outcome (joint surplus maximizing): if $\Gamma > 0$, $T = P$ and $b = 0$; if $\Gamma < 0$, $T = FT$ and $b = 0$
- Γ is uncertain ex-ante. Both govs observe Γ ex-post, but Γ is not verifiable by the DSB, so govs cannot write a complete contingent contract
- Assume γ^* is ex-ante known to all (so all uncertainty in Γ comes from γ), and γ is not verifiable
  - this is the best possible scenario for the "efficient breach" argument
- Assume γ^* is in the interior of the support of γ, so the first-best is P in some states ($\gamma > \gamma^*$) and FT in others ($\gamma < \gamma^*$)
- Density $h(\gamma)$ defined over $\gamma \in [0, \infty)$; let $\underline{\gamma} = \inf\{\gamma : h(\gamma) > 0\}$ and $\bar{\gamma} = \sup\{\gamma : h(\gamma) > 0\}$
- Look for contract that maximizes ex-ante joint surplus

The Contracting Options

- Two types of contracts
- Property rule: assigns right of FT to exporter ("prohibitive" property rule) or right of P to importer ("discretionary" property rule)
- Liability rule: an option contract giving Home a choice between (i) FT and (ii) P and payment b^D to Foreign
  - consider possibility of transfer also associated with FT (see paper)
- At formal level focus on family of liability contracts and optimize b^D:
  - prohibitive property rule outcome-equiv to liability with b^D set prohibitively high
  - discretionary property rule outcome-equiv to liability rule at other extreme with $b^D = 0$
- Note: b^D can be interpreted as payment specified under explicit escape clause, or remedy for contract breach

Timing of the Game

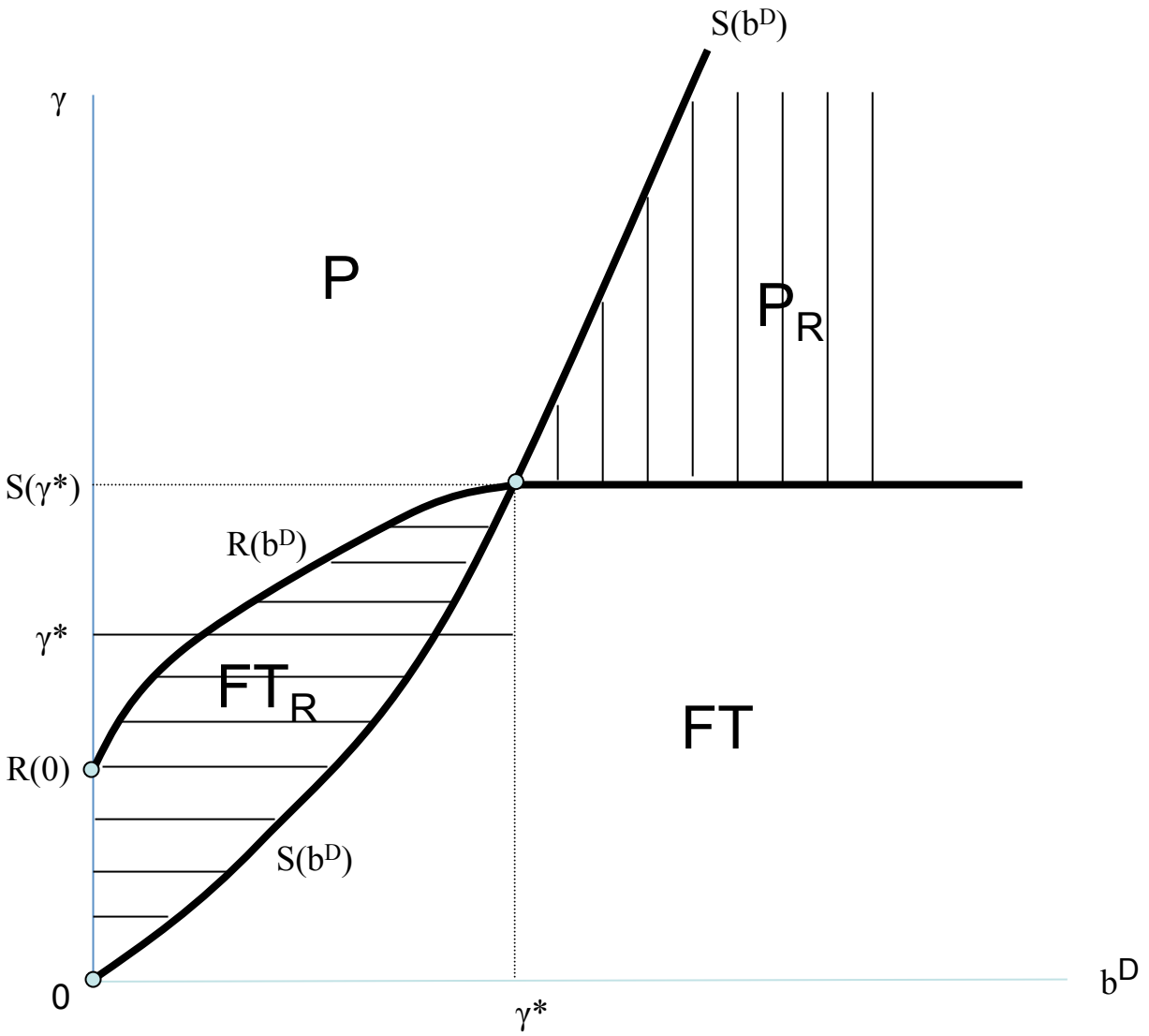
0. Governments write the contract
1. γ is realized and observed by the governments
2. Governments can renegotiate the terms of the contract (b and T)

Assume symmetric bargaining power (see paper for asymmetric case); abstract from enforcement issues

Analysis

- Given a contract specifying b^D, when does renegotiation occur, and in what direction?
- For any b^D, contract provides *threat point* for any renegotiation
- Threat point gives importer option to choose between $(T = FT, b = 0)$ and $(T = P, b = b^D)$
  - importer indifferent between options when $\gamma = b^D + c(b^D) \equiv S(b^D)$
  - for $\gamma < S(b^D)$ threat point is $(T = FT, b = 0)$
  - for $\gamma > S(b^D)$ threat point is $(T = P, b = b^D)$
- Fig 1

Figure 1



Analysis

- Consider first $\gamma < S(b^D)$ where threat point is $(T = FT, b = 0)$
- Renegotiation from $(T = FT, b = 0)$ to $(T = P, b = b^e)$ requires:
  - $\gamma > S(b^e)$ (for the importer) and $b^e > \gamma^*$ (for the exporter)
- Renegotiation toward P iff $S(\gamma^*) < \gamma < S(b^D)$. Region $\mathrm{P_R}$ in Fig 1
- Note: never strictly optimal to set $b^D > \gamma^*$; Fig 1
  - Implies in *equilibrium* contract never renegotiated towards P
- Consider next $\gamma > S(b^D)$ where threat point is $(T = P, b = b^D)$
- Renegotiation from $(T = P, b = b^D)$ to $(T = FT, b = b^e)$ requires:
  - $S(b^D) - S(b^e) > \gamma$ (for importer) and $\gamma^* > b^D - b^e$ (for exporter)
- Renegotiation toward FT iff $\gamma < S(b^D) - S(b^D - \gamma^*) \equiv R(b^D)$. Region $\mathrm{FT_R}$ in Fig 1

The Pattern and Direction of Renegotiation

- Summary of findings on pattern and direction of renegotiation:

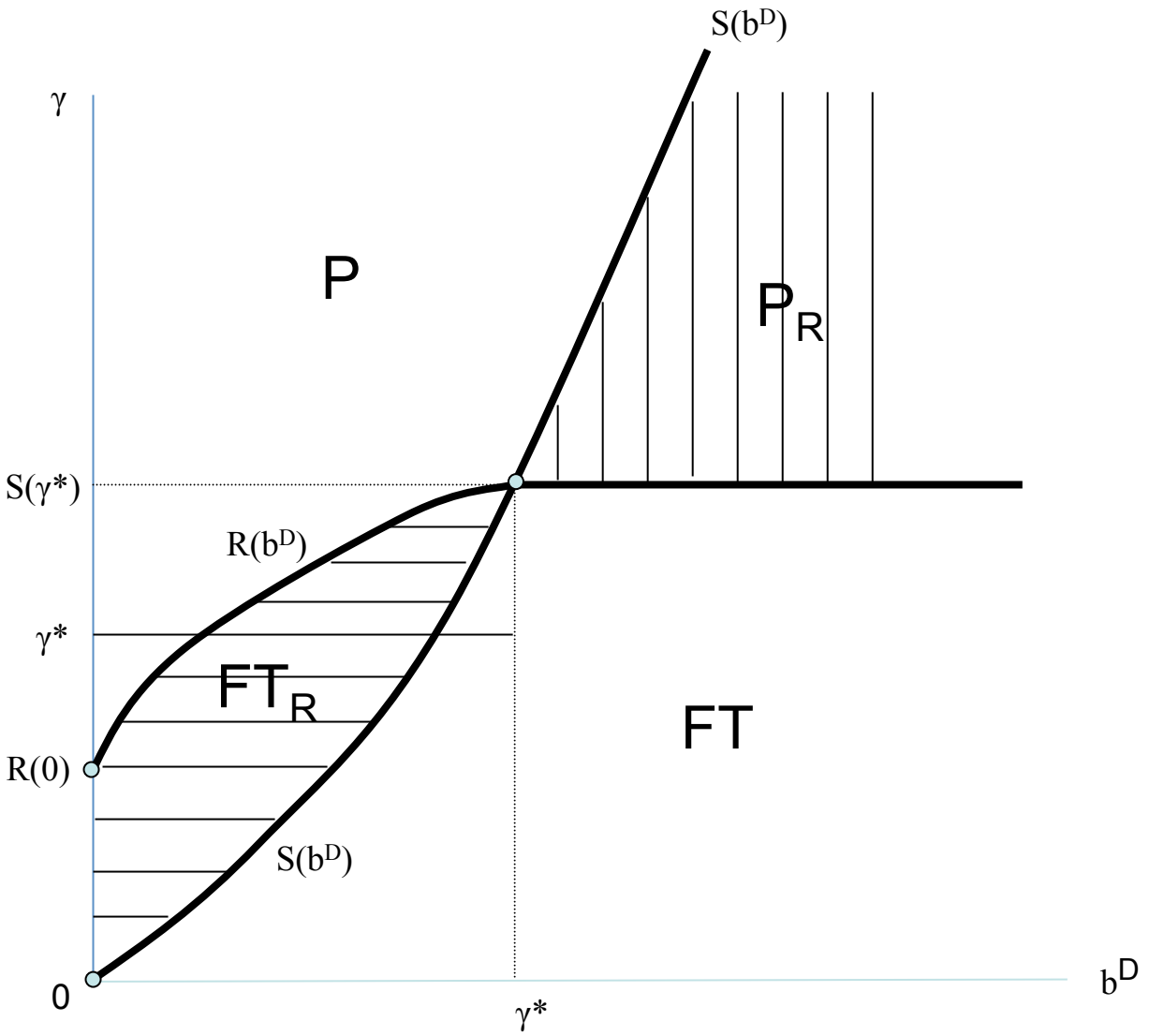
Proposition 1: (i) If $b^D < \gamma^*$, the contract is renegotiated for $\gamma \in (S(b^D), R(b^D))$, and the governments agree on FT and the exporter compensates the importer. (ii) If $b^D > \gamma^*$, the contract is renegotiated for $\gamma \in (S(\gamma^*), S(b^D))$, and the governments agree on P and the importer compensates the exporter; however, setting $b^D > \gamma^*$ is weakly dominated, and this kind of renegotiation does not happen in equilibrium.

- Note what is ruled out if damages set optimally: importer's threat point is FT, but govs agree to a policy P and level of damages to exporter less than contractually specified level b^D
- Note that renegotiation can occur in equilibrium only for intermediate values of γ, not "extreme" states of world

The Optimal Agreement with Renegotiation

- Next, What "allocations" $\hat{\gamma}$ can be implemented, and what level of b^D implements a given $\hat{\gamma}$?
- Renegotiation limits implementable range of $\hat{\gamma}$ (Lemma 1):
  - if no cost of transfers, only $\hat{\gamma} = \gamma^*$ implementable (Coase)
  - w/ costly transfers, any $\hat{\gamma} \in [R(0), S(\gamma^*)]$ is implementable (Fig 1)
  - still, renegotiation beneficial for ex-ante joint surplus
- And from Fig 1, level of b^D that implements a given $\hat{\gamma}$ is $b^D(\hat{\gamma}) = R^{-1}(\hat{\gamma})$
- Finally, How does b^e change with b^D? $\frac{\partial |b^e|}{\partial b^D} < 0$
  - Intuitively, increasing b^D strengthens the bargaining position of the exporter and hence decreases b^e in absolute size (Lemma 2)
- Now ready to study optimal level of b^D:
  - property rules ($b^D = 0$, or $b^D \geq \bar{b}^{prohib}$ where $\bar{b}^{prohib}$ determined by $S(\bar{b}^{prohib}) = \bar{\gamma}$); vs. liability rules ($b^D \in (0, \bar{b}^{prohib})$)

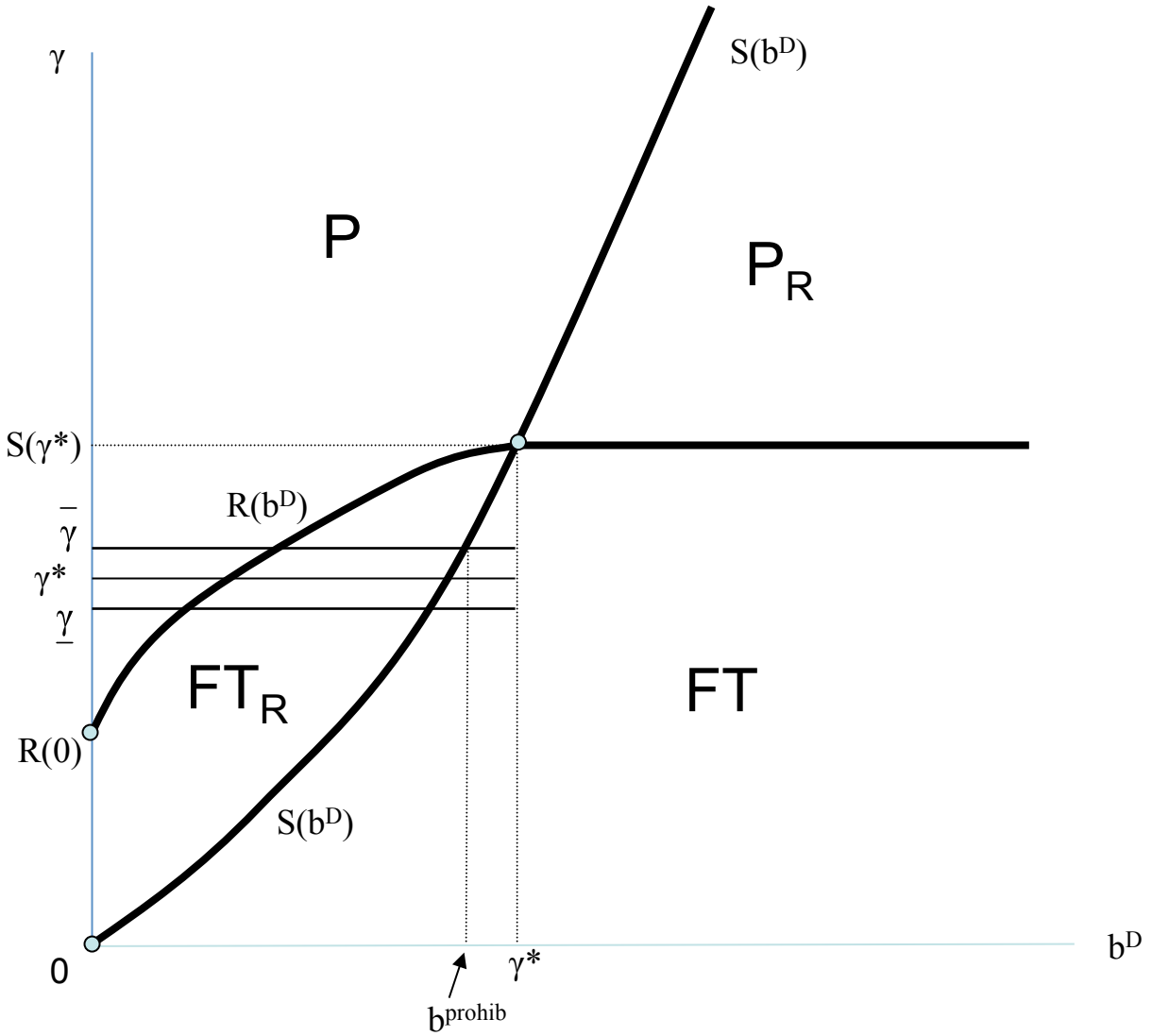
Figure 1



The Optimal Agreement with Renegotiation

- Small uncertainty:
  - Property rule not renegotiated, hence no equilibrium transfers; Fig 2
  - A liability rule can make policy contingent on γ, but benefit small when uncertainty small, cost not small; Fig 2
- Hence property rule optimal for small uncertainty: $b^D = 0$ if $E\gamma > \gamma^*$ and $b^D \geq \bar{b}^{prohib}$ if $E\gamma < \gamma^*$
- Large uncertainty: suppose $\underline{\gamma} < R(0)$ and $\bar{\gamma} > S(\gamma^*)$; back to Fig 1
- $\bar{b}^{prohib} > \gamma^*$, so $b^D \geq \bar{b}^{prohib}$ cannot be optimal by Prop 1; Fig 1
- What about $b^D = 0$?
  - For $\gamma > R(0)$, contract not renegotiated, outcome is $(P, b = 0)$, increasing b^D slightly from zero entails second-order loss
  - But for all $\gamma < R(0)$, contract renegotiated when $b^D = 0$, exporter pays sizable b^e, and hence with $\frac{\partial |b^e|}{\partial b^D} < 0$, increasing b^D slightly from zero gives first-order benefit. Fig 1
- Liability rule optimal for large uncertainty

Figure 2



The Optimal Agreement with Renegotiation

Proposition 2: (i) If the support of γ is sufficiently small, a property rule is optimal (specifically, the optimum is $b^D = 0$ if $E\gamma > \gamma^*$ and $b^D \geq \bar{b}^{prohib}$ if $E\gamma < \gamma^*$). (ii) If the support of γ is sufficiently large (on both sides of γ^*), the optimum is a liability rule, and in particular the optimal b^D satisfies $0 < b^D < \gamma^* < \bar{b}^{prohib}$.

- Opt. liability rule never makes injured party "whole," i.e., $b^D < \gamma^*$
  - Intuition: compensation inefficient, so use it sparingly; a feature consistent with GATT *reciprocity* norm
- Empirical prediction if uncertainty primarily about political-economy shocks: liability rules for issue areas where political-economy shocks more intense; property rules where political-economy less important
  - GATT/WTO: tarrification channeled political pressures from QRs to tariffs; exporters less politically active than import-competing sectors
  - $\Longrightarrow$ export subsidies/QRs prohibited by property rule; tariffs and production subsidies regulated through liability rules

Renegotiation under the Optimal Agreement

- A prediction that derives from underlying pattern of equilibrium renegotiation:
  - Prohibitive property rule ($b^D \geq \bar{b}^{prohib}$) implies threat point of FT for all γ in support, and Prop 1 says no renegotiation from FT to P
  - Discretionary property rule ($b^D = 0$) renegotiated only for $\gamma < R(0)$, but if $\underline{\gamma} < R(0)$ then liability rule optimal by Prop 2

Proposition 3: When a property rule is optimal, it is never renegotiated, and therefore entails no equilibrium transfers.

- Note: frequency of renegotiation/compensation in GATT/WTO has diminished through time; GATT/WTO has evolved towards system of property rules through time; Prop 3 links these observations
  - Evolution of GATT/WTO towards property rules may account for decline in frequency of renegotiation/compensation over time

Summary

- Argued that renegotiation and inefficient gov-to-gov transfers figure prominently in the GATT/WTO and other trade agreements
- Derived predictions concerning the optimal form of the agreement, the conditions under which the agreement will be renegotiated in equilibrium, and the form that such renegotiation will take
- Forged a link between the theory of trade agreements and the law-and-economics theory of optimal legal rules
- Extensions: harm not perfectly verifiable, DSB can observe noisy signal (2^{nd} paper); private information; continuous policies
- Finally, in a multi-country setting, all propositions extend. But new question: How does expansion of membership affect tradeoff between liability/property rules?
  - if more members increases bargaining frictions, then property rules favored by expanding membership (see paper)
  - could help explain evolution of legal rules in GATT/WTO

Final Thoughts

- Many features of real-world trade agreements are hard to square with complete contracts perspective
- ...Design of rules
  - mix of rigidity and discretion (GATT/WTO: tariff bindings, escape clause, domestic policies, national treatment)
- ...Settlement of disputes
  - role of court (GATT/WTO: interpretive, gap-filling, modification)
- ...Prominence of renegotiation
  - against backdrop of property and liability rules (GATT/WTO: quantitative restrictions, domestic subsidies)
- Incomplete contracts perspective provides a promising approach

Lecture II

Trade Disputes and Settlement

Giovanni Maggi and Robert W. Staiger

Yale and Wisconsin

October 2013

Introduction

- On September 24 2012, the *New York Times* reported that "*[t]he EU says it has obeyed WTO rulings by eliminating the harmful effect of government loans to Airbus, but Washington disagrees and is threatening up to $10 billion in sanctions*."
  - Not the outbreak of a non-cooperative U.S.-EU trade war
  - Washington is threatening WTO-authorized trade sanctions to achieve compensation for the harmful trade effects of EU subsidies
  - The *Times* report describes current status of a legal process of dispute resolution within the WTO
- Will the EU remove the trade effects of its subsidies?
- Or will the two governments negotiate a settlement?
- Or will the United States follow through on its threat to impose WTO-authorized tariffs on $10 billion of imports from the EU?

Introduction

- How to understand rich variation of outcomes in trade disputes?
  - For example, in GATT/WTO: early settlement; DSB ruling and implementation; post-ruling settlement
- Study trade agreements in a world of imperfectly verifiable political/economic shocks
- Highlight role of transaction costs, renegotiation "in the shadow of the law," and renegotiation "after the court has spoken"
- A key transaction cost: gov-to-gov compensation typically achieved through "self-help" (raising one's own tariffs)
  - Entails a deadweight loss

Preview of Results

- Optimal contract can take different forms
  - Small uncertainty/accurate DSB $\Longrightarrow$ "property rule" with/without exceptions optimal
  - Large uncertainty/inaccurate DSB $\Longrightarrow$ "liability rule" with/without exceptions optimal
- A rich set of possibilities for outcomes of trade disputes
  - Govs may reach "early settlement" or trigger DSB ruling; and in latter case ruling can be implemented or lead to post-ruling settlement
- Interaction between optimal contract and dispute outcome
  - Both early and post-ruling settlement possible when liability rule optimal; neither possible when property rule optimal
  - If DSB accuracy $\uparrow$: for fixed contract, rate of early settlement should $\uparrow$, but if contract evolves to property rule, settlement rate should $\downarrow$
- We examine these predictions in light of data on actual GATT/WTO disputes

Related Literature

- Maggi and Staiger (2012): focuses on optimal contract form under renegotiation, but no trade disputes in equilibrium (because govs have no uncertainty about DSB ruling)

- Models of trade agreements that generate disputes in equilibrium: Beshkar (2010, 2011), Maggi and Staiger (2011), Staiger and Sykes (2013), Park (forthcoming). But none of these models can explain rich diversity of dispute outcomes

- Law-and-economics literature on settlement (e.g. Bebchuck, 1984, Reinganum and Wilde, 1986) and on on property/liability rules (e.g. Calabresi and Melamed 1972, Schwartz, 1979, Shavell, 1984, Ulen, 1984, Kaplow and Shavell, 1996). But these models allow for cash transfers, so not directly applicable to trade agreements

The basic model

- A single industry; importing gov (H) chooses policy $T \in \{FT, P\}$; exporting gov (F) is passive in this industry
- Gov-to-gov transfers are costly: b a pos/neg transfer from H to F; $c(b)$ the associated DWL (borne by H)
  - For tractability, assume $c(b) = c \cdot |b|$, with $c \in (0, 1)$
- Importer's payoff: $v(T) - b - c(b)$
- Exporter's payoff: $v^*(T) + b$
- Importing gov's gain from protection: $\gamma \equiv v(P) - v(FT) \geq 0$
- Exporting gov's loss from protection: $\gamma^* \equiv v^*(FT) - v^*(P) \geq 0$
- First best: P if $\gamma > \gamma^*$, FT if $\gamma < \gamma^*$ (and $b = 0$ regardless)

Information Structure

- γ^* is ex-ante known to all
- γ is ex-ante uncertain but observed ex-post by govs. Not verifiable by DSB, so govs cannot write complete contingent contract, but DSB can observe a noisy signal γ^{dsb} (DSB investigation)
- Assume the joint density of (γ, γ^{dsb}) is log-supermodular

Contracts and bargaining

- Focus on menu contracts that allow H to choose between (i) setting FT and (ii) setting P and compensating F with payment b^C (*damages*)
  - b^C can be contingent on γ^{dsb}, so the contract is a schedule $b^C(\gamma^{dsb})$
  - If invoked, DSB announces "ruling" $b^C(\hat{\gamma}^{dsb})$, where $\hat{\gamma}^{dsb}$ is realization of signal
- We allow govs to negotiate before DSB ruling (bargaining "in the shadow of the court") and, if DSB invoked, after DSB ruling (bargaining "after the court has spoken"). Assume:
  - Govs have symmetric bargaining powers
  - Contracts are perfectly enforceable

Timing of events

0. Governments write contract $b^C(\gamma^{dsb})$
1. γ is realized and observed by governments
2. Governments Nash-bargain over policy T and transfer b
3. If negotiation fails: DSB steps in and issues ruling $b^C(\hat{\gamma}^{dsb})$
4. If DSB ruling issued: governments Nash-bargain over T and b with disagreement point given by DSB ruling

Note possibilities for dispute resolution:

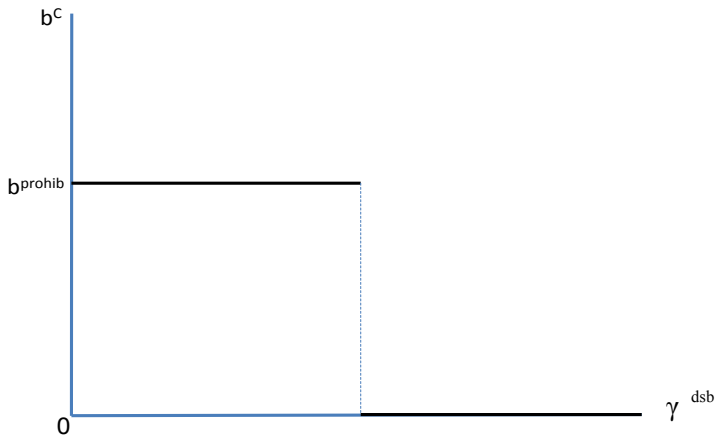
— "early settlement" (at stage 2)
— DSB invoked, ruling implemented
— DSB invoked, post-ruling settlement (at stage 4)

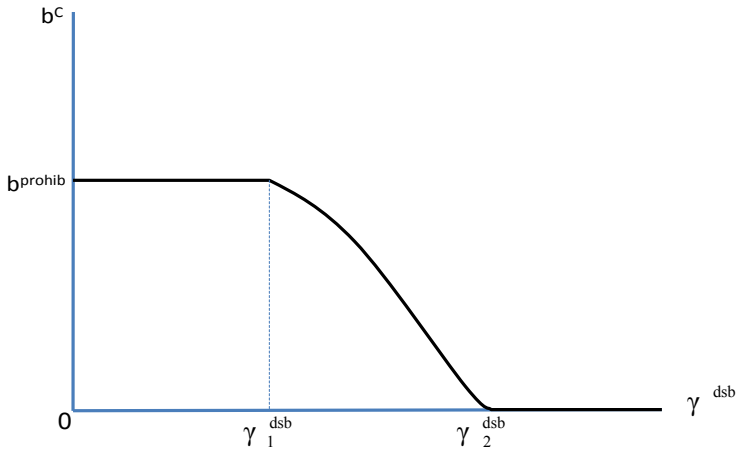
Optimal contract

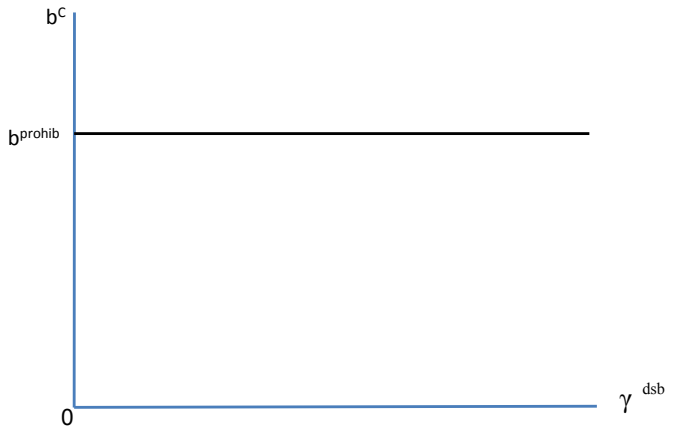
- **Proposition 1**: (i) The optimal $b^C\left(\gamma^{dsb}\right)$ is a weakly decreasing schedule; (ii) An increase in γ^* weakly increases the optimal b^C for given γ^{dsb}.

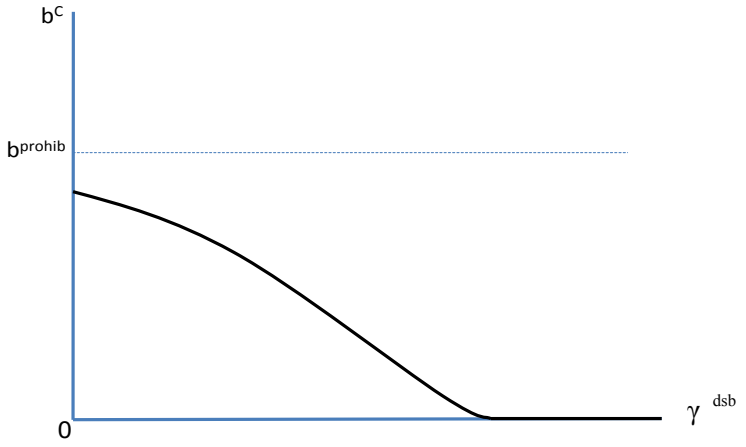
- Some interesting possibilities: Figure 2
  - Bottom-left: "property rule without escape"
  - Top-left: "property rule with escape"
  - Bottom-right: "liability rule with escape"
  - Top-right: mixed rule (reminiscent of WTO safeguards)

Figure 2: possible types of contract









Optimal contract

- Under what conditions do we obtain each type of contract?
- If DSB signal precise or ex-ante uncertainty about γ small (support of $\gamma|\gamma^{dsb}$ sufficiently small for all γ^{dsb}), then property rule optimal (Proposition 2)
- If support of $\gamma|\gamma^{dsb}$ sufficiently large for all γ^{dsb}, then liability rule optimal (Proposition 3)
- Basic argument:
  - If support of $\gamma|\gamma^{dsb}$ large, then for highest γ's P is implemented regardless of rule (renegotiation): liability rule optimal, b/c can minimize expected cost of compensation/retaliation
  - If support of $\gamma|\gamma^{dsb}$ small, then for highest γ's P is implemented only w/ liability rule: but permitting P not so important for efficiency; and a property rule does not induce any compensation in equilibrium
- Cross-issue and time-series predictions about optimal rules

Disputes

- Now consider disputes and their resolution under optimal contract
- To keep results sharp, add more structure. Assume:
  - $\gamma^{dsb} = \gamma + \varepsilon$, where ε is independent of γ
  - Support of ε symmetric around zero, $[-\bar{\varepsilon}, \bar{\varepsilon}]$, and $E(\varepsilon) = 0$
  - DSB signal not too inaccurate ($\bar{\varepsilon}$ not too large)

When is there post-ruling settlement?

- **Proposition 4:** Suppose a DSB ruling has been triggered. (i) If the optimal contract is a property rule (with or without escape), post-ruling settlement never occurs, so the ruling is always implemented. (ii) If the optimum is a liability (or mixed) rule, either outcome is possible.

- Intuition for (i). Suppose ruling is $b^C(\hat{\gamma}^{dsb}) = b^{prohib}$ (similar argument for $b^C(\hat{\gamma}^{dsb}) = 0$)

  - Govs will renegotiate the ruling and agree on P (with H compensating F) only if ruling is "way off," so that it's worth incurring the transfer cost to correct the DSB mistake
  - This can happen only if true γ much higher than DSB estimate; but by Prop 2, DSB errors cannot be large if property rule optimal
  - Example

When is there early settlement?

- Define "no dispute" outcome: stage-2 agreement with $b = 0$

When is there early settlement?

- Define "no dispute" outcome: stage-2 agreement with $b = 0$
- **Proposition 6:** (i) If the optimum is a property rule (with or without escape), the outcome can be "no dispute" or "DSB ruling" (with the latter always implemented), but never "early settlement." (ii) If the optimum is a liability (or mixed) rule, any of the outcomes including "early settlement" may occur.

When is there early settlement?

- Intuition for (i). With a property rule, DSB ruling (if reached) is either (i) FT or (ii) P with $b = 0$. Two possibilities: either govs are uncertain about direction of ruling (possible if property rule has escape), or not (e.g. property rule has no escape):

When is there early settlement?

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  - If govs are uncertain, benefit of early settlement is to avoid DSB errors. But transfers are costly, so settling + sharing surplus entails DWL $\Longrightarrow$ may not Pareto-improve over disagreement point (expected DSB ruling) if cost of DSB errors not large. And DSB errors cannot be large, otherwise (by Prop 2) property rule could not be optimal

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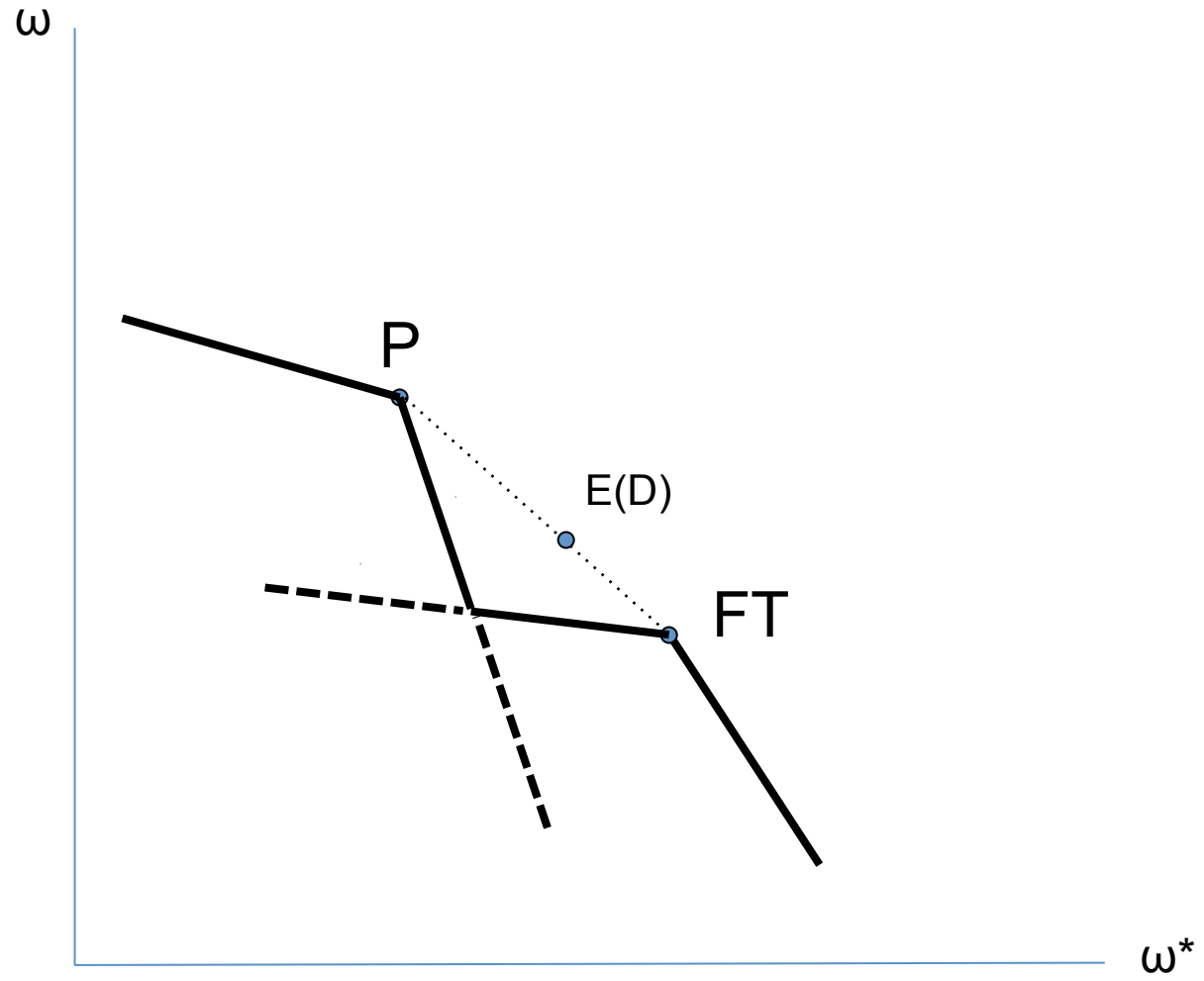
    - Graphically, bargaining frontier must look as in Fig 3 (can be shown), so disagreement point lies outside frontier, hence DSB invoked

Figure 3



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    - Graphically, bargaining frontier must look as in Fig 3 (can be shown), so disagreement point lies outside frontier, hence DSB invoked
  - If govs are certain, they stay with existing contract and exchange no transfer, hence "no dispute"
- Overall prediction: rates of early settlement *and* post-ruling settlement should be lower for property rules than for liability rules

Changes in DSB accuracy

- Reasonable to expect that accuracy of DSB rulings increases over time:
  - Learning associated with accumulation of GATT legal decisions
  - Introduction of appeals process with inception of WTO
- In reality, the contract is re-optimized only periodically during negotiation rounds. So we distinguish between a "short run," where the contract is fixed, and a "long run"
- **Remark:** If DSB accuracy increases over time:
  - (i) in the "short run" with the contract held fixed, the probability of early settlement rises (weakly)
  - (ii) in the "long run," if the contract switches from a liability (or mixed) rule to a property rule, there will be a drop in the probability of early settlement

Evidence

- Focus on GATT/WTO disputes across three periods: GATT-I (1948-1978), GATT-II (1979-1989) and WTO (1995-2009)
- We maintain two assumptions:
  - GATT-I a system of liability rules, WTO a system of mostly property rules with a few liability rules, GATT-II a transitional system (Hudec 1993, Jackson 1997, Pauwelyn 2008). See Table 1 for WTO-era classification of rules
  - Accuracy of DSB rulings increases over time
- We examine two key predictions of the model:
  - Rates of early and post-ruling settlement should be lower for property rules than for liability rules
  - Under the two assumptions above, the early settlement rate should follow a non-monotonic path, increasing initially and eventually decreasing

Descriptive Findings

- Overall rates of settlement in GATT-I, GATT-II and WTO:

Table 2

Settlement Rates	GATT-I 1948-1978	GATT-II 1979-1989	WTO 1995-2009
Early	0.47	0.60	0.54
Post-Ruling	0.21	0.28	0.15
Decline from Early to Post-Ruling	0.26	0.32	0.39

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  - the model can explain non-monotonicity across eras if (a) increase in DSB accuracy the dominant change from GATT-I to GATT-II and (b) shift from liability to property rules the dominant change in WTO

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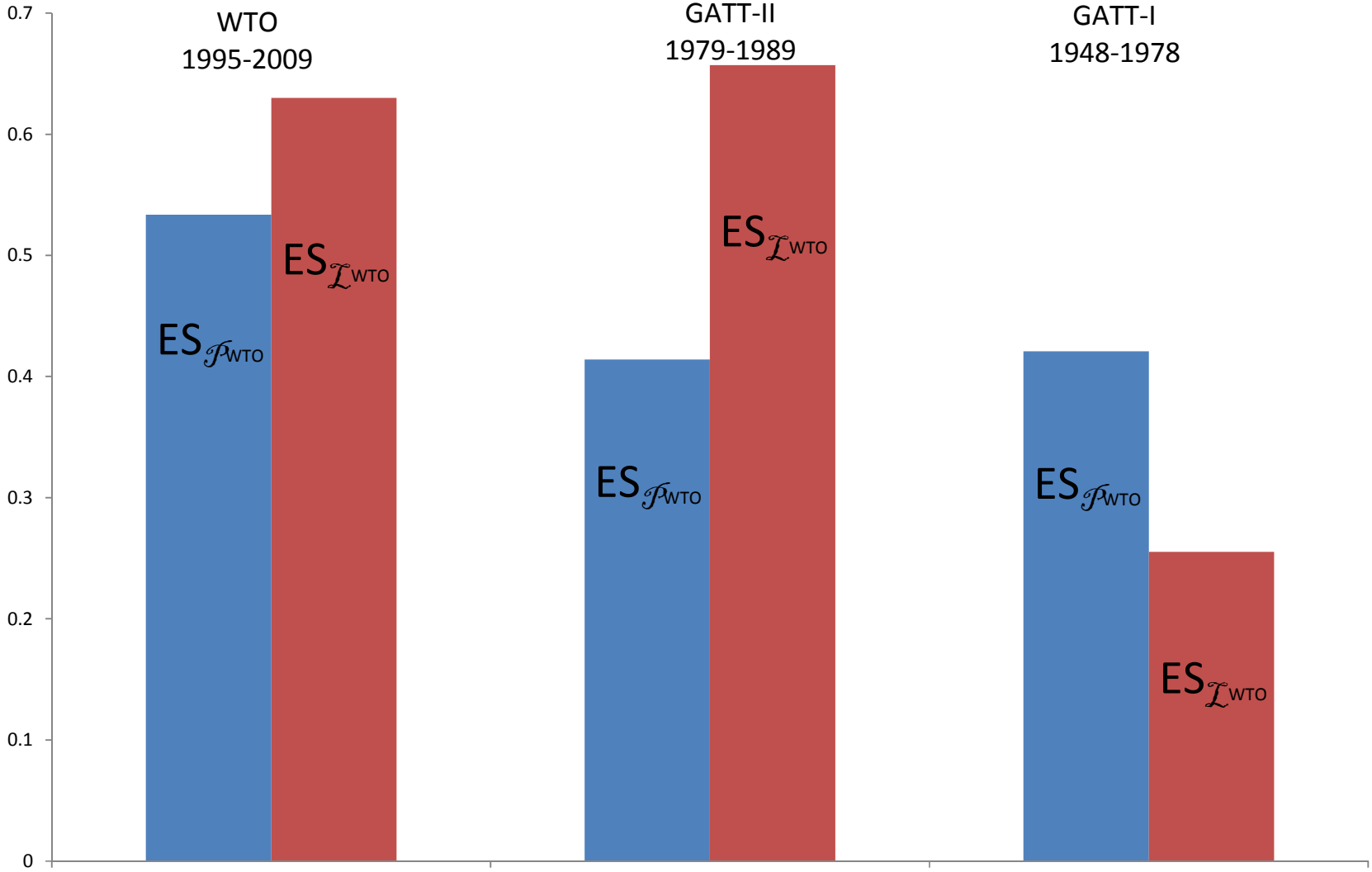
  - the model can explain non-monotonicity across eras if (a) increase in DSB accuracy the dominant change from GATT-I to GATT-II and (b) shift from liability to property rules the dominant change in WTO
  - the model can explain decline in early to post-ruling settlement rates as reflecting a selection effect: property-rule disputes are more likely to reach DSB ruling, and less likely to get settled post-ruling (with this effect growing over time as importance of property rules grows)

Descriptive Findings

- Mean rates of early settlement for
  - all WTO-era property rule claims ($ES_{\mathcal{P}_{WTO}}$) and
  - all WTO-era liability rule claims ($ES_{\mathcal{L}_{WTO}}$)
- across the GATT-I, GATT-II and WTO eras: Figure 4

Figure 4



Note: Bars represent the claim-weighted average rates of early settlement in a given era for claims that are classified as property (ES$_{\mathcal{P}WTO}$) and liability (ES$_{\mathcal{L}WTO}$) rules in the WTO era; see text for precise definitions.

Logits

- Focus on prediction that early settlement less likely for property rules than for liability rules
- Regress log odds of early settlement for dispute j on dummies for whether each type of claim was raised in dispute j
  - Controls: year, industry, multiple-claimant dispute, claimant-is-a-developing-country, respondent-is-a-developing-country
  - Columns 1-3 of Table 3
- Diff-in-diffs specification: pool GATT-I and WTO data, include WTO-era dummy and interaction terms between each claim variable and WTO dummy
  - Expect coefficients on property-rule interaction terms to be more negative than coefficients on liability-rule interaction terms
  - Column 4 of Table 3

Table 3: Logit Coefficients

Dependent variable:	Early Settlement	Early Settlement	Early Settlement	Early Settlement		Early Settlement		Early Settlement Claim-Level
	(1) WTO 1995-2009	(2) GATT-I 1948-1978	(3) GATT-II 1979-1989	(4) GATT-I & WTO 1948-1978 & 1995-2009		(5) GATT-I&II 1948-1989		(6) WTO 1995-2009
Explanitory variables:				(Base group)	(Interaction terms)[1]		(Interaction terms)[2]	
constant	0.4347** (0.2213)	0.4409 (0.3348)	0.7187*** (0.2680)	0.3893 (0.3240)	-0.0202 (0.3846)	0.6244*** (0.2012)	-	3.5409*** (0.5857)
Developing respondent	1.0042*** (0.2545)	0.4890 (0.7007)	0.5815 (0.8256)	0.8936*** (0.2359)	-	0.6258 (0.5664)	-	0.5410*** (0.1710)
Property	-	-	-	-	-	-	-	-2.8287*** (0.5908)
WTO-era property rules:								
National treatment	-0.6446** (0.2676)	-0.6081 (0.5193)	-0.7399 (0.5031)	-0.6098 (0.5227)	-0.0974 (0.5853)	-0.8902 (0.6159)	0.0073 (0.0180)	-
Antidumping/countervailing duty	-0.8940*** (0.3202)	-1.2446 (1.2324)	-0.4345 (0.7687)	-1.1916 (1.2298)	0.3695 (1.2696)	-0.6431 (1.1041)	-0.0215 (0.1537)	-
Admin of trade regs/fees/formalities	-0.5581* (0.2858)	0.4485 (0.8704)	-2.0284** (0.8687)	0.5043 (0.8666)	-0.9701 (0.9112)	1.7472 (1.3006)	-0.3562** (0.1609)	-
Escape clause	-0.7795* (0.4150)	0.7641 (0.8656)	-0.9145 (1.3375)	0.7856 (0.8677)	-1.4822 (0.9596)	1.2222 (1.4436)	-0.1851 (0.2096)	-
Export subsidies	-0.8442** (0.4193)	a	-0.0173 (0.7428)	a	a	a	a	-
WTO-era liability rules:								
Nonviolation	0.5507* (0.2952)	-1.7484*** (0.5706)	-1.4385** (0.6825)	-1.7622*** (0.5739)	2.3497*** (0.6450)	-2.1778*** (0.7798)	0.0228 (0.0295)	-
Domestic subsidies	0.1721 (0.6017)	-0.7653 (0.7246)	1.9571* (1.0842)	-0.7125 (0.7197)	0.3301 (0.8900)	-1.5726 (0.9754)	0.2149** (0.1037)	-
Observations	348	109	133	457		242		916
χ^2 (d.f.)	37.92 (8)	22.06 (7)	22.57 (8)	57.38 (14)		48.89 (13)		63.91 (2)
Pseudo R^2	0.079	0.1464	0.1262	0.0907		0.1465		0.0611

Note:
Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1
"a" denotes claim omitted due to lack of use.
1: interaction terms represent the product of the associated base group variable and an indicator variable that takes value 1 if the dispute was a WTO-era dispute and zero otherwise.
2: interaction terms represent the product of the associated claim variable and its claim-specifi c experience variable.

Logits

- Focus next on impact of DSB accuracy on early settlement rate
- If DSB accuracy increases with DSB experience, then model predicts that, if contract is of liability type and is held fixed, early settlement rate should increase with DSB experience
- Focus on GATT-I&GATT-II period
  - Proxy claim-specific DSB experience with # of times a particular claim was raised in previous GATT disputes
  - Augment regressions by including interactions between each claim variable and the associated experience variable
- If a claim is a liability rule throughout GATT-I and GATT-II, coefficient on interaction term should be positive; for claims that evolve to property rule, either sign is consistent with the model
  - Column 5 of Table 3

Table 3: Logit Coefficients

Dependent variable:	Early Settlement	Early Settlement	Early Settlement	Early Settlement		Early Settlement		Early Settlement Claim-Level
	(1) WTO 1995-2009	(2) GATT-I 1948-1978	(3) GATT-II 1979-1989	(4) GATT-I & WTO 1948-1978 & 1995-2009		(5) GATT-I&II 1948-1989		(6) WTO 1995-2009
Explanitory variables:				(Base group)	(Interaction terms)[1]		(Interaction terms)[2]	
constant	0.4347** (0.2213)	0.4409 (0.3348)	0.7187*** (0.2680)	0.3893 (0.3240)	-0.0202 (0.3846)	0.6244*** (0.2012)	-	3.5409*** (0.5857)
Developing respondent	1.0042*** (0.2545)	0.4890 (0.7007)	0.5815 (0.8256)	0.8936*** (0.2359)	-	0.6258 (0.5664)	-	0.5410*** (0.1710)
Property	-	-	-	-	-	-	-	-2.8287*** (0.5908)
WTO-era property rules:								
National treatment	-0.6446** (0.2676)	-0.6081 (0.5193)	-0.7399 (0.5031)	-0.6098 (0.5227)	-0.0974 (0.5853)	-0.8902 (0.6159)	0.0073 (0.0180)	-
Antidumping/countervailing duty	-0.8940*** (0.3202)	-1.2446 (1.2324)	-0.4345 (0.7687)	-1.1916 (1.2298)	0.3695 (1.2696)	-0.6431 (1.1041)	-0.0215 (0.1537)	-
Admin of trade regs/fees/formalities	-0.5581* (0.2858)	0.4485 (0.8704)	-2.0284** (0.8687)	0.5043 (0.8666)	-0.9701 (0.9112)	1.7472 (1.3006)	-0.3562** (0.1609)	-
Escape clause	-0.7795* (0.4150)	0.7641 (0.8656)	-0.9145 (1.3375)	0.7856 (0.8677)	-1.4822 (0.9596)	1.2222 (1.4436)	-0.1851 (0.2096)	-
Export subsidies	-0.8442** (0.4193)	a	-0.0173 (0.7428)	a	a	a	a	-
WTO-era liability rules:								
Nonviolation	0.5507* (0.2952)	-1.7484*** (0.5706)	-1.4385** (0.6825)	-1.7622*** (0.5739)	2.3497*** (0.6450)	-2.1778*** (0.7798)	0.0228 (0.0295)	-
Domestic subsidies	0.1721 (0.6017)	-0.7653 (0.7246)	1.9571* (1.0842)	-0.7125 (0.7197)	0.3301 (0.8900)	-1.5726 (0.9754)	0.2149** (0.1037)	-
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1: interaction terms represent the product of the associated base group variable and an indicator variable that takes value 1 if the dispute was a WTO-era dispute and zero otherwise.
2: interaction terms represent the product of the associated claim variable and its claim-specifi c experience variable.

Claim-Level Evidence

- As robustness check, we use claim-level data from WTO Dispute Settlement Database, which records claims made at two stages:
  - request for "consultation" and
  - request for a "panel"
  - also records the claims that are ruled upon in each dispute
- We assume: If a claim is not ultimately ruled upon, it must have been settled prior to DSB ruling ("early settlement")
- Unit of observation is now the claim made at either stage (request-for-consultation and/or request-for-panel)
  - Column 6 of Table 3
- Property-rule claims have lower odds of early settlement than liability-rule claims, as the model predicts

Table 3: Logit Coefficients

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Property	-	-	-	-	-	-	-	-2.8287*** (0.5908)
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National treatment	-0.6446** (0.2676)	-0.6081 (0.5193)	-0.7399 (0.5031)	-0.6098 (0.5227)	-0.0974 (0.5853)	-0.8902 (0.6159)	0.0073 (0.0180)	-
Antidumping/countervailing duty	-0.8940*** (0.3202)	-1.2446 (1.2324)	-0.4345 (0.7687)	-1.1916 (1.2298)	0.3695 (1.2696)	-0.6431 (1.1041)	-0.0215 (0.1537)	-
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Note:
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Conclusion

- What explains the wide variation that is observed in the resolution of trade disputes?
- A model of trade agreements with renegotiation and imperfectly verifiable information, which can generate a variety of dispute outcomes in equilibrium
- Govs may reach "early" settlement, they may trigger a DSB ruling and implement it, or they may reach a post-ruling settlement
- Predictions on how the dispute outcome depends on the contracting environment and how it correlates with the optimal contract form
- Initial support for the model's predictions from data on the outcomes of actual trade disputes in the GATT/WTO

Example

- Suppose:
  - $\gamma^* = \$100$ million
  - $\hat{\gamma}^{dsb} = \$90$ million
  - and $b^C(\hat{\gamma}^{dsb})$ is prohibitive, so that threat point to post-ruling settlement negotiations is FT and no transfer
- For successful post-ruling settlement (implementing P instead of FT), must have:
  - $b > \gamma^* = \$100$ million
  - $\gamma > b + c \cdot b \Longrightarrow \gamma > (1+c) \cdot \$100$ million
- But if $\gamma = (1+c) \cdot \$100$ million possible when $\hat{\gamma}^{dsb} = \$90$ million so that DSB ruling could be this far off, then
  - by Prop 2 a property rule/prohibitive $b^C(\hat{\gamma}^{dsb})$ could not be optimal

Table 1

CLAIM	WTO-ERA CLASSIFICATION	PROPORTION OF CASES WHERE CLAIM INVOKED		
		WTO 1995-2009	GATT-I 1948-1978	GATT-II 1979-1989
Nondiscrimination	property	0.29	0.17	0.16
Schedule of concessions	property	0.23	0.24	0.24
National treatment	property	0.34	0.30	0.17
Film provisions	property	0.00	0.00	0.01
Transit	property	0.02	0.00	0.01
Antidumping/countervailing duty	property	0.49	0.04	0.17
Customs valuation	property	0.03	0.01	0.00
Fees/formalities	property	0.03	0.05	0.02
Marks of Origin	property	0.01	0.01	0.01
Administration of trade regulations	property	0.20	0.02	0.05
Quantitative restrictions	property	0.26	0.38	0.35
Balance of payments	property	0.00	0.06	0.00
Nondiscriminatory quotas	property	0.09	0.21	0.15
Exchange arrangements	property	0.01	0.03	0.00
Domestic subsidies	liability	0.06	0.10	0.14
Export subsidies	property	0.13	0.00	0.08
State trading	property	0.02	0.00	0.04
Government development assistance	property	0.02	0.01	0.04
Escape clause	property	0.09	0.08	0.02
General exceptions	property	0.01	0.01	0.05
Security exceptions	property	0.01	0.01	0.01
Violation nullification or impairment	property	0.03	0.07	0.12
Nonviolation	liability	0.20	0.28	0.10
Free trade agreements/customs unions	property	0.02	0.00	0.03
Modification of schedules	liability	0.03	0.06	0.03

Note: See Data Appendix for specific GATT/WTO Articles associated with each claim.

Lecture III

Trade Agreements, the Nature of Price Determination and Offshoring

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March 2014

Introduction

- A fundamental question for modern research on commercial policy: What is the purpose of international trade agreements?
- Answer has implications for understanding the design and operation of trade agreements that we observe
- Two broad views:
  - internalize international policy externalities
  - help governments make commitment to their own private sectors
- International externality view dominates in accounting for observed features and operation of trade agreements
- But what form does the international externality take? And if the form of the externality changes, must trade agreements change to remain successful?

Introduction

- Theme 1: Nature of international price determination a key determinant of the nature of the international externality, can have profound impact on the design of an effective trade agreement
- Theme 2: Rise of offshoring may alter the design of effective trade agreements through its impact on the nature of price determination
- First discuss trade agreements and the nature of price determination (Antràs and Staiger, 2012a)
- Then through this lens discuss implications for trade agreements of rise in offshoring (Antràs and Staiger, 2012b)

Trade Agreements and the Nature of Price Determination

- 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
- 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^*:

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

- Reflects essential mission of GATT/WTO rules: provide secure property rights over negotiated market access
- 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

- Does this result depend on absence of 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

- Now suppose international prices determined by bilateral bargaining
- 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

Summary

- According to ToT theory, Nash tariffs inefficiently high but domestic policies internationally efficient, market access/shallow integration approach can achieve efficiency
- But when prices are not fully disciplined by market clearing (bilateral bargaining), deep integration needed
- How much are international prices disciplined by market clearing?
  - arguably less and less so with the increase in offshoring (Antràs and Staiger 2012b)
- How sensitive is the performance of the market-access/shallow integration approach to the nature of international price determination?
  - some suggestive evidence: rise of deep-integration FTAs (Orefice and Rocha 2014)
- Important questions for the architecture of the WTO moving forward

Offshoring and the Role of Trade Agreeements

- Offshoring the production of inputs an increasingly dominant feature of the world economy
  - has come to symbolize the current wave of "globalization"
- Now examine the role and design of trade agreements in the presence of offshoring

Offshoring

- Intermediate inputs often customized/involve costly search, and hence exhibit lock-in for buyers and sellers
- Contractual safeguards for international transactions difficult to enforce
- Two features of offshoring implied:
  - terms of trade determined by *bilateral bargaining* between foreign suppliers and domestic producers, not disciplined by market clearing considerations
  - potential for *international hold up*
- Show that second feature can give rise to activist role for trade policy, but first feature has fundamental implications for the role and design of trade agreements

Main Findings

- The rise in offshoring complicates the task of trade agreements in two ways:
  - mechanism for international cost-shifting is more complex and extends to wider set of policies, so negotiations must extend to wider set of policies as well
  - underlying problem that a trade agreement must address in the presence of offshoring varies with the political preferences of member governments
- Implication of rise in offshoring for design of trade agreements:
  - increasingly difficult for governments to rely on traditional GATT/WTO concepts and rules – such as market access, reciprocity and non-discrimination – to help them solve their trade-related problems
- Some suggestive evidence:
  - signs of greater difficulty liberalizing trade through WTO negotiations in sectors where customized inputs are especially prevalent (Figure 1)

Plan for Remainder of Talk

- Sketch of the Benchmark Model
- Nash Trade Policy
- Trade Agreements: Beyond Market Access
- Benchmark Model with Political Economy
- Trade Agreements: Beyond the Terms of Trade
- Sensitivity
- Final Thoughts & Some Open Questions

Benchmark Model

Setup

- Two small countries, H and F, face fixed price at which a final good 1 is available on world markets
- Consumer preferences in country $j \in \{H, F\}$ given by $U^j = c_0^j + u\left(c_1^j\right)$; $u' > 0$ and $u'' < 0$
- Numeraire good 0 is costlessly traded / always consumed in both H and F
- Choose units so (fixed) price of good 1 on world markets is 1; with free trade, price is 1 everywhere

Setup

- Good 1 produced with customized input x according to concave $y(x)$
- Producers in H must import x from suppliers in F
- Choose units so (fixed) marginal cost of x in F is 1; for now trade in x is free
- Note: production efficiency requires $y'\left(x^E\right) = 1$
- Ex-ante contracts ruled out (e.g., unverifiable quality), hence:
  - the price at which each supplier in F sells its inputs to a producer in H is decided ex-post (through bargaining) once investment in x has been made
- All agents have ex-ante zero outside option
- Unit measure of producers in H and suppliers in F randomly matched

Timing

stage 1. Match occurs; if both agents stay with the match, producer provides supplier with list of customized input specifications; otherwise both exit and receive zero outside option

stage 2. Each supplier decides on amount x of customized input to produce

stage 3. Each producer-supplier pair (Nash) bargains over price of the input, with bargaining weights α and $(1-\alpha)$ for home producer and foreign supplier, resp

stage 4. Each producer in H imports x from its partner-supplier; produces the final good with the acquired x; payments agreed in *stage* 3 are settled

Free Trade Equilibrium

Consider *stage* 3 for producer in H and supplier in F matched in *stage* 1

agm. jt. p/o		$y(x)$	
d/agm. p/o	pr: 0		spl: 0
quasi-rents		$y(x)$	
stage-3 p/o	pr: $\alpha y(x)$		spl: $(1-\alpha)y(x)$

In *stage* 2, input supplier chooses x to maximize $(1-\alpha)y(x)-x$, so the optimal quantity $\hat{x}$ of input satisfies $(1-\alpha)y'(\hat{x})=1$

Note: $\hat{x} < x^E$ for $\alpha > 0$; under-investment associated with hold up

Proposition 1 *In the Benchmark Model, a hold-up problem exists under free trade, leading to an inefficiently low volume of input trade ($\hat{x} < x^E$).*

Constrained-Efficient Trade Policy

- International nature of hold-up problem makes organizational/contractual remedies especially problematic

In the absence of these remedies, can trade policy help to alleviate hold-up?

stage 0. A social planner selects a home-country trade tax τ_1^H on the final good 1, a home-country import tax τ_x^H on home imports of the input x, and a foreign-country export tax τ_x^F on foreign exports of the input x

Note: $p_1^H = (1 + \tau_1^H)$

Define $\tau_x \equiv (\tau_x^H + \tau_x^F)$

Constrained-Efficient Trade Policy

Consider *stage* 3 for producer in H and supplier in F matched in *stage* 1

agm. jt. p/o		$\left(1+\tau_1^H\right) y\left(x\right) - \tau_x x$	
d/agm. p/o	pr: 0		spl: 0
quasi-rents		$\left(1+\tau_1^H\right) y\left(x\right) - \tau_x x$	
stage-3 p/o	pr: αq.r.		spl: $(1-\alpha)$q.r.

In *stage* 2, input supplier chooses x according to FOC

$$(1-\alpha)\left(1+\tau_1^H\right) y'\left(\hat{x}\right) = 1 + (1-\alpha)\tau_x,$$

implicitly defining $\hat{x}(\tau_1^H, \tau_x)$. Note: If $\tau_1^H = 0$, then $\tau_x^E \equiv -\alpha/(1-\alpha)$ achieves $\hat{x} = x^E$ w/o consumption distortion

Proposition 2 *In the Benchmark Model, the constrained-efficient trade policy choices maintain free trade in the final good and subsidize importation of the input so as to solve the hold-up problem and achieve an efficient volume of input trade ($\hat{x} = x^E$).*

Unilateral Home Policy

- Does H have a unilateral incentive to "do the right thing?"

  stage 0. The home government H selects a trade tax τ_1^H on the final good 1, and a trade tax τ_x^H on the imported input x; the foreign government F remains passive, i.e., $\tau_x^F \equiv 0$

- Two goals for H: achieve the desired $\hat{x}$; and extract inframarginal surplus from F's supplier

Unilateral Home Policy

- Inframarginal surplus extraction:

$$\frac{d\pi^F(\tau_1^H, \tau_x^H(\tau_1^H))}{d\tau_1^H}|_{d\hat{x}=0} = (1-\alpha)\,\hat{x}\left[\frac{y(\hat{x})}{\hat{x}} - y'(\hat{x})\right]$$

- What stops H from extracting all surplus from foreign suppliers?

$$\frac{dW^H(\tau_1^H, \tau_x^H(\tau_1^H))}{d\tau_1^H}|_{d\hat{x}=0} = \tau_1^H \frac{\partial D_1^H}{\partial p_1^H} - (1-\alpha)\,\hat{x}\left[\frac{y(\hat{x})}{\hat{x}} - y'(\hat{x})\right]$$

  - Negative at $\tau_1^H = 0$ due to concavity of $y(x)$. Hence, $\hat{\tau}_1^H < 0$
  - Note: $\tau_1^H = 0$ efficient for any level of $\hat{x}$:

$$\frac{dW^W(\tau_1^H, \tau_x^H(\tau_1^H))}{d\tau_1^H}|_{d\hat{x}=0} = \tau_1^H \frac{\partial D_1^H}{\partial p_1^H}$$

  - Hence, $p_1^H = (1+\tau_1^H)$ inefficiently low for any level of $\hat{x}$

Unilateral Home Policy

- Desired $\hat{x}$ satisfies

$$y'(\hat{x}) = 1 - (1-\alpha)\frac{\hat{x}}{\partial \hat{x}/\partial \tau_x^H} > 1$$

  - Hence, $\hat{x} < x^E$

Nash Equilibrium Policies

stage 0. The home government H selects a trade tax τ_1^H on the final good 1, and a trade tax τ_x^H on the imported input x; simultaneously, the foreign government F selects a trade tax τ_x^F on the exported input x

- F has no reason to distort τ_1^F, and can pass cost of $\tau_x^F > 0$ on to producers in H who accept lower bargaining surplus
- **Proposition 3** *In the Nash equilibrium of the Benchmark Model, F maintains free trade in the final good and taxes the exports of the input, while H intervenes in both the final-good and input markets, resulting in (i) an inefficiently low volume of input trade ($\hat{x} < x^E$), and (ii) an inefficiently low local price for the final good in H's market.*

Trade Agreements: Beyond Market Access

- Two inefficiencies to correct: inefficiently low volume of input trade, and inefficiently low local price for the final good in H's market
- Hence, an agreement on input trade volume alone cannot achieve efficiency frontier in presence of offshoring
  - To see why, suppose F agrees to $\bar{\tau}_x^F$ and H may choose τ_1^H and τ_x^H to satisfy $\hat{x}(\tau_1^H, \tau_x^H + \bar{\tau}_x^F) = x^E$. Then H's choices satisfy

$$\frac{dW^H(\tau_1^H, \tau_x^H(\tau_1^H), \bar{\tau}_x^F)}{d\tau_1^H}\Big|_{d\hat{x}=0}$$

$$= \tau_1^H \frac{\partial D_1^H}{\partial p_1^H} - (1-\alpha) x^E \left[\frac{y\left(x^E\right)}{x^E} - y'\left(x^E\right)\right] = 0$$

    implying $\tau_1^H < 0$

  - So efficiency requires negotiations over τ_x^H, τ_x^F *and* τ_1^H

Interpreting Inadequacy of Market Access Focus

- Define p_x^*, the *international* (untaxed) price negotiated in *stage* 3 for exchange of inputs between foreign supplier and home producer:

$$p_x^*(\tau_1^H, \tau_x^H, \tau_x^F) \equiv (1-\alpha)(1+\tau_1^H)\frac{y\left(\hat{x}(\tau_1^H, \tau_x)\right)}{\hat{x}(\tau_1^H, \tau_x)} - (1-\alpha)\tau_x^H + \alpha\tau_x^F$$

- But

$$\frac{dp_x^*(\tau_1^H, \tau_x^H(\tau_1^H), \bar{\tau}_x^F)}{d\tau_1^H}\Big|_{d\hat{x}=0} = (1-\alpha)\left[\frac{y(\hat{x})}{\hat{x}} - y'(\hat{x})\right] > 0$$

$$\Longrightarrow \frac{dW^H(\tau_1^H, \tau_x^H(\tau_1^H), \bar{\tau}_x^F)}{d\tau_1^H}\Big|_{d\hat{x}=0}$$

$$= \tau_1^H \frac{\partial D_1^H}{\partial p_1^H} - x^E \frac{dp_x^*(\tau_1^H, \tau_x^H(\tau_1^H), \bar{\tau}_x^F)}{d\tau_1^H}\Big|_{d\hat{x}=0} = 0$$

- Evidently, market access focus inadequate because H retains policy flexibility to manipulate its ToT

Trade Agreements: Beyond Market Access

- Absent offshoring and the bilateral bargaining over international price that offshoring implies, an agreement over input trade volume would work (ToT theory)
- **Proposition 4** *In the presence of offshoring, an efficient trade agreement must achieve deep integration, requiring governments to agree to constraints on policies that extend beyond market access commitments.*
- Note: Propositions 3 and 4 hold for $\alpha \longrightarrow 0$, and hence regardless of whether lock-in effect leads to hold-up problem
- Key for the results is bilateral determination of prices resulting from lock-in effects

Benchmark Model with Political Economy

- Introduce political economy weights:

$$W^j = CS^j + \gamma^j \pi^j + \text{Trade Tax Revenue}^j, \quad \text{with } \gamma^j \geq 1, \text{ for } j \in \{H, F\}$$

- Can ensure that model predicts import tariffs and export subsidies with sufficient political economy forces
- Focus on different point: in the presence of offshoring, political economy leads to new inefficiencies that are not associated with international cost-shifting

Trade Agreements: Beyond the Terms of Trade

- To establish this point, useful to express home and foreign government welfare in terms of local and international prices that policies induce:

$$W^H = \bar{W}^H \left(p_1^H(\tau_1^H),\ p_x^H(\tau_1^H, \tau_x), p_x^F(\tau_1^H, \tau_x),\ p_x^*(\tau_1^H, \tau_x^H, \tau_x^F) \right)$$

and

$$W^F = \bar{W}^F \left(p_1^H(\tau_1^H),\ p_x^H(\tau_1^H, \tau_x), p_x^F(\tau_1^H, \tau_x),\ p_x^*(\tau_1^H, \tau_x^H, \tau_x^F) \right)$$

- And world welfare:

$$W^W = \bar{W}^W (p_1^H(\tau_1^H),\ p_x^H(\tau_1^H, \tau_x), p_x^F(\tau_1^H, \tau_x))$$

Trade Agreements: Beyond the Terms of Trade

- Efficient policies satisfy:

$$\bar{W}^W_{p^H_x} \frac{\partial p^H_x}{\partial \tau_x} + \bar{W}^W_{p^F_x} \frac{\partial p^F_x}{\partial \tau_x} = 0$$

$$\bar{W}^W_{p^H_1} + \bar{W}^W_{p^H_x} \left(\frac{\partial p^H_x}{\partial \tau^H_1} + \frac{\partial p^H_x}{\partial \tau_x} \frac{d\tau^H_x}{d\tau^H_1} \bigg|_{dp^*_x = 0} \right) = 0$$

- At efficient policies, a small change in τ_x must have no first-order impact on world welfare
- And small changes in τ^H_1 and τ^H_x that hold fixed p^*_x and hence p^F_x must have no first-order impact on world welfare either

Trade Agreements: Beyond the Terms of Trade

- Note. An increase in τ_1^H that is accompanied by a change in τ_x^H which prevents p_x^* from changing must *alter* the equilibrium volume of input trade $\hat{x}$:

$$\left.\frac{\partial \hat{x}(\tau_1^H, \tau_x)}{\partial \tau_1^H} + \frac{\partial \hat{x}(\tau_1^H, \tau_x)}{\partial \tau_x} \frac{d\tau_x^H}{d\tau_1^H}\right|_{dp_x^*=0}$$

$$= \frac{\left[\frac{y(\hat{x})}{\hat{x}} - y'(\hat{x})\right]\hat{x}}{p_1^H\left(\left[\frac{y(\hat{x})}{\hat{x}} - y'(\hat{x})\right] + \hat{x}y''\right)} \neq 0$$

- This is why efficiency requires that the impacts of small changes in τ_1^H and τ_x^H that hold fixed p_x^* must have no first-order impact on home *and* foreign welfare
- Different from ToT theory, where foreign welfare automatically unaffected; comes from bilateral bargaining over p_x^*

Trade Agreements: Beyond the Terms of Trade

- Nash policies satisfy:

$$\bar{W}^W_{p^H_x} \frac{\partial p^H_x}{\partial \tau_x} + \bar{W}^W_{p^F_x} \frac{\partial p^F_x}{\partial \tau_x} = -\hat{x}^N$$

and

$$\bar{W}^H_{p^H_1} + \bar{W}^H_{p^H_x} \left(\frac{\partial p^H_x}{\partial \tau^H_1} + \frac{\partial p^H_x}{\partial \tau_x} \left. \frac{d\tau^H_x}{d\tau^H_1} \right|_{dp^*_x = 0} \right) = 0$$

- Easy to see: Nash not efficient; not surprising, as international cost-shifting motive still active when political economy motives present
- More interesting question: Is international cost-shifting still the only source of inefficiency?

Trade Agreements: Beyond the Terms of Trade

- Political Optimum: unilateral choices "as if" $\bar{W}^H_{p^*_x} \equiv 0 \equiv \bar{W}^F_{p^*_x}$. If efficient, then int. cost-shifting ("ToT manipulation") is the problem
- Politically Optimal policies imply:

$$\bar{W}^W_{p^H_x} \frac{\partial p^H_x}{\partial \tau_x} + \bar{W}^W_{p^F_x} \frac{\partial p^F_x}{\partial \tau_x} = 0$$

$$\bar{W}^H_{p^H_1} + \bar{W}^H_{p^H_x} \left(\frac{\partial p^H_x}{\partial \tau^H_1} + \frac{\partial p^H_x}{\partial \tau_x} \left. \frac{d\tau^H_x}{d\tau^H_1} \right|_{dp^*_x = 0} \right) = 0$$

- But at political optimum, also have

$$\bar{W}^F_{p^H_1} + \bar{W}^F_{p^H_x} \left(\frac{\partial p^H_x}{\partial \tau^H_1} + \frac{\partial p^H_x}{\partial \tau_x} \left. \frac{d\tau^H_x}{d\tau^H_1} \right|_{dp^*_x = 0} \right) = \frac{\left(\gamma^F - 1\right) \hat{x}}{2} \left[\frac{y\left(\hat{x}\right)}{\hat{x}} - y'\left(\hat{x}\right) \right] > 0$$

- When $\gamma^F > 1$, PO inefficient; ToT manipulation not the only problem

Trade Agreements: Beyond the Terms of Trade

- $\Longrightarrow$ A trade agreement can generate additional Pareto gains beyond providing governments with an avenue of escape from a ToT-driven Prisoners' Dilemma
- Beginning from PO, a small increase in τ_1^H coupled with a change in τ_x^H that leaves p_x^* unchanged implies second-order loss for H but first-order gain for F
  - τ_x^H and τ_x^F can then be adjusted holding τ_x fixed to compensate H and still leave F with gain
- What is new problem to solve?

Interpreting the Non-ToT Problem

- Recall: trade volume $\hat{x}$ will be altered as a result of the policy adjustments described above
  - and at PO, F's politically motivated government is offering an export subsidy to its input producers
- Impact on W^H is second-order, but impact on W^F is

$$dW^F = \gamma^F [p_x^F - 1] d\bar{x} + \tau_x^F d\bar{x}.$$

- When $\gamma^F = 1$, PO implies $p_x^* = 1$ and dW^F simplifies to $dW^F = \gamma^F [p_x^* - 1] d\bar{x} = 0$
- But when $\gamma^F > 1$, $dW^F > 0$ because H's policies can help provide a more efficient means of redistributing income toward input suppliers in F than is possible with F's own policies alone
- $\Longrightarrow$ a need for additional international policy coordination beyond that required to eliminate ToT manipulation

Trade Agreements: Beyond the Terms of Trade

- **Proposition 5**: *In the presence of offshoring, an efficient trade agreement must serve two roles: it must provide governments with an avenue of escape from a terms-of-trade driven Prisoners' Dilemma; and when the foreign government objectives include political economy considerations, it must coordinate the setting of policies across countries so as to reduce the deadweight loss associated with export promotion programs for traded intermediate inputs.*

Sensitivity

- Secondary Market
- Ex-Ante Lump-Sum Transfers
- Other Extensions:
  - Vertical Integration
  - Multiple Foreign Countries and Search Costs
  - Ad Valorem Tariffs
  - Domestic Suppliers
  - Two-sided Investments

Final Thoughts & Some Open Questions

- How much are international prices disciplined by market clearing?
  - 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?
  - novel "political externalities"
- Some suggestive evidence
  - rise of deep-integration FTAs (Figure 1, Orefice and Rocha 2014)
  - signs of greater difficulty liberalizing trade through WTO negotiations in sectors where customized inputs are especially prevalent (Figure 1, Antràs and Staiger 2012b)
- Important questions for the architecture of the WTO moving forward

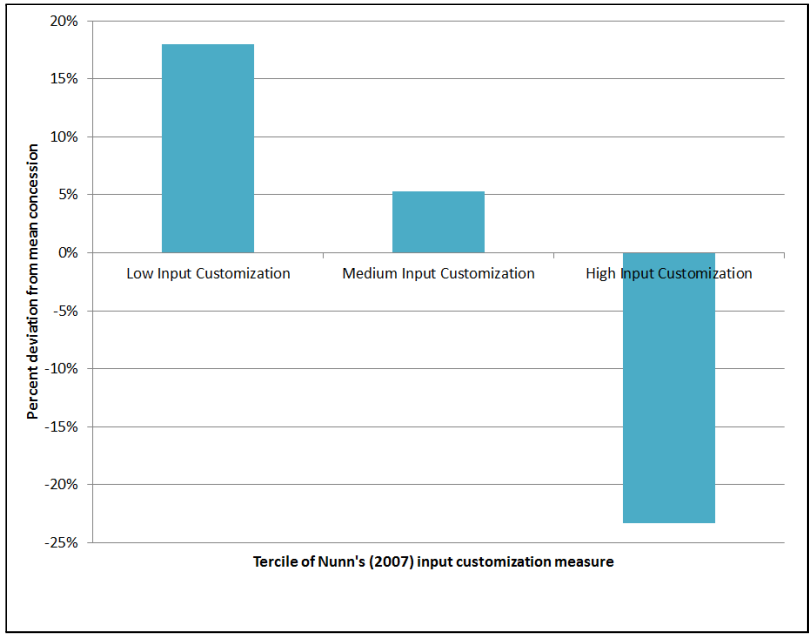
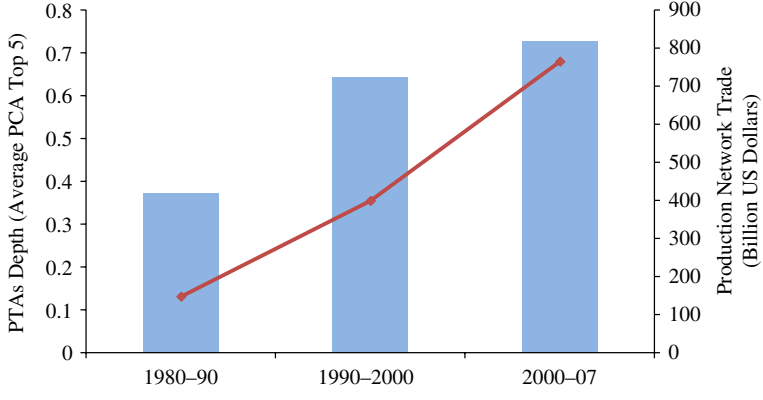
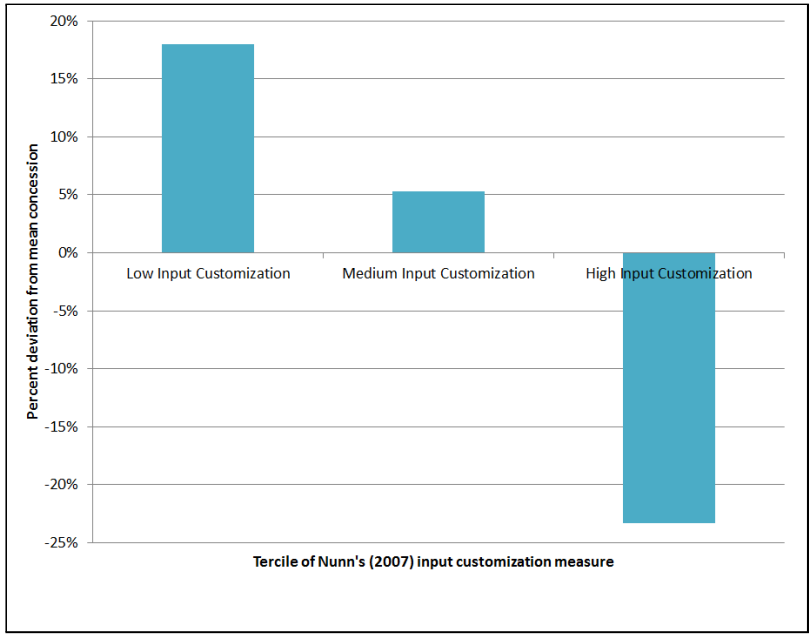


Figure 1: Percent deviation from mean concession by tercile of input customization measure

FIGURE 1
Production Networks Trade and Deep Integration



Source: Authors calculations on WTO'PTA content and COMTRADE databases.



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