Trade and Domestic Policies under Monopolistic Competition

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Trade Agreements Have Fundamentally Changed

- In the past, trade agreements mostly **shallow**: focused on the reduction of **import tariffs** and **export taxes** (classical trade policies).
- More recently, shift to **deep** trade agreements: **classical trade policies + domestic policies** (sector-specific production subsidies, product and labor standards, intellectual property rights, competition policy, and many other subjects)
- **However,** much of the theoretical literature on trade agreements still focused on classical trade policies (Bagwell and Staiger, Handbook Ch, 2016) . (Recent exceptions are, e.g., Grossman, McCalman and Staiger, 2019 and Maggi and Ossa, 2020.)

Trade Policies and Domestic policies

- Domestic policies deal with *domestic regulation* but may have international *externalities*.
- In contrast to trade policies, they do not discriminate between domestic and foreign goods.
- Under current WTO rules, domestic policies are not restricted/coordinated by trade agreeements, but actionable (may lead to retaliation).
- How do trade and domestic policies interact?
- Should trade agreements also regulate the use of domestic policies?

What We Do

- We develop a welfare decomposition to analyze incentives for trade and domestic policies and the design of trade agreements;
- We do this using a flexible trade model with monopolistic competition and free entry (Krugman, 1980);
- Firms are either homogeneous or heterogeneous (Melitz, 2003) and operate potentially in multiple sectors with CES demand.
- Policy makers in each country set sector-specific trade policies (import and export taxes/subsidies) and sector-specific domestic policies (production taxes/subsidies).

Advantages of this Setup

The model:

- is a generalized version of the modern workhorse trade model.
- features a clear motive for domestic regulation even in the absence of international trade:

  $\Rightarrow$ without sector-specific production subsidies, market outcomes are distorted by monopolistic price setting due to multiple sectors with different markups.
- allows us to study to what extent trade and domestic policies are affected by firm heterogeneity.

What We Do

- We derive a welfare decomposition, based on efficiency principles from welfare economics, that:
  - is valid in a broad class of trade models ("ACR, 2012 for policy");
  - allows to clearly separate efficiency motives from beggar-thy-neighbor incentives.

- We use the welfare decomposition to study the relative performance of trade agreements with different levels of integration:

  - a **shallow trade agreement**: free trade but no coordination of domestic policies;

  - a **deep trade agreement**: free trade and coordinated domestic policies;

  - a **laissez-faire trade agreement**: free trade and a commitment to abstain from using domestic policies.

Contribution 1: Welfare Decomposition

Approach of our welfare decomposition:

1. Rewrite the model in terms of CES aggregate bundles.
2. Derive the allocation chosen by world social planner and compare it with market allocation.
3. Express the market allocation in terms of efficiency wedges between market prices and those that implement the planner allocation.
4. Compute efficiency changes induced by policy changes.
5. Decompose welfare changes induced by policy changes into efficiency effects and terms-of-trade effects.

Contribution 1: Welfare Decomposition

The welfare effects induced by trade and domestic policies can be exactly decomposed into:

1. consumption-efficiency effects (due to wedges between consumer and producer prices induced by trade taxes).

2. production-efficiency effect (due to wedges between the marginal value product of labor at producer prices and its marginal cost)

3. terms-of-trade effects (due to changes in international prices of aggregate tradable bundles)

Contribution 1: Welfare Decomposition

The welfare decomposition is extremely general and flexible.

- It establishes a common framework for analyzing the incentives for trade and domestic policies in the CES monopolistic competition setup.
- It does not depend on the set of available policy instruments (it can be used to identify incentives in second-best situations).
- It clearly identifies the beggar-thy-neighbor incentives and separates them from efficiency motives.
- It can in principle be applied to study welfare in other models, other policies, comparative statics in fundamentals, e.g. trade costs...

Contribution 1: Welfare Decomposition

- Terms-of-trade effects of policies are the only beggar-thy-neighbor effect.
- $\Rightarrow$ Terms-of-trade motives are the only reason to sign a trade agreement – this extends result from the neoclassical framework (Bagwell and Staiger, 1999) to the "new" trade theory.
- The delocation effect (Venables, 1987, Ossa, 2011) is not a policy motive on its own. However, it can be at work when the set of available policy instruments is limited (more later...)

Contribution 2: Nash-Equilibrium Policies of Alternative Trade Agreements

- Absence of any agreement – targeting principle applies!
  - production subsidies exactly offset monopolistic distortions;
  - import subsidies and export taxes aim at improving the terms of trade by delocating firms to the other economy (anti-delocation effect!)
- Deep trade agreement - member countries cooperate on trade and domestic policies and reach first-best outcome:
  - set trade taxes to zero;
  - set production subsidies to exactly offset monopolistic distortion.

Contribution 2: Nash-Equilibrium Policies of Alternative Trade Agreements

- Shallow trade agreement – free trade and strategic domestic policies:
  - when set of policy instruments is limited, policies are governed by trade-off between production-efficiency and terms-of-trade effects.
  - With heterogeneous firms the relative importance of effects depends on sufficient statistic:
    a. When profit share from domestic sales larger than the one from export sales, production efficiency dominates $\Rightarrow$ (inefficiently low) Nash production subsidies.
    b. Otherwise, terms-of-trade effect dominates $\Rightarrow$ Nash production taxes.

Contribution 2: Nash-Equilibrium Policies of Alternative Trade Agreements

- Laissez-faire agreement – free trade and abstaining from use of domestic policies:
  - With heterogeneous firms, a laissez-faire agreement dominates a shallow agreement if and only if the profit share from domestic sales is smaller than the one from export sales.
  - Due to endogenous selection into exporting, the average variable profit share from domestic sales is an increasing function of fixed and variable physical trade costs.
  - When physical trade costs fall sufficiently, a laissez-faire agreements is better than a shallow agreement.

Related Literature

- Trade policy with perfect competition: Grossman and Helpman (AER 1995), Bagwell and Staiger (AER 1999);
- Trade policy with monopolistic competition and homogeneous firms: Venables (EJ 1987), Helpman and Krugman (1989), Ossa (JPE 2008), Campolmi, Fadinger and Forlati (JIE 2014);
- Trade policy with monopolistic competition and heterogeneous firms: Costinot, Rodriguez-Clare and Werning (2019)
- Trade and domestic policies: Bagwell and Staiger (QJE 2001) (perfect competition); Grossman, McCalman and Staiger (2019) (product standards with monopolistic competition and homogeneous firms), Maggi and Ossa (2020) (deep trade agreements with lobbying)

The Model

- Two identical countries *i*: Home and Foreign;
- Two sectors
  - monopolistically competitive sector produces differentiated goods subject to transport costs:
    - Firms in the differentiated sector have heterogeneous productivities - Melitz (2003)
    - (Can be easily generalized to many differentiated sectors with different substitution elasticities.)
  - A sector producing a homogeneous good, freely traded under perfect competition.

- (in the paper we also discuss case of single sector)
- (in the paper we also discuss the case of homogeneous firms)

Household

- Notation: first subindex: location of consumption; second subindex: location of production
- Preferences:

$$U_i \equiv \alpha \log C_i + (1-\alpha) \log Z_i \qquad i = H, F \qquad 0 < \alpha < 1$$

- CES Aggregators:

$$C_i = \left[\sum_{j \in H,F} C_{ij}^{\frac{\varepsilon-1}{\varepsilon}} \right]^{\frac{\varepsilon}{\varepsilon-1}} \qquad i = H, F$$

$$C_{ij} = \left[N_j \int_{\varphi_{ij}}^{\infty} c_{ij}(\varphi)^{\frac{\varepsilon-1}{\varepsilon}} dG(\varphi) \right]^{\frac{\varepsilon}{\varepsilon-1}} \qquad i, j = H, F$$

Differentiated Sector: Monopolistic Competition

- Pay a fixed cost f_E (in terms of labor) to enter the market and draw productivity φ from continuous cdf $G(\varphi)$.
- Decide whether to pay an additional market access cost f_{ji} and produce:

$$l_{ji}(\varphi) = \frac{q_{ji}(\varphi)}{\varphi} + f_{ji}, \quad i,j = H,F$$

where

$$f_{ji} = \begin{cases} f & j = i \\ f_X & j \neq i \end{cases}$$

Differentiated Sector: Monopolistic Competition

- Optimal pricing:

$$p_{ji}(\varphi) = \tau_{ji}\tau_{Tji}\tau_{Li}\frac{\varepsilon}{\varepsilon - 1}\frac{W_i}{\varphi} \quad i,j = H,F$$

where τ_{Tji} are the (sector-specific) trade policy instruments

$$\tau_{Tji} = \begin{cases} 1 & j = i \\ \tau_{Ij}\tau_{Xi} & i \neq j \end{cases}$$

- τ_{Li} is a (sector-specific) production subsidy on fixed and marginal costs (labor subsidy)
- τ_{ji} is an iceberg transport cost on goods sold in export market

$$\tau_{ji} = \begin{cases} 1 & j = i \\ \tau > 1 & j \neq i \end{cases}$$

Homogeneous Good Sector: Perfect Competition

- If present, the homogeneous good is produced in both countries with identical production technology:

$$Q_{Zi} = L_{Zi}$$

- No transport costs and perfect competition in homogeneous-good sector:

$$p_{Zi} = W_i \qquad\qquad p_{Zi} = p_{Zj}$$

$\Rightarrow$ Factor Price Equalization and numeraire:

$$W_i = W_j = p_{Zi} = 1$$

- Can write the model in terms of 5 aggregate goods: homogeneous + 4 differentiated bundles (2 non-traded, 2 traded)

Market Equilibrium

- Consumption aggregators:

$$C_{ij} = \left(\frac{\varepsilon - 1}{\varepsilon}\right) (\varepsilon f_{ij})^{\frac{-1}{\varepsilon - 1}} \tau_{ij}^{-1} \varphi_{ij} (\delta_{ij} L_{Cj})^{\frac{\varepsilon}{\varepsilon - 1}}, \quad i, j = H, F$$

- Price indices:

$$P_{ij} = \left(\frac{\varepsilon}{\varepsilon - 1}\right) (\varepsilon f_{ij})^{\frac{1}{\varepsilon - 1}} \tau_{ij} \tau_{Tij} \tau_{Lj} W_j \varphi_{ij}^{-1} (\delta_{ij} L_{Cj})^{\frac{-1}{\varepsilon - 1}}, \quad i, j = H, F$$

- Trade balance:

$$L - L_{Ci} - \frac{(1 - \alpha)}{\alpha} \sum_{k=H,F} (P_{ik} C_{ik}) + \tau_{Ij}^{-1} P_{ji} C_{ji} = \tau_{Ii}^{-1} P_{ij} C_{ij}, \quad i = H, j = F$$

- Homogeneous-good market clearing condition:

$$\sum_{i=H,F} (L - L_{Ci}) = \frac{1 - \alpha}{\alpha} \sum_{i=H,F} \sum_{j=H,F} P_{ij} C_{ij}$$

Market Equilibrium

- Profit share of average firm from sales in domestic and export markets:

$$\delta_{ji} = \frac{f_{ji}(1 - G(\varphi_{ji}))\left(\frac{\widetilde{\varphi}_{ji}}{\varphi_{ji}}\right)^{\varepsilon-1}}{\sum_{k=H,F} f_{ki}(1 - G(\varphi_{ki}))\left(\frac{\widetilde{\varphi}_{ki}}{\varphi_{ki}}\right)^{\varepsilon-1}}, \quad i,j = H,F$$

- Average productivity of country-i firms active in domestic/export market:

$$\widetilde{\varphi}_{ji} = \left[\int_{\varphi_{ji}}^{\infty} \varphi^{\varepsilon-1} \frac{dG(\varphi)}{1 - G(\varphi_{ji})}\right]^{\frac{1}{\varepsilon-1}}$$

- The zero-profit-cutoff conditions:

$$\left(\frac{\varphi_{ii}}{\varphi_{ij}}\right) = \left(\frac{f_{ii}}{f_{ij}}\right)^{\frac{1}{\varepsilon-1}} \left(\frac{\tau_{Li}}{\tau_{Lj}}\right)^{\frac{\varepsilon}{\varepsilon-1}} \left(\frac{W_i}{W_j}\right)^{\frac{\varepsilon}{\varepsilon-1}} \tau_{ij}^{-1} \tau_{Tij}^{-\frac{\varepsilon}{\varepsilon-1}} \quad i,j = H,F, \quad i \neq j$$

- The free-entry conditions:

$$\sum_{j=H,F} f_{ji}(1 - G(\varphi_{ji}))\left(\frac{\widetilde{\varphi}_{ji}}{\varphi_{ji}}\right)^{\varepsilon-1} = f_E + \sum_{j=H,F} f_{ji}(1 - G(\varphi_{ji})), \quad i = H,F$$

World Social Planner

- The world planner problem can be broken into *three stages* which determine how much to consume and produce of:

  1. individual varieties given aggregate quantities of differentiated bundles
  2. domestically produced and consumed and imported bundles in the differentiated sector given total sectoral labor
  3. differentiated bundle and the homogeneous good

- This approach allows providing an economic interpretation of all the wedges characterizing the world-policy-maker problem below.

Pareto Efficiency and Market Equilibrium

- **First stage**: the relative production of individual firms is optimal in any market equilibrium (requires no or same tax rate on fixed and marginal costs)
- **Second stage**: market allocation coincides with solution to second stage of planner problem only when tariffs are compensated by export subsidies, otherwise consumption choice of importable bundle is distorted.

$$\frac{\partial U_i}{\partial C_{ii}}\frac{\partial Q_{Cii}}{\partial L_{Cii}} = \frac{\partial U_j}{\partial C_{ji}}\frac{\partial Q_{Cji}}{\partial L_{Cji}}(\tau_{Tji})^{1-\varepsilon}, \quad i,j = H,F, \quad i \neq j.$$

- **Third stage** (only in the multi-sector model): market allocation is inefficient because too little labor is allocated to differentiated sector due to distortions from monopolistic markups and possibly from trade taxes.

$$\sum_{j=H,F}\frac{\partial U_j}{\partial C_{ji}}\frac{\partial Q_{Cji}}{\partial L_{Ci}} = -\Omega_{3p}\frac{\partial U_i}{\partial Z_i}\frac{\partial Q_{Zi}}{\partial L_{Ci}}, \quad i = H,F$$

$$\Omega_{3P} = \frac{\varepsilon}{\varepsilon - 1}\tau_{Li}\sum_{j=H,F}\tau_{Tij}\delta_{ij}$$

$\Omega_{3P} = 1 \Leftrightarrow \tau_{Li} = \frac{\varepsilon-1}{\varepsilon}$ and $\tau_{Tij} = 1$ for $i,j = H,F$.

Efficiency Wedges in the Market Equilibrium

Market equilibrium replicates planner allocation if and only if:

(a) countries have same level of income: $I_i = I_j, \quad j \neq i,$

(b) consumer price indices of differentiated importable bundles must correspond to monopolistic markup over aggregate marginal costs of differentiated exportable bundles:

$$P_{ij} - \frac{\varepsilon}{\varepsilon - 1} \tau_{Lj} W_j \frac{\partial L_{Cij}}{\partial Q_{Cij}} = 0, \quad i = H, F, \quad j \neq i,$$

(c) (for the multi-sector model only) marginal value product of labor in the differentiated sector evaluated at producer prices must equal price of labor.

$$\sum_{j=H,F} \tau_{Tji}^{-1} P_{ji} \frac{\partial Q_{Cji}}{\partial L_{Ci}} - W_i = 0, \qquad i = H, F,$$

Corresponding equations in the market equilibrium:

$$P_{ij} = \tau_{Tij} \frac{\varepsilon}{\varepsilon - 1} \tau_{Lj} W_j \frac{\partial L_{Cij}}{\partial Q_{Cij}}, \quad j \neq i, \quad \sum_{j=H,F} \tau_{Tji}^{-1} P_{ji} \frac{\partial Q_{Cji}}{\partial L_{Ci}} = \frac{\varepsilon}{\varepsilon - 1} \tau_{Li} W_i, \quad i = H, F$$

The efficiency-wedge decomposition

- The efficiency wedges can be decomposed into domestic and foreign components:

$$P_{ij} - \frac{\varepsilon}{\varepsilon - 1}\tau_{Lj} W_j \frac{\partial L_{Cij}}{\partial Q_{Cij}} = \underbrace{(\tau_{Ii} - 1)}_{\substack{\text{domestic} \\ \text{consumption-efficiency} \\ \text{wedge, home tariff}}} \tau_{Ii}^{-1} P_{ij} + \underbrace{(\tau_{Xj} - 1)\,\tau_{Tij}^{-1} P_{ij}}_{\substack{\text{domestic} \\ \text{consumption-effiency} \\ \text{wedge, foreign export tax}}} = \underbrace{\left(1 - \tau_{Tij}^{-1}\right) P_{ij}}_{\substack{\text{domestic} \\ \text{consumption-efficiency} \\ \text{wedge}}}$$

$$\sum_{j=H,F} \tau_{Tji}^{-1} P_{ji} \frac{\partial Q_{Cji}}{\partial L_{Ci}} - W_i = \underbrace{\frac{\varepsilon}{\varepsilon - 1}\tau_{Li} - 1}_{\substack{\text{domestic} \\ \text{production-efficiency} \\ \text{wedge}}}, \qquad i = H, F$$

  - Consumption efficiency wedges: Export and import taxes induce distortion between consumer prices and international prices and thus in relative choice of non-tradable versus imported differentiated bundle.
  - Production efficiency wedge: Distortions of marginal value product of aggregate labor in terms of international producer prices and thus mis-allocation of labor across aggregate sectors. Can be closed with a production subsidy equal to inverse of markup $\tau_{Li} = \frac{\varepsilon - 1}{\varepsilon}$, $i = H, F$

Global and individual-country efficiency effects of a small policy change

(a) The total efficiency effects of a small policy change can be decomposed as:

$$\sum_{i=H,F} dE_i \equiv \sum_{\substack{i=H,F \\ j\neq i}} \left[\left(P_{ij} - \frac{\varepsilon}{\varepsilon - 1} \tau_{Lj} W_j \frac{\partial L_{Cij}}{\partial Q_{Cij}} \right) dC_{ij} + \left(\sum_{k=H,F} \tau_{Tki}^{-1} P_{ki} \frac{\partial Q_{Cki}}{\partial L_{Ci}} - W_i \right) dL_{Ci} \right]$$

$$= \underbrace{\sum_{\substack{i=H,F \\ j\neq i}} \left[\underbrace{(\tau_{Ii} - 1)\tau_{Ii}^{-1} P_{ij} dC_{ij} + (1 - \tau_{Xi}) P_{ii} dC_{ii}}_{\textit{individual consumption-efficiency effect}} + \underbrace{\left(\frac{\varepsilon}{\varepsilon - 1} \tau_{Li} \tau_{Xi} - 1 \right) dL_{Ci}}_{\textit{individual production-efficiency effect}} \right]}_{dE_i} \tag{1}$$

$$= \underbrace{\sum_{\substack{i=H,F \\ j\neq i}} (\tau_{Tij} - 1)\, \tau_{Tij}^{-1} P_{ij} dC_{ij}}_{\textit{global consumption-efficiency effect}} + \underbrace{\sum_{i=H,F} \left(\frac{\varepsilon}{\varepsilon - 1} \tau_{Li} - 1 \right) dL_{Ci}}_{\textit{global production efficiency effect}} \tag{2}$$

(b) The total effects of a small policy change are zero and the market allocation is efficient: (i) if each wedge on the right-hand side of condition (1) is zero; (ii) if and only if $I_i = I_j$ for $j \neq i$ and each wedge on the right-hand side of condition (2) is zero.

World Policy Maker

- The world policy maker sets domestic and foreign policy instruments (export, import and production taxes) in order to maximize:

$$\sum_{i=H,F} U_i$$

subject to all equilibrium conditions.

- We solve this problem using the total-differential approach:
- Involves taking total differentials of the equilibrium conditions and the objective. (6 instruments correspond to 6 total differentials being zero)

Decomposition of World Welfare

The total differential of world welfare in response to domestic or foreign policy changes can be decomposed as:

$$\sum_{i=H,F} dU_i = \sum_{i=H,F} \frac{dE_i}{I_i} + \underbrace{\sum_{\substack{i=H,F \\ j \neq i}} \frac{C_{ji} d(\tau_{Ij}^{-1} P_{ji}) - C_{ij} d(\tau_{Ii}^{-1} P_{ij})}{I_i}}_{\text{terms-of-trade effect}} \tag{3}$$

which, if $I_i = I_j$, implies that

$$\sum_{i=H,F} dV_i = \sum_{i=H,F} dE_i \tag{4}$$

where $dV_i \equiv dU_i / \frac{\partial U_i}{\partial I_i}$, and $I_i = W_i L + T_i$ is household income.

Decomposition of World Welfare

Terms of Trade

$$\sum_{i=H,F} [C_{ji} d(\tau_{Ij}^{-1} P_{ji}) - C_{ij} d(\tau_{Ii}^{-1} P_{ij})] \quad i \neq j$$

- ▷ Terms-of-Trade (TOT) effect: An increase in the international price of the exportable bundle raises welfare, while an increase in the international price of importable bundle reduces it.
- ▶ Home and foreign TOT effects sum to zero in any symmetric equilibrium.

Optimal world policies and Pareto efficiency

(a) When production, import and export taxes are available in the differentiated sector, solving the world-policy-maker problem is equivalent to setting $I_i = I_j$ and the efficiency wedges individually equal to zero.

(b) As a result, the world policy maker implements the planner allocation and the global policy is optimal if and only if:

  (i) when $\alpha < 1$ (multi-sector model): $\tau_{Tij} = \tau_{Ii}\tau_{Xj} = 1$, $\tau_{Ii} = \tau_{Ij}$ (or $\tau_{Xi} = \tau_{Xj}$) and $\tau_{Li} = \frac{\varepsilon - 1}{\varepsilon}$ for $i = H, F$ and $j \neq i$.

Decomposition of individual-country welfare

The total differential of individual-country welfare can be decomposed as follows:

$$dV_i = dE_i + \underbrace{C_{ji}d(\tau_{Ij}^{-1}P_{ji}) - C_{ij}d(\tau_{Ii}^{-1}P_{ij})}_{\textit{domestic terms-of-trade effect}} =$$

$$\underbrace{(1-\tau_{Xi})P_{ii}dC_{ii} + (\tau_{Ii}-1)\tau_{Ii}^{-1}P_{ij}dC_{ij}}_{\substack{\textit{domestic}\\ \textit{consumption-efficiency effect}}} + \underbrace{\left(\frac{\varepsilon}{\varepsilon-1}\tau_{Li}\tau_{Xi}-1\right)dL_{Ci}}_{\substack{\textit{domestic}\\ \textit{production-efficiency effect}}} +$$

$$\underbrace{C_{ji}d(\tau_{Ij}^{-1}P_{ji}) - C_{ij}d(\tau_{Ii}^{-1}P_{ij})}_{\substack{\textit{domestic}\\ \textit{terms-of-trade effect}}}, \quad j \neq i$$

where $dV_i \equiv dU_i / \frac{\partial U_i}{\partial I_i}$, and $I_i = W_i L + T_i$ is household income.

Individual-Country Incentives

Our welfare decomposition implies that:

(a) In the one-sector model, any deviations of individual-country policy makers from laissez-faire equilibrium are due to terms-of-trade effects (production-efficiency effect is absent since $dL_i = 0$).

$\Rightarrow$ In this context FTAs should prohibit the use of all (trade and domestic) policy instruments.

(b) In the multi-sector model, individual-country policy makers' deviations from laissez-faire equilibrium are driven by TOT and production-efficiency effects.

$\Rightarrow$ The optimal design of FTAs requires to study strategic outcomes.

(c) TOT effects are the only pure beggar-thy-neighbor effects.

$\Rightarrow$ The TOT externality is the only externality that needs to be solved by FTAs.

How Policy Instruments affect ToT and Production Efficiency in the Multi-sector Model

- Study incentives for unilateral deviations from the laissez-faire allocation.
- ToT effect of a tariff, starting from the symmetric laissez-faire allocation.

$$\frac{d(\tau_{Ij}^{-1}P_{ji})}{P_{ji}} - \frac{d(\tau_{Ii}^{-1}P_{ij})}{P_{ij}} = (\varepsilon-1)^{-1}\left[\underbrace{\left(\frac{dL_{Cj}}{L_{Cj}} - \frac{dL_{Ci}}{L_{Ci}}\right)}_{(i)<0} + \underbrace{\left(\frac{d\delta_{ij}}{\delta_{ij}} - \frac{d\delta_{ji}}{\delta_{ji}}\right)}_{(ii)<0\Leftrightarrow\delta_{ii}>1/2}\right] + \underbrace{\left(\frac{d\varphi_{ij}}{\varphi_{ij}} - \frac{d\varphi_{ji}}{\varphi_{ji}}\right)}_{(iii)>0\Leftrightarrow\delta_{ii}>1/2} < 0$$

(i) Tariff increases demand for domestic bundles, leads to entry into differentiated sector: this worsens TOT via extensive margin (more domestic varieties)

(ii) Tariff leads to a reduction in share of foreign export profits relative to share of home export profits iff $\delta_{ii} > 1/2$: worsens TOT via increase in relative number of domestic exporters

(iii) Tariff increases selection of foreign exporters in domestic market relative to domestic exporters in foreign market iff $\delta_{ii} > 1/2$: improves TOT via intensive margin (lower price of average foreign variety)

How Policy Instruments affect ToT and Production Efficiency in the Multi-sector Model

Consider a marginal unilateral increase in each policy instrument at a time starting from the laissez-faire equilibrium, i.e., with $\tau_{Li} = \tau_{Ii} = \tau_{Xi} = 1$ for $i = H, F$. Then:

(a) the consumption-efficiency effect is zero for all policy instruments.

(b) production efficiency increases in τ_{Ii} (and decreases in τ_{Xi} and τ_{Li}).

(c) the terms-of-trade effect is negative for τ_{Ii} (and positive for τ_{Xi} and τ_{Li}).

(d) the total welfare effect is positive for τ_{Ii} (and negative for τ_{Xi} and τ_{Li}) if and only if $1/2 < \delta_{ii} < 1$

- Thus, any instrument leads to a trade-off between increased production efficiency and worsening of TOT.
- δ_{ii} (profit share in home market) determines the relative weight of these oposing incentives.

Strategic Trade and Domestic Policies

- Study strategic policies in the absence of any trade agreement
- Any symmetric Nash equilibrium in the multi-sector model with heterogeneous (or homogeneous) firms when countries can simultaneously set all policy instruments entails:
  - the first-best level of production subsidies i.e., $\tau_L^N = \frac{\varepsilon-1}{\varepsilon}$;
  - import subsidies i.e., $\tau_I^N < 1$;
  - export taxes i.e., $\tau_X^N > 1$.

Interpretation

Our welfare decomposition allow us to interpret the Nash policy outcome.

When *all policy instruments* are available:

- Domestic policies are set to eliminate the monopolistic distortion (*targeting principle*) i.e., they are set efficiently even under strategic interaction and do not cause any beggar-thy-neighbor effects;

- Trade policy instruments are used by countries to try to improve TOT.
- Import subsidies and export taxes shift firms to the other economy (anti-delocation effect).

Implications

- Monopolistic competition does not change the result from neoclassical models that the only motive for signing an FTA is TOT externality. (Grossman and Helpman, AER 1995, Bagwell and Staiger, AER 1999)

- Firm heterogeneity neither adds further motives for signing an FTA beyond TOT effect nor changes the qualitative results (import subsidies and export taxes) of the equilibrium outcome compared to the case with homogeneous firms.

Implications for Optimal Design of Trade Agreements

- Implementation of the first-best allocation requires a deep trade agreement with cooperation on both trade and domestic policies: countries agree to abstain from using trade policy and set production subsidies to exactly eliminate monopolistic distortions;

- However, shallow trade agreements (e.g., GATT-WTO) do not regulate domestic policies

- Therefore, we study strategic interaction when only domestic policies are set non-cooperatively while a trade agreement prevents the strategic use of trade taxes.

Strategic Domestic Policies in the Presence of a Shallow Trade Agreement

Let δ_{ii} be the average variable-profit share from sales in home market.

The Nash equilibrium in the multi-sector model when only production taxes are available entails:

- a production subsidy below the efficient level when $\delta_{ii} > \frac{1}{2}$
- a production tax when $\delta_{ii} < \frac{1}{2}$ and $\varepsilon \geq \frac{3-\alpha}{2}$.

With a single instrument there is a trade off between two incentives:

1. improving production efficiency
2. manipulating TOT

Relative weight depends on δ_{ii} (if firms only sell domestically countries don't care about manipulating international prices)

Welfare Effects of Strategic Domestic Policies in Presence of a Shallow Trade Agreement

Assume that $\tau_{Ii} = \tau_{Xi} = 1$ for $i = H, F$ and let δ_{ii} be the average variable-profit share from sales in domestic market.

- When $\delta_{ii} < \frac{1}{2}$ the symmetric Nash equilibrium when countries can only set domestic policies strategically is welfare-dominated by the laissez-faire allocation with $\tau_{Li} = 1$, $i = H, F$.

- δ_{ii} is increasing in τ_{ij} and f_{ij}, for $j \neq i$.

The Design of Trade Agreements

- Implementing the first-best allocation requires a deep agreement on trade and domestic policies;
- When $\delta_{ii} \geq \frac{1}{2}$, a shallow agreement that forbids the strategic use of trade policies and allows countries to set domestic policies freely welfare dominates a laissez-faire agreement that forbids country to use domestic and trade policies;
- When $\delta_{ii} < \frac{1}{2}$ a laissez-faire agreement welfare dominates a shallow agreement.

Conclusions

Have studied motives for signing shallow and deep FTAs in models with monopolistic competition and firm heterogeneity

1. Common welfare incentives: consumption-efficiency effects, production-efficiency effects, terms-of-trade effects.

2. Terms-of-trade effect remains the only motive for signing FTAs in these models.

3. Reaping the full benefits of globalization requires a deep trade agreement

4. A laissez-faire agreement (no domestic policies) dominates a shallow agreement (strategic domestic policies), when physical trade costs are sufficiently low.

5. Our results suggests that rethinking design of WTO rules is necessary.