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A "new trade" theory of GATT/WTO negotiations

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Abstract: I suggest a novel theory of GATT/WTO negotiations based on Krugman's "new trade" model. It emphasizes international production relocations and is easy to calibrate to bilateral trade data. Focusing on the major players in recent GATT/WTO negotiations, I find that it implies reasonable noncooperative tariffs as well as moderate gains from GATT/WTO negotiations.

A 'New Trade' Theory of GATT/WTO Negotiations

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Basic questions

- Since the end of WWII, the average tariff fell from over 40 percent to below 4 percent. Ethier (2002): "History's greatest act of deliberate economic policy making"

- GATT/WTO negotiations were an important driving force of this liberalization

- What is the purpose of trade negotiations? And what is the role played by the fundamental GATT/WTO principles of reciprocity and nondiscrimination?

Benchmark

- My benchmark is the standard neoclassical theory of GATT/WTO negotiations. Important contributions include Johnson (1953-1954), Grossman and Helpman (1995), Bagwell and Staiger (1999)

- This theory argues that GATT/WTO negotiations help governments internalize a terms-of-trade externality. It also argues that this is the only trade policy externality GATT/WTO negotiations can be about

- An alternative theory of trade agreements is provided by Maggi and Rodriguez-Clare (1998, 2007). In contrast to the standard theory and my 'new trade' theory, it does not view trade negotiations as a means to internalize an international trade policy externality

Contributions

- Instead of analyzing GATT/WTO negotiations in a neoclassical environment, I build on the Krugman (1980) 'new trade' model.

- This sheds new light on GATT/WTO negotiations between similar countries

- It also highlights a production relocation externality which is different from the terms-of-trade externality

- This is especially interesting given that many economists have questioned the real-world relevance of terms-of-trade effects. Bagwell and Staiger (2002): "Many economists are skeptical as to the practical relevance of terms-of-trade considerations for actual trade policy negotiations". Krugman (1997): "This optimal tariff argument plays almost no role in real-world trade disputes"

Main idea

- The main idea is that GATT/WTO negotiations governed by the principles of reciprocity and nondiscrimination help governments internalize a production relocation externality

- Each government imposes import tariffs in an attempt to host more of the world's manufacturing firms $\longrightarrow$ prisoner's dilemma $\longrightarrow$ principles of reciprocity and nondiscrimination help governments escape this prisoner's dilemma by ensuring that tariff changes no longer entail production relocations

Predecessors

- While I am, I believe, the first to study trade negotiations in a Krugman (1980) model, I am by no means the first to study trade policy in this model

- Venables (1987) shows that tariffs can improve welfare in a Krugman (1980) model through a price index effect

- Gros (1987) shows that tariffs can also improve welfare in a Krugman (1980) model through a terms-of-trade effect

- The price index effect underlies my argument. I follow Helpman and Krugman (1989) in developing a version of the Krugman (1980) model which isolates this effect

Overview

- In the first part, I develop the basic two-country model. I use this model to establish that the non-cooperative equilibrium is inefficient and demonstrate how the principle of reciprocity helps countries overcome this inefficiency

- In the second part, I present a three-country extension of the basic model and use it to evaluate the joint functioning of the principles of reciprocity and nondiscrimination

Basic model: setup

- Preferences are Cobb-Douglas with CES

$$U = \left[\int\limits_{0}^{n+n^*} m\left(i\right)^{\frac{\sigma-1}{\sigma}} di \right]^{\frac{\mu\sigma}{\sigma-1}} Y^{1-\mu}$$

- Technology is IRS in the manufacturing sector and CRS in the outside good sector

$$l^M = f + cq^M$$
$$l^Y = q^Y$$

- The manufacturing goods market is monopolistically competitive and the outside good market is perfectly competitive

Basic model: assumptions regarding trade costs

- Trade costs apply only to manufacturing goods and are of the Samuelson (1952) 'iceberg' type

- These 'iceberg' trade costs consist of transport costs and trade barriers, where the trade barriers are policy instruments. For concreteness, I refer to them as tariffs henceforth

$$\phi = \theta + \tau$$
$$\phi^* = \theta + \tau^*$$

Basic model: additional assumptions

- Transport costs are sufficiently large so that the manufacturing sector is always active in both countries (precise restriction on θ in the paper). This is to avoid uninteresting corner solutions

- Demand for manufacturing goods is sufficiently small so that the outside good sector is always active in both countries (precise restriction on μ in the paper). This ensures, together with the above assumptions on outside good technology, market structure, and trade costs, that there is no role for terms-of-trade effects

Basic model: utility maximization

- Demand for manufacturing goods $(p^Y \equiv 1 \rightarrow w = 1)$

$$m(i) + \phi^* m^*(i) = \mu L \frac{p(i)^{-\sigma}}{G^{1-\sigma}} + \mu L^* \phi^{*1-\sigma} \frac{p(i)^{-\sigma}}{G^{*1-\sigma}}$$

$$\phi m(j) + m^*(j) = \mu L \phi^{1-\sigma} \frac{p^*(j)^{-\sigma}}{G^{1-\sigma}} + \mu L^* \frac{p^*(j)^{-\sigma}}{G^{*1-\sigma}}$$

- Demand for outside good

$$Y = (1 - \mu) L$$
$$Y^* = (1 - \mu) L^*$$

Basic model: profit maximization & free entry

- Profit maximization yields

$$p\left(i\right) = p^*\left(j\right) = \frac{\sigma c}{\sigma - 1} \equiv p$$

- Therefore, the manufacturing price indices simplify to

$$G = p\left[n + n^*\phi^{1-\sigma}\right]^{\frac{1}{1-\sigma}}$$

$$G^* = p\left[n\phi^{*1-\sigma} + n^*\right]^{\frac{1}{1-\sigma}}$$

- Free entry requires

$$q = q^* = \frac{f\left(\sigma - 1\right)}{c}$$

$$l = l^* = f\sigma$$

Basic model: manufacturing sector market clearing

- Manufacturing market clearing requires

$$q = \mu L \frac{p^{-\sigma}}{G^{1-\sigma}} + \mu L^* \frac{\phi^{*1-\sigma} p^{-\sigma}}{G^{*1-\sigma}}$$

$$q = \mu L \frac{\phi^{1-\sigma} p^{-\sigma}}{G^{1-\sigma}} + \mu L^* \frac{p^{-\sigma}}{G^{*1-\sigma}}$$

- This can be solved for the manufacturing price indices

$$G = \left[\frac{q p^{\sigma} \left(1 - \phi^{*1-\sigma}\right)}{\mu L \left[1 - (\phi \phi^*)^{1-\sigma}\right]} \right]^{\frac{1}{\sigma-1}}$$

$$G^* = \left[\frac{q p^{\sigma} \left(1 - \phi^{1-\sigma}\right)}{\mu L^* \left[1 - (\phi \phi^*)^{1-\sigma}\right]} \right]^{\frac{1}{\sigma-1}}$$

Basic model: manufacturing sector market clearing

- These manufacturing price indices can be solved for the equilibrium 'number' of manufacturing firms

$$n = \frac{\mu}{qp} \left[\frac{L}{1 - \phi^{*1-\sigma}} - \frac{L^* \phi^{1-\sigma}}{1 - \phi^{1-\sigma}} \right]$$

$$n^* = \frac{\mu}{qp} \left[\frac{L^*}{1 - \phi^{1-\sigma}} - \frac{L \phi^{*1-\sigma}}{1 - \phi^{*1-\sigma}} \right]$$

- Notice that the world number of manufacturing firms is constant

$$n + n^* = \frac{\mu (L + L^*)}{qp}$$

Basic model: welfare and terms-of-trade

- Welfare is decreasing in the manufacturing price index

$$V = \mu^\mu \left(1 - \mu\right)^{(1-\mu)} L G^{-\mu}$$

$$V^* = \mu^\mu \left(1 - \mu\right)^{(1-\mu)} L^* G^{*-\mu}$$

- Notice that world prices are fixed in this environment so that there can be no role for terms-of-trade effects

Basic model: noncooperative equilibrium

Lemma 1 *Suppose governments choose tariffs simultaneously, Home maximizing V and Foreign maximizing V^*. Then the unique trembling-hand perfect Nash equilibrium is autarky*

- If governments maximize their citizens' welfare, the (robust) noncooperative equilibrium is autarky

- Each country's welfare is generally monotonically increasing in its tariff. This is because each country's price index is generally monotonically decreasing in its tariff

- Underlying this are two opposing effects of a tariff on the price index: the import price effect and the production relocation effect. The production relocation effect generally dominates in equilibrium

Basic model: efficiency locus

Lemma 2 *The set of Pareto-efficient tariff combinations consists of all (τ, τ^*) such that $(\tau, \tau^*) = (any \ possible \ \tau, 0)$ or $(\tau, \tau^*) = (0, \ any \ possible \ \tau^*)$*

- There generally exists a bilateral tariff reduction, which reduces one country's price index without affecting the other country's price index by appropriately balancing import price and production relocation effect

- However, bilateral tariff reductions are only possible if tariffs are positive in both countries so that Pareto improvements cannot be achieved if tariffs are zero in at least one of the countries

Basic model: main result

Proposition 1 *The noncooperative equilibrium is inefficient*

- While the details of lemma 1 and 2 clearly reflect specific modeling assumptions, proposition 1 captures a first fundamental point

- Tariffs entail an international production relocation externality, which governments fail to internalize when setting tariffs noncooperatively

Basic model: reciprocity (definition)

Definition 1 *Define a tariff change to be reciprocal if it is such that $dTB_M = 0$, where $TB_M \equiv EXP_M - IMP_M$ and EXP_M (IMP_M) refers to the value of manufacturing exports (imports)*

- First application in GATT/WTO practice: countries are required to seek a 'balance of concessions' during trade liberalization (not legally binding)

- Second application in GATT/WTO practice: countries are entitled to 'withdraw substantially equivalent concessions' if a trading partner increases previously bound tariffs (legally binding)

Basic model: reciprocity

Lemma 3 *Tariff changes leave the number of firms unchanged in both countries if and only if they are reciprocal*

- This is because

$$n = \frac{\mu L + EXP_M - IMP_M}{qp} = \frac{\mu L}{qp} + \frac{TB_M}{qp}$$

- If tariff changes are reciprocal, shifts in domestic consumer expenditure towards domestic goods are exactly offset by shifts in foreign consumer expenditure away from these goods (and vice versa)

Basic model: reciprocity

Proposition 2 *Reciprocal trade liberalization (trade protection) monotonically increases (decreases) welfare in both countries*

- It follows from lemma 3 that the principle of reciprocity neutralizes the production relocation effect. Hence, if trade is liberalized reciprocally the number of firms remains unchanged in both countries and prices fall because of the import price effect

- While the details of lemma 3 again reflect specific modeling assumption, this result captures a second fundamental point. The principle of reciprocity makes countries internalize the production relocation externality by ruling out changes in the manufacturing trade balance

Basic model: reciprocity

- Suppose that, starting at the noncooperative equilibrium, Home assumes the leadership in trade negotiations

- First application: Home immediately has an incentive to initiate reciprocal trade liberalization, which monotonically increases welfare in all countries. Second application: Home never has an incentive to increase its tariff so that negotiated tariff concessions can be secured

- In summary, the principle of reciprocity thus helps governments overcome the inefficient noncooperative equilibrium in a way, which monotonically increases welfare in both countries

Extended model: setup

- I focus on the simplest possible setup that allows for discriminatory tariff setting. There are now three countries: Home, Foreign 1, and Foreign 2. Home trades with Foreign 1 and Foreign 2, but Foreign 1 and Foreign 2 only trade with Home so that only Home can set discriminatory tariffs

- For simplicity, I now also assume that countries are symmetric. Everything else is just as in the basic model

- The notation is a straightforward generalization of the one used before: τ_i is now the tariff imposed by Home against imports from Foreign i. τ_i^* is now the tariff imposed by Foreign i against imports from Home

Extended model: noncoop. equilibrium & eff. locus

Lemma 4 *Suppose governments choose tariffs simultaneously, Home maximizing V, Foreign 1 maximizing V_1^*, and Foreign 2 maximizing V_2^*. Then the unique trembling-hand perfect Nash equilibrium is autarky*

Lemma 5 *The set of Pareto-efficient tariff combinations consists of all $(\tau_1, \tau_2, \tau_1^*, \tau_2^*)$ such that $(\tau_1, \tau_2, \tau_1^*, \tau_2^*) = (any\ possible\ \tau_1,\ any\ possible\ \tau_2, 0, 0)$ or $(\tau_1, \tau_2, \tau_1^*, \tau_2^*) = (0, 0,\ any\ possible\ \tau_1^*,\ any\ possible\ \tau_2^*)$*

Proposition 3 *The noncooperative equilibrium is inefficient*

Extended model: new effect

- Although these results generalize so naturally to the three-country case, tariffs now have more complicated international implications. Besides the import price effect, there is now generally both a bilateral as well as a multilateral production relocation effect

- The bilateral production relocation effect is an effect between the two countries directly affected by the tariff and is just the production relocation effect familiar from the basic model

- The multilateral production relocation effect is a new effect on the third country, which is not directly affected by the tariff. It works through changes in Home's price index

Extended model: reciprocity (definition)

Definition 2 *Define a tariff change to be bilaterally reciprocal between Home and Foreign i if it is such that $dTB^*_{Mi} = 0$, where $TB^*_{Mi} \equiv EXP^*_{Mi} - IMP^*_{Mi}$ and EXP^*_{Mi} (IMP^*_{Mi}) refers to the value of manufacturing exports (imports) in country Foreign i. Define a tariff change to be multilaterally reciprocal if it is such that $dTB^*_{M1} = dTB^*_{M2} = 0$*

- Bilaterally reciprocal tariff changes leave the trade balance of the tariff changing country pair unchanged

- Multilaterally reciprocal tariff changes leave the trade balances of both tariff changing country pairs unchanged

Extended model: reciprocity

Lemma 6 *Tariff changes leave the number of firms unchanged in all countries if and only if they are multilaterally reciprocal. Moreover, bilaterally reciprocal trade liberalization (trade protection) between Home and Foreign i leaves the number of firms unchanged in Foreign i but increases (decreases) the number of firms at Home at the expense of (to the benefit of) Foreign j, if $\tau_j < \infty$.*

- This is because multilateral reciprocity neutralizes both the bilateral and the multilateral production relocation effect, whereas bilateral reciprocity only neutralizes the bilateral production relocation effect

$$n_i^* = \frac{\mu L_i^* + EXP_{Mi}^* - IMP_{Mi}^*}{qp} = \frac{\mu L_i^*}{qp} + \frac{TB_{Mi}^*}{qp}$$

Extended model: reciprocity

Proposition 4 *Multilaterally reciprocal trade liberalization monotonically increases welfare in all countries. Bilaterally reciprocal trade liberalization between Home and Foreign i monotonically increases welfare in Home and Foreign i but monotonically decreases welfare in Foreign j, if $\tau_j < \infty$.*

- This is again because multilateral reciprocity neutralizes both the bilateral and the multilateral production relocation effect, whereas bilateral reciprocity only neutralizes the bilateral production relocation effect

Extended model: Timing

- It is easy to show that, starting at the noncooperative equilibrium, Home prefers sequential bilateral trade negotiations to simultaneous multilateral trade negotiations

- Intuitively, this is because Home gains only because of the import price effect in simultaneous multilateral trade negotiations but also because of the multilateral production relocation effect in sequential bilateral trade negotiations

- Hence, the principle of reciprocity alone is no longer sufficient to ensure that negotiated tariff concessions increase welfare monotonically in all countries

Extended model: nondiscrimination

- The principle of nondiscrimination is a simple rule forcing Home to engage in multilateral trade negotiations so that both principle jointly ensure that negotiated tariff concessions increase welfare monotonically in all countries

- If Home is required to impose nondiscriminatory tariffs, Home has to change τ_1 and τ_1 simultaneously so that both Foreign i and Foreign j are then required to seek a 'balance of concessions' if Home reduces its tariffs, and entitled to 'withdraw substantially equivalent concessions' if Home increases its tariffs

- Overall, the principles of reciprocity and nondiscrimination therefore again help countries overcome the inefficient noncooperative equilibrium in a way, which monotonically increases welfare in all countries

Conclusion

- I presented a novel theory of GATT/WTO negotiations which does not build on the neoclassical trade model but instead on the Krugman (1980) 'new trade' model

- It sheds new light on GATT/WTO negotiations between similar countries

- It highlights a production relocation externality which is different from the terms-of-trade externality

Conclusion

- This 'new trade' theory builds on a rationale for unilateral protection which can be linked directly to trade policy debates. It emphasizes the importance of domestic manufacturing firms and is consistent with policymakers' preoccupation about domestic manufacturing jobs

- Future work: (i) introduce political economy forces, (ii) consider domestic production subsidies, (iii) consider labor and environmental standards