Do poor countries benefit from rich countries going into a tariff war?

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Introduction

American's relatively recent aversion to free trade and globalization has led to a reversal in trade liberalization both domestically and globally. This has raised the specter of trade war among powerful economies. However, in the real world most countries are neutral in a tariff war, but their economics are still affected via trade.

Research Question: The purpose of this paper is to study the effects of a tariff war between rich countries on bystander developing countries. Additionally, we look to see how developing countries shape the outcome of a tariff war between richer countries.

To study these questions, we use the Ricardo-Matsuyama (2000) model , because it is capable of accounting for trade among multiple countries which are at different stages of economic development. It thus allows us to study the effect on the welfare of developing countries from a trade war between two richer countries, e.g., the U.S. and China. We believe, to the best of our knowledge, that this is a first formal analysis of bilateral trade war in a multi-country setting.

Literature review

The literature has addressed the question as to who can win a tariff war using two country models.

- **Johnson (1953-1954)** "Optimum Tariffs and Retaliation"-analyzed trade wars in terms of the offer curves and found that trade wars need not end up in a prisoners' dilemma
- **Kennan and Riezman (1988)** "Do Big Countries Win Tariff wars?"- studying the Nash equilibrium of tariff warfare in a two-country two-good pure exchange model, they demonstrate that when two countries are sufficiently lopsided in endowments, the large country wins while the smaller one loses
- **Syropoulous (2002)** "Optimum Tariff and Retaliation Revisited: How Country Size Matters"- using a generalized Heckscher-Ohlin model he shows that there exist a size threshold level that will cause the country which is larger in size to prefer a bilateral-tariff war
- **Opp (2010)** "Tariff wars in the Ricardian Model with a continuum of goods"- using the Dornbusch, Fisher, Sameulson (1977) Ricardian model with a continuum of goods he shows that there exist a size threshold level that will cause the country which is larger in size to prefer a bilateral-tariff war.

Model

Setup:

Three countries labeled by $i = \boldsymbol{H, M, L}$

- Country L represent a multitude of developing low-income countries, each of which are too small to influence the terms of trade
- Countries H and M are the world's high-income countries, with country H being the richer of the two

Production:

All three countries can produce a continuum of goods $z \in [0, \infty)$ using distinct technologies. Let $a_i(z)$ denote the unit labor requirement (labor-output ratio) for good z production in country i.

- Goods are produced competitively
- Labor is the only factor of production
- Labor is freely mobile within each country but is immobile across countries

Model (continued)

Assumption 1: For all $z \in [0, \infty)$,

- $a_H(z) \leq a_M(z) \leq a_L(z)$ with the equalities holding possibly at $z = 0$ only.
- $a_i(z)$ is continuously differentiable and monotone-increasing.

Assumption 1 implies that the wages in the rich country are greater than the poor country i.e.

Lemma 1: $w_H > w_M > w_L$.

Demand:

Consumption is binary. Consumer either buy zero or one unit of each good.

- $u(z) > 0$ from consumption of one unit of z, zero utility otherwise
- Consumers utility per dollar falls as they consume along the continuum
  - Consumers consume lowest indexed good first and continue to buy higher indexed goods until their budgets are exhausted.
- Consumers in country i consume every good in the range $[0, c_i]$, where c_i denotes the highest-indexed good they buy
- There is a one-to-one correspondence between consumer welfare and c_i

Tariff war

Suppose that countries H and M are embroiled in a bilateral tariff war. While maintaining free trade mutually with country L.

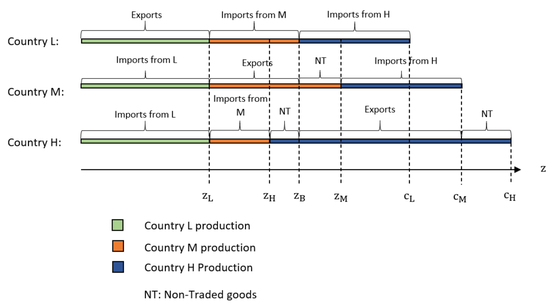
Trade Patterns:

Assumption 2: $A(z) \equiv a_M(z)/a_H(z)$ and $B(z) \equiv a_L(z)/a_M(z)$ are (twice) continuously differentiable and monotone-increasing in $z \in (0, \infty)$

Assumption 2 implies:

- Country L has the comparative advantage in producing lower indexed goods
- Country M has the comparative advantage in producing middle indexed goods
- Country H has the comparative advantage in producing higher indexed goods

Tariffs create nontraded goods between the high-income country, country H, and middle-income country, country M.



Welfare effects of Tariff war

Country L :

- If the tariff war causes the wages in country H, w_H, to rise, then country L will be forced to reduce its consumption of goods produced in country H which causes its welfare to fall, i.e., c_L will fall.
- If the tariff war causes w_H to rise, then c_L will fall.

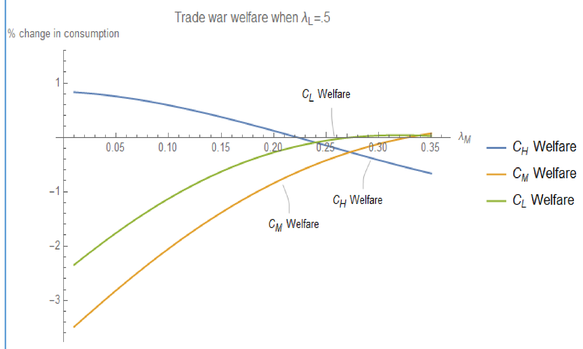
Country M and Country H :

- A tariff war has two effects on country M and country H's welfare:
  - *Terms of trade effects*: The tariffs that country M and H place on each other affect w_H
    - If w_H rises as a result of the tariff war, then welfare in the country H rises and falls in country M
    - If w_H falls as a result of the tariff war, then welfare in the country H falls and rises in country M
  - *Trade diversion effects*: Increasing tariffs on goods causes the country that is placing the tariff to substitute to more expensive domestic production
- Country M and country H's welfare improves if their terms of trade effects outweighs the trade diversion effects from placing tariff on the other country

Proposition:

- Country L benefits from tariff war if and only if the wage in country H falls.
- Whenever country H wins tariff war, country L and country M are harmed by it.
- Whenever country M wins tariff war, country L also benefits from it but not vice versa.

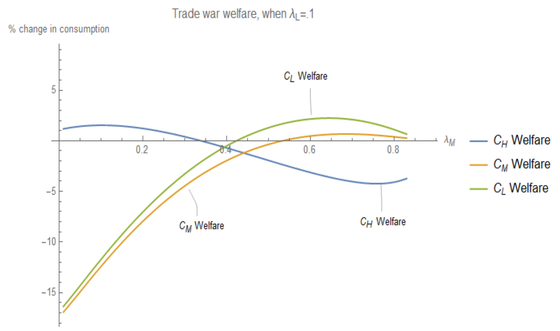
Numerical results and developing country influence on tariff war



When the population in Country L is 50% of the world population

- Country H wins the tariff war when it is 27% larger than country M
- Country M wins the tariff war when it is 94% larger than country H

Numerical results and developing country influence on tariff war (continued)



When the population in Country L is 10% of the world population

- Country H wins the tariff war when it is 50% larger than country M
- Country M wins the tariff war when it is 72% larger than country H

- As evident by the two figures above, when country L gets larger in population, country H is more likely to win the tariff war.

Mechanism:

- As country L gets larger in size, the wages in country L fall, making the goods from country L cheaper. Both countries M and H take these newfound savings and buy more goods from country H.
- Therefore, the value of goods that country M imports from country H is rising. This causes country M to be more vulnerable to tariffs by country H. Whereas the value of the goods that country H imports is falling.
- Country H can harm country M with a small tariff rate increase, whereas country M needs to place a greater tariff to harm country H.
  - Placing higher tariffs on country H makes country M substitute to more expensive domestic production causing welfare to fall.
  - Country M must be large in size to be able to place a high tariff on country H while still being able to increase its welfare.

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