\( T_1 = \text{trade cost for Firm 1 when selling in Country 2: } 1 \rightarrow 2 \)
\[ = \text{transport cost } 1 \rightarrow 2 + \text{gov. actions} \]
- Tariffs imposed by Country 2
- Subsidy/tax to exports by Country 1

\( T_2 = \text{similarity} \)

**Two Markets:**

**Country 1 Market**

2 Firms:
- **Local (Home):** Effective Mfg. Cost = MC1
- **Foreign:** \( MC_2 + T_2 \)

**Country 2 Market**

2 Firms
- **Local (Home):** Eff. Mfg. Cost = MC2
- **Foreign:** \( MC_1 + T_1 \)
**Symmetric Case:**

- 2 Markets have the same demand
- 2 Firms have production costs
- Assume constant Marginal Cost of Production

\[ p_1 = a - 6q_1 \]
\[ p_2 = a - 6q_2 \]

\[ q_1 = q^H + q^F \]
\[ q_2 = q^H + q^F \]

\[ MC_1 = 0 \]
\[ MC_2 = 0 \]

NE \( q_1 \)'s: simultaneous moves.
\[ NE: \left( q^H_1, q^F_1, q^H_2, q^F_2 \right) \]

such that they are best responses to each other.

**Step 2:** Find best responses.

\[ q^H_1 = B_1(q^H_2, q^F_2) = B^H_1(q^F_2) \]
\[ q^F_1 = B_1(q^F_2, q^H_2) = B^F_1(q^H_2) \]

\[ q^H_2 = B_2(q^H_1, q^F_1) = \text{case: } B^H_2(q^F_1) \]
\[ q^F_2 = B_2(q^F_1, q^H_1) = \downarrow = B^F_2(q^H_1) \]

**Calculation:**

Firm 1's best responses: \( q^H_1, q^F_1 \)

that maximize \( \Pi_1 \), assuming \( q^H_2, q^F_2 \)

constant.

In this case, effective marginal costs are: \( MC_1 + \tau \) when selling in foreign

\( MC_1 \) at home.

\[ \max \quad \Pi_1(q^H_1, q^F_1, q^F_2, q^H_2) = p_1 q^H_1 + p_2 q^F_2 - c^H_1 q^H_1 - c^F_1 q^F_1 \]

where:

\[ c^H_1 = MC_1 \]
\[ c^F_1 = MC_1 + \tau \]
\[ 0 = \left[ a - 6 \frac{q_H}{q_1} - 6 \frac{q_F}{q_2} \right] \cdot \frac{q_H}{q_1} + \left[ a - 6 \frac{q_H}{q_2} - 6 \frac{q_F}{q_1} \right] \cdot \frac{q_F}{q_1} \]

For exterior solution: \( \frac{q}{q} = 0 \)

\[ \frac{2}{q^{H}} = -6 \cdot \frac{q^{H}}{q_1} + 1 \cdot \left[ a - 6 \frac{q^{H}}{q_1} - 6 \frac{q^{F}}{q_2} \right] - C^{H} = 0 \]

\[ \Rightarrow q^{H} = B_{1}^{H} \left( \frac{q^{F}}{q_2} \right) = \frac{(a-C^{H}) - 6 \frac{q^{F}}{q_2}}{26} \]

\[ \frac{2}{q^{F}} = -6 \cdot \frac{q^{F}}{q_1} + 1 \cdot \left[ a - 6 \frac{q^{H}}{q_2} - 6 \frac{q^{F}}{q_1} \right] - C^{F} = 0 \]

\[ \Rightarrow q^{F} = B_{1}^{F} \left( q^{H} \right) = \frac{(a-C^{F}) - 6 \frac{q^{H}}{q_2}}{26} \]

Similarly for firm 2:

\[ q^{H}_{2} = \frac{(a-C^{H}) - 6 \frac{q^{F}}{q_1}}{26} = B_{2}^{H} \left( \frac{q^{F}}{q_1} \right) \]

\[ q^{F}_{2} = \frac{(a-C^{F}) - 6 \frac{q^{H}}{q_1}}{26} = B_{2}^{F} \left( q^{H} \right) \]
STEP 2: Solving \( y_{EF}, y_{UNK} \)

But in this case, we can solve 2 at a time:

\[ \begin{align*}
\Delta & \quad 2 \quad \Delta \\
\text{AND} & \quad 2 \quad \Delta \\
\end{align*} \]

Solving \( \Delta \) and \( \Delta \) \( \begin{align*}
\theta_1^H &= \frac{a + 2\tau}{36} \\
\theta_2^H &= \frac{a - 2\tau}{36} \\
\theta_1^F &= \frac{a + 2\tau}{36} \\
\theta_2^F &= \frac{a - 2\tau}{36} \\
\end{align*} \)

**Interior Solution for** \( a - 2\tau > 0 \)

\[ \Rightarrow \frac{a}{2} > \tau \]

**Outcome at NE \( \theta \)'s:**

**Market 1 / Country 1:**

\[ \begin{align*}
\theta_1 &= \theta_1^H + \theta_2^F = \frac{2a - \tau}{36} \\
\theta_1 &= a - 6\phi \\
\end{align*} \]

**Market 2 / Country 2:**

\[ \begin{align*}
\theta_2 &= \frac{2a - \tau}{36} \\
\phi_2 &= \frac{a + \tau}{36} \]
**WELFARE:**

**CASE 1:** Assume $T$ is an "Iceberg" Transport Cost and Free Trade (No Tariff)

$$W_{cT} = CS_1^* + \pi_1^*$$

$$= \frac{(a - hi^*) q_i^*}{2} + \pi_1^*$$

$$= \left(\frac{2a - T}{18b}\right)^2 + \left(\frac{a + \pi}{3}\right) \cdot \frac{2a - T}{36} - T \left(\frac{2a - T}{36}\right)$$

**CASE 2:** Assume $T$ is a Tariff (Per Unit Tariff) where Transport Costs are Zero

$$W_{FT} = CS_1^* + \pi_1^* + \text{Gov. Revenue},$$

Where

$$\text{Gov. Revenue} = \frac{T}{2} \times q_f$$

*Country 2 Exports to Country 1 = Country 1 Imports from Country 2*
Dumais  → Theory: Reciprocal Results
             → Monopolist 2 Markets
             → Trade Law, Anti-Imports
             → Article Chicago Fed

Next Topic

International Pricing

Theoretical Model

After that

- Monopolistic Competition
- Previous cases were cases where trade was taking place/allowed.
  i.e.: Case 1: Free trade
  Case 2: Trade with tariffs

- Assume now: No trade is possible (Closed economy = Autarky)

\[
\begin{align*}
\text{Country 1} \quad & \text{Figure 1} \\
& p_1 = q - 6q_1 \\
\text{Country 2} \quad & \text{Figure 2} \\
& p_2 = q - 6q_2
\end{align*}
\]

Monopoly outcome!

\[
\Rightarrow \quad MR = MC = 0
\]

\[
\begin{align*}
MR &= a - 26q = 0 \\
q^* &= \frac{a}{26} \\
p^* &= a - 6q^* \\
W &= CS_1 + \Pi_1
\end{align*}
\]
Remark:
Assume \( \tau = 0 \) (no trade costs)

We can compare:
- Closed economy: Monopoly
- Free trade: \( N \) with trade costs in each country

If \( \tau > 0 \) (not tariffs but transport costs positive FCSBENG type)

Comparison of world welfare (with \( w_2 \)) in FT & closed economy varies depending on parameters (sizes of \( \tau, q, k, \lambda \))
ANOTHER SCENARIO

\[ \text{MC} = c > 0 \]

ASSUME \( \tau = 0 \), DIFFERENT DEMANDS

\[ p^m_1 < p^m_2 \]

\[ |\epsilon^m_1| > |\epsilon^m_2| \]
Background on Dumping / Anti-Dumping Issues

Dumping: Selling "Too Cheap"

Predatory Dumping

Selling "Too Cheap" Selling Below Cost

"Fairy Price"

Determination: Did Dumping Occur?

Yes 1

Definition of Dumping According to Trade Law

A

Yes 1

Harm Occurred or Not?

B

To Domestic Firms As a Result of the "Dumping"

C

An Anti-Dumping Duty (Import Tariff) Can Be Applied

Duty = "Fairy Price" - Price Changed by the Foreign Firm.
A foreign firm is "dumping" a product in the US if one of the following holds:

(i) \[ \frac{\text{PF}}{\text{Price charged by foreign firm in the US}} \leq \frac{\text{AC + Trade Costs}}{\text{Cost of production in home country}} \]

(ii) \[ \text{PF} \leq \frac{\text{PH + Trade Costs}}{\text{Price charged at home}} \]

(iii) \[ \text{PF} \leq \frac{\text{PH}}{\text{Price charged at home}} + \text{Trade Costs} + \text{Trade Costs} \]

Right hand side can be identified as "fair price"
The US Domestic Industry is "injured" and there is a "link" between the dumped product and the "injury" itself. Sales, plant closing, and profits in most cases need evidence is not too strict.

Remedy:

Imposition of an "anti-dumping duty/tax" to compensate & raise foreign price to fair level:

\[ \text{Duty} = \text{Dumping} = \text{Fair Price} - \text{Pro\textregistered} \text{Margin} \]