PubPol/Econ 541

Classes 3, 4

Tariffs and Quotas

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Announcements

- Quiz 1
  - Available today after class
  - Due Friday midnight
  - Accepted until Saturday midnight with penalty
  - Covers material on State of Play, 1 and 2
- Suggestion for in-class responses:
  - If you've already responded once, give time for others to respond
- How to handle skipped slides

Classes 3, 4: Tariffs and Quotas

Pause for Discussion

Classes 3, 4: Tariffs and Quotas

Questions from KOM

- How do "specific" and "ad valorem" tariffs differ?

- An import demand curve is sometimes called a "derived demand curve." Why?

- What is an "effective rate of protection"?

Outline

✓ Tariff by Small country

✓ Tariff by large country

- Quotas

- Recent tariff threats

Small country

- Assumptions throughout
  - Markets perfectly competitive
  - Product homogeneous
  - Markets in equilibrium
  - There are no "distortions" (externalities, etc.)
  - Supply and demand curves are linear
    - Just for simplicity
  - Model is partial equilibrium
  - Model is static
  - Free and frictionless trade

Classes 3, 4: Tariffs and Quotas

Small country

- Special assumption for small country case
  - World price is given (country too small to influence it)
  - More correctly: country's supply and demand in that industry too small to influence the world price

Small country, Import Industry

P

P_aut

a

b

P_0=P_W

S=MC

D=MB

S_aut = D_aut

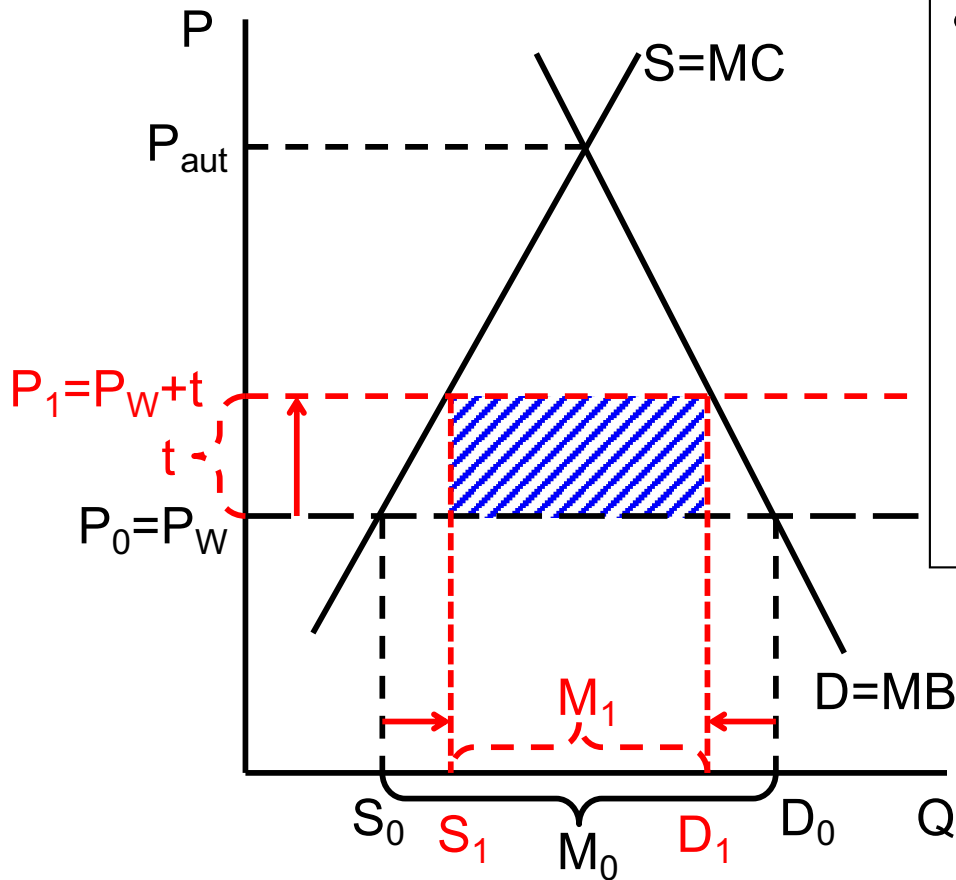S_0   D_0   Q

M_0
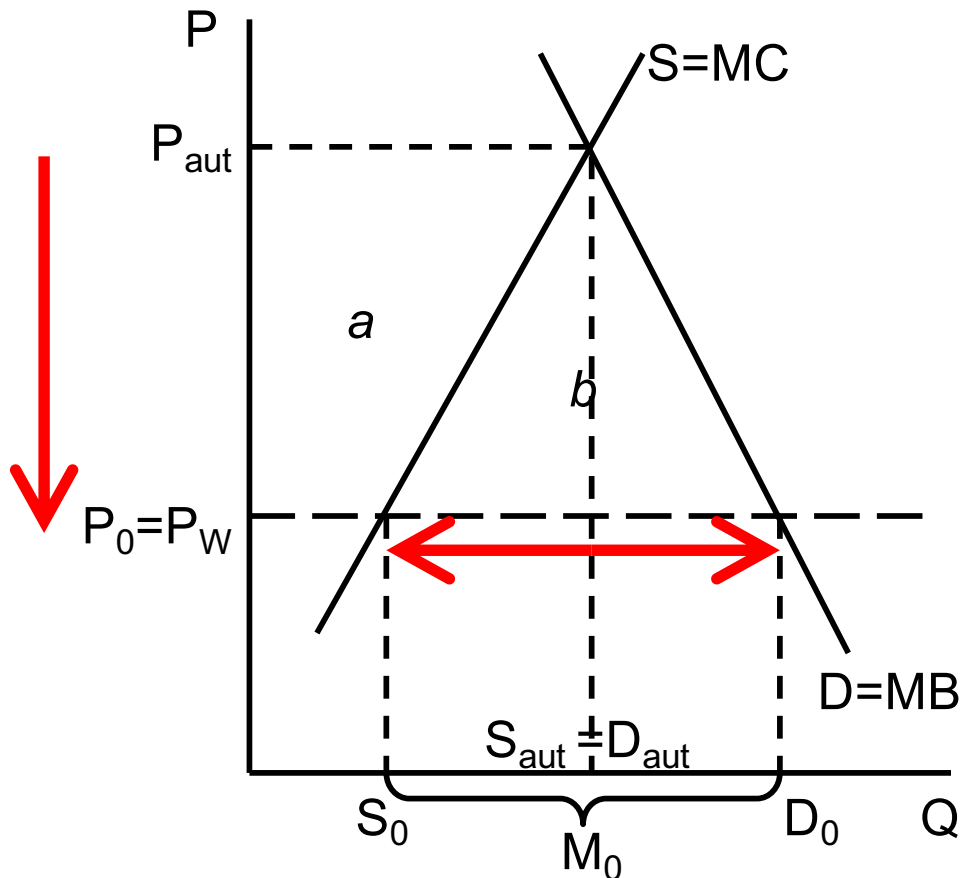
Free trade

- Effects of move from autarky to free trade
  - Price falls
  - Quantity supplied falls
  - Quantity demanded rises
  - Imports rise
- Welfare effects:
  - Suppliers lose $-a$
  - Demanders gain $+(a+b)$
  - Country gains $+b$

The Gain from Trade

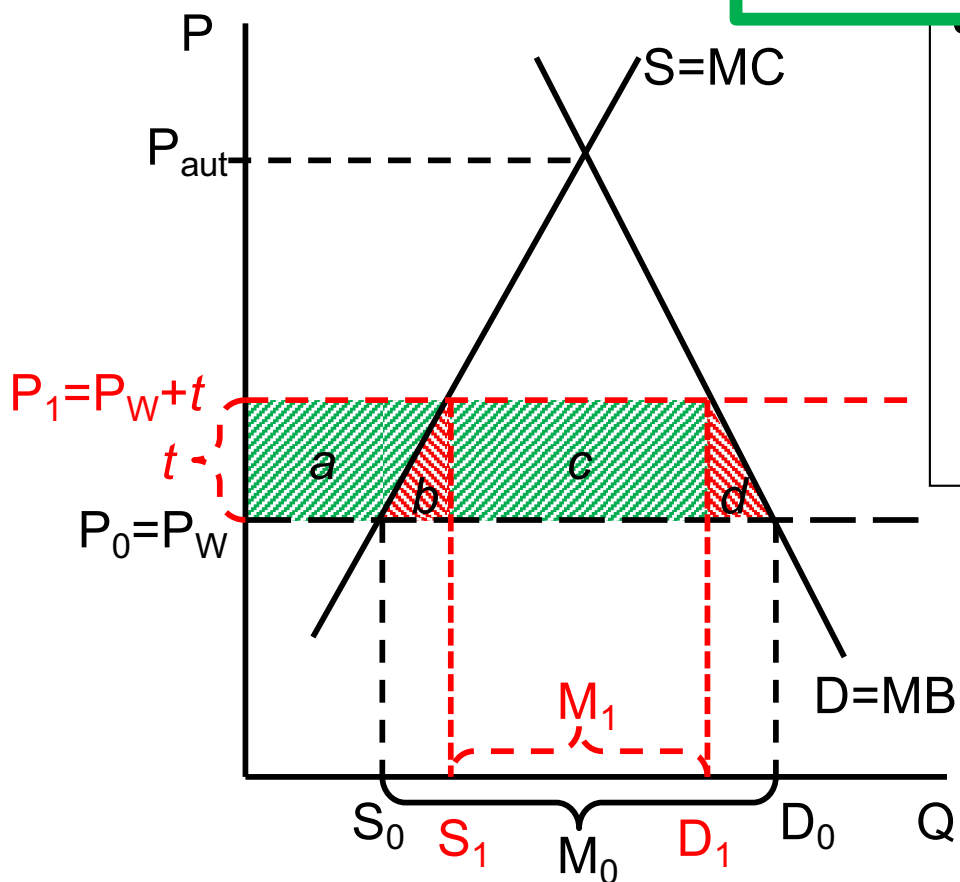Classes 3, 4: Tariffs and Quotas

Small country tariff

- Effects of a tariff, starting from free trade
  - Price rises
  - Quantity supplied rises
  - Quantity demanded falls
  - Quantity of imports falls
  - Tariff revenue rises from zero

Specific Tariff t

Classes 3, 4: Tariffs and Quotas

Small country tariff

WHY?

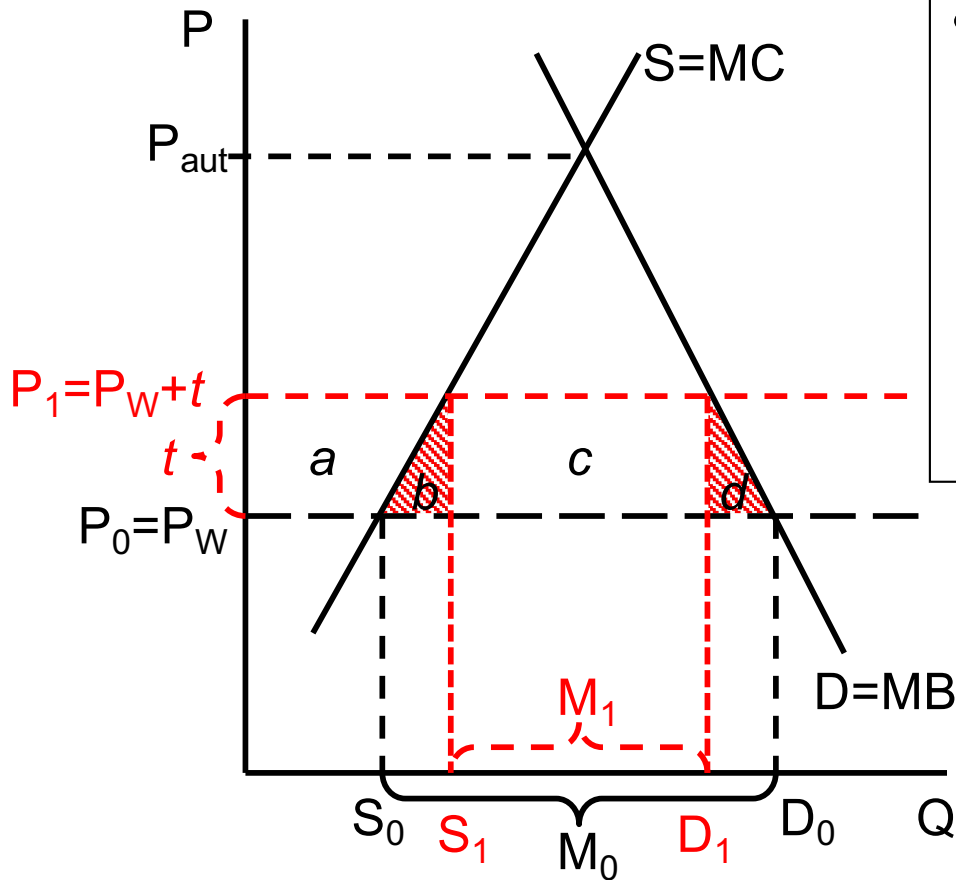- Welfare effects of a tariff, starting from free

  WHY?

  - Suppliers gain

  - Demanders Lose $-(a+b+c+d)$

  - Government gains $+c$

  _____

  - Country loses $-(b+d)$

"Dead Weight Loss" =

Specific Tariff t

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Small country tariff

- Welfare effects of a tariff, starting from free trade
  - Suppliers gain $+a$
  - Demanders Lose $-(a+b+c+d)$
  - Government gains $+c$
  - Country loses $-(b+d)$

"Dead Weight Loss" =

Specific Tariff t

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Pause for Discussion

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Questions on Graph

- If a price falls, why does the gain to demanders not equal the fall in what they pay? Is it larger than this or smaller?

- If a price rises, why is the gain to suppliers not their rise in revenue? Is it larger or smaller?

- In what sense does a small country gain by eliminating a tariff? Does anybody in the country lose?

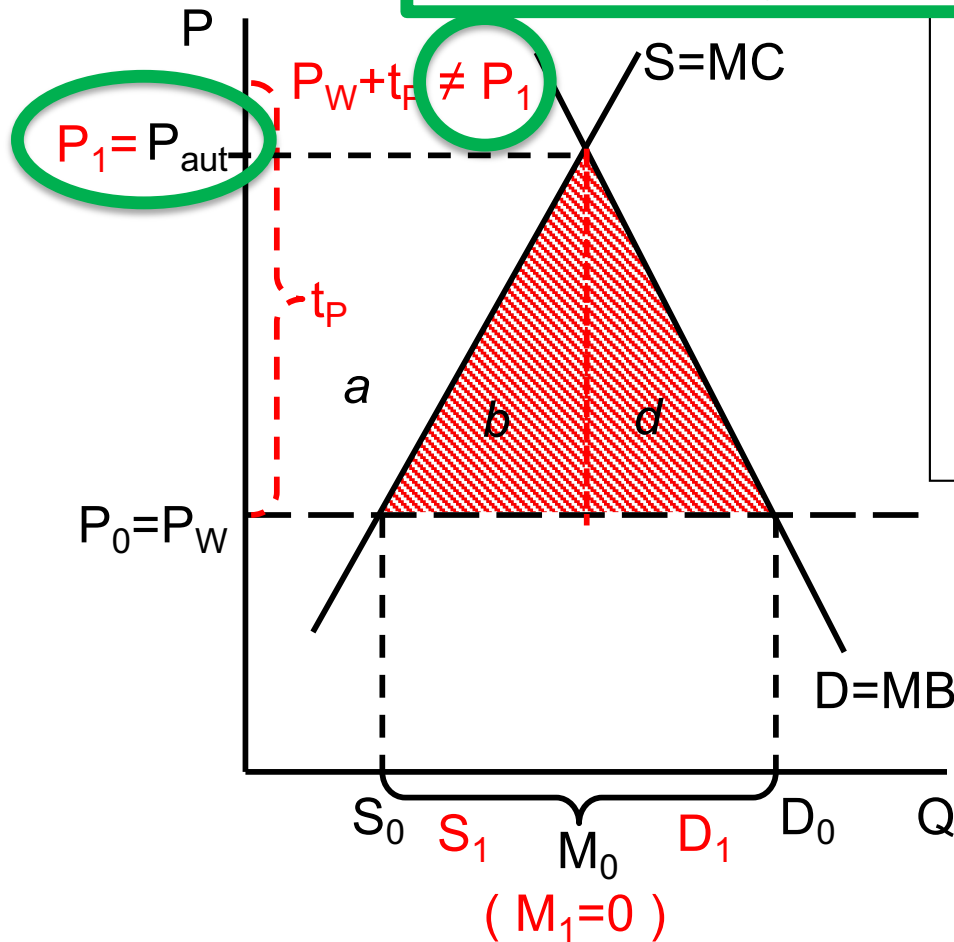Classes 3, 4: Tariffs and Quotas

Small country, larger tariff
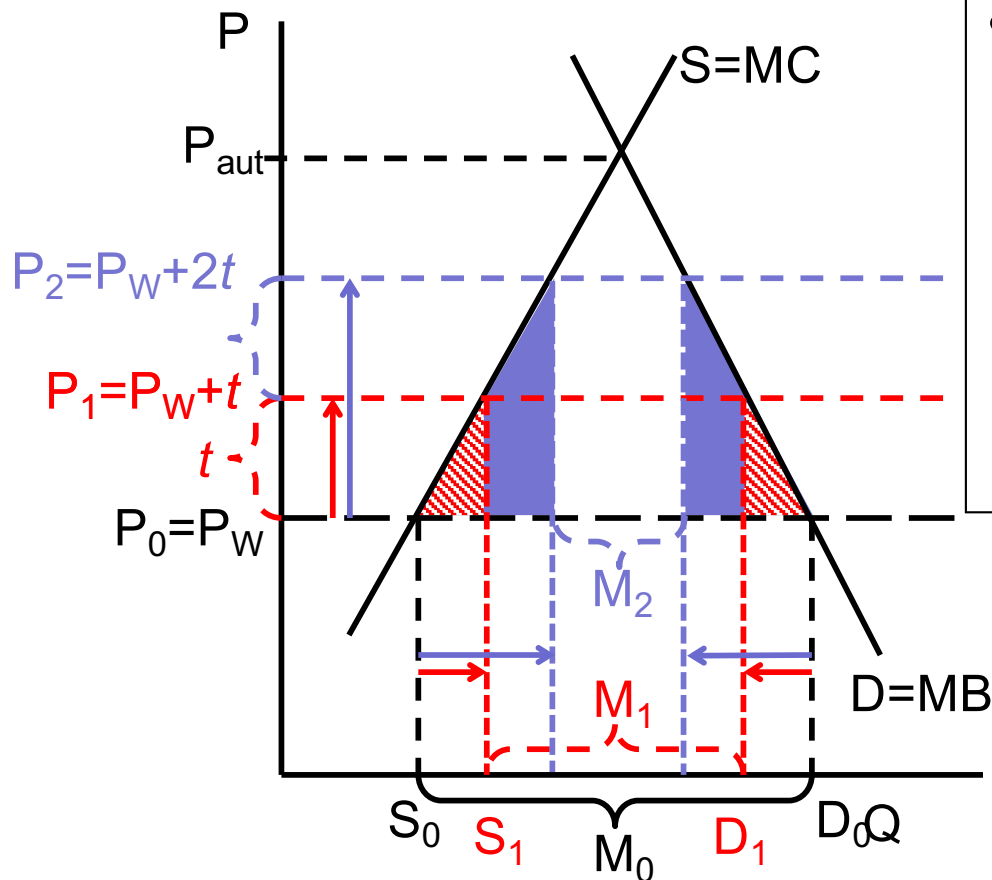
- Effects of doubling the tariff
  - Price rises by twice as much
  - Imports fall by twice as much
  - Deadweight loss is 4-times as large!
    - (Efficiency loss rises with the square of the tariff)

Specific Tariffs, t, then 2t

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Small country, prohibitive tariff

$P_W + t_P \neq P_1$

$P_1 = P_{aut}$

S=MC

t_P

a

b d

$P_0 = P_W$

D=MB

S_0 S_1 M_0 D_1 D_0 Q

($M_1 = 0$)

- Welfare effects of a prohibitive tariff, starting from free trade
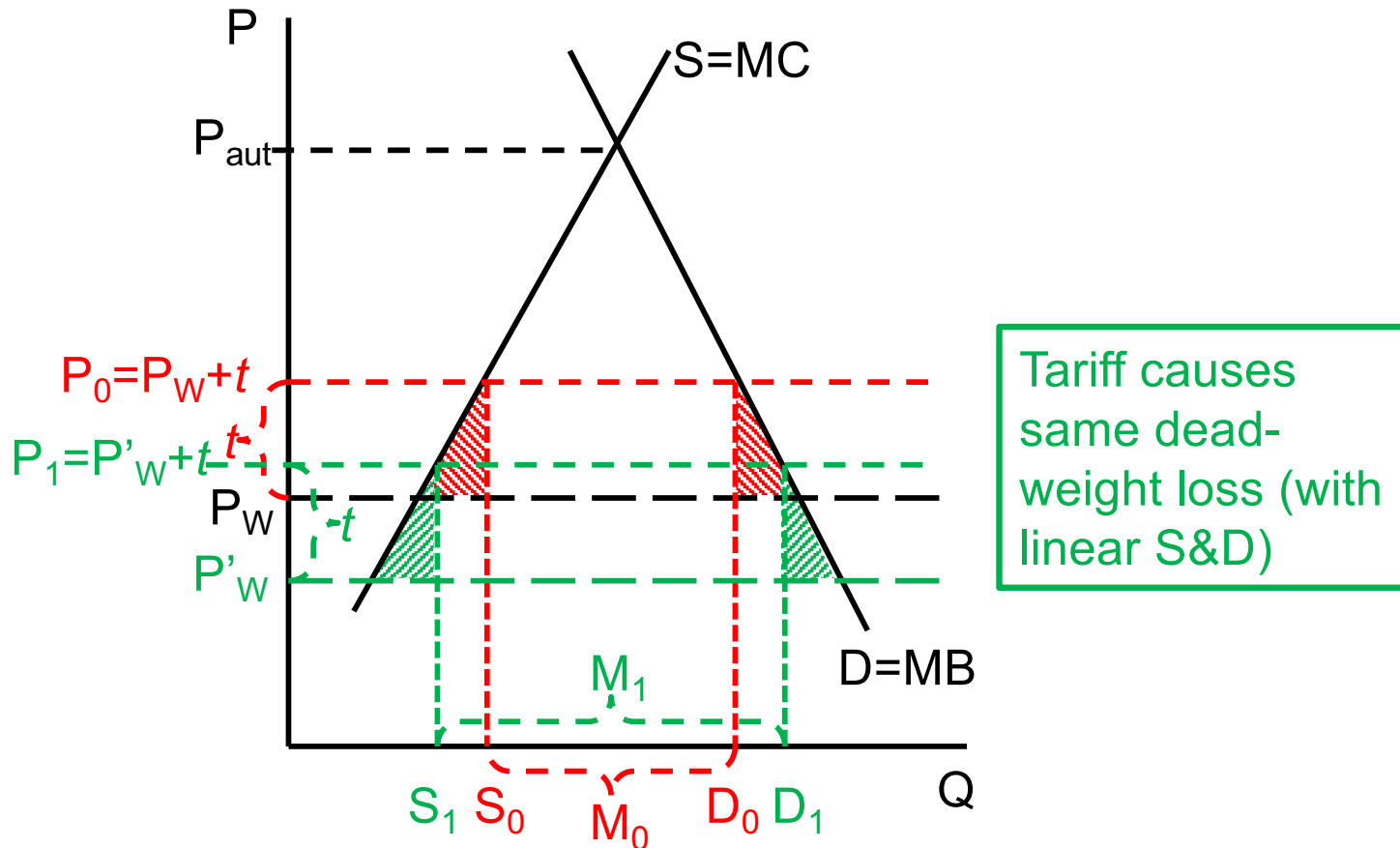 - Suppliers gain $+a$
  - Demanders Lose $-(a+b+d)$
  - Government gains 0
  - Country loses $-(b+d)$

"Dead Weight Loss" =

Specific Tariff $t_P > P_{aut} - P_W$

Comparative Statics with Tariff Fall in World Price

Tariff causes same deadweight loss (with linear S&D)

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Comparative Statics with Tariff Fall in World Price

- Welfare effects of a fall in world price in presence of specific tariff
  - Suppliers lose $-a$
  - Demanders gain $+(a+b+c+d)$
  - Government gains $+(e+f)$
  - Country gains $+(b+c+d+e+f)$

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Pause for
Your Questions

Classes 3, 4: Tariffs and Quotas

Pause for Discussion

Classes 3, 4: Tariffs and Quotas

Questions on Tariff Analysis

- Why does Lahart say the measurement of harm from tariffs is an "imperfect science"?

- Lahart cited an estimate of loss from Trump's tariffs and retaliation of 1.3% of GDP. Is this big?

- What effects of tariffs are missing from the welfare effects of tariffs?

Small Country in Equations

- Let p^w be world price and p^h be price in home market. With *ad valorem* tariff, t, *assumed not large enough to stop trade:*

$$p^h = (1 + t)p^w$$

- Demand: $\quad Q^d = D(p^h)$

- Supply: $\quad Q^s = S(p^h)$

- Imports: $\quad Q^m = Q^d - Q^s$

NOTE: Used specific tariff in graphs, ad valorem in eqns. Both are for simplicity.

Small Country in Equations

- Without tariff (free trade; $t = 0$):

$$p^{h0} = p^w$$
$$Q^{m0} = D(p^w) - S(p^w)$$

- With tariff, $t > 0$:

$$p^{h1} = (1 + t)p^w$$
$$Q^{m1} = D\big((1 + t)p^w\big) - S\big((1 + t)p^w\big)$$

Small Country in Equations

- Notation: Let

$$\Delta x = x^1 - x^0$$

for $x = p, Q,$ etc.

Then

$$\Delta p^h = p^{h1} - p^{h0} = (1 + t)p^w - p^w = tp^w$$

and

$$t = \frac{\Delta p^h}{p^w} = \frac{\Delta p^h}{p^{h0}}$$

Classes 3, 4: Tariffs and Quotas

Small Country in Equations

- It is most convenient to work with <u>percentage changes</u> and <u>elasticities</u>:

- Percentage change in any variable, x, is

$$Percent\ change\ in\ x = \frac{\Delta x}{x}$$

- Elasticity of x with respect to y is

$$\frac{\Delta x}{x} / \frac{\Delta y}{y}$$

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Small Country in Equations

- Elasticity of (home) demand (η):

$$\eta = \frac{\Delta Q^d}{Q^{d0}} \bigg/ \frac{\Delta p^h}{p^{h0}} \quad \text{or} \quad \frac{\Delta Q^d}{Q^{d0}} = \eta \frac{\Delta p^h}{p^{h0}}$$

- Note that $\eta < 0$ (downward sloping)

- Elasticity of (home) supply (ε):

$$\varepsilon = \frac{\Delta Q^s}{Q^{s0}} \bigg/ \frac{\Delta p^h}{p^{h0}} \quad \text{or} \quad \frac{\Delta Q^s}{Q^{s0}} = \varepsilon \frac{\Delta p^h}{p^{h0}}$$

When you know the price change, use these to find the quantity change

Small Country in Equations

- Notes regarding elasticities:
  - *They'll be defined here as changes relative to the free-trade quantities and prices.*
  - *Different, but just as valid, would be changes relative to quantities and prices in the presence of the tariff.*
  - *Answers will differ, but by much less than our uncertainty about the values of elasticities.*
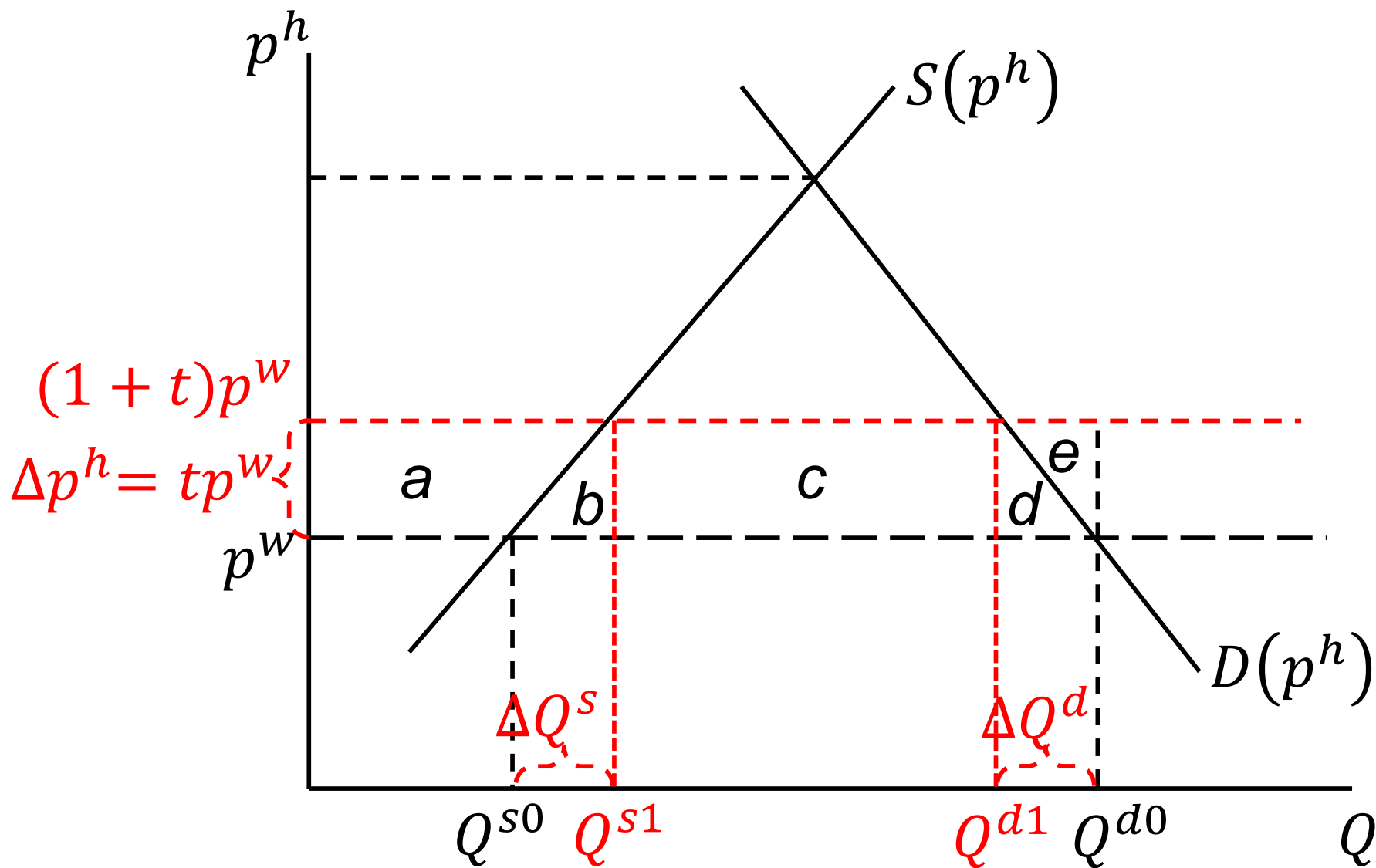 - *In your calculations, use whichever is most convenient, but be consistent.*

Classes 3, 4: Tariffs and Quotas

Small Country in Equations

- Data are usually values, not quantities.

- Values of initial quantities:
- Demand: $\qquad V^{d0} = p^{h0}Q^{d0} = p^{W}Q^{d0}$
- Supply: $\qquad V^{s0} = p^{h0}Q^{s0} = p^{W}Q^{s0}$
- Imports: $\qquad V^{m0} = p^{w0}\left(Q^{d0} - Q^{s0}\right)$

Small Country in Equations

- Effects of tariff on quantities:

Demand: $\Delta Q^d = \eta t Q^{d0}$
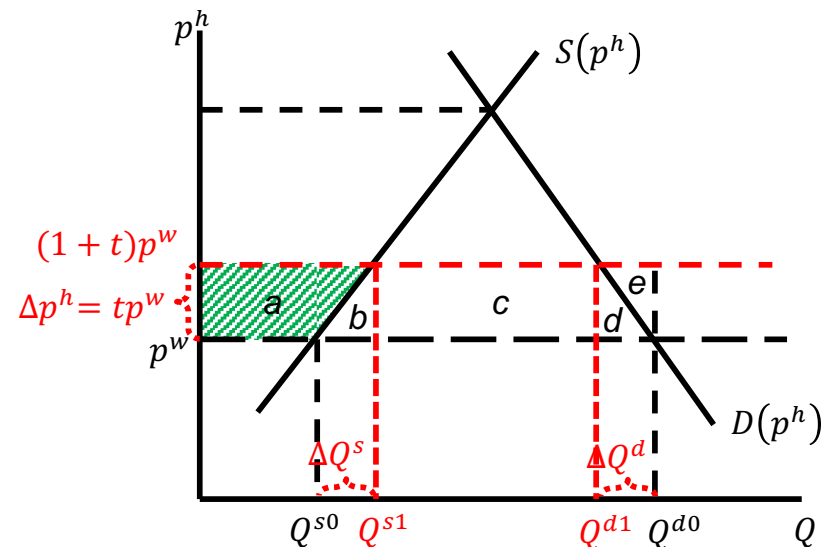
Supply: $\Delta Q^s = \varepsilon t Q^{s0}$

I'll use $\langle a \rangle$, $\langle abcd \rangle$, *etc*. to represent these areas.

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Small Country in Equations

- Welfare gain of suppliers (producers & upstream):

$$WGS = \langle a \rangle$$

$$= (Q^{s0})(\Delta p^h) + \frac{1}{2}(\Delta Q^s)(\Delta p^h)$$

$$= Q^{s0}\Delta p^h + \frac{1}{2}\frac{\Delta Q^s}{Q^{s0}}Q^{s0}\Delta p^h$$

$$= \left(1 + \frac{1}{2}\varepsilon\frac{\Delta p^h}{p^{h0}}\right)p^{h0}Q^{s0}\frac{\Delta p^h}{p^{h0}}$$

$$= \left(1 + \frac{1}{2}\varepsilon\frac{\Delta p^h}{p^{h0}}\right)V^{s0}\frac{\Delta p^h}{p^{h0}}$$

$$= \boxed{\left(1 + \frac{1}{2}\varepsilon t\right)tV^{s0}}$$

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Small Country in Equations

- Welfare loss of demanders (consumers and downstream):
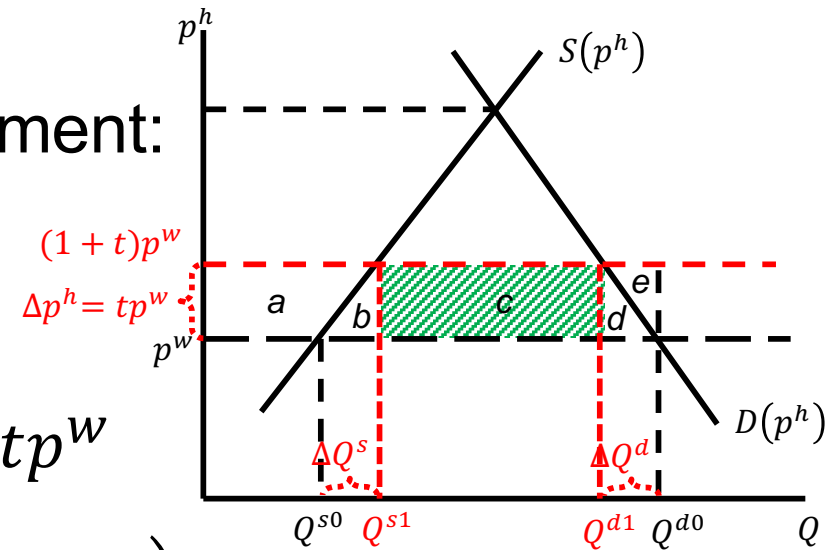
$$WLD = \langle abcd \rangle = \langle abcde \rangle - \langle e \rangle$$

$$= (Q^{d0})(\Delta p^h) - \frac{1}{2}(|\Delta Q^d|)(\Delta p^h)$$

$$= \left(1 - \frac{1}{2}\frac{|\Delta Q^d|}{Q^{d0}}\right)Q^{d0}\Delta p^h$$

$$= \left(1 + \frac{1}{2}\frac{\Delta Q^d}{Q^{d0}}\right)p^{h0}Q^{d0}\frac{\Delta p^h}{p^{h0}}$$

$$= \left(1 + \frac{1}{2}\eta\frac{\Delta p^h}{p^{h0}}\right)V^{d0}\frac{\Delta p^h}{p^{h0}}$$

$$= \boxed{\left(1 + \frac{1}{2}\eta t\right)tV^{d0}}$$

Classes 3, 4: Tariffs and Quotas
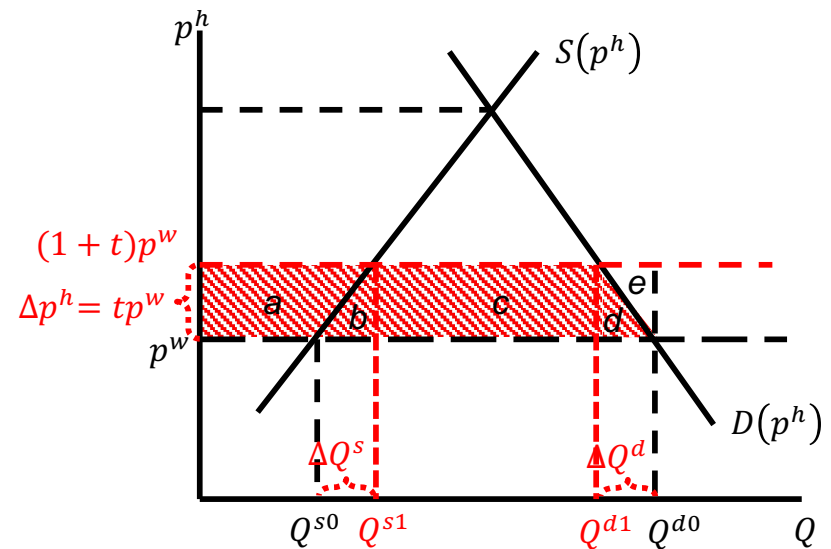
Small Country in Equations

- Revenue gain of (home) government:

$$R = \langle c \rangle$$

$$= \left(Q^{d1} - Q^{s1}\right)\Delta p^h$$

$$= \left(Q^{d0} + \Delta Q^d - Q^{s0} - \Delta Q^s\right)tp^w$$

$$= \left(Q^{d0}\left(1 + \frac{\Delta Q^d}{Q^{d0}}\right) - Q^{s0}\left(1 + \frac{\Delta Q^s}{Q^{s0}}\right)\right)tp^w$$

$$= \left(Q^{d0}\left(1 + \eta\frac{\Delta p^h}{p^{h0}}\right) - Q^{s0}\left(1 + \varepsilon\frac{\Delta p^h}{p^{h0}}\right)\right)tp^w$$

$$= \boxed{\left(V^{d0}(1 + \eta t) - V^{s0}(1 + \varepsilon t)\right)t}$$

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Small Country in Equations

- Welfare change for country:

$$WCC = -\langle abcd \rangle + \langle a \rangle + \langle c \rangle$$
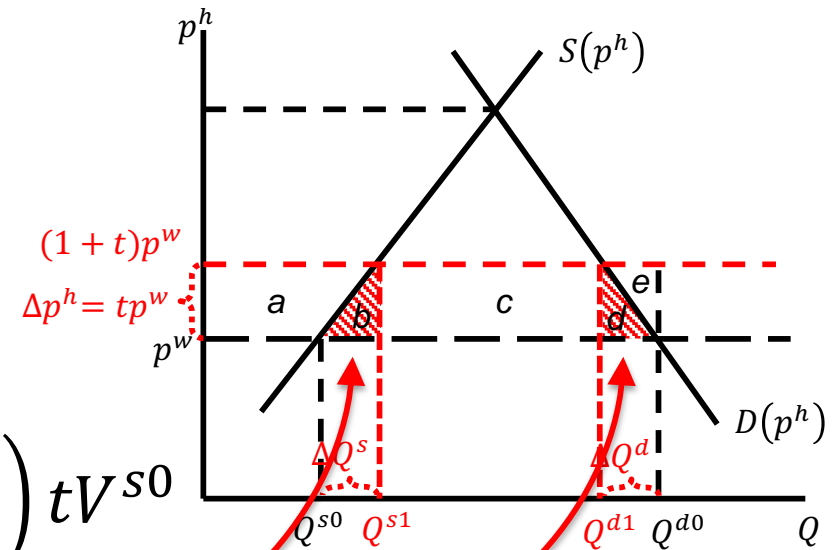
$$= WLD - WGS - R$$

$$= -\left(1 + \frac{1}{2}\eta t\right)tV^{d0} + \left(1 + \frac{1}{2}\varepsilon t\right)tV^{s0}$$

$$+ \left(V^{d0}(1 + \eta t) - V^{s0}(1 + \varepsilon t)\right)t$$

$$= -tV^{d0} + tV^{s0} - \frac{1}{2}\eta t^2 V^{d0} + \frac{1}{2}\varepsilon t^2 V^{s0} + tV^{d0} - tV^{s0}$$

$$+ \eta t^2 V^{d0} - \varepsilon t^2 V^{s0}$$

$$= -\left[\frac{1}{2}\varepsilon t^2 V^{s0} - \frac{1}{2}\eta t^2 V^{d0}\right]$$

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Small Country in Equations

- ## Summary:

WGS = Welfare Gain of Suppliers
WLD = Welfare Loss of Demanders
R = Government Revenue
WCC = Welfare Change of Country

- ## WGS $= \left(1 + \dfrac{1}{2}\varepsilon t\right) t V^{s0}$

- ## WLD $= \left(1 + \dfrac{1}{2}\eta t\right) t V^{d0}$

- ## R $= \left(V^{d0}(1 + \eta t) - V^{s0}(1 + \varepsilon t)\right) t$

- ## WCC $= -\left[\dfrac{1}{2}\varepsilon t^2 V^{s0} - \dfrac{1}{2}\eta t^2 V^{d0}\right]$

Classes 3, 4: Tariffs and Quotas

# Pause for Discussion

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Questions on Equations

- What information do you need to calculate these welfare effects?

- How do they change with larger tariffs?

- Explain the sources of the "production distortion loss" and the "consumption distortion loss."

  - Why does each occur, and who is it that loses in each case?
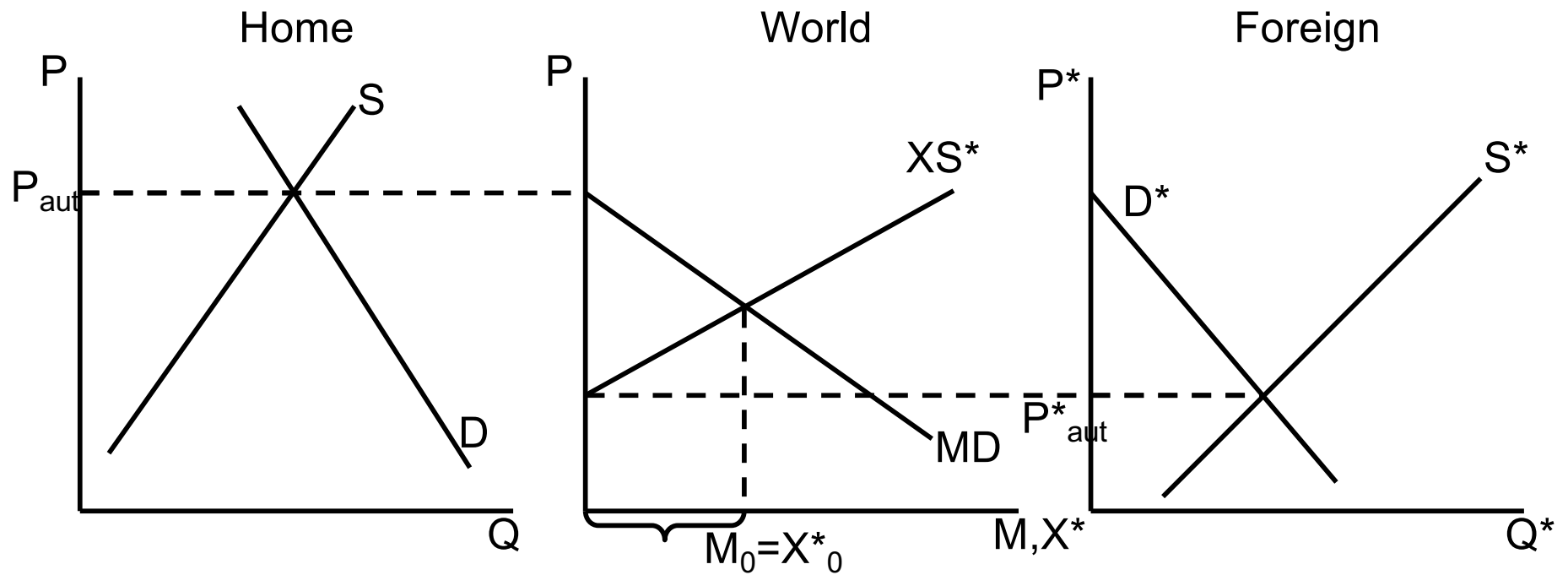
  - Where do these appear in the equations?

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Outline

- Small country

- Large country

Large country
(i.e., Two Countries)

Home

Foreign (*)
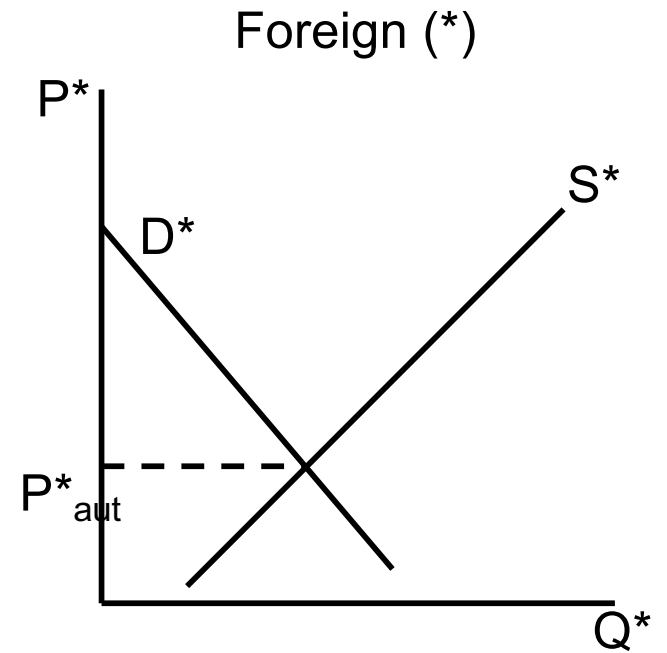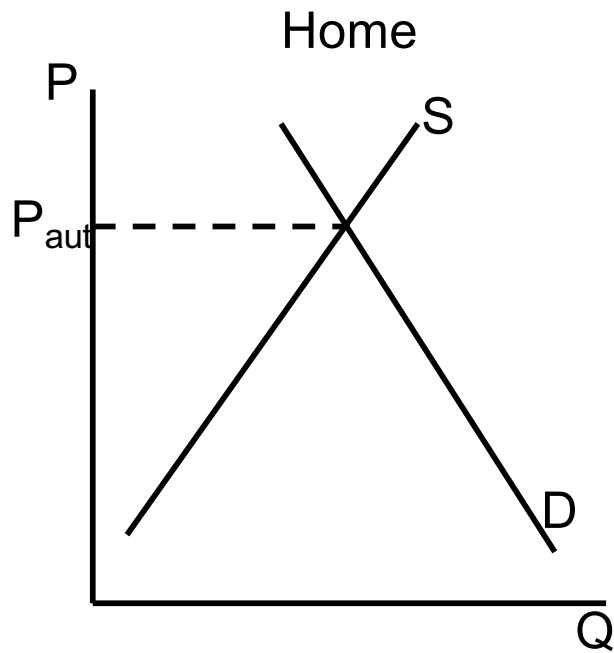
Autarky

Classes 3, 4: Tariffs and Quotas

Large country
(i.e., Two Countries)

Home

P

P_{aut}

S

D

Q

World

P

XS^*

MD

$M_0 = X^*_0$

M, X^*

Foreign

P^*

D^*

S^*

P^*_{aut}

Q^*

Free trade

Classes 3, 4: Tariffs and Quotas

Large country
(i.e., Two Countries)

Home World Foreign

Free trade

Classes 3, 4: Tariffs and Quotas
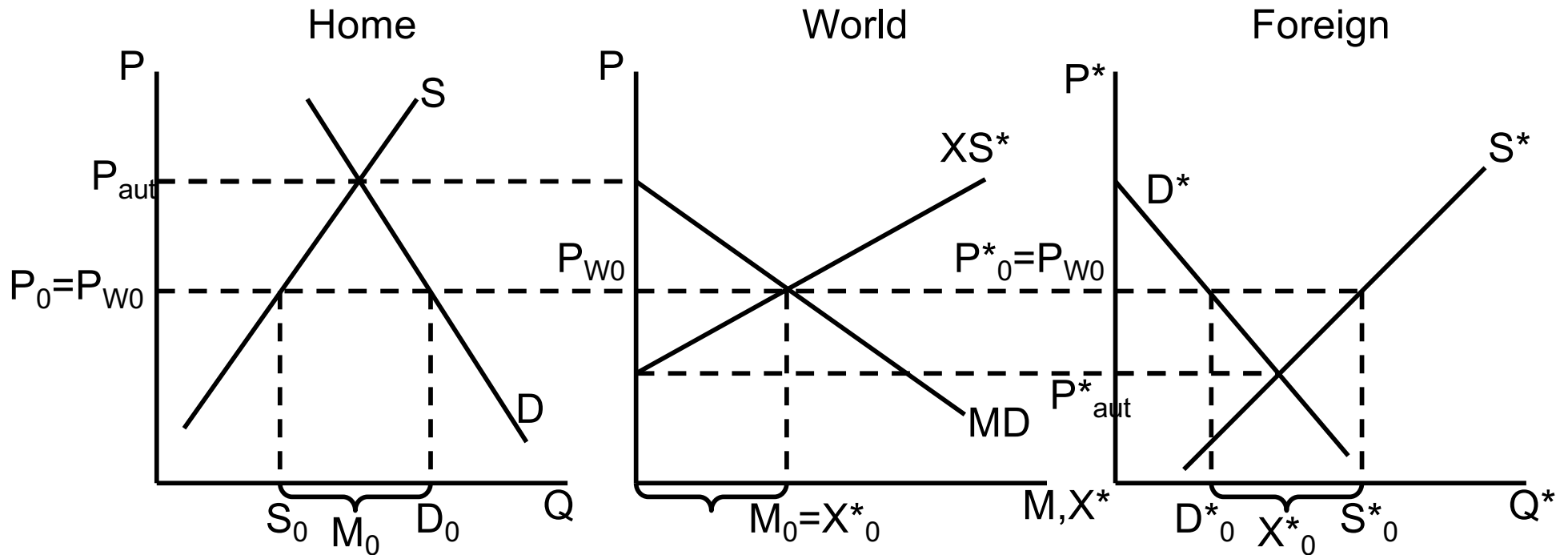
Large country
(i.e., Two Countries)
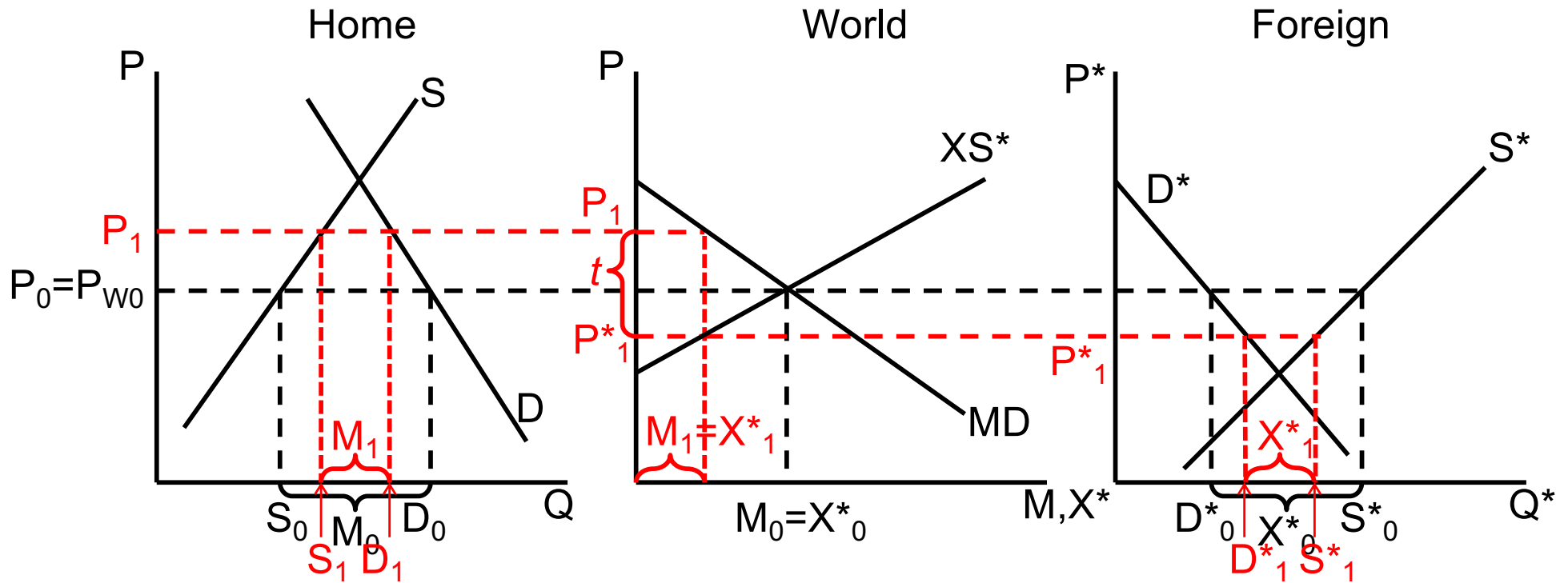
Specific Tariff, t, by Home
Requires: $P = P^* + t$, $MD = XS^*$

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Large country (i.e., Two Countries)
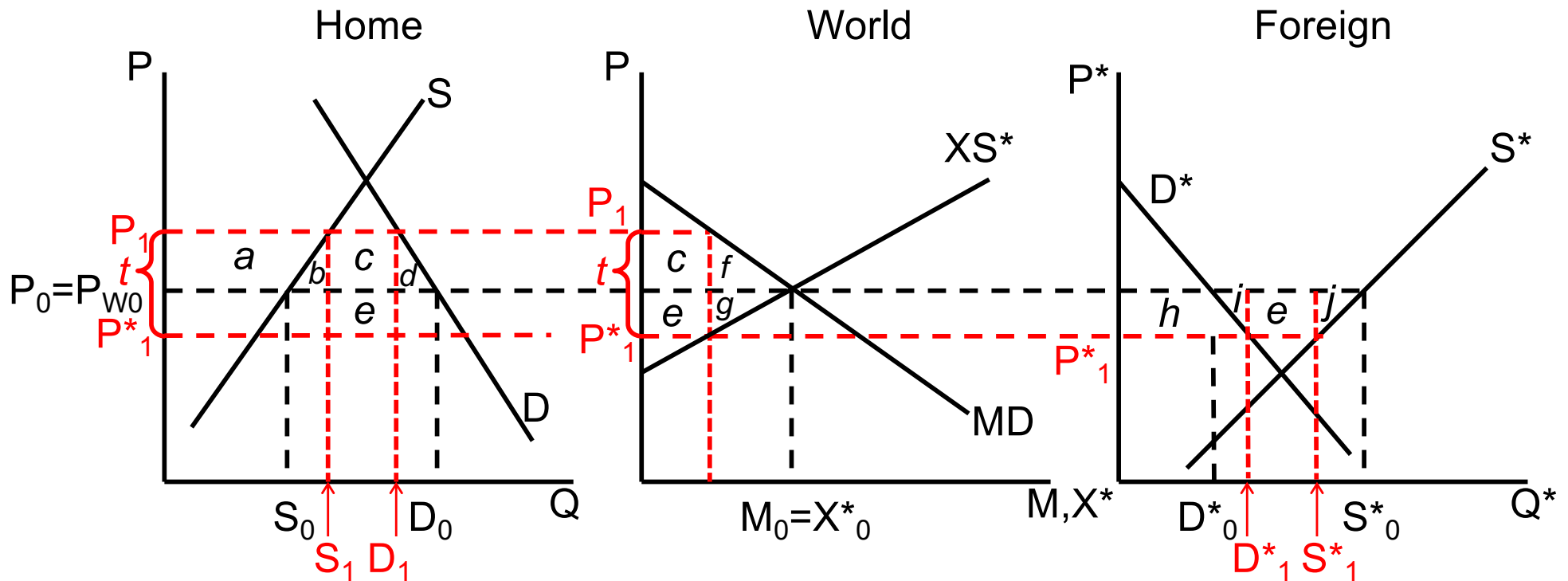
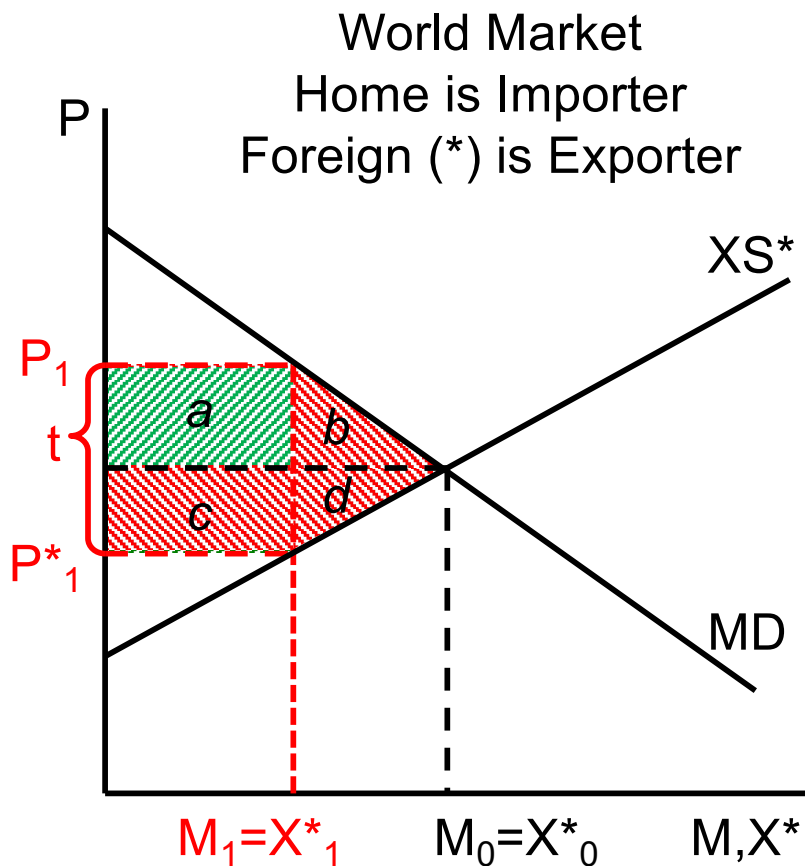## Welfare effects of Tariff, t:

- Home
  - Suppliers $+a$
  - Demanders $-(a+b+c+d)$
  - Government $+(c+e)$
  - Country $+e-(b+d) = e-f$

- Foreign
  - Suppliers $-(h+i+e+j)$
  - Demanders $+h$
  - Country $-(i+e+j) = -(e+g)$

- World: $-(f+g) = -(b+d+i+j)$

Large country, World Market

World Market
Home is Importer
Foreign (*) is Exporter

Welfare effects of a large-country tariff, starting from free trade

- Home:

Private sector (S&D) loses	$-(a+b)$
Government gains	$+(a+c)$
Country may gain or lose:	$+c-b$

- Foreign

Private sector (S&D) loses	$-(c+d)$

- World loses $-(b+d)$

"Dead Weight Loss" =

Classes 3, 4: Tariffs and Quotas

Large country, World Market

World Market
Home is Importer
Foreign (*) is Exporter
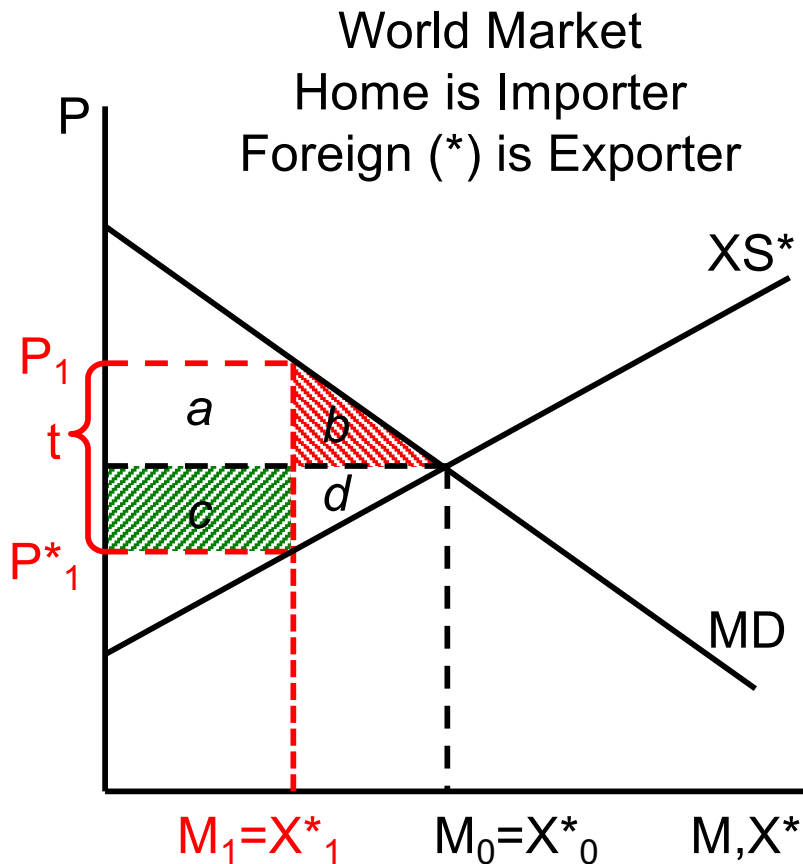
Thus large country will gain from tariff if $c>b$

- What is area c?
  - The portion of the tariff paid by foreign exporters, who get a lower price
  - A transfer from foreign producers to the home government
  - The result of improving the home country's "terms of trade"

"Terms of Trade" $\equiv$ Relative price of exports $= P^X/P^M$

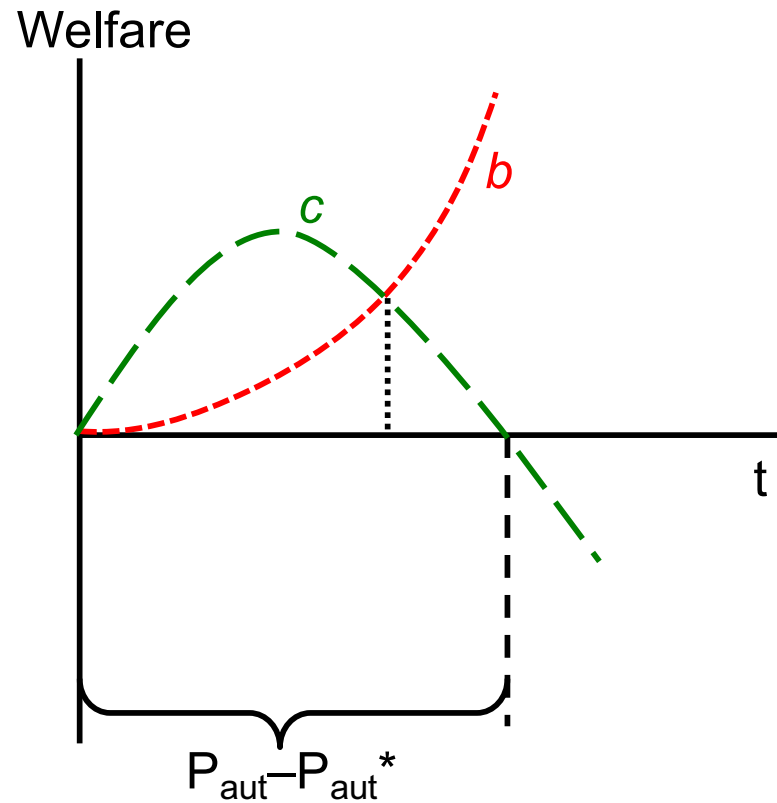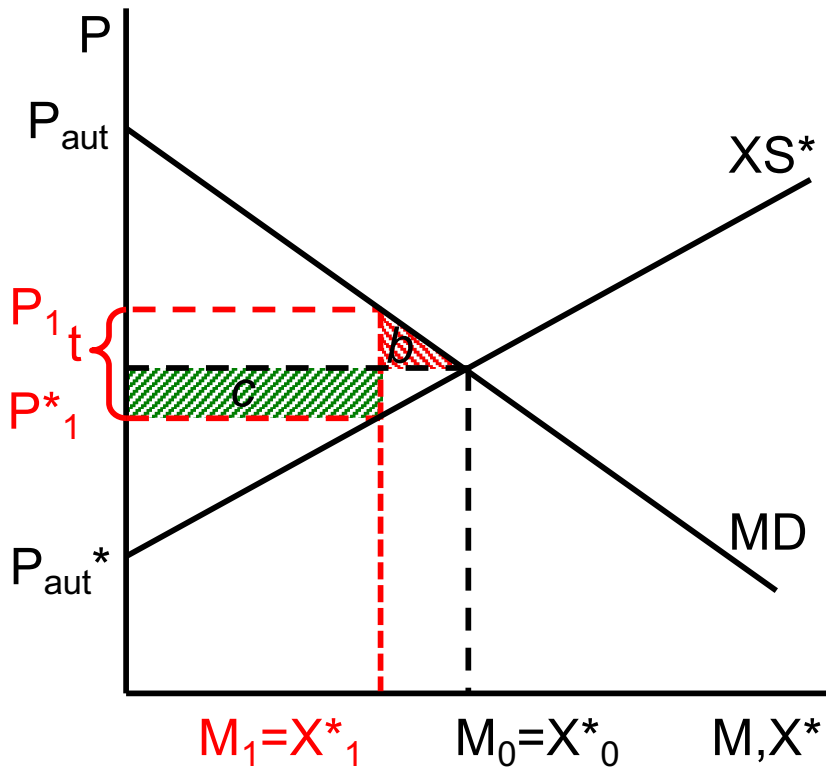Classes 3, 4: Tariffs and Quotas

Pause for Discussion

Classes 3, 4: Tariffs and Quotas

Questions on Large Country

- The figure for the world market shows the tariff causing the world price to fall. What in the figure tells you that the Home country is large?

- In what sense might a large country gain by using a tariff? Who in the country benefits from that gain?

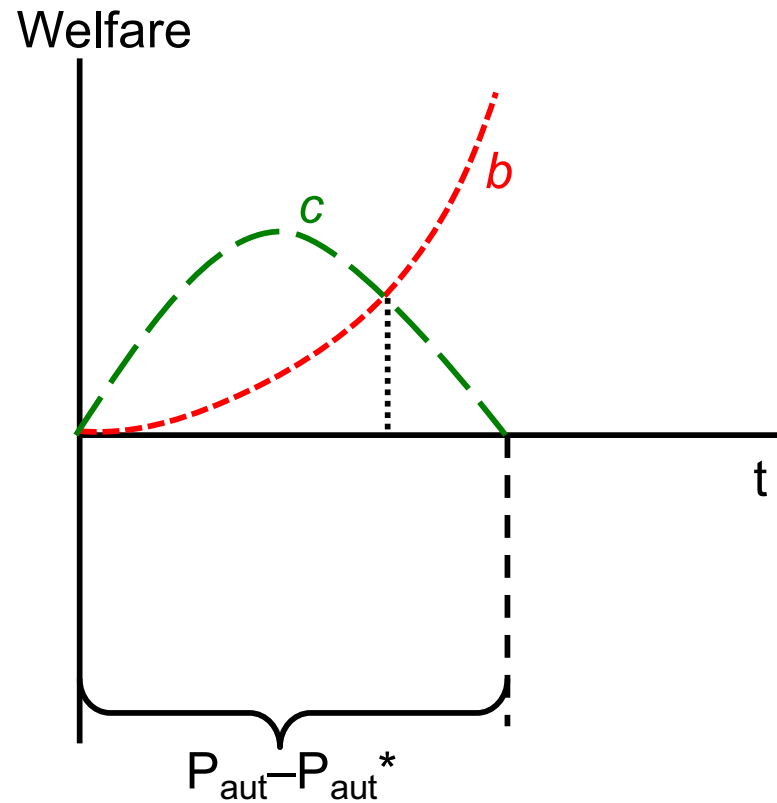- What reasons are there, if any, for a large country <u>not</u> to levy a tariff?
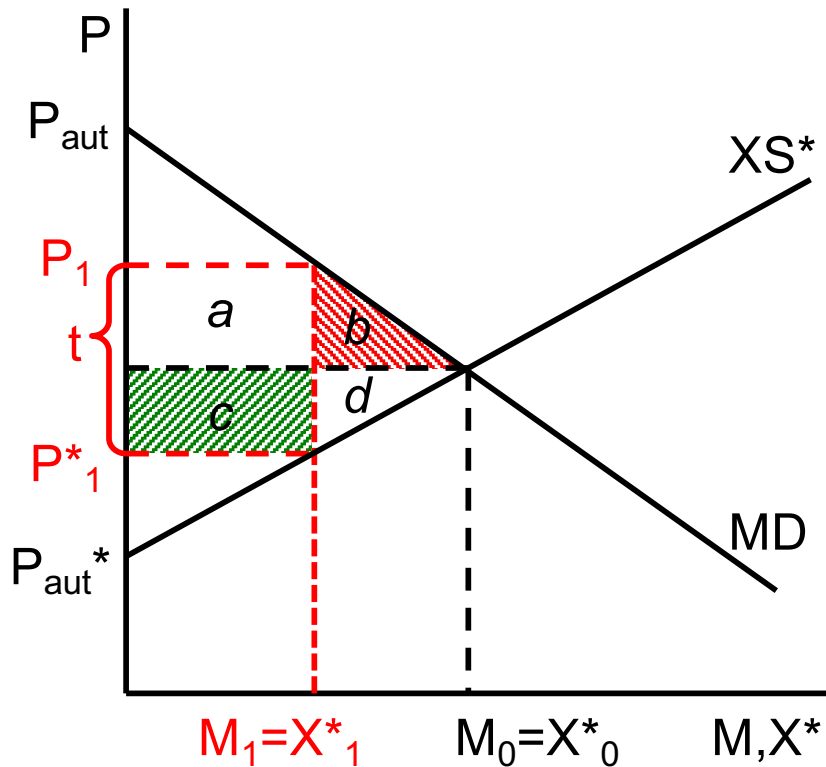
Classes 3, 4: Tariffs and Quotas

Large country, "Optimal" tariff
Watch as *t* rises

Classes 3, 4: Tariffs and Quotas
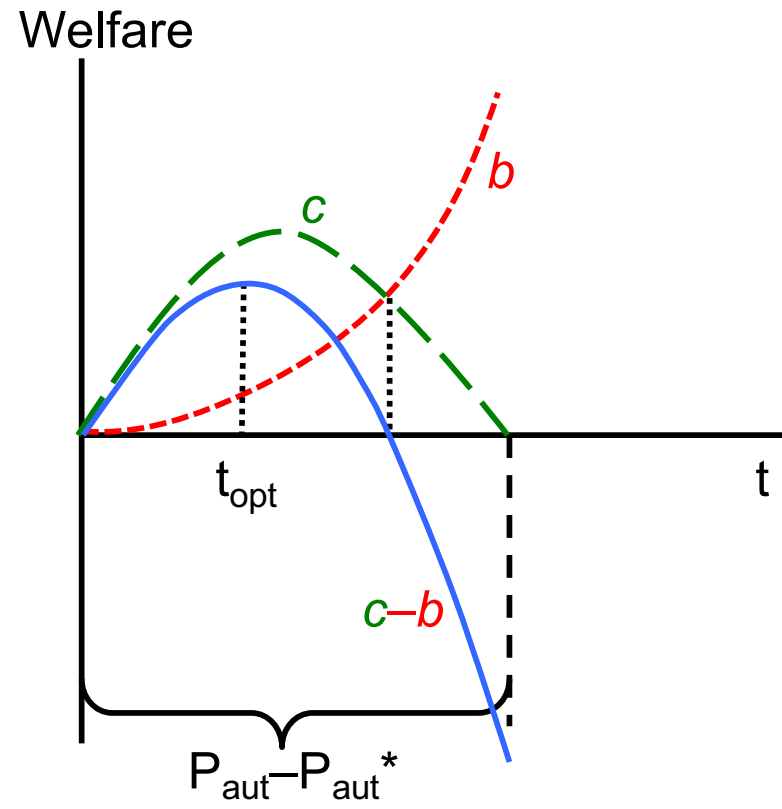
Large country, "Optimal" tariff
Watch as *t* rises

Classes 3, 4: Tariffs and Quotas
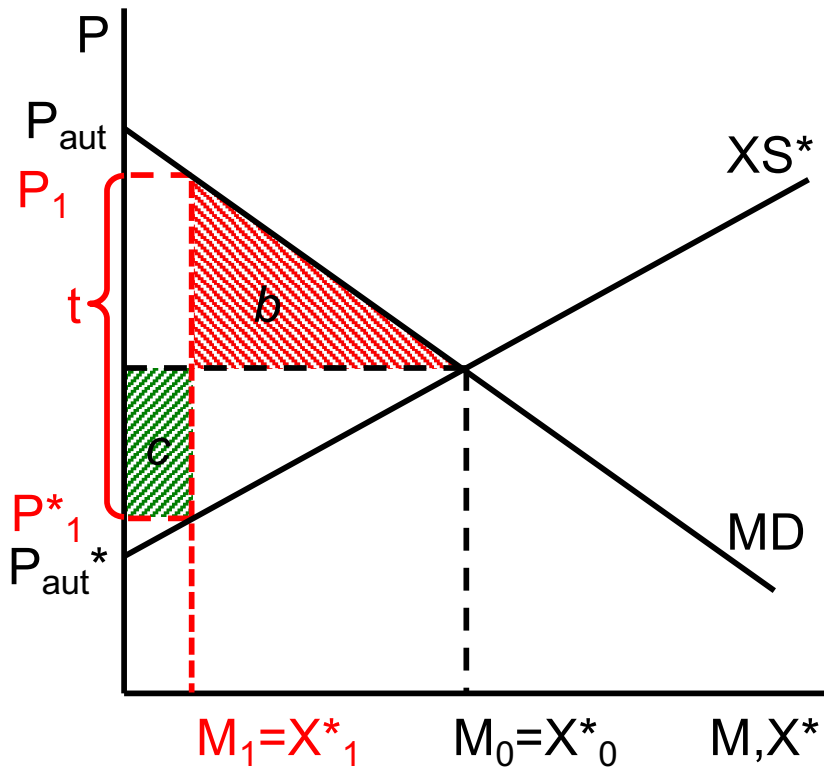
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How Sizes and Slopes Matter

Free trade
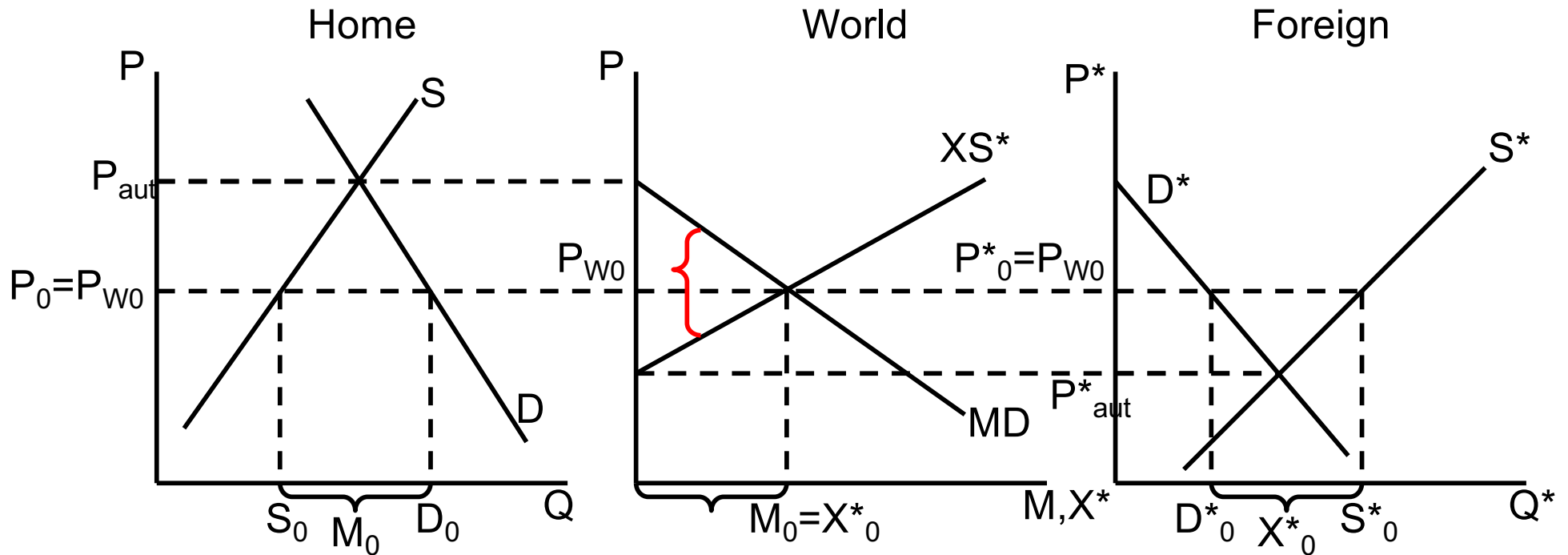
Tariff
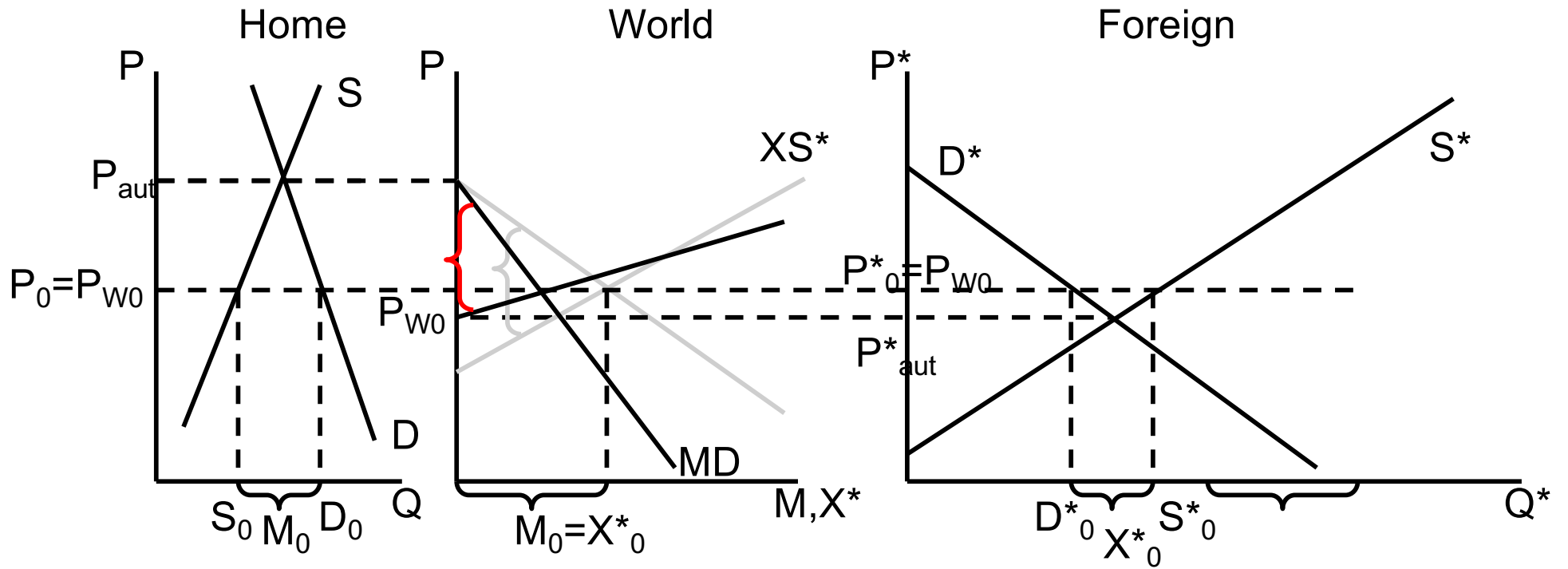
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How Slopes (Elasticities) Matter

Home

World

Foreign

Free trade

Tariff

Classes 3, 4: Tariffs and Quotas

How Sizes Matter

Home World Foreign

Free trade

Tariff

Classes 3, 4: Tariffs and Quotas

Pause for Your Questions

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- Countries $i = h, f = home, foreign$
- Prices $p^i, i = h, f$
  - With free trade, equilibrium #0:
  $$p^{h0} = p^{f0}(= p^{w0})$$
  - With specific tariff, t, levied by country h on export of f, equilibrium #1:
  $$p^{h1} = p^{f1} + t$$
  - *Ad valorem* equivalent of the specific tariff at the initial price:
  $$\tau = \frac{t}{p^{h0}}$$

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- Domestic supply and demand in each country, $i = h, f$, are represented by their elasticities:

$$\varepsilon^i = \frac{\Delta Q^{is}}{Q^{is0}} \bigg/ \frac{\Delta p^i}{p^{i0}} > 0 \quad \text{or} \quad \Delta Q^{is} = \varepsilon^i \frac{\Delta p^i}{p^{i0}} Q^{is0}$$

$$\eta^i = \frac{\Delta Q^{id}}{Q^{id0}} \bigg/ \frac{\Delta p^i}{p^{i0}} < 0 \quad \text{or} \quad \Delta Q^{id} = \eta^i \frac{\Delta p^i}{p^{i0}} Q^{id0}$$

Two-Country in Equations

- Notation
  - Values of initial supply and demand, $i = h, f$:
  $$V^{is0} = p^{i0}Q^{is0}$$
  $$V^{id0} = p^{i0}Q^{id0}$$

  - Value of initial (home-country) imports:
  $$M^0 = \left(V^{hd0} - V^{hs0}\right)$$

  - Convenient values, capturing both size and price responsiveness, $i = h, f$:
  $$\boxed{A^i \equiv \varepsilon^i V^{is0} - \eta^i V^{id0} > 0}$$
  $$\bar{A} = A^h + A^f > 0$$

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Two-Country in Equations

- Price changes must add up to tariff:

$$\Delta p^h - \Delta p^f = t$$

- Divide by $p^{h0} = p^{f0}$:

$$\frac{\Delta p^h}{p^{h0}} - \frac{\Delta p^f}{p^{f0}} = \frac{t}{p^{h0}} = \tau$$

or:

$$\frac{\Delta p^h}{p^{h0}} = \frac{\Delta p^f}{p^{f0}} + \tau$$

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Two-Country in Equations

- Equilibrium quantities:

$$\Delta Q^{hd} - \Delta Q^{hs} = \Delta Q^{fs} - \Delta Q^{fd}$$

- Use elasticities:

$$\eta^h \frac{\Delta p^h}{p^{h0}} Q^{hd0} - \varepsilon^h \frac{\Delta p^h}{p^{h0}} Q^{hs0} = \varepsilon^f \frac{\Delta p^f}{p^{f0}} Q^{fs0} - \eta^f \frac{\Delta p^f}{p^{f0}} Q^{fd0}$$

- Multiply through by $p^{h0} = p^{f0}$ to get values:

$$A^h \boxed{\left(\eta^h V^{hd0} - \varepsilon^h V^{hs0}\right)} \frac{\Delta p^h}{p^{h0}} = \left(\varepsilon^h f V^{fs0} - \eta^f V^{fd0}\right) \frac{\Delta p^f}{p^{f0}}$$

- or:

$$A^h \frac{\Delta p^h}{p^{h0}} = -A^f \frac{\Delta p^f}{p^{f0}}$$

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- This gives us two equations in two unknowns, $\dfrac{\Delta p^h}{p^{h0}}$ & $\dfrac{\Delta p^f}{p^{f0}}$:

$$\frac{\Delta p^h}{p^{h0}} = \frac{\Delta p^f}{p^{f0}} + \tau$$

$$A^h \frac{\Delta p^h}{p^{h0}} = -A^f \frac{\Delta p^f}{p^{f0}}$$

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- Solution:

$$A^h \frac{\Delta p^h}{p^{h0}} = A^h \left(\frac{\Delta p^f}{p^{f0}} + \tau \right) = -A^f \frac{\Delta p^f}{p^{f0}}$$

$$= \left(A^h + A^f \right) \frac{\Delta p^f}{p^{f0}} = -A^h$$

Where
$A^h \approx$ Home size
$A^f \approx$ Foreign size
$\bar{A} = A^h + A^f$

$$\boxed{\frac{\Delta p^f}{p^{f0}} = -\frac{A^h}{\bar{A}} \tau}$$

$$\frac{\Delta p^h}{p^{h0}} = -\frac{A^h}{\bar{A}} \tau + \frac{A^h + A^f}{\bar{A}} \tau = \frac{A^f}{\bar{A}} \tau$$

$$\boxed{\frac{\Delta p^h}{p^{h0}} = \frac{A^f}{\bar{A}} \tau}$$

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- Interpretation:
  - Ratio of two price changes:

  $$R \equiv \frac{\Delta p^h}{-\Delta p^f} = \frac{\Delta p^h / p^{h0}}{-\Delta p^f / p^{f0}} = \frac{A^f}{A^h}$$

  - Home country share of tariff incidence:

  $$S \equiv \frac{\Delta p^h}{\Delta p^h - \Delta p^f} = \frac{A^f}{A^h + A^f}$$

- Recall that $A^i = \varepsilon^i V^{is0} - \eta^i V^{id0}$ measures country <u>size</u> in this industry:
  - Small home country: if $A^h \to 0; R \to \infty; S \to 1$
  - Large home country: if $A^h \approx A^f; R \approx 1; S \approx 1/2$
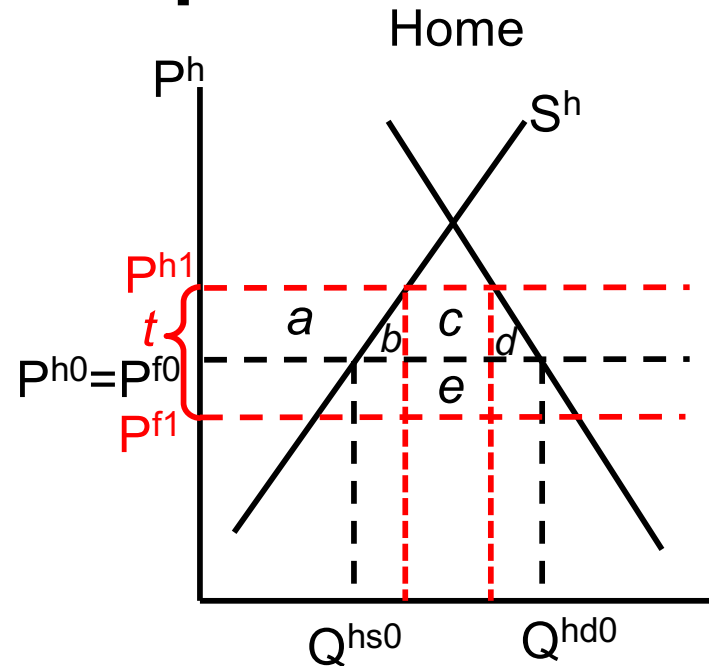
Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

Home

- Welfare of home country:

$$WHC = \langle e \rangle - \langle b \rangle - \langle d \rangle$$

$$\langle e \rangle = -\Delta p^f \left(Q^{hd0} + \Delta Q^{hd} - Q^{hs0} - \Delta Q^{hs} \right)$$
$$= -\Delta p^f \left(Q^{hd0} - Q^{hs0} \right) - \Delta p^f \left(\Delta Q^{hd} - \Delta Q^{hs} \right)$$
$$= -\frac{\Delta p^f}{p^{f0}} M^0 + \Delta p^f \left(\varepsilon^h \frac{\Delta p^h}{p^{h0}} Q^{hs0} - \eta^h \frac{\Delta p^h}{p^{h0}} Q^{hd0} \right)$$
$$= -\frac{\Delta p^f}{p^{f0}} M^0 + \frac{\Delta p^f}{p^{f0}} \left(\varepsilon^h V^{hs0} - \eta^h V^{hd0} \right) \frac{\Delta p^h}{p^{h0}}$$
$$= \frac{A^h}{\bar{A}} \tau M^0 - \frac{A^h}{\bar{A}} \tau A^h \frac{A^f}{\bar{A}} \tau$$

$$\boxed{\langle e \rangle = \frac{A^h}{\bar{A}} M^0 \tau - \frac{A^{h^2} A^f}{\bar{A}^2} \tau^2}$$
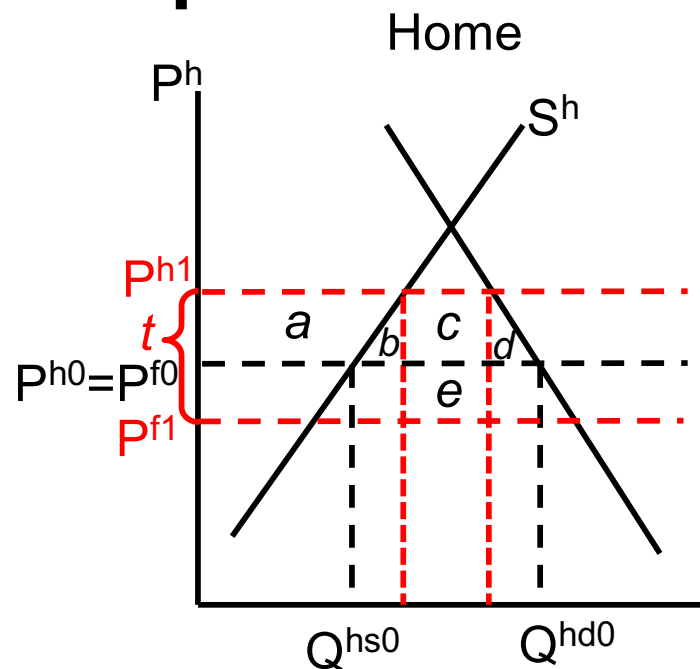

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- Welfare of home country:

$$WHC = \langle e \rangle - \langle b \rangle - \langle d \rangle$$

$$\langle b \rangle + \langle d \rangle = \Delta p^h \left(\Delta Q^{hs} - \Delta Q^{hd} \right)/2$$

$$= \frac{\Delta p^h}{2p^{h0}} \left(\varepsilon^h \frac{\Delta p^h}{p^{h0}} p^{h0} Q^{hs0} - \eta^h \frac{\Delta p^h}{p^{h0}} p^{h0} Q^{hd0} \right)$$

$$= \frac{\Delta p^h}{2p^{h0}} \left(\varepsilon^h V^{hs0} - \eta^h V^{hd0} \right) \frac{\Delta p^h}{p^{h0}}$$
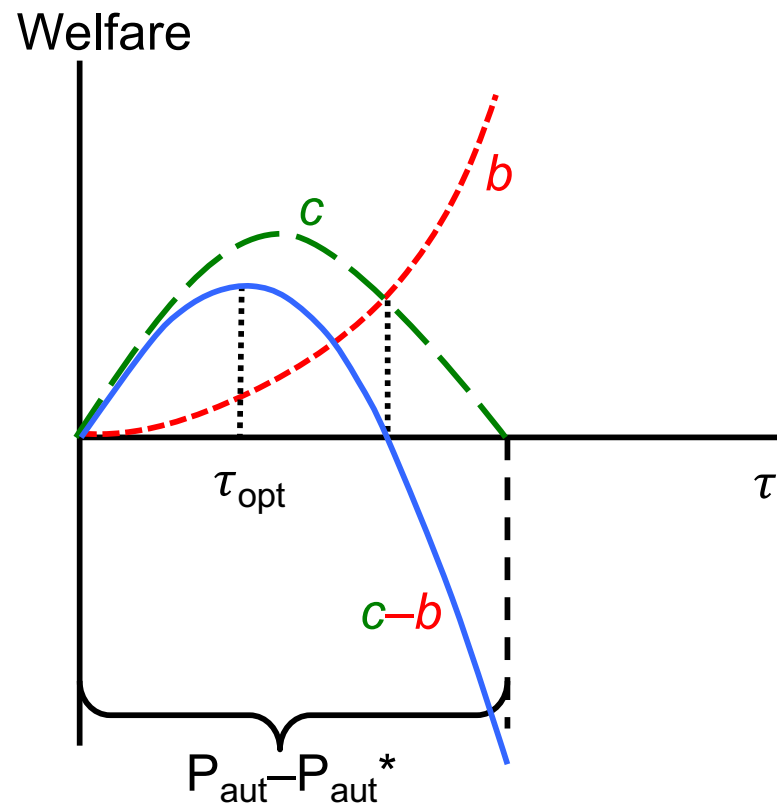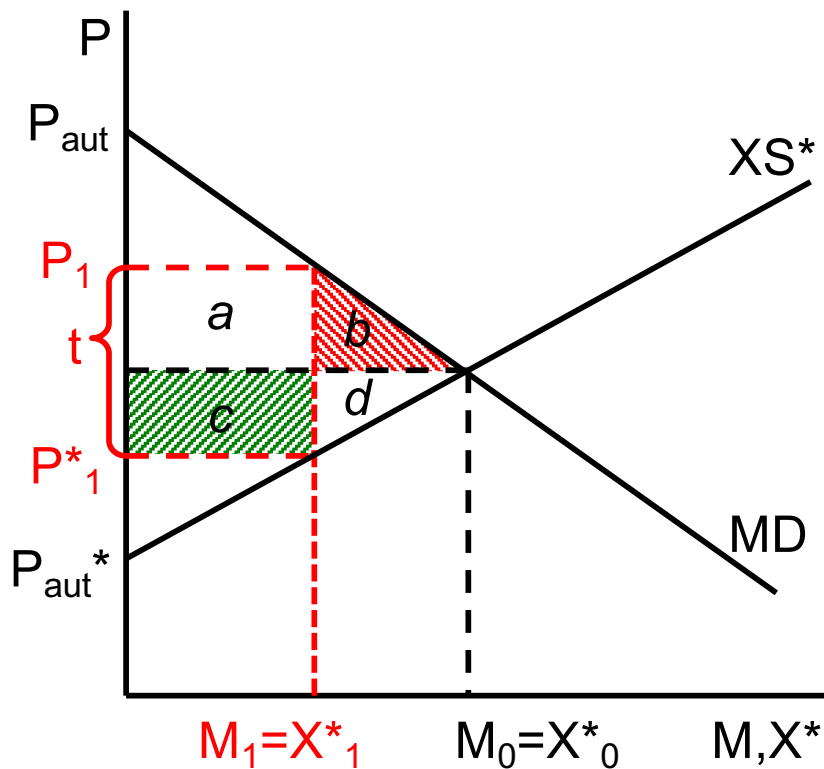
$$= \frac{1}{2} A^h \left(\frac{\Delta p^h}{p^{h0}} \right)^2 = \frac{1}{2} A^h \left(\frac{A^f}{\bar{A}} \tau \right)^2$$

$$\boxed{\langle b \rangle + \langle d \rangle = \frac{A^h A^{f^2}}{2\bar{A}^2} \tau^2}$$
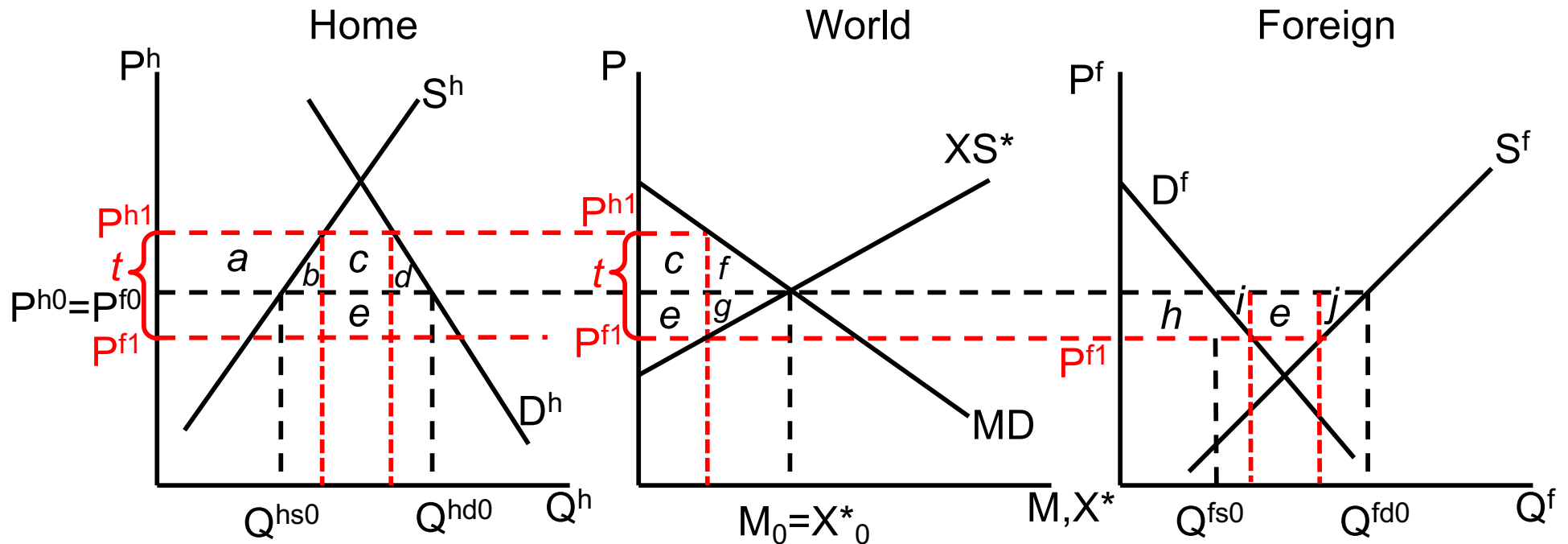
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Welfare of Home Country

$$WHC = \langle e \rangle - (\langle b \rangle + \langle d \rangle) = \left[\frac{A^h}{\bar{A}} M^0 \tau - \frac{A^{h^2} A^f}{\bar{A}^2} \tau^2 \right] - \frac{A^h A^{f^2}}{2\bar{A}^2} \tau^2$$

Classes 3, 4: Tariffs and Quotas

Two-Country in Equations

- Other effects can be calculated similarly from the areas in the figure:

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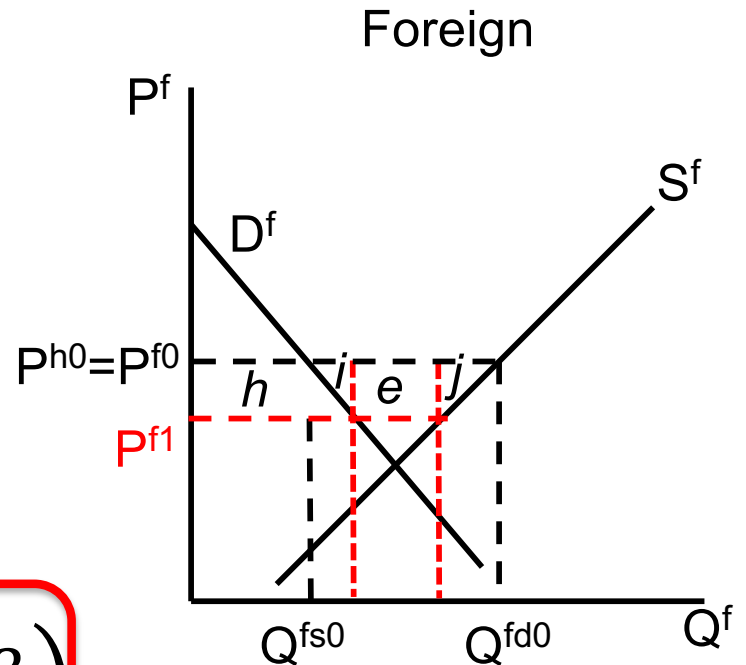
Two-Country in Equations

- Welfare of foreign country:

$$WFC = -\langle e \rangle - \langle i \rangle - \langle j \rangle$$

$$\langle e \rangle = \frac{A^h}{\bar{A}} M^0 \tau - \frac{{A^h}^2 A^f}{\bar{A}^2} \tau^2$$

$$\langle i \rangle + \langle j \rangle = \frac{1}{2}\left(\frac{A^h}{A^f}\right) A^h \left(\frac{A^f}{\bar{A}} \tau\right)^2$$

$$WFC = -\frac{A^h}{\bar{A}}\left(M^0 \tau - \frac{1}{2}\frac{A^h A^f}{\bar{A}} \tau^2\right)$$

Foreign

Note that as A^h goes to zero, so does $\frac{A^h}{\bar{A}}$ and WFC.

However, area $\langle h \rangle$ may not, so the welfare effects on foreign demanders and suppliers separately are not negligible.

Classes 3, 4: Tariffs and Quotas

Is the US a Large Country?

- Consider Trump's 25% tariff on steel

$$\frac{\Delta p^f}{p^{f0}} = -\frac{A^{US}}{\bar{A}} 25\%$$

$$A^{US} \equiv \varepsilon^{US} V^{USs0} - \eta^{US} V^{USd0}$$

$$\bar{A} = A^{US} + A^f$$

- So

  – Foreign price of steel should fall by 25% times the US share of the world market

  – US price of steel should rise by 25% of the foreign share of the world market

Classes 3, 4: Tariffs and Quotas

Is the US a Large Country?

- What matters is, approximately, the US share of the world market for steel.

- In 2018 (from Wikipedia)
  - US/World production ≈ 5%
  - US/World demand ≈ 7%

- So US share is, at most, 7%
  - World price change 7% of 25%: negative < 2%
  - US price change 93% of 25%: positive > 23%

- Several studies of the 2018 tariffs showed
  - No perceptible fall in world prices
 - US prices rose by amount of tariffs

Pause for Your Questions

Classes 3, 4: Tariffs and Quotas

Quotas

- Quota puts upper limit on <u>quantity</u> of imports
- Analysis is exactly the same as a tariff, except
  - Policy sets quantity of imports
  - Price difference is determined by the market (supply & demand)
  - Price difference is called "tariff equivalent" of the quota
- Welfare analysis of quota is the same as tariff, except
  - "Quota rent" instead of tariff revenue
- Who gets the quota rent?
  - Depends on how quota is administered
  - Most commonly, goes to foreigners

Classes 3, 4: Tariffs and Quotas

# Small country quota (with rents to foreigners)
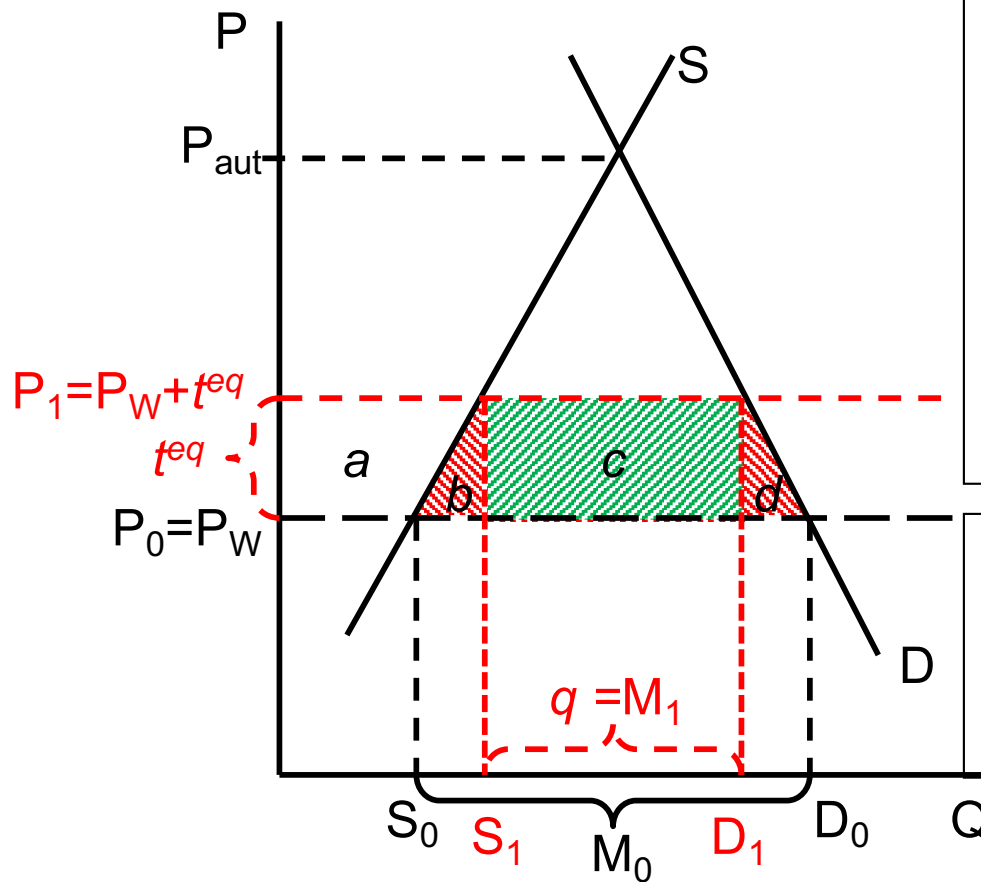
- Welfare effects of a quota, q, starting from free trade
  - Suppliers gain $+a$
  - Demanders Lose $-(a+b+c+d)$
  - Government gains nothing

  - Country loses $-(b+c+d)$

- Foreign gains quota rent $+c$
  - But this is negligible for world, since country is small

- World dead-weight loss is still $b+d$

Quota q

Large country quota
(with rents to foreigners)

World Market
Home is Importer
Foreign (*) is Exporter
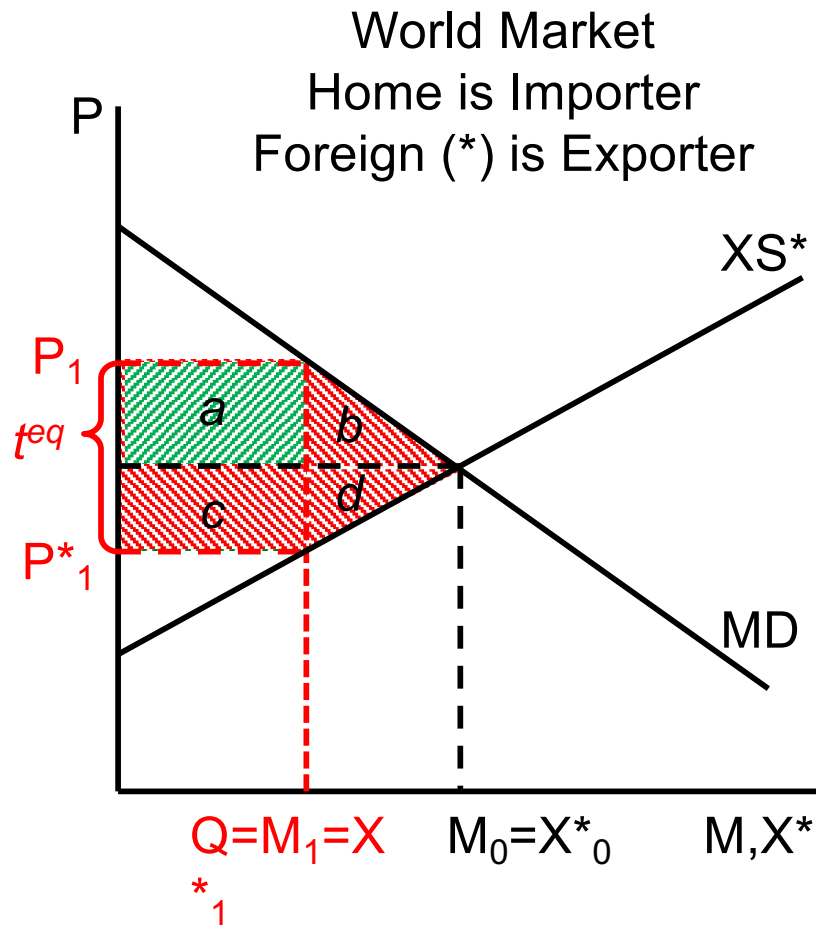
Welfare effects of a large-country quota, starting from free trade

- Home:

Private sector (S&D) loses	$-(a+b)$
Government gains	0
Country must lose:	$-(a+b)$

- Foreign:

Private sector (S&D) loses	$-(c+d)$
Foreigners gain rents	$+(a+c)$
Country may gain or lose	$+a-d$

- World loses $-(b+d)$

"Dead Weight Loss"

Classes 3, 4: Tariffs and Quotas

Pause for Discussion

Classes 3, 4: Tariffs and Quotas

Questions on Quotas

- How might quotas be administered; what happens to the quota rents in each case?

- How is an import quota equivalent to a tariff? How is it not?

- With a fixed and binding import quota, how will the domestic price and the tariff-equivalent of the quota change if curves shift?

Recent Tariff Threats

- I'm not finding much on this, unlike last year.
  - UK threatens new tariffs on US
    - Reuters, 5/24/21: "UK proposes new tariffs on U.S. wines and lobsters" (Due to US tariffs on steel & Aluminum)
  - US continues to threaten tariffs against digital taxes.
    - FT, 6/2/21: "US wields $2bn tariff threat against 6 nations over digital taxes"
  - Trump threatened Vietnam with tariff due to its weak currency.
    - Reuters, 7/24/21: "U.S. trade agency drops tariff threat against Vietnam over currency practices"