

# PubPol/Econ 541

Classes 3, 4

## **Tariffs and Quotas**

by

Alan V. Deardorff

University of Michigan

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# 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

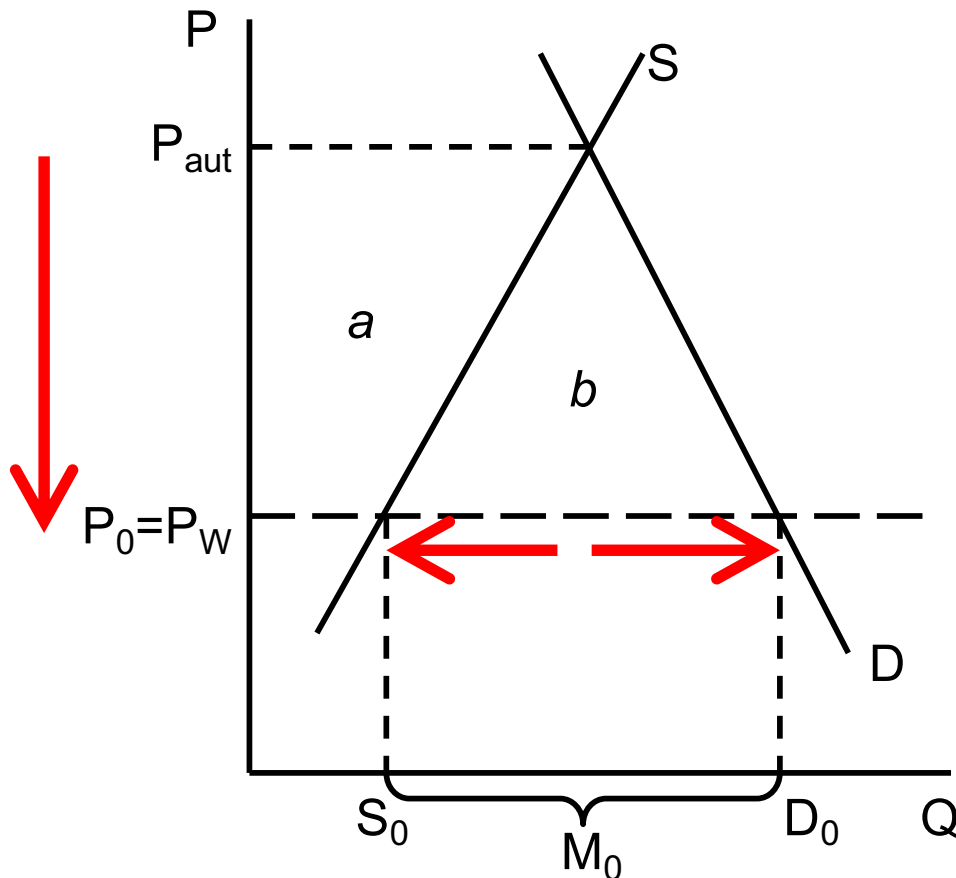
# Small country

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

# 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

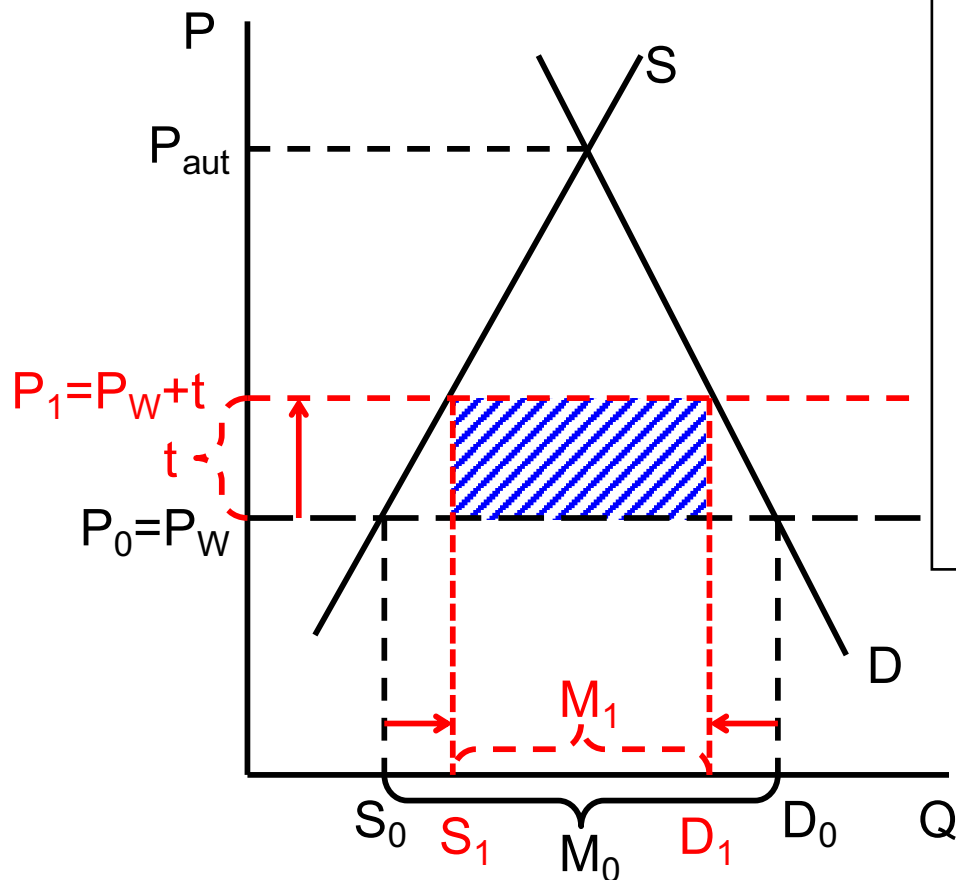
# Small country, Import Industry



- 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  $+b$

Free trade

# Small country tariff

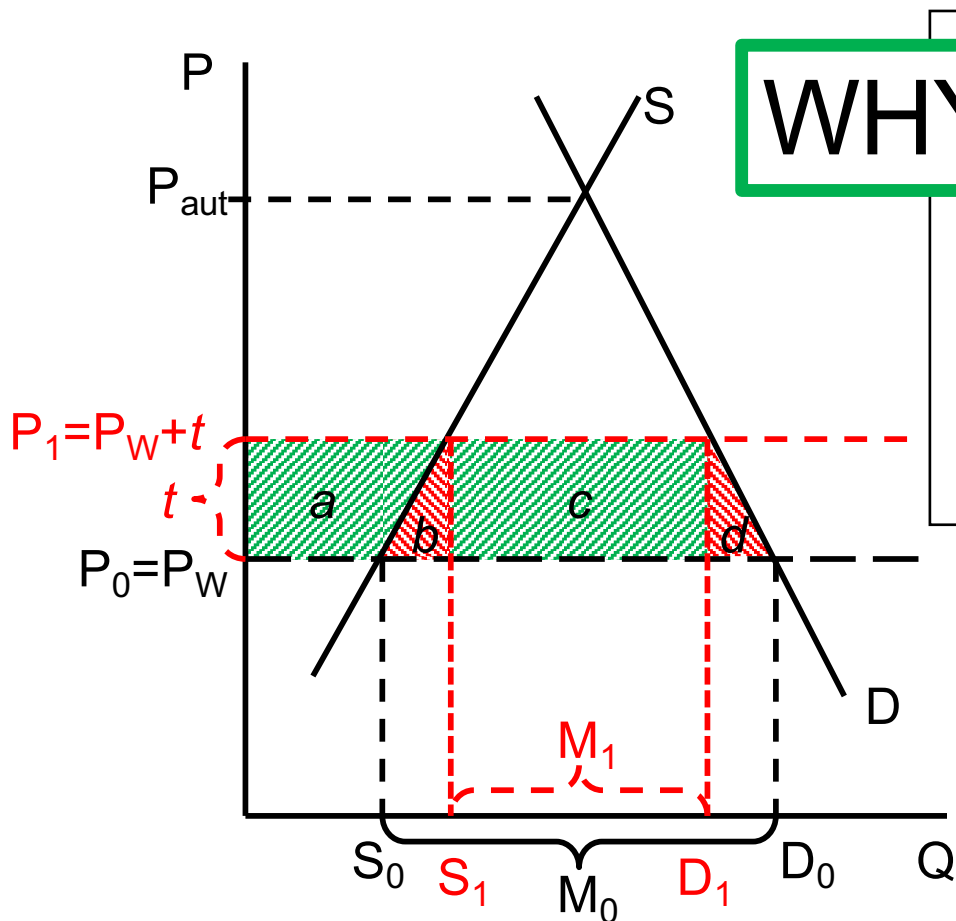


- Effects of a tariff, starting from free trade
  - Price rises
  - Quantity supplied rises
  - Quantity demanded falls
  - Quantity of imports falls
  - Tariff revenue rises from zero

Specific Tariff  $t$



# Small country tariff



WHY?

Welfare effects of a tariff, starting from free trade

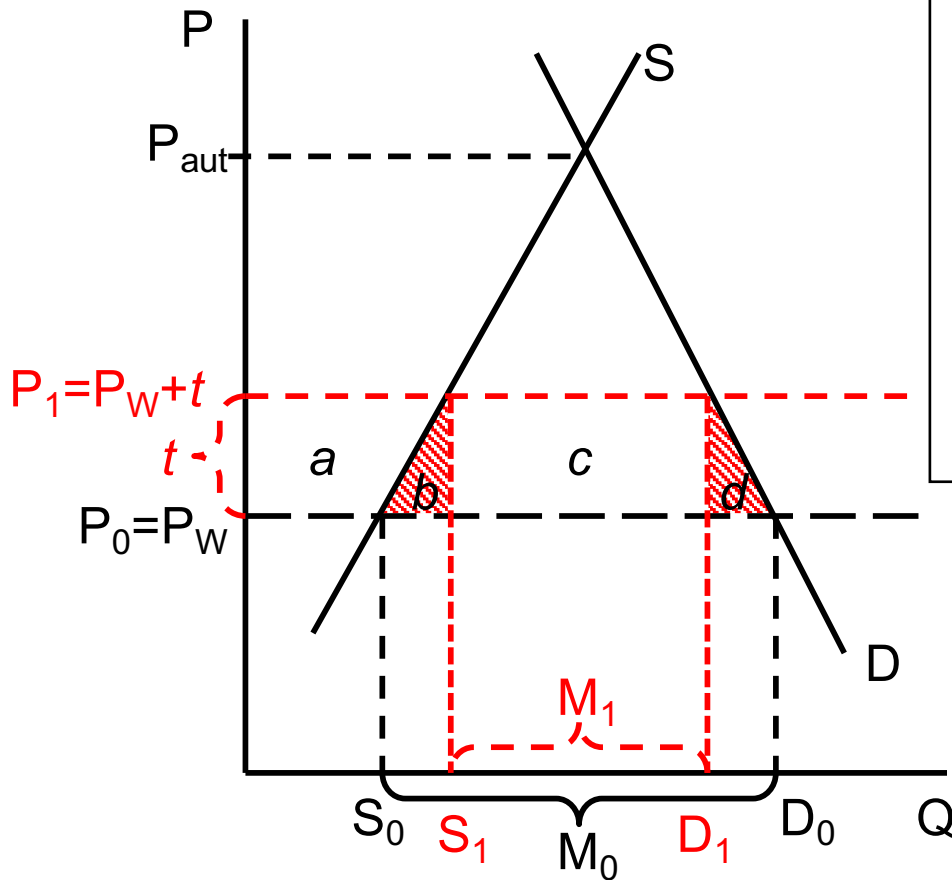
WHY?

- Suppliers gain
- Demanders Lose  $-(a+b+c+d)$
- Government gains  $+c$
- Country loses  $-(b+d)$

*“Dead Weight Loss”*

Specific Tariff  $t$

# 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  $t$

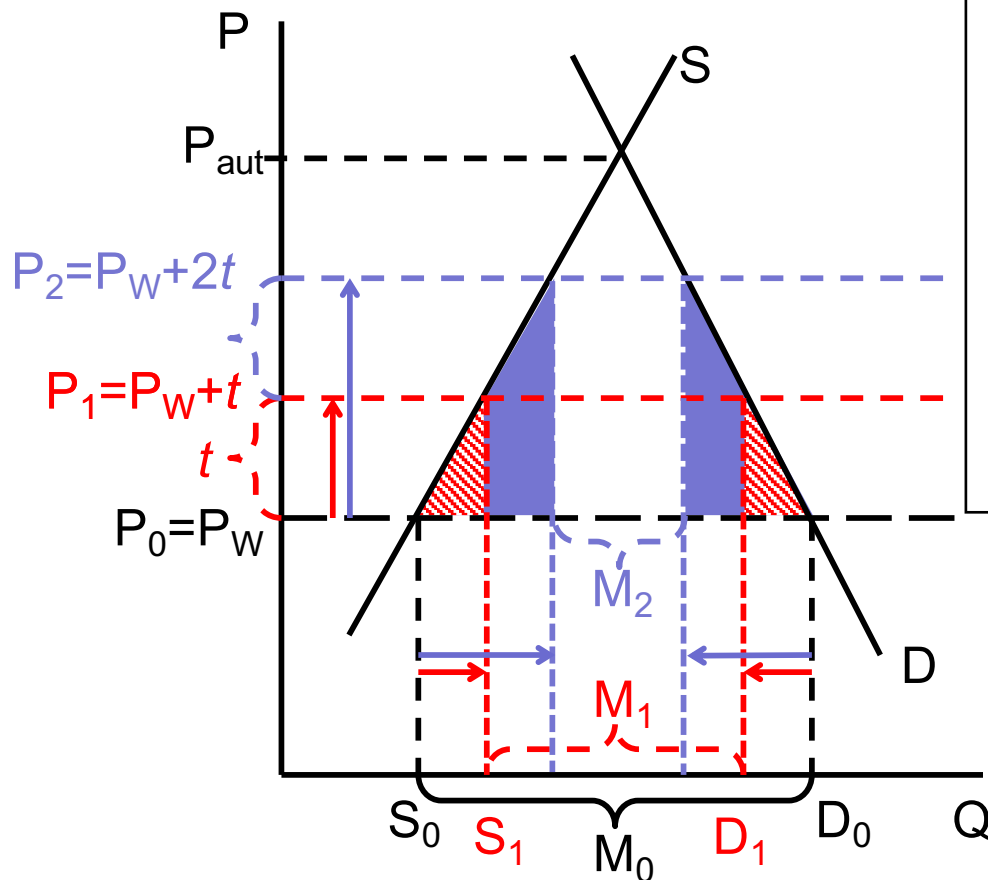
# Pause for Discussion

Classes 3, 4: Tariffs and Quotas

# 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?

# Small country, larger tariff

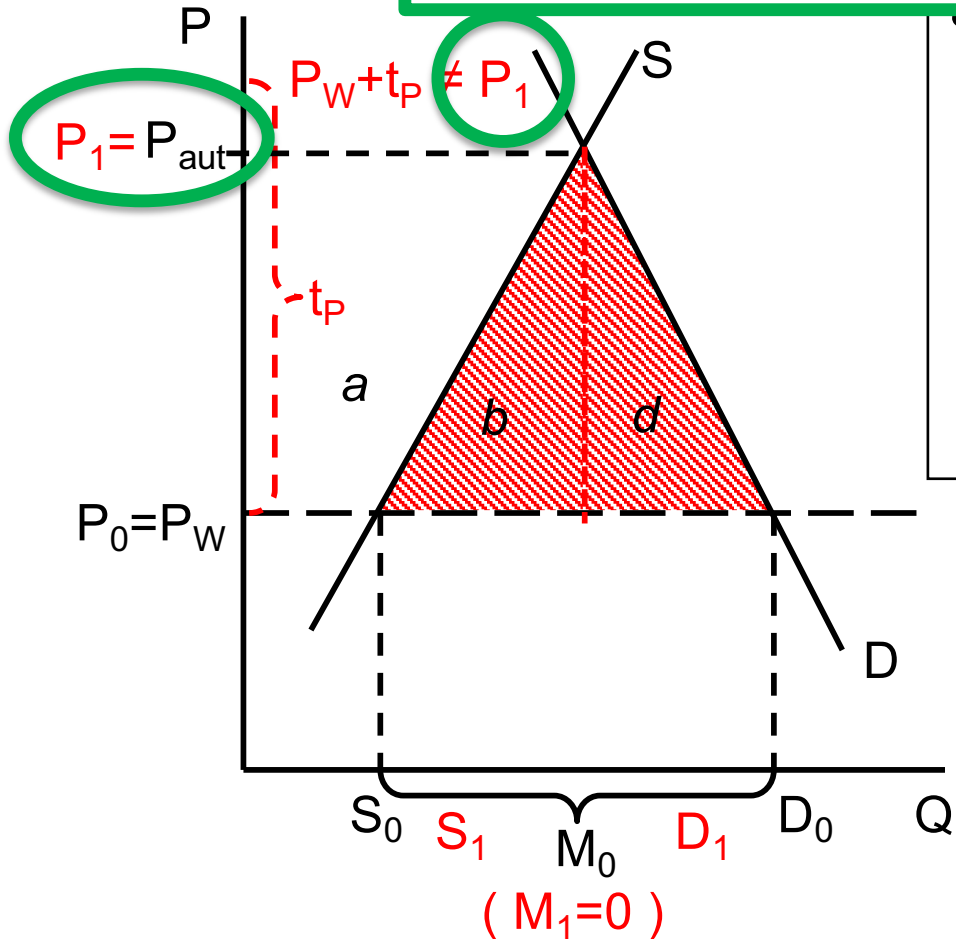


- Effects of doubling the tariff
  - Price rises by twice as much
  - Imports fall by twice as much
  - Deadweight loss is **4-times** as large!
    - (Efficiency loss rises with the square of the tariff)

Specific Tariffs,  $t$ , then  $2t$

# Small country, prohibitive tariff

**NOTE:** You'll have to calculate this from supply and demand

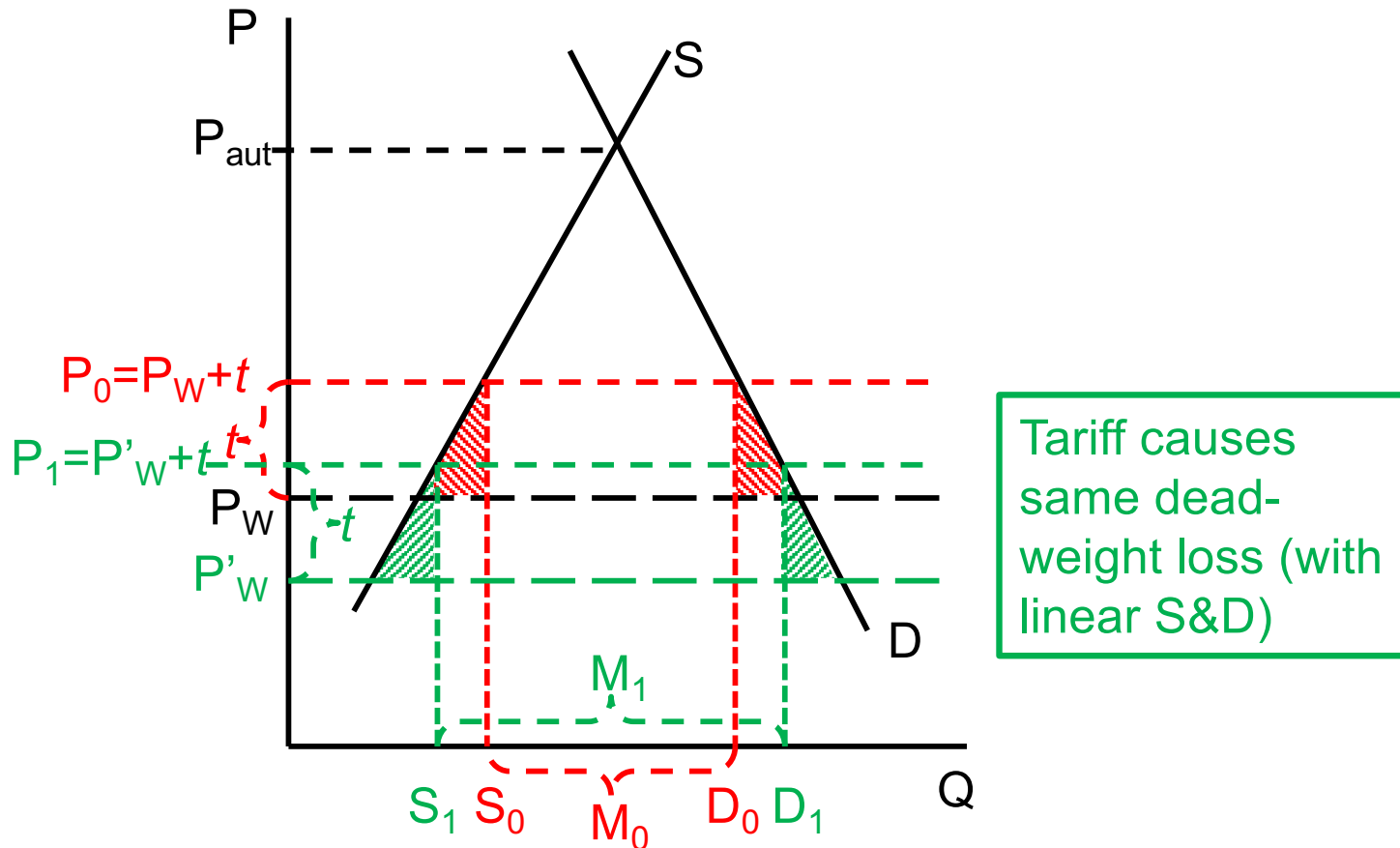


- Welfare effects of a prohibitive tariff, starting from free trade
  - Suppliers gain  $+a$
  - Demanders Lose  $-(a+b+d)$
  - Government gains  $0$
  - Country loses  $-(b+d)$

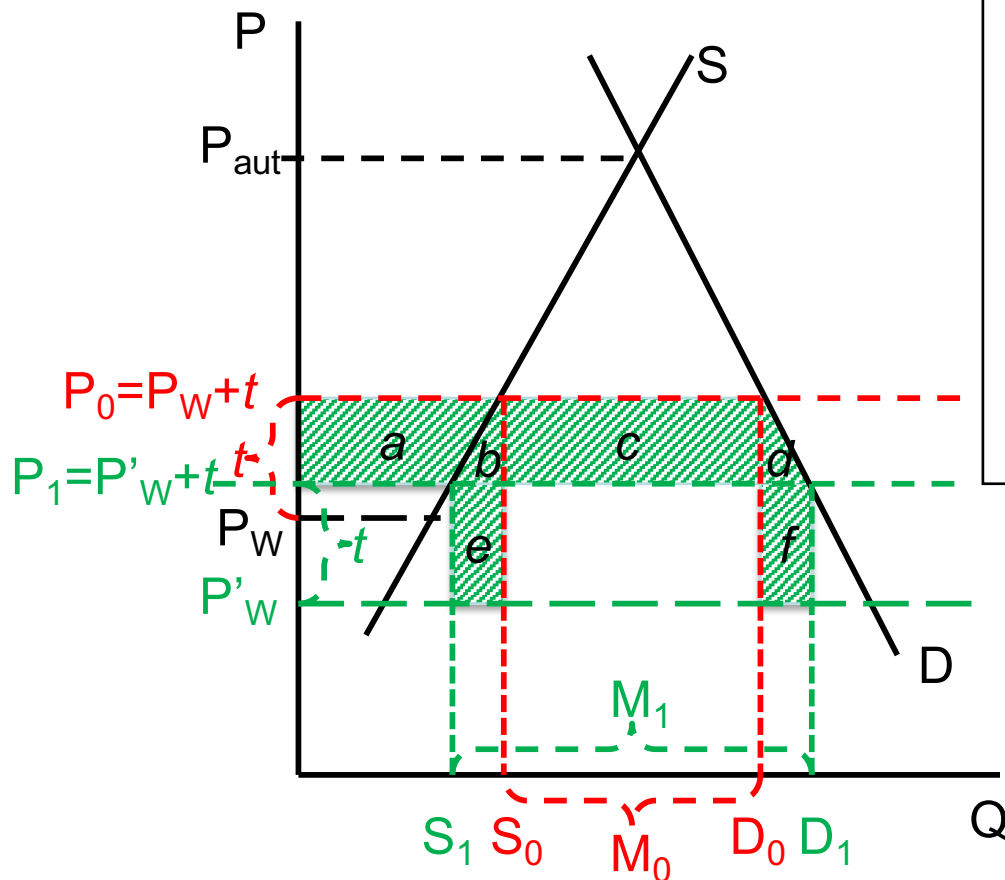
*“Dead Weight Loss”*

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

# Comparative Statics with Tariff Fall in World Price



# 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  $+(b+c+d+e+f)$



# 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:  $Q^d = D(p^h)$
- Supply:  $Q^s = S(p^h)$
- Imports:  $Q^m = Q^d - Q^s$

# Small Country in Equations

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

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

- With tariff,  $t > 0$ :

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

# 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

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

# Small Country in Equations

- Elasticity of (home) demand ( $\eta$ ):

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

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

- Elasticity of (home) supply ( $\varepsilon$ ):

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

# Small Country in Equations

- Notes regarding elasticities:
  - *They are 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.*



# Small Country in Equations

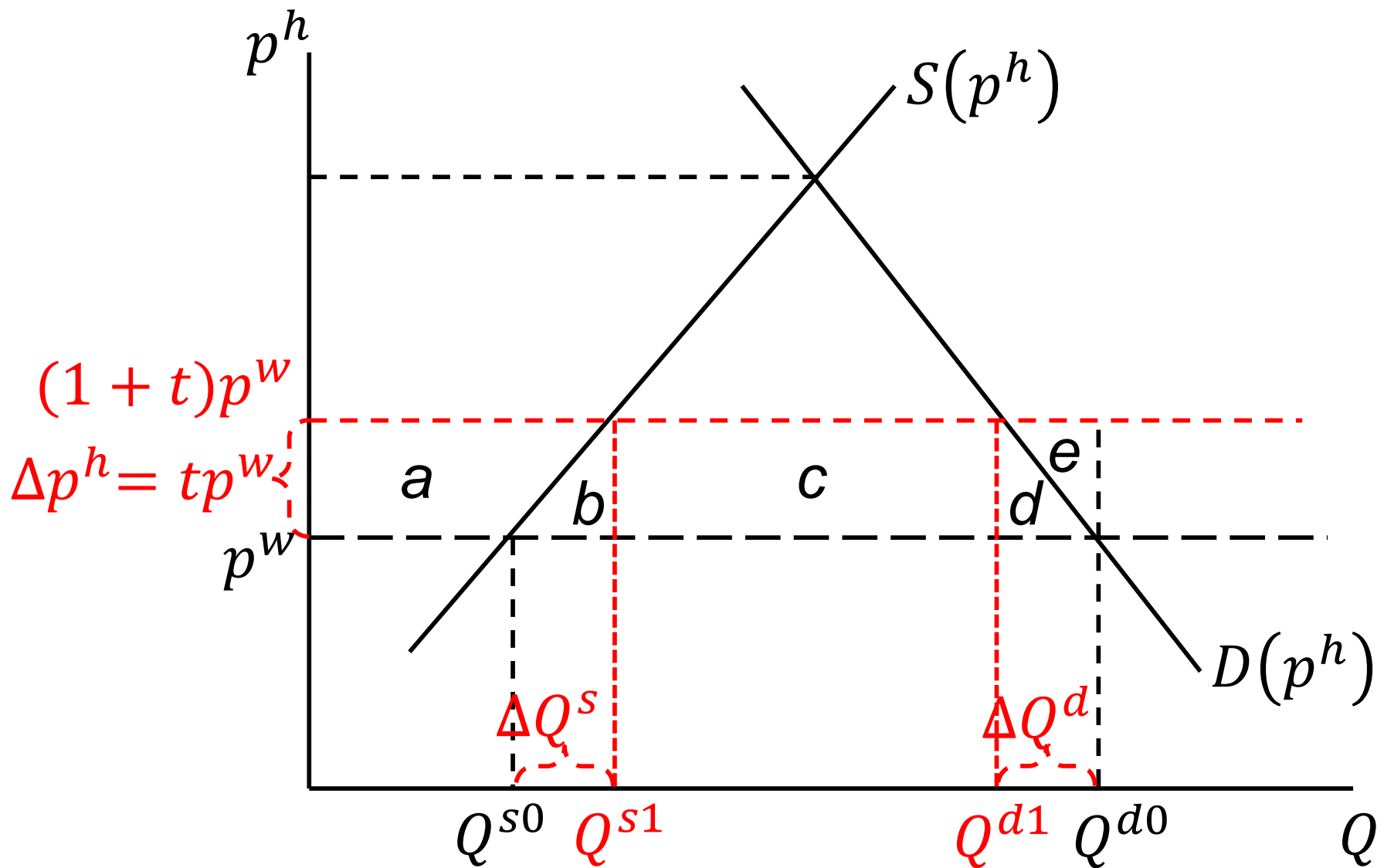
- Data are usually values, not quantities.
- Values of initial quantities:
- Demand:  $V^{d0} = p^{h0} Q^{d0} = p^w Q^{d0}$
- Supply:  $V^{s0} = p^{h0} Q^{s0} = p^w Q^{s0}$
- Imports:  $V^{m0} = p^{w0} (Q^{d0} - Q^{s0})$

# Small Country in Equations

- Effects of tariff on quantities:

Demand:  $\Delta Q^d = \eta t Q^{d0}$

Supply:  $\Delta Q^s = \varepsilon t Q^{s0}$

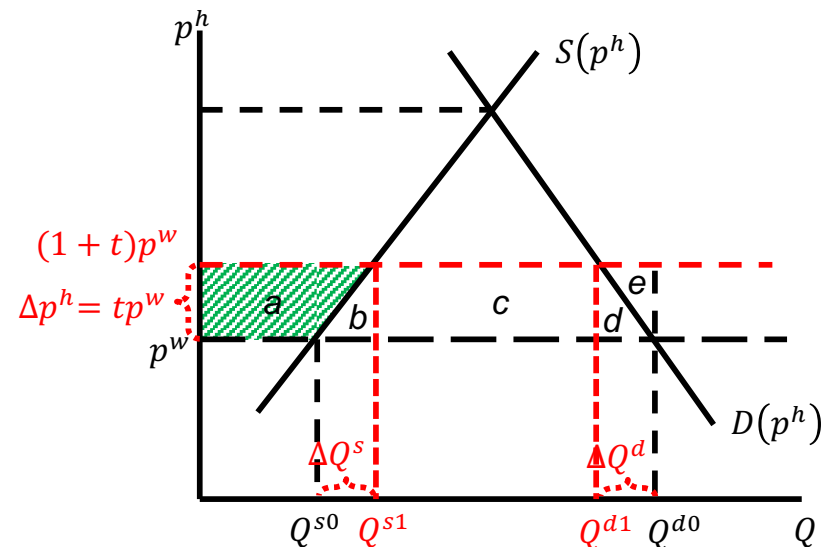


I'll use  $\langle a \rangle$ ,  $\langle abcd \rangle$ , etc. to represent these areas.

# Small Country in Equations

- Welfare gain of suppliers (producers & upstream):

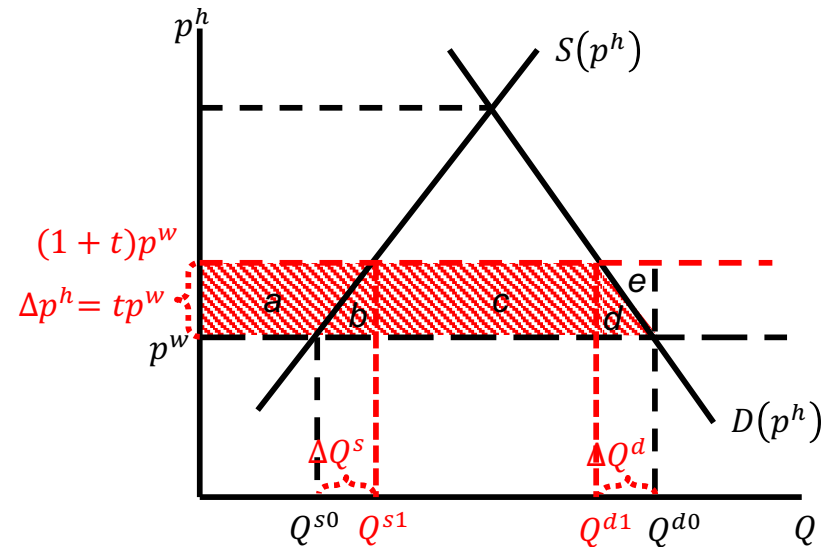
$$\begin{aligned}
 WGS &= \langle a \rangle \\
 &= (Q^{s0})(\Delta p^h) + \frac{1}{2} (\Delta Q^s)(\Delta p^h) \\
 &= Q^{s0} \Delta p^h + \frac{1}{2} \frac{\Delta Q^s}{Q^{s0}} Q^{s0} \Delta p^h \\
 &= \left(1 + \frac{1}{2} \varepsilon \frac{\Delta p^h}{p^{h0}}\right) p^{h0} Q^{s0} \frac{\Delta p^h}{p^{h0}} \\
 &= \left(1 + \frac{1}{2} \varepsilon \frac{\Delta p^h}{p^{h0}}\right) V^{s0} \frac{\Delta p^h}{p^{h0}} \\
 &= \boxed{\left(1 + \frac{1}{2} \varepsilon t\right) t V^{s0}}
 \end{aligned}$$



# Small Country in Equations

- Welfare loss of demanders (consumers and downstream):

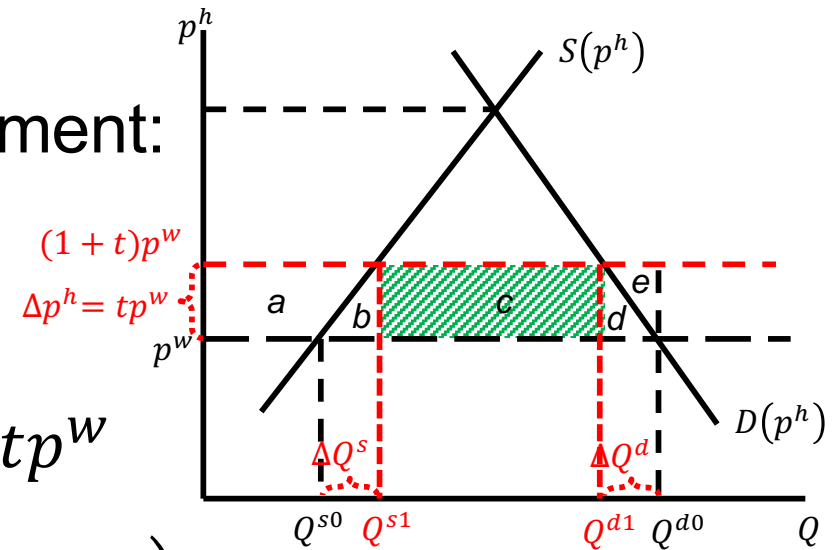
$$\begin{aligned}
 WLD &= \langle abcd \rangle = \langle abcde \rangle - \langle e \rangle \\
 &= (Q^{d0})(\Delta p^h) - \frac{1}{2} (|\Delta Q^d|)(\Delta p^h) \\
 &= \left(1 - \frac{1}{2} \frac{|\Delta Q^d|}{Q^{d0}}\right) Q^{d0} \Delta p^h \\
 &= \left(1 + \frac{1}{2} \frac{\Delta Q^d}{Q^{d0}}\right) p^{h0} Q^{d0} \frac{\Delta p^h}{p^{h0}} \\
 &= \left(1 + \frac{1}{2} \eta \frac{\Delta p^h}{p^{h0}}\right) V^{d0} \frac{\Delta p^h}{p^{h0}} \\
 &= \boxed{\left(1 + \frac{1}{2} \eta t\right) t V^{d0}}
 \end{aligned}$$



# Small Country in Equations

- Revenue gain of (home) government:

$$\begin{aligned}
 R &= \langle c \rangle \\
 &= (Q^{d1} - Q^{s1}) \Delta p^h \\
 &= (Q^{d0} + \Delta Q^d - Q^{s0} - \Delta Q^s) t p^w \\
 &= \left( Q^{d0} \left( 1 + \frac{\Delta Q^d}{Q^{d0}} \right) - Q^{s0} \left( 1 + \frac{\Delta Q^s}{Q^{s0}} \right) \right) t p^w \\
 &= \left( Q^{d0} \left( 1 + \eta \frac{\Delta p^h}{p^{h0}} \right) - Q^{s0} \left( 1 + \varepsilon \frac{\Delta p^h}{p^{h0}} \right) \right) t p^w \\
 &= \boxed{\left( V^{d0} (1 + \eta t) - V^{s0} (1 + \varepsilon t) \right) t}
 \end{aligned}$$



# Small Country in Equations

- Welfare change for country:

$$WCC = -\langle abcd \rangle + \langle a \rangle + \langle c \rangle$$

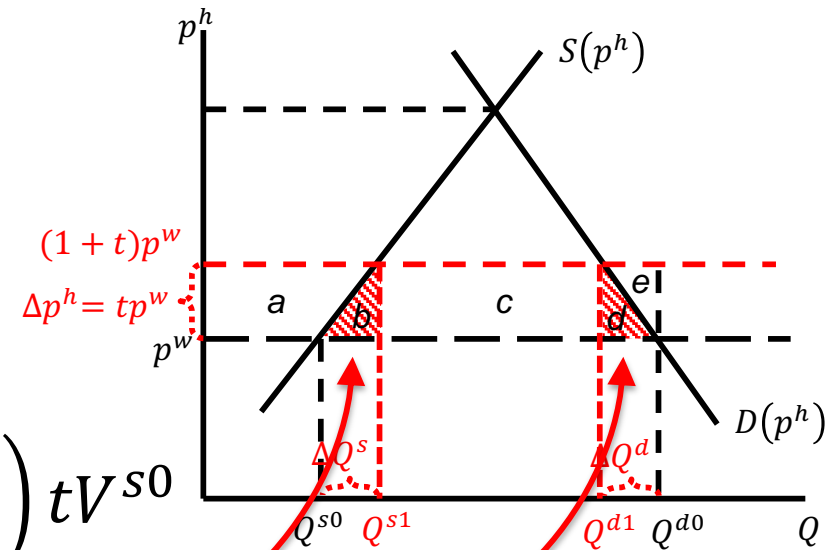
$$= WLD - WGS - R$$

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

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

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

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



# Small Country in Equations

- Summary:
- $WGS = \left(1 + \frac{1}{2}\varepsilon t\right) tV^{s0}$
- $WLD = \left(1 + \frac{1}{2}\eta t\right) tV^{d0}$
- $R = \left(V^{d0}(1 + \eta t) - V^{s0}(1 + \varepsilon t)\right) t$
- $WCC = - \left[ \frac{1}{2}\varepsilon t^2 V^{s0} - \frac{1}{2}\eta t^2 V^{d0} \right]$



# Pause for Discussion

Classes 3, 4: Tariffs and Quotas

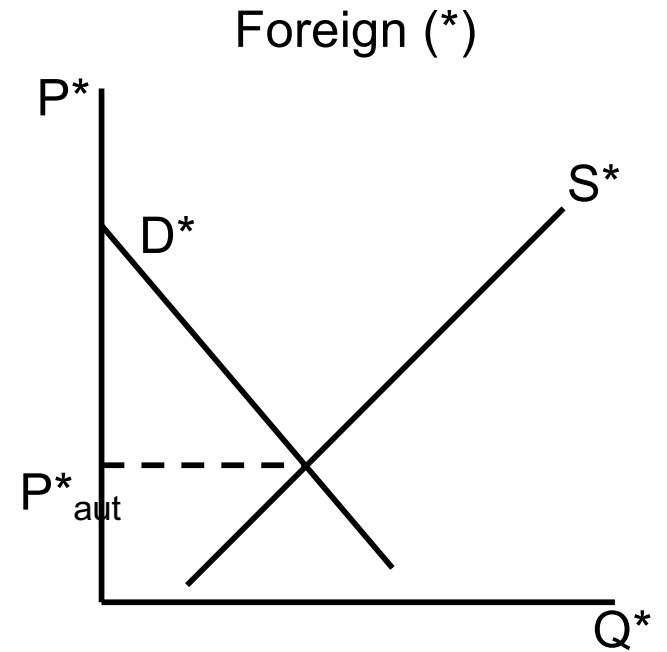
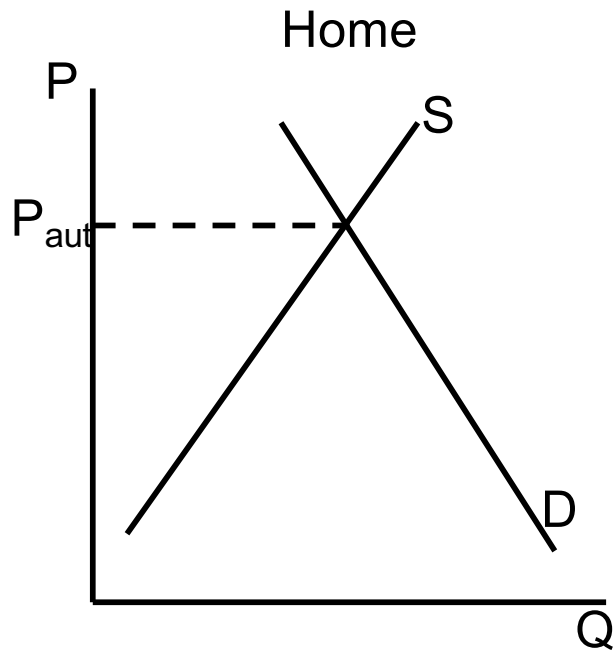
# Questions on Equations

- 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?

# Outline

- Small country
- Large country

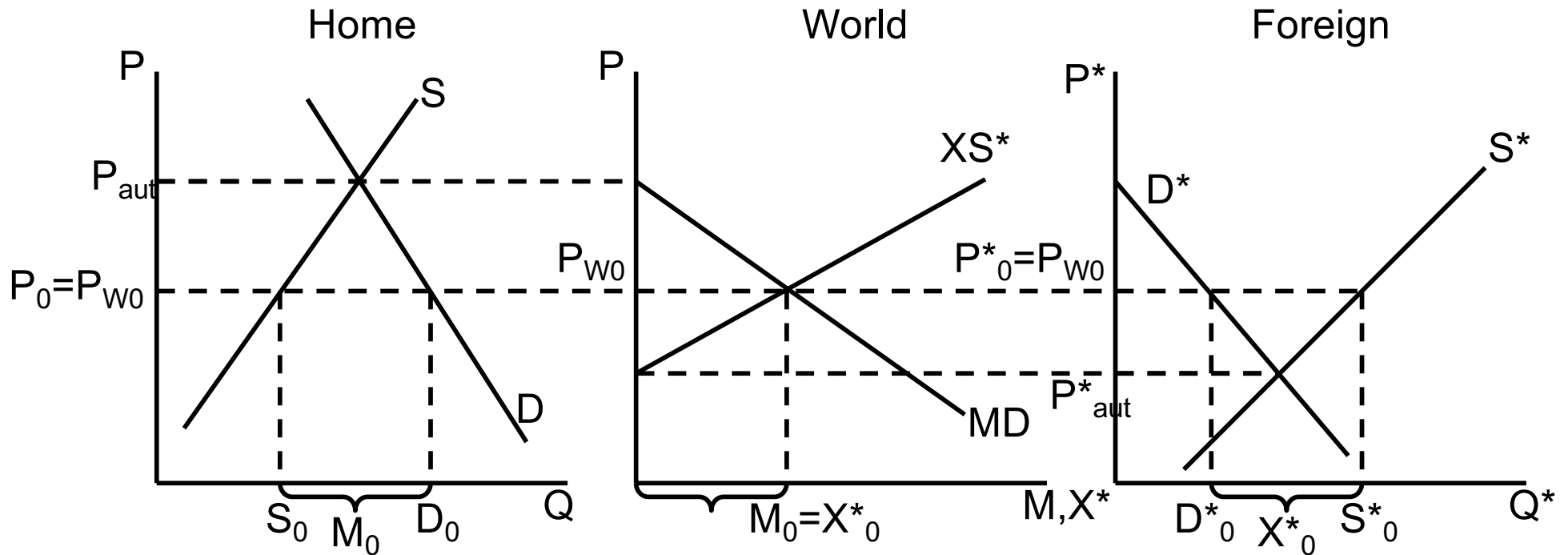
# Large country (i.e., Two Countries)



## Autarky

Classes 3, 4: Tariffs and Quotas

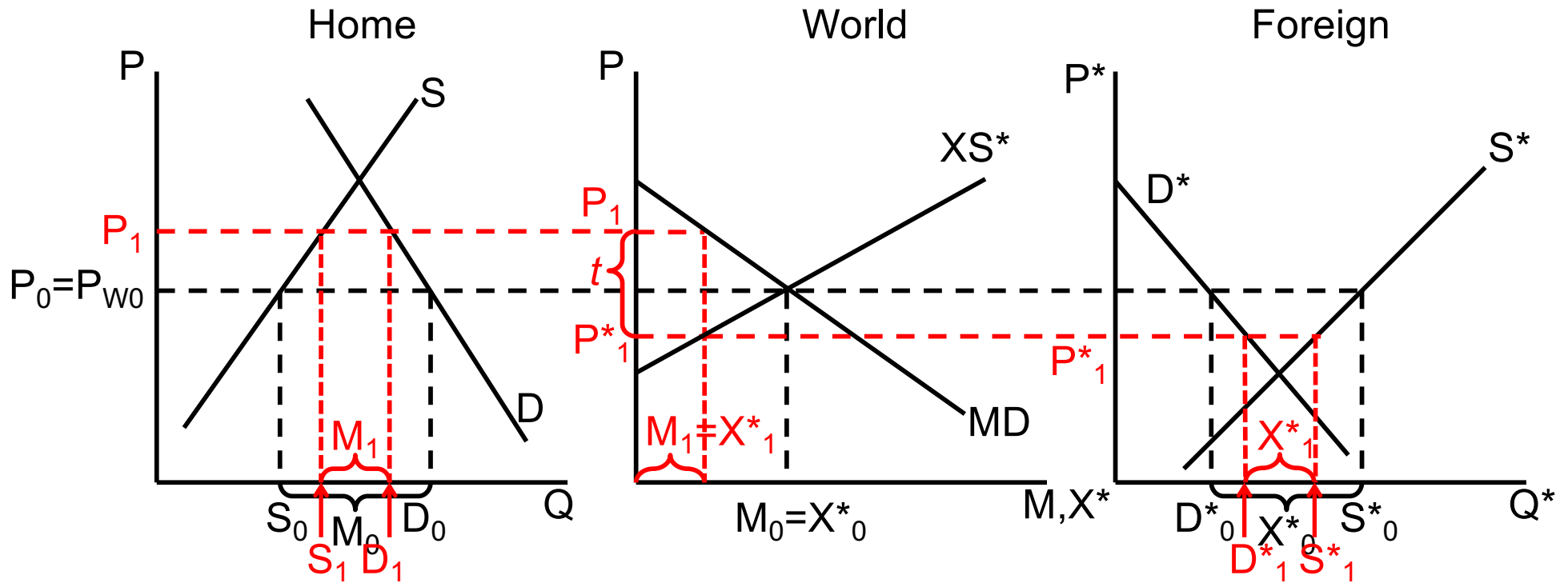
# Large country (i.e., Two Countries)



Free trade

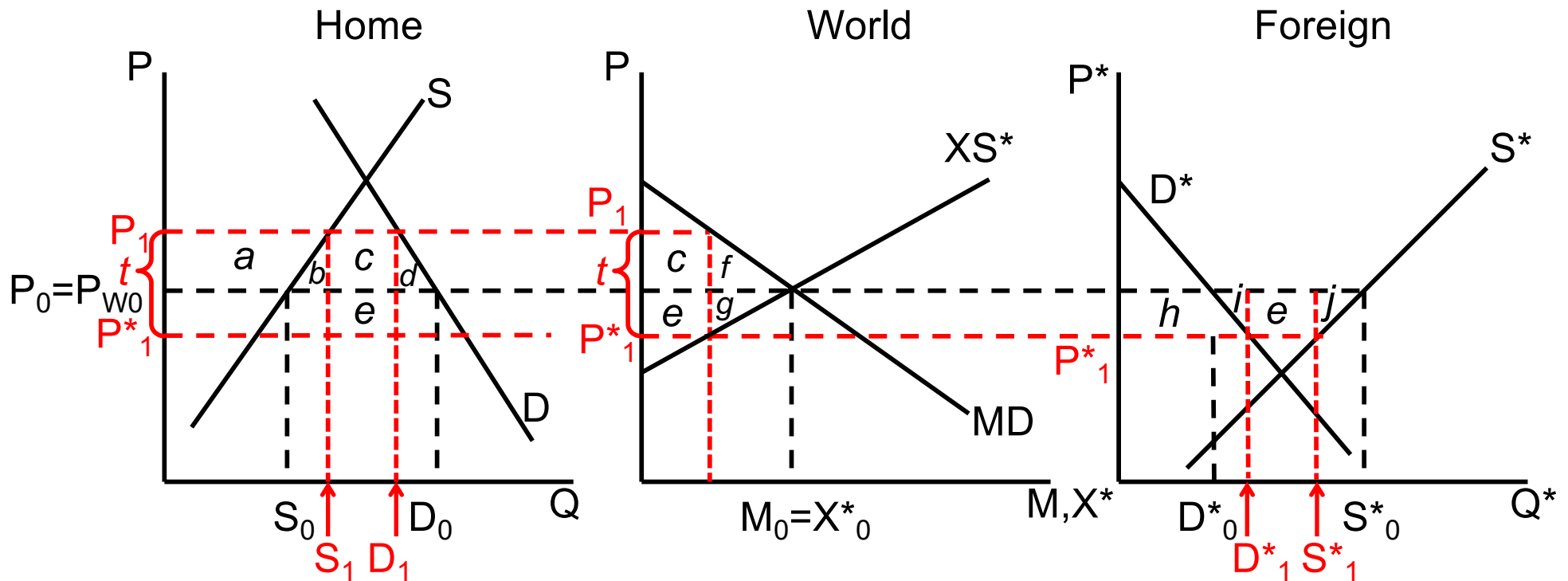
Classes 3, 4: Tariffs and Quotas

# Large country (i.e., Two Countries)



Specific Tariff,  $t$ , by Home  
Requires:  $P = P^* + t$ ,  $MD = XS^*$

# Large country (i.e., Two Countries)



## Welfare effects of Tariff, $t$ :

- Home

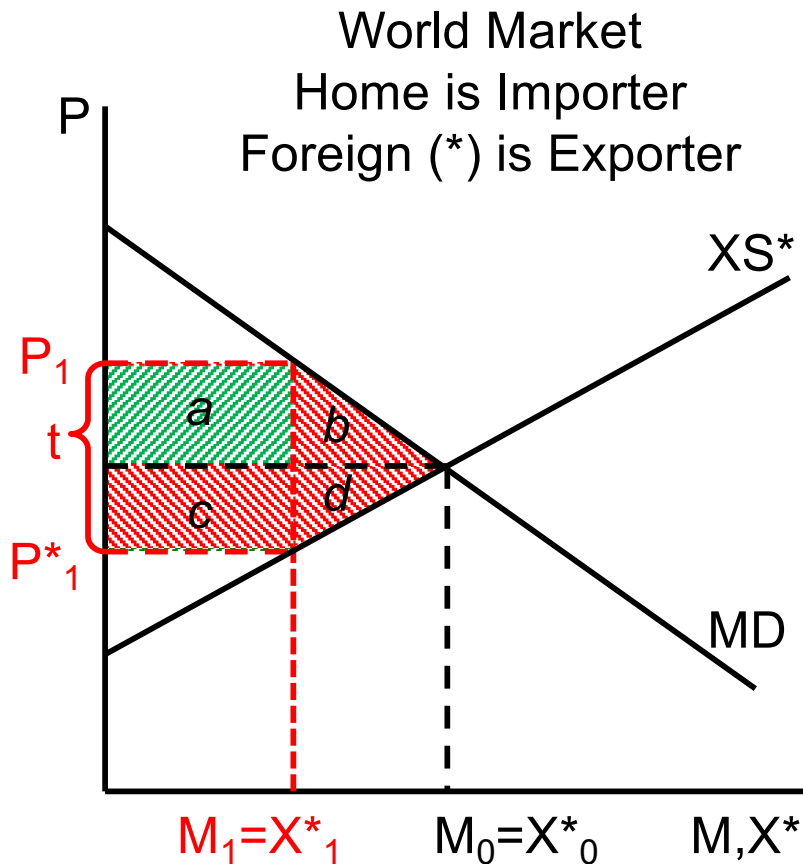
- Suppliers  $+a$
- Demanders  $-(a+b+c+d)$
- Government  $+(c+e)$
- Country  $+e - (b+d) = e - f$

- 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



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

- Home:
 

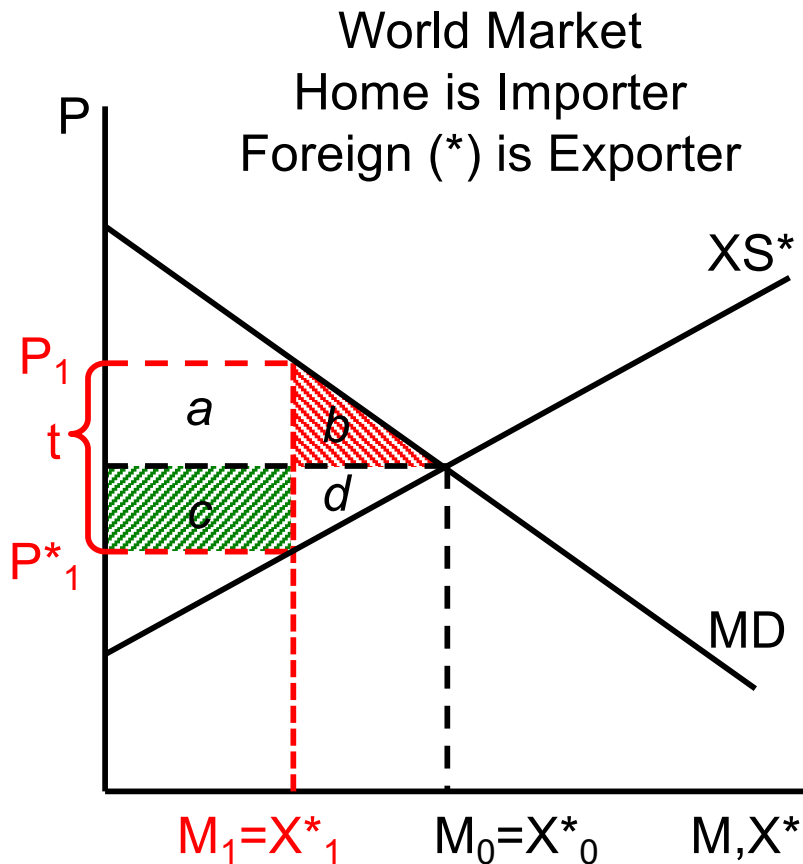
Private sector (S&D) loses	$-(a+b)$
Government gains	$+(a+c)$
<hr/>	
Country may gain or lose:	$+c-b$
- Foreign
 

Private sector (S&D) loses	$-(c+d)$
<hr/>	
World loses	$-(b+d)$

*“Dead Weight Loss” =*



# Large country, World Market



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"

# Pause for Discussion

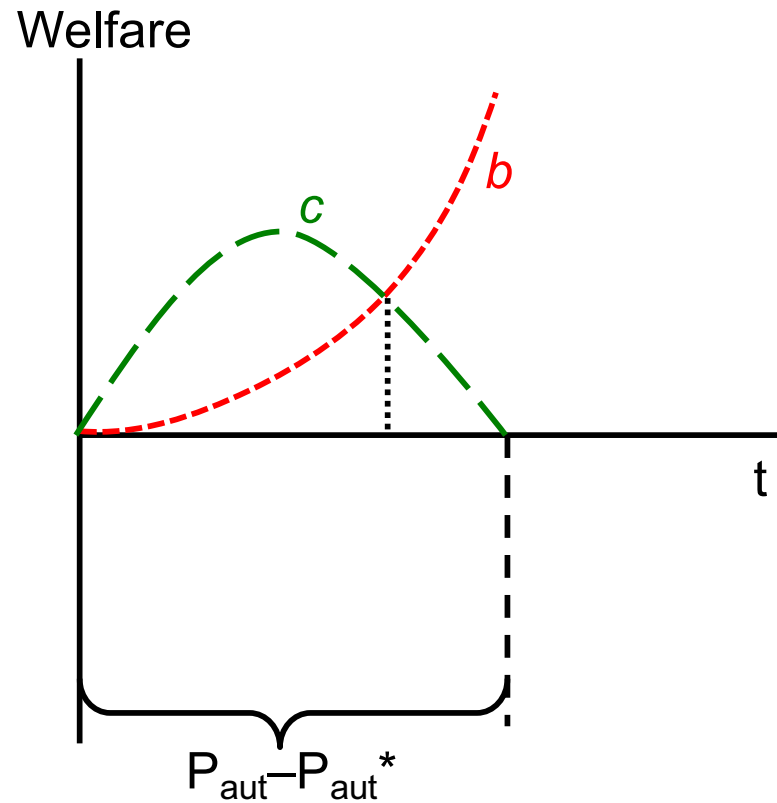
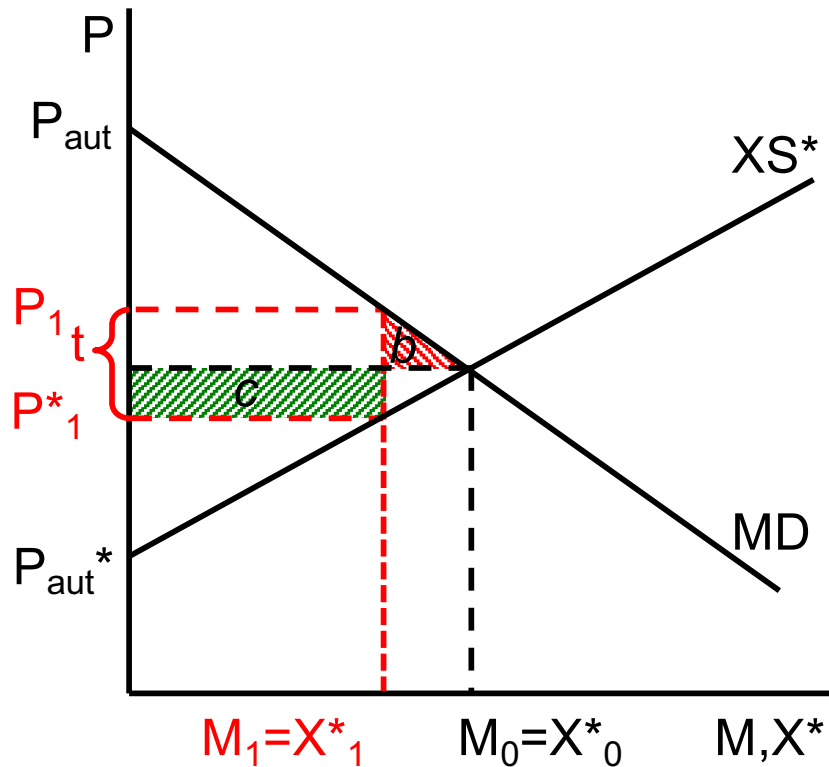
Classes 3, 4: Tariffs and Quotas

# 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 not to levy a tariff?

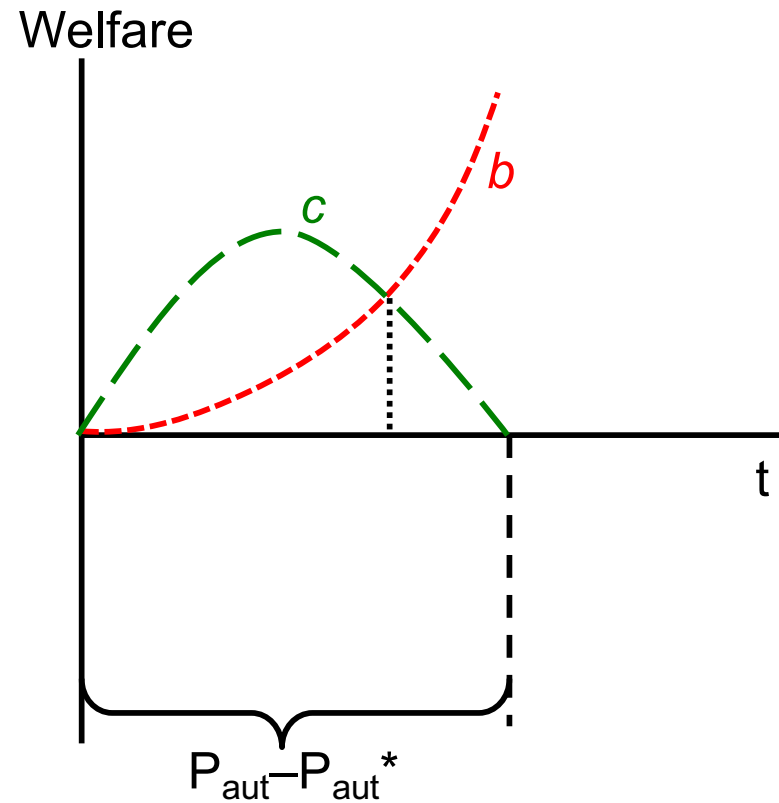
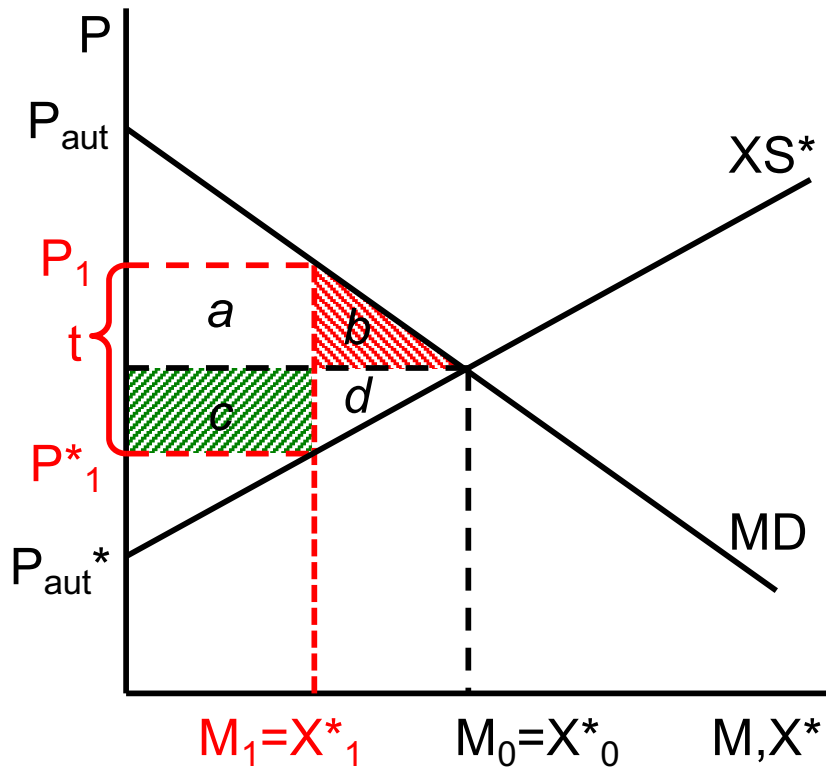
# Large country, "Optimal" tariff

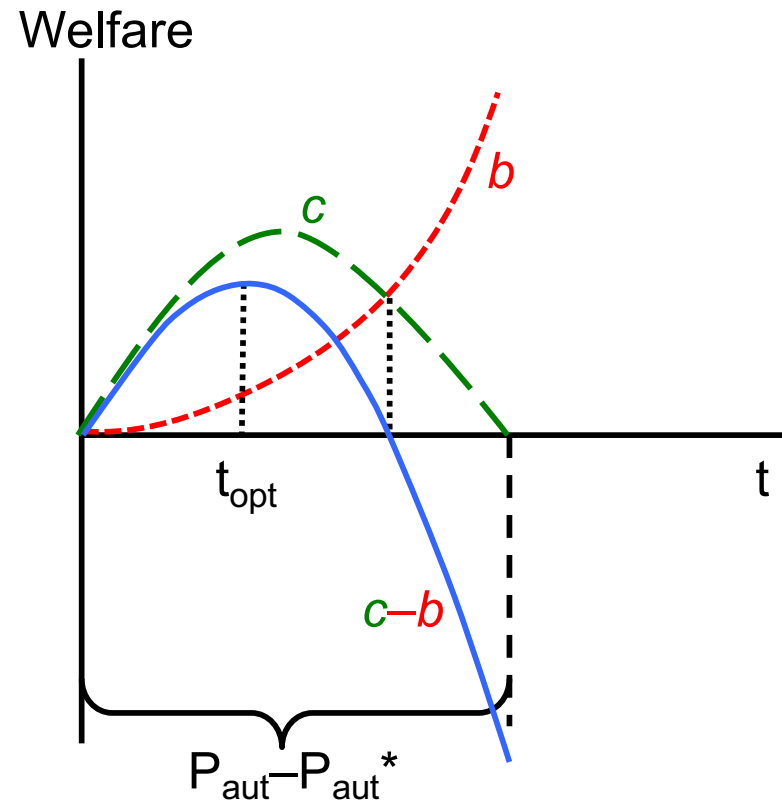
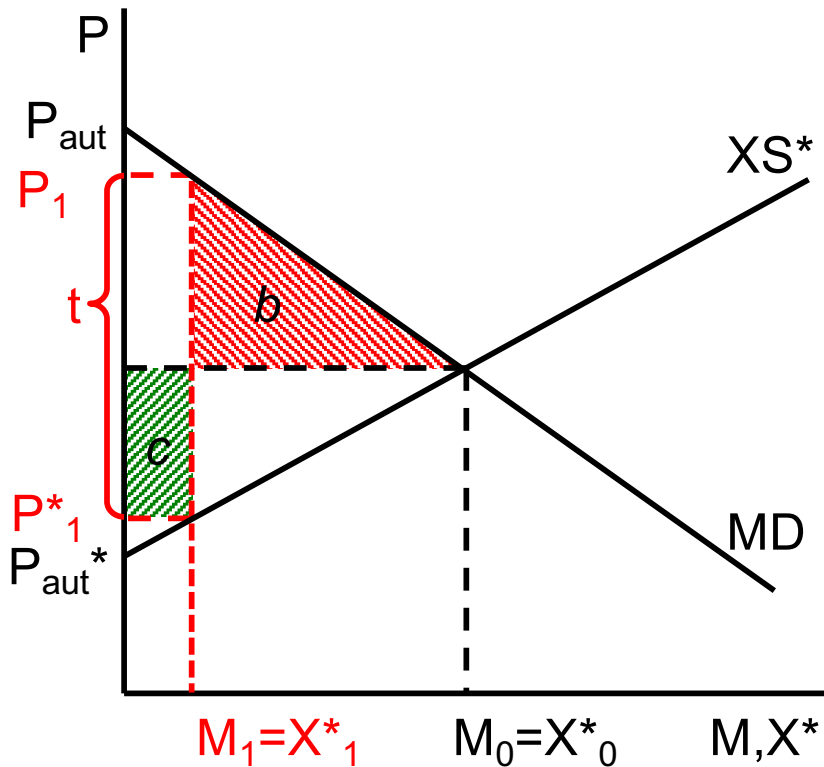
## Watch as $t$ rises



# Large country, "Optimal" tariff

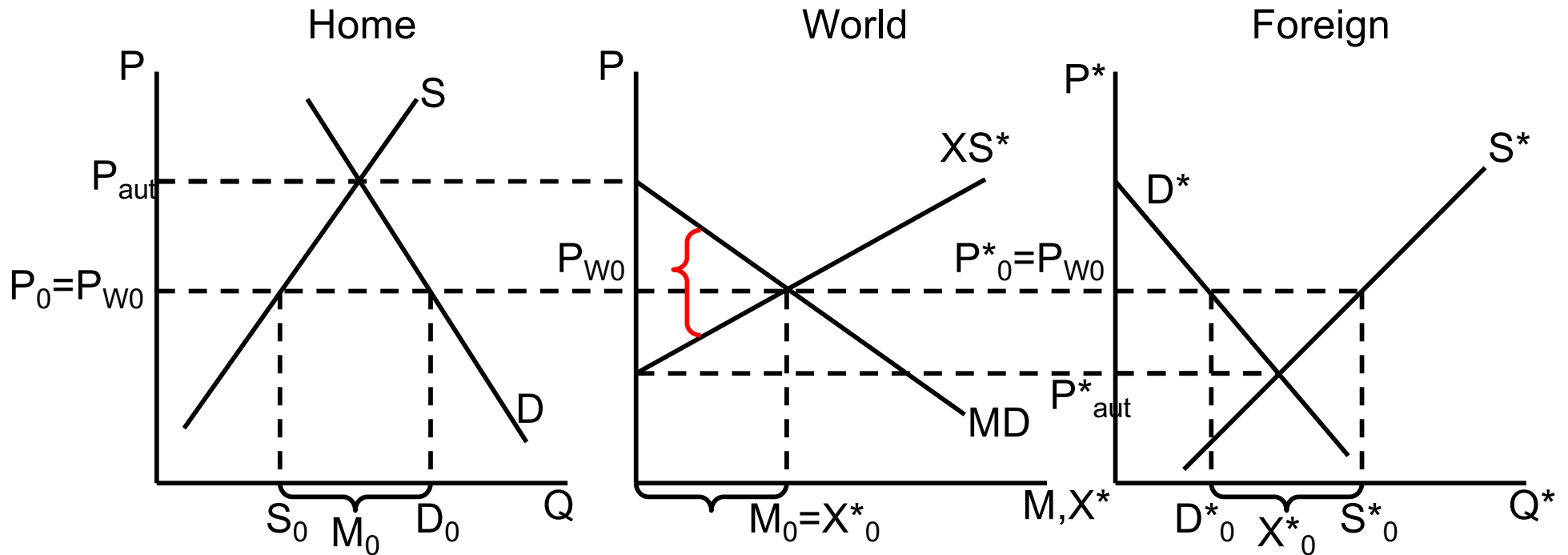
## Watch as $t$ rises





Classes 3, 4: Tariffs and Quotas

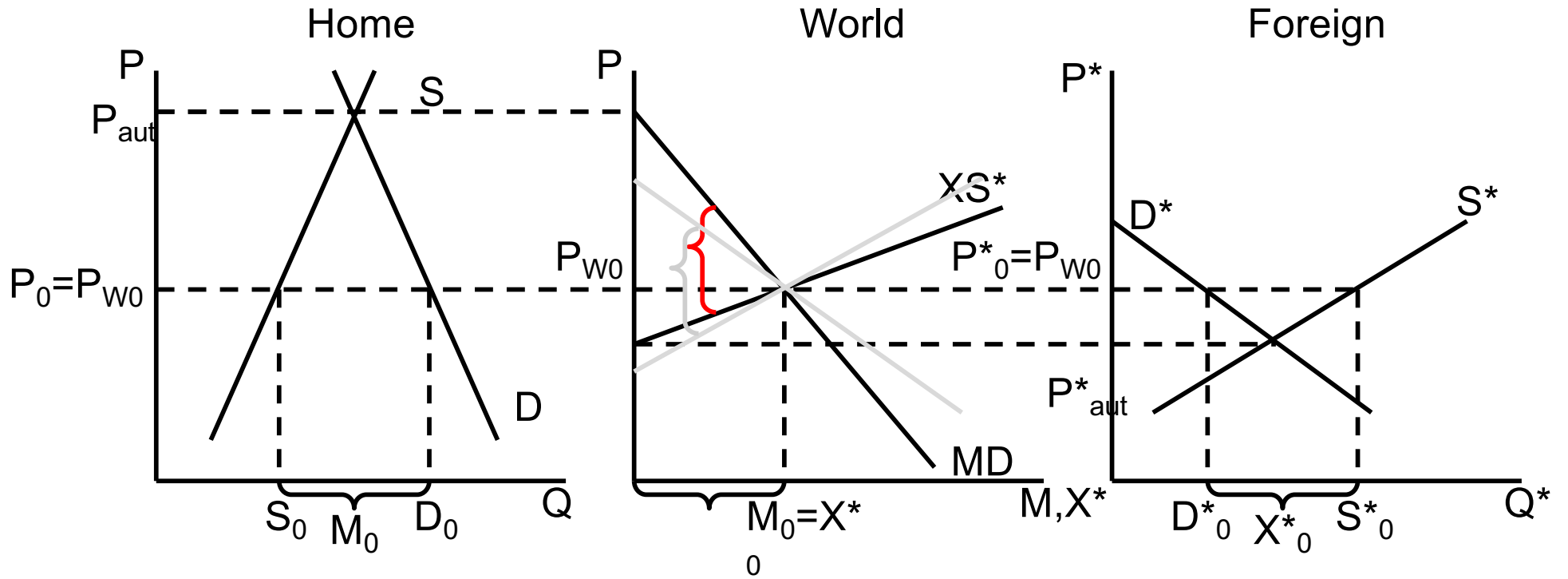
# How Sizes and Slopes Matter



Free trade

Tariff

# How Slopes Matter

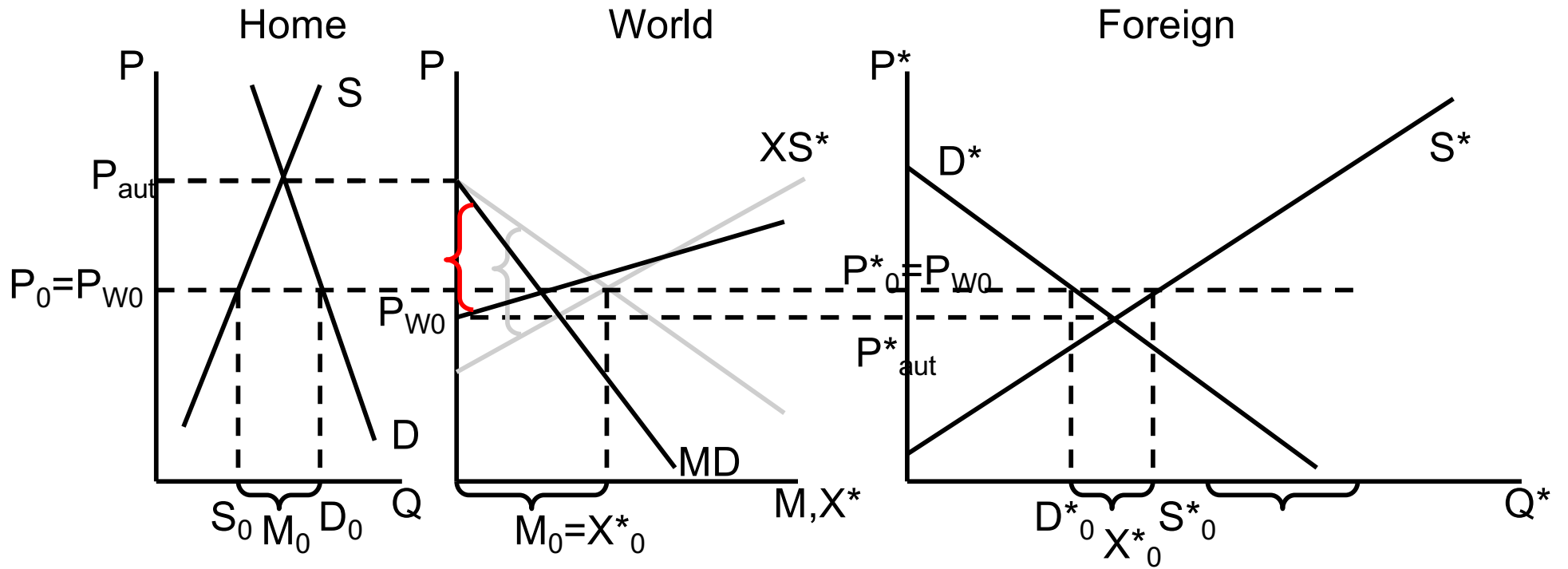


Free trade

Tariff



# How Sizes Matter



Free trade

Tariff

# Pause for Questions

Classes 3, 4: Tariffs and Quotas

# Two-Country in Equations

- Countries  $i = h, f = \text{home, foreign}$

- 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:

$$\tau = \frac{t}{p^{h0}}$$

# Two-Country in Equations

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

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

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

# 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:

$$M^0 = (V^{hd0} - V^{hs0})$$

- Convenient values, capturing both size and price responsiveness,  $i = h, f$ :

$$A^i \equiv \varepsilon^i V^{is0} - \eta^i V^{id0} > 0$$

$$\bar{A} = A^h + A^f > 0$$

# 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:

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

# 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:

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

- or:

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

# Two-Country in Equations

- This gives us two equations in two unknowns,

$$\frac{\Delta p^h}{p^{h0}} \text{ \& \ } \frac{\Delta p^f}{p^{f0}} :$$

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

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



# Two-Country in Equations

- Solution:

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

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

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

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

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

# 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 size in this industry:

- Small home country: if  $A^h \rightarrow 0$ ;  $R \rightarrow \infty$ ;  $S \rightarrow 1$
- Large home country: if  $A^h \approx A^f$ ;  $R \approx 1$ ;  $S \approx 1/2$

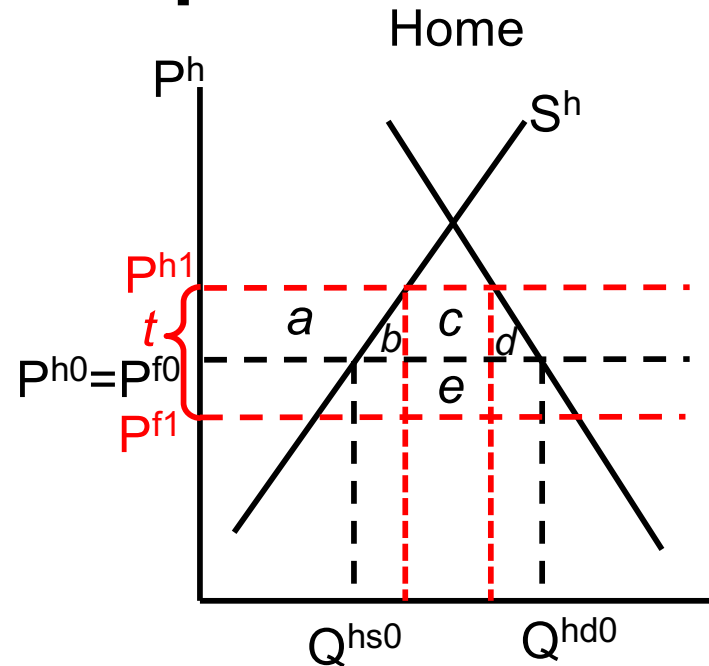
# Two-Country in Equations

- Welfare of home country:

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

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

$$\langle e \rangle = \frac{A^h}{\bar{A}} M^0 \tau - \frac{A^{h2} A^f}{\bar{A}^2} \tau^2$$



# Two-Country in Equations

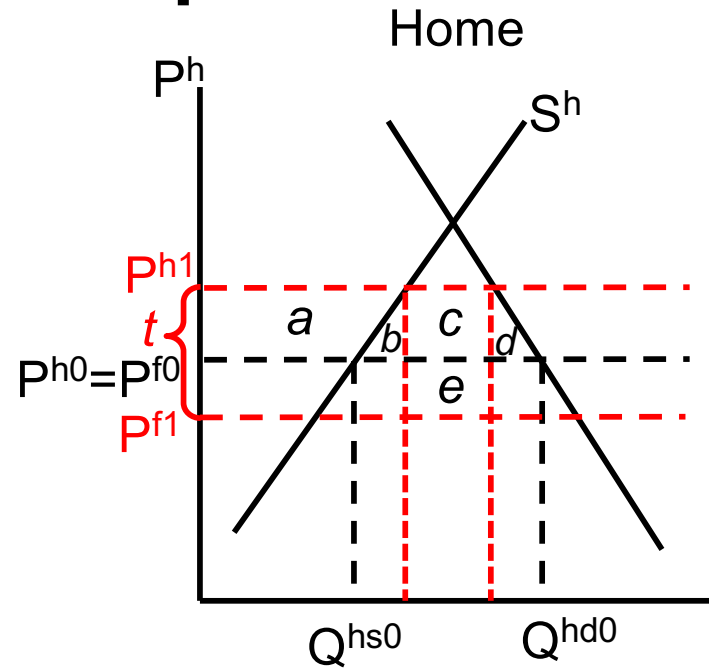
- Welfare of home country:

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

$$\begin{aligned} \langle b \rangle + \langle d \rangle &= \Delta p^h (\Delta Q^{hs} - \Delta Q^{hd}) / 2 \\ &= \frac{\Delta p^h}{2p^{h0}} \left( \varepsilon^h \frac{\Delta p^h}{p^{h0}} p^{h0} Q^{hs0} - \eta^h \frac{\Delta p^h}{p^{h0}} p^{h0} Q^{hd0} \right) \\ &= \frac{\Delta p^h}{2p^{h0}} (\varepsilon^h V^{hs0} - \eta^h V^{hd0}) \frac{\Delta p^h}{p^{h0}} \end{aligned}$$

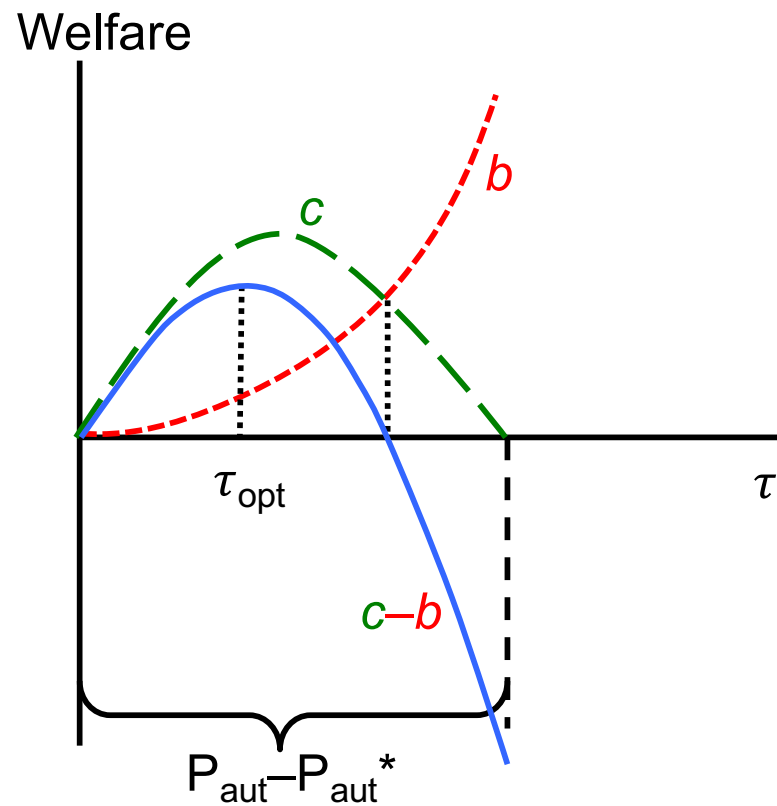
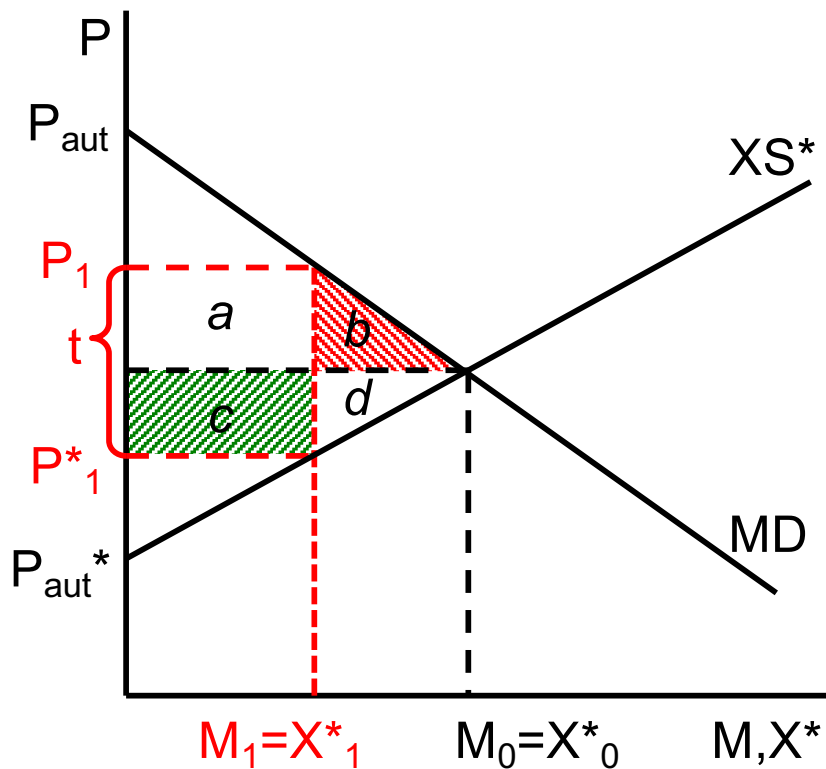
$$= \frac{1}{2} A^h \left( \frac{\Delta p^h}{p^{h0}} \right)^2 = \frac{1}{2} A^h \left( \frac{A^f}{\bar{A}} \tau \right)^2$$

$$\langle b \rangle + \langle d \rangle = \frac{A^h A^f{}^2}{2\bar{A}^2} \tau^2$$



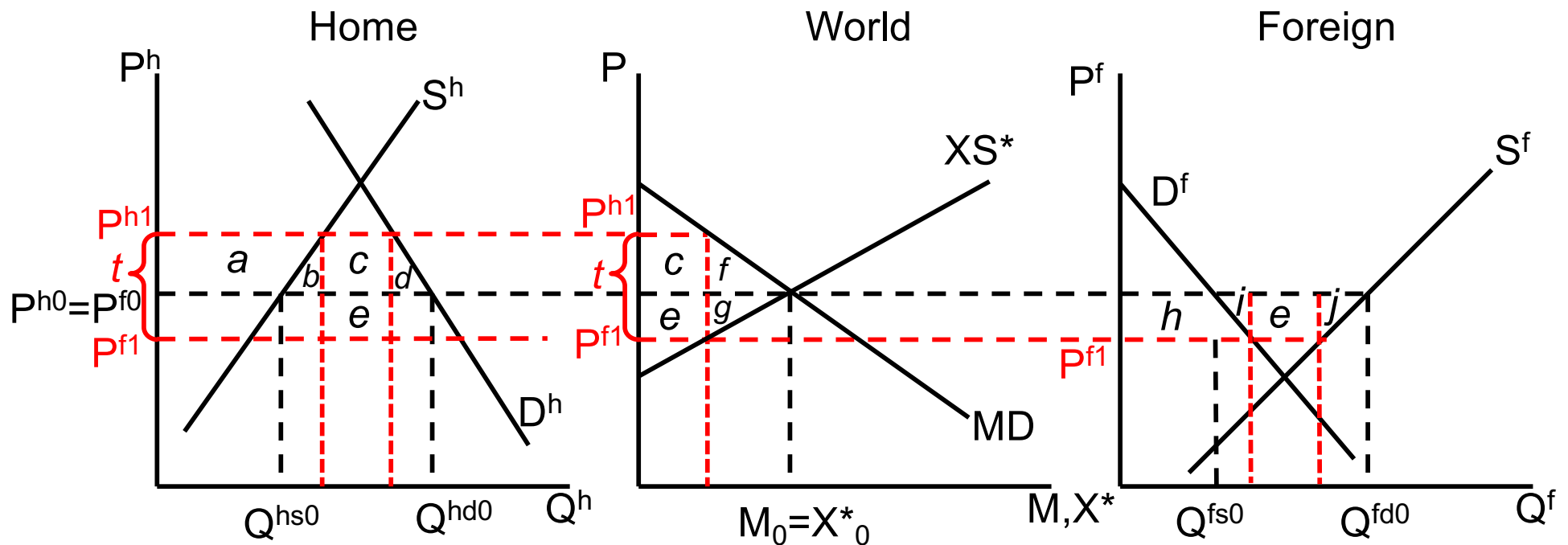
# Welfare of Home Country

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



# Two-Country in Equations

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



# Two-Country in Equations

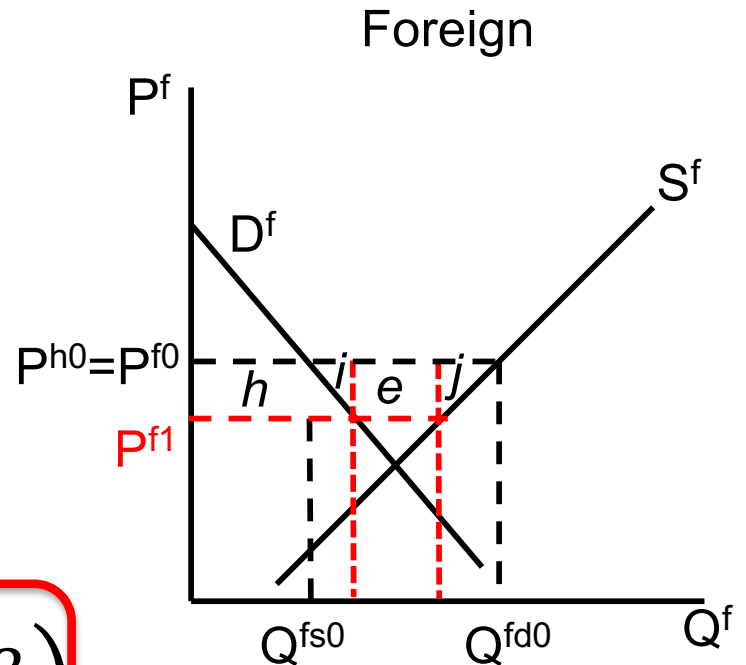
- Welfare of foreign country:

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

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

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

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



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.

# 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% time the US share of the world market
  - US price of steel should rise by 25% of the foreign share of the world market



# 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  $\approx 5\%$
  - US/World demand  $\approx 7\%$
- 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

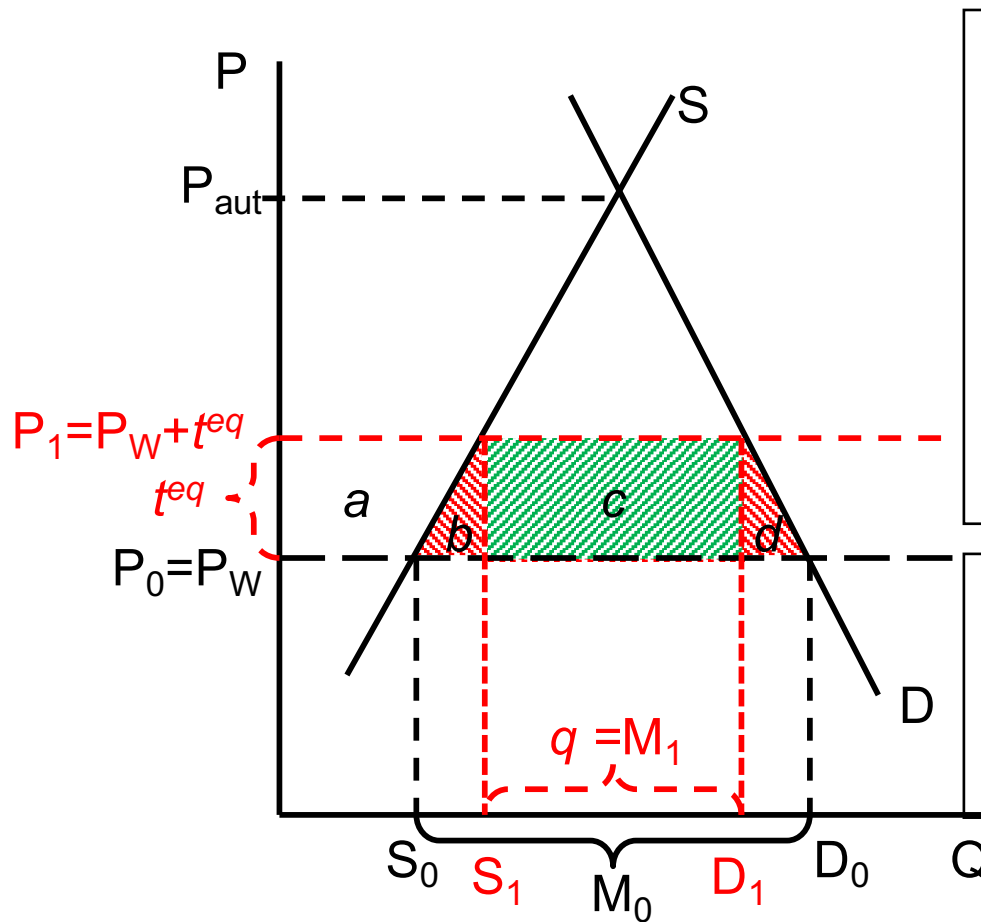
# Pause for Questions

Classes 3, 4: Tariffs and Quotas

# Quotas

- Quota puts upper limit on quantity of imports
- Analysis is exactly the same as a tariff, except
  - Policy sets quantity of imports
  - Price difference determined by market
  - Price difference is “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

# Small country quota (with rents to foreigners)



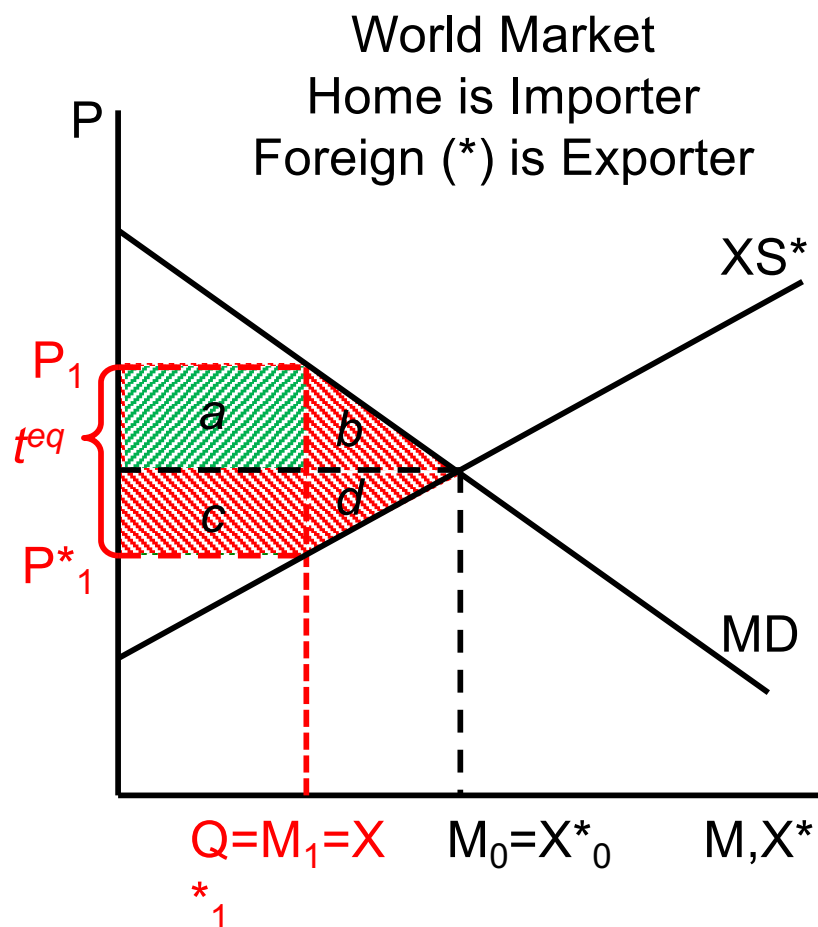
- Welfare effects of a quota,  $q$ , starting from free trade
  - Suppliers gain  $+a$
  - Demanders Lose  $-(a+b+c+d)$
  - Government gains nothing
  - Country loses  $-(b+c+d)$

- 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)



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

- Home:
 

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

Private sector (S&D) loses	$-(c+d)$
Foreigners gain rents	$+(a+c)$
<hr/>	
Country may gain or lose	$+a-d$
- World loses  
 "Dead Weight Loss" =  $-(b+d)$

# 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

- Oil
  - Oil price dropped 60% with pandemic
    - Demand fell with reduced travel and production
    - Oil producers were in price war
  - Trump floated the idea of a tariff on imported oil
    - Purpose to help US oil producers



# Recent Tariff Threats

- Wine
  - US put 25% tariff on European wine, as part of Boeing-Airbus retaliation
  - In February, Trump threatened to raise the tariff to 100%
    - [Later report said this was postponed to at least 2021

# Recent Tariff Threats

- Champagne
  - In response to France's digital services tax, the US is threatening 100% tariffs on \$2.4 billion of French wine and luxury goods
  - This would include champagne.
  - Who would pay the tariffs?
    - Article (Toplensky) suggests US consumers would pay
    - How does that fit with what we learned today?

# Pause for Discussion

Classes 3, 4: Tariffs and Quotas

# Questions on Tariff Threats

- What is OPEC+?
- Who is protesting against raising the tariff on wine to 100%?
- What does it mean for wine to be “on the water,” and why is that relevant?
- Might the tariff on champagne be avoided by negotiation?