

Chapter 9

Applying the Competitive Model

Key topics

1. consumer welfare
2. producer welfare
3. competition maximizes welfare
4. policies that shift supply curves
5. policies that create a wedge between supply and demand
6. comparing both types of policies: imports

Applications & Problems

- occupational licenses and zoning
- trucking
- restriction on entry across countries
- FTC fights bans of Internet sales of wine
- government barriers on entry: milk
- recent fights over barriers to trade

Definition of welfare

- most people: welfare = government payments to poor people
- economists: welfare = well-being of various groups such as consumers and producers

Consumer's welfare

- using a consumer's utility function is not practical for 2 reasons:
 - we don't know individuals' utility functions
 - we cannot compare utilities across individuals
- instead, we measure consumer welfare in dollars
 - easier to measure than utility
 - can compare dollars across individuals

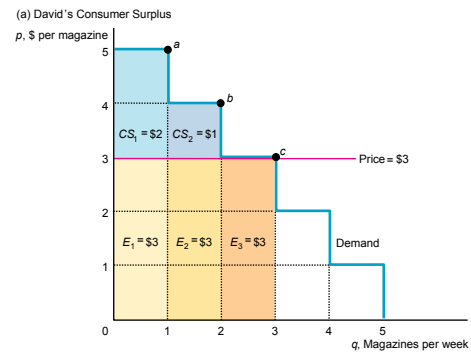
Measuring consumer welfare

- *consumer surplus* (CS) from a good =
 - benefit a consumer gets from consuming it (in \$'s) minus its price
 - how much more you'd be willing to pay than you did pay for a good
- demand curve contains this information
- demand curve reflects a consumer's *marginal willingness to pay*: amount a consumer will pay for an extra unit

Graph individual's CS

area under individual's demand curve and above market price up to quantity that consumer buys

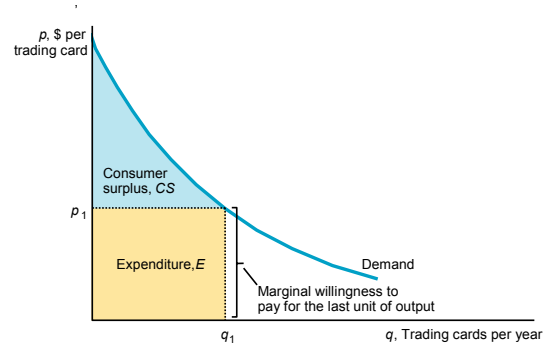
Figure 9.1a Consumer Surplus



Graph market consumer surplus

area under market demand curve above market price up to quantity consumers buy

Figure 9.1b Consumer Surplus



Consumer surplus from TV

- how much for you to "give up watching absolutely all types of television" for rest of your life?
 - 23% would do so for \$25,000
 - 46% want at least \$1 million
 - 25% wouldn't give it up for \$1 million
- 25% of those earning < \$20,000/year wouldn't give up TV for \$1 million (50 years of earnings)
- thus, we use demand curves rather than asking consumers

Bruce Springsteen's Gift to His Fans

- 2002 average rock concert ticket price was \$51
- \$75 that Bruce Springsteen and the E Street Band charged for their concerts was below the market clearing price
- when tickets went on sale at the Bradley Center in Milwaukee, 9,000 tickets sold in the first 10 minutes and all were gone after 20 minutes

Scalpers

- some tickets were available from scalpers, ticket brokers, or on the Internet at higher prices
- a web site offered tickets for Dallas American Airlines Center concert for \$540 to \$1,015
- according to a survey, the average price of a resold ticket at the Philadelphia First Union Center concert was \$280

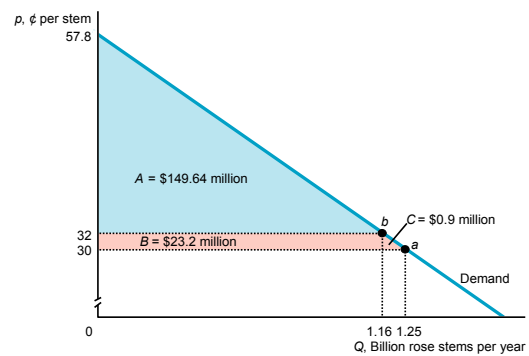
Springsteen's pricing

- says he set the price relatively low to give value to his fans
- (in addition, he may have helped promote his new album)
- assuming that he could have sold all the tickets at \$280, he gave almost \$3 million of consumer surplus to his Philadelphia fans — double the ticket revenue for that concert

Effect of a price change on CS

- price increase reduces CS
- could be caused by
 - leftward shift of supply curve
 - new government tax

Figure 9.02 Fall in Consumer Surplus from Roses as Price Rises



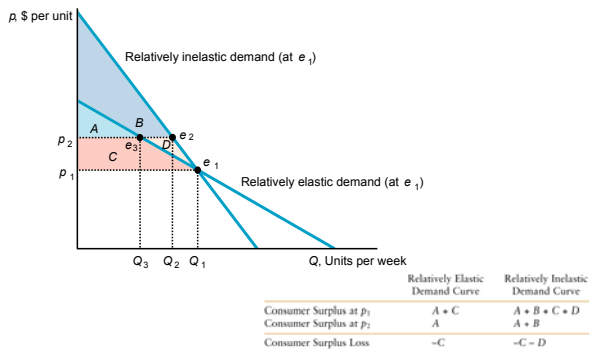
Where CS losses are large

- a price increase causes a larger CS loss, the
- greater the initial revenues spent on the good (further to the right is the demand curve)
- less elastic is the demand curve

Solved problem

- 2 linear demand curves go through the initial equilibrium e_1
- one demand curve is less elastic than another at e_1
- for which demand curve will a price increase cause largest consumer surplus loss?

Solved Problem 9.1



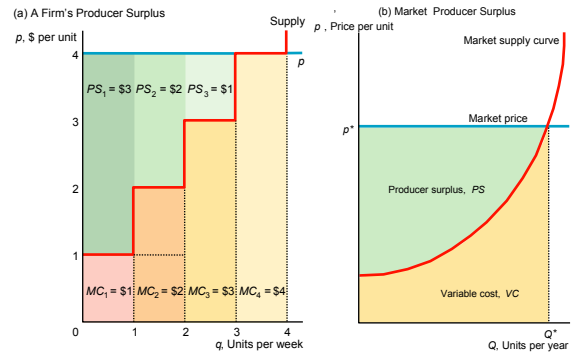
Producer surplus

1. supplier's gain from participating in a market
2. difference between amount for which good sells and minimum amount necessary for seller to produce good
3. minimum amount a seller must receive to be willing to produce is firm's avoidable production cost (shut-down rule)

Measuring PS using supply curve

- producer surplus for a competitive firm or market:
- area above supply curve (MC curve), below price line, up to quantity sold

Figure 9.3



Producer surplus and profit

$$PS = R - VC$$

- profit = revenue - (variable cost plus fixed cost):

$$\pi = R - C = R - [VC + F]$$

$$\Rightarrow PS - \pi = F$$

- which is zero in LR when $F = 0$
- PS differs from π by fixed cost

Interpreting producer surplus

- producer surplus is a gain to trade:
 - in SR, if firm produces it earns
- $$\pi = R - VC - F$$
- if firm shuts down it loses its fixed cost, F
 - thus, $PS =$ profit from trade - profit (loss) from not trading is

$$PS = [R - VC - F] - [-F] = R - VC$$

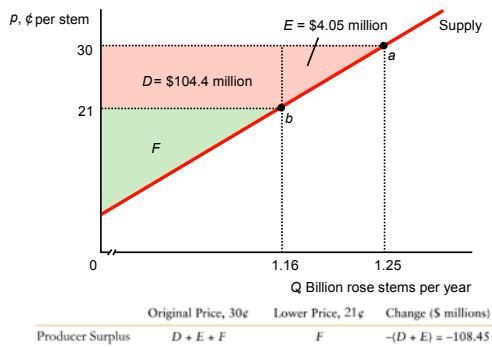
Shocks and PS

- shocks change PS by same amount as π (because fixed costs do not change)
- market PS measures effect of a shock on all firms - so we don't have to measure π of each firm separately

Solved problem

- if estimated supply curve for roses is linear,
- how much PS is lost when price of roses falls from 30¢ to 21¢ per stem
- so that quantity sold falls from 1.25 billion to 1.16 billion rose stems per year

Solved Problem 9.2



Common measure of welfare

- welfare = consumer surplus + producer surplus

$$W = CS + PS$$

- weights well-being of consumers and producers equally (value judgment)

Welfare maximized at competitive output

- producing more or less than competitive level reduces welfare
- competition maximizes welfare because $p = MC$ in competitive equilibrium

Figure 9.4 Why Reducing Output from the Competitive Level Lowers Welfare

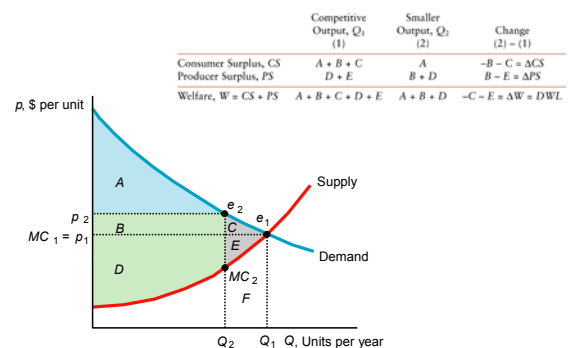
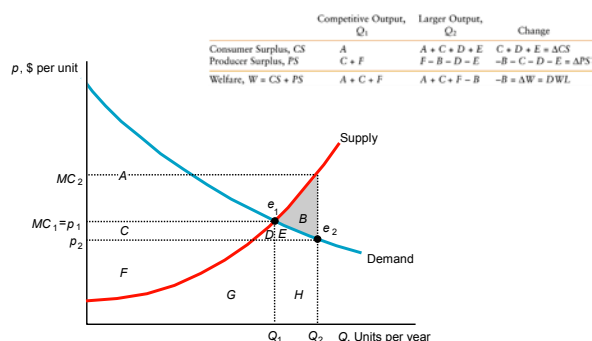


Figure 9.5 Why Increasing Output from the Competitive Level Lowers Welfare



Deadweight loss (*DWL*)

drop in welfare due to loss of surplus by one group that is not offset by a gain to another group from an action that alters a market equilibrium

DWL if too little produced

- producing < competitive output \Rightarrow *DWL*
 - consumers value extra output by more than *MC* of producing it
 - *DWL* is opportunity cost of giving up some of this good to buy more of another good
- market failure (*DWL*) is inefficient production or consumption, often due to $p > MC$

Deadweight loss of Christmas

- *efficient gift*: recipient values gift as much as it cost giver
- *DWL* = price of gift – value to recipient
- according to Yale undergraduates, *DWL* is between 10% and 33% of value of gifts

DWL of Christmas (cont.)

- gifts from friends and "significant others" are most efficient
- noncash gifts from members of extended family are least efficient (1/3 of value is lost)
- grandparents, etc. are most likely to give cash
- *DWL* is large
 - U.S. holiday expenditures are \$40 billion per year
 - *DWL* of gift-giving holidays is between a 1/10 and 1/3 as large as estimates of *DWL* from inefficient income taxation

Government policies

- government policies tend to lower welfare in competitive markets:
- welfare is maximized in competitive equilibrium, so new equilibrium has lower welfare

We examine 2 types of policies

- limits on number of firms in a market, which shift supply curve
- sales taxes, which create a wedge between p and MC

Regulation of taxicabs

- every country except Sweden regulates taxicabs
- many American cities limit number of taxicabs

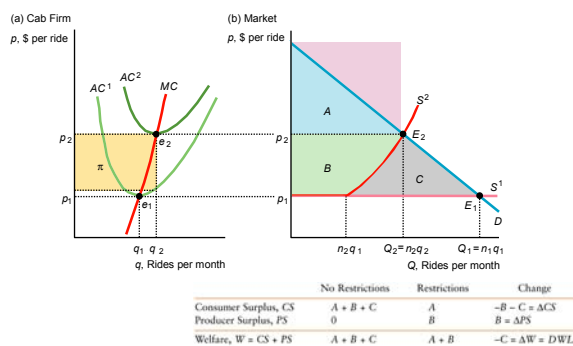
Explanations for taxi regulation

- raises earnings of permit owners (taxi-fleet owners), who lobby city officials
- some city officials contend that limiting cabs allows for better regulation of cabbies' behavior and protection of consumers (why not regulate without restricting?)

Effects of limiting number of cabs

- raises market price
- lowers welfare creates DWL
- hurts consumers helps medallion owners (but not cab drivers)

Figure 9.6 Effect of a Restriction on the Number of Cabs



Occupational licenses

- governments around world license: doctors, lawyers, electricians, contractors, beauticians, ...
- usually current practitioners design tests to prevent entry
- failure rate on California bar exam in 1993:
 - 46% overall
 - 47% of attorneys from other states

Zoning

- many cities frequently control number and location of firms using zoning laws
- Berkeley's zoning ordinances
 - limits number of restaurants to 31 in Telegraph Av. area near Univ. of Calif. Berkeley
 - limits number of chain book stores in certain areas
 - designed to prevent these low-cost stores from driving higher-cost, traditional book stores out of business
- Houston: no zoning

World Bank Survey

- survey of entry restrictions in 85 countries
- found that ease of entry varied substantially across countries
 - it takes 2 business days to enter a typical business in Australia or Canada
 - 152 days in Madagascar
 - average for the 85 countries surveyed was 47 days

Patterns in onerous restrictions

- rich countries have fewer restrictions than poor countries
- countries with greater political freedoms, less corruption, and smaller illegal sectors tend to have fewer entry restrictions
- leaders of governments in poor, underdeveloped countries generally set rules protecting existing businesses from competition (to benefit friends, relatives, or themselves, who own existing companies) — e.g., Arafat and the Palestinian Authority

Restrictions on Entry across Countries

- most countries restrict new businesses from entering markets
- virtually every country requires potential new firms to fill out certain forms and pay fees to become a legal business
- some countries prohibit entry in certain industries.

World Bank Survey II

- To determine the cost of entry, Djankov, et al. (2002) calculated the ratio of fees plus the cost of time in applying as a percentage of per capita annual gross domestic product (GDP)
- range across countries was enormous:
 - lowest ratio was $< 0.5\%$ for U.S.
 - highest was $> 4.6 \times$ per capita GDP in Dominican Republic
 - average was 47% of per capita GDP

FTC opposes Internet bans that harm competition

- preventing Internet shopping raises the prices of some goods
- in 2003, a FTC report concluded that ending bans on interstate wine sales over the Internet would save consumers as much as 21% on relatively expensive wines and increase consumer choice

Existing regulations

- 26 states, including New York, Florida, Massachusetts, and Pennsylvania, laws (many dating from the Prohibition era) ban direct-to-consumer shipping from out-of-state, in part to prevent sales to minors
- FTC concluded that shipping wine directly to homes does not lead to more underage drinking: many states require an adult to sign to accept wine deliveries

Entry barriers

- *LR barrier to entry*:
 - an explicit restriction or a cost that applies only to potential new firms
 - existing firms are not subject to restriction or do not bear cost
- barriers to entry limit ability of firms to enter a market in response to a profit opportunity

Government barriers: Milk

when a federal court declared unconstitutional a 50-year-old statute that allowed only 5 wholesalers to sell milk in New York City

- a new firm entered market
- price per gallon fell 70¢
- consumers saved \$80 million a year

Government barriers: Factories

laws require

- new factories have extra features to prevent pollution or avoid seismic problems
- exempt older factories

Trucking

- entry unregulated trucking market is easy
- as a result, unregulated trucking market has a horizontal LR supply curve at minimum of AC of a typical firm

Trucking regulation

- Motor Carrier Act of 1935 gave Interstate Commerce Commission (ICC) control over pricing and entry in interstate trucking
- in response to lobbying by industry it was supposed to regulate, ICC granted truck firms monopolies over some routes and restricted entry on others
- drove up prices

Motor Carrier Act of 1980

- ended ICC's regulation
- increase in entry from 1977 to 1982
 - # of for-hire trucks rose 17% (to 267,000)
 - # of trucks in private trucking sector rose 65% (to 510,000)
- more efficient firms expanded; less-efficient firms failed
 - trucking rates fell 15-20% from 1980 to 1983 (saves consumers \$15 billion/year)
 - 25-35% by 1985

State regulation

- with end of federal regulations, state regulations created bizarre rate differentials
- before trucking was partially deregulated in 1990 in California, sometimes less expensive to ship a package from SF to Reno (deregulated interstate route) than to ship it 15 miles from SF to Oakland (an intrastate route)
- As of 1/1/95 federal law ended state differentials: prohibited state or local agencies from regulating "prices, routes or services" in trucking industry

Exit barriers

- exit barriers make it difficult for a firm to go out of business
- exit barriers keep number of firms in a market high in SR low in LR

Job-termination laws

- Canada: employers must give advanced notice of termination length of warning varies with size reaching a maximum of 16 weeks for firms with more than 300 employees
- UK: advanced warning varies with length of service ranging from 1 to 8 weeks for workers with 15 or more years of service

Policies that create a wedge between supply and demand

- sales taxes
- price controls
- quantity restrictions

Effects of a sales tax

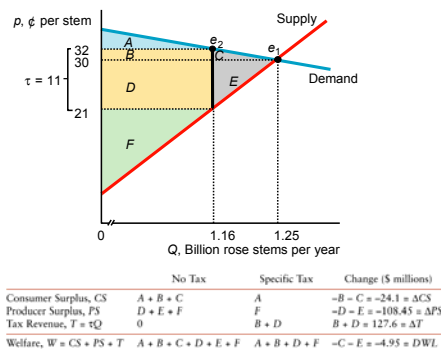
- higher price
- hurts consumers: $\Delta CS < 0$
- hurts firms: $\Delta PS < 0$
- raises new tax revenue, $\Delta T = T > 0$
- welfare:

$$W = CS + PS + T$$

- change in welfare is

$$\Delta W = \Delta CS + \Delta PS + \Delta T < 0$$

Figure 9.7 Welfare Effects of a Specific Tax on Roses



Deadweight loss from wireless taxes

- federal, state, and local government taxes and fees on cell phone and other wireless vary substantially across jurisdictions
 - median state tax is 10%
 - median combined state and federal tax is 14.5% (about \$91 per year)
 - California and Florida have even higher state taxes of 21%, so their combined taxes are 25.5%, or \$185 per year
 - New York is nearly as high
- governments raise about \$4.8 billion in wireless taxes.

Who loses

- marginal cost of supplying a minute of wireless service is constant at about 5¢
- thus, a tax inflicts consumer surplus loss but not producer surplus loss (see Solved Problem 3.1)
- Hausman (2000) estimates *DWL* (efficiency cost) from taxes is \$2.6 billion
- for every \$1 raised in tax revenue,
 - average efficiency cost is 53¢ for typical state (70¢ in high tax states)
 - marginal efficiency cost is 72¢ (93¢ in high tax states)

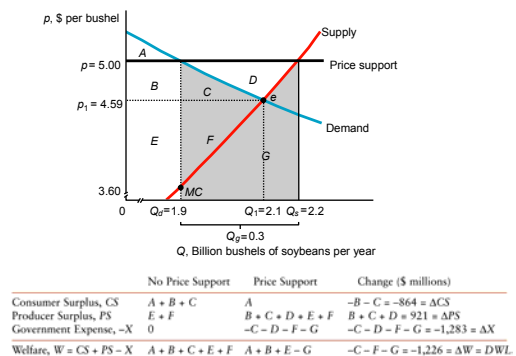
DWL large relative to other taxes

- estimates of the marginal efficiency loss per dollar of income tax range from 26¢ to 41¢
- price elasticity of mobile telephones is -0.7, which is more elastic than for other telecommunications services
- tax on landlines creates almost no deadweight loss because price elasticity for local landline phone service is virtually zero (-0.005)

Welfare effects of a price floor

- price floor*: minimum price at which a consumer can buy
- many governments set price floors for agricultural products using price support payments

Figure 9.8 Effect of Price Supports in Soybeans



DWL reflects 2 distortions

- excess production: Q_g is stored, destroyed, or shipped abroad
- inefficiency in consumption
 - $p = \$5$ for last bushel of soybeans
 - $MC = \$3.60$

Price floors and technical progress

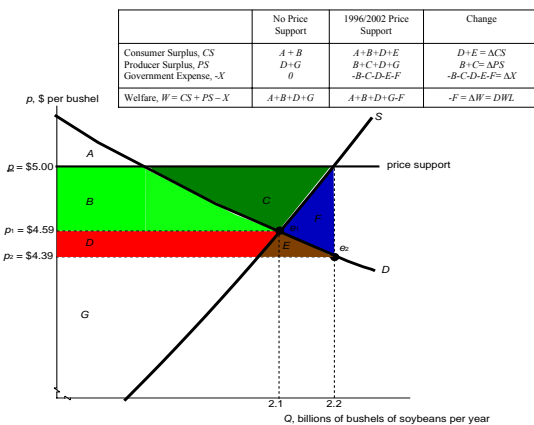
- since World War II, output per hour of farm work rose nine fold due to technological progress
- wheat and milk yields increased 2.5% per year, year after year

Today's subsidy program

- government sets a support price, \underline{p}
- farmers decide how much to grow and sell all of their produce to consumers at market-clearing price, p
- government gives farmers a *deficiency* payment = $\underline{p} - p$ for every unit sold
- thus, farmers receive support price on their entire crop

Solved problem

- government uses deficiency payment approach
- what are the effects in the soybean market of a \$5 per bushel price support on
 - equilibrium price and quantity
 - consumer surplus
 - producer surplus
 - deadweight loss?



2001 agricultural support payments

- \$59 billion in Japan
- \$95 billion in the United States
- \$106 billion in the European Union

Farm support as fraction of total receipts (OECD)

- 69% Switzerland
- 59% Iceland and Japan
- 35% EU
- 21% United States
- 17% Canada
- 4% Australia
- 1% New Zealand

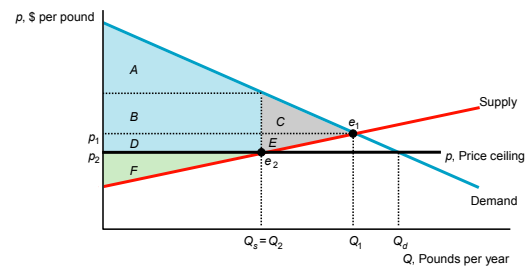
Welfare effects of a price ceiling

- *price ceiling*: highest price that a firm can legally charge
- in 1970s, U.S. government used price controls to keep gasoline prices below market price
- long lines at gas stations and large *DWL* loss in consumer surplus in California (\$1985)
 - \$1.2 billion 12/1973 - 3/1974 price controls
 - \$800 million 5/1979 - 7/1979 controls

Solved problem

What is the effect on the equilibrium and welfare if the government sets a price ceiling below the unregulated competitive equilibrium price?

Solved Problem 9.4



	No Ceiling	Price Ceiling	Change
Consumer Surplus, CS	$A + B + C$	$A + B + D$	$D - C = \Delta CS$
Producer Surplus, PS	$D + E + F$	F	$-D - E = \Delta PS$
Welfare, $W = CS + PS$	$A + B + C + D + E + F$	$A + B + D + F$	$-C - E = \Delta W = DWL$

Comparing both types of policies: Imports

government of (potentially) importing country can use one of four import policies:

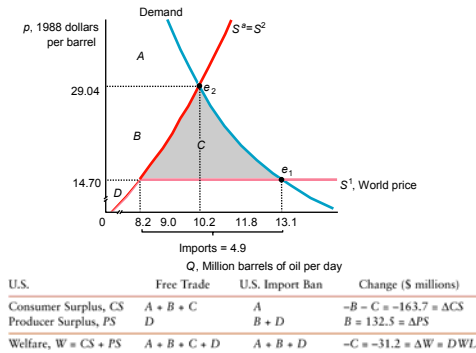
1. allow free trade: any firm can sell in this country without restrictions
2. ban all imports: government sets quota = 0 on imports
3. set a positive quota
4. set a tariff: tax (duty) on only imported goods

U.S market for crude oil

assumptions for simplicity:

- transportation costs = 0
- U.S. is a price taker: supply curve of potentially imported good is horizontal at world price

Figure 9.9 Loss from Eliminating Free Trade



Free trade vs. tariff

- common types of tariffs
 - specific tariffs: τ dollars per unit
 - ad valorem tariffs: α percent of sales price
- taxes vs. tariffs
 - almost 5 times more tax revenue would be generated by
 - a 15% additional ad valorem tax on petroleum products (\$34.6 billion)
 - than by a 25% additional import tariff on oil and gas (\$7.3 billion)

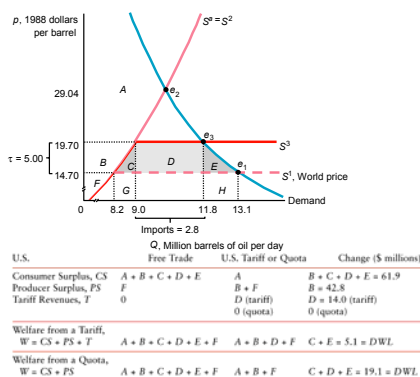
Tariff

- suppose government imposes a specific tariff of $\tau = \$5$ per barrel of crude oil
- tariff creates a wedge: firms will not import oil into US unless US price is at least \$5 above world price of \$14.70

Tariff effects

- tariff protects U.S. producers from foreign competition
- larger tariff \Rightarrow less is imported, hence domestic firms charge higher price
- consumers lose; domestic producers gain
- loss is less than from a ban

Figure 9.10 Effect of a Tariff (or Quota)



Interpretation of *DWL*

- $-C$ = loss from producing 9.0 million barrels per day instead of 8.2 million barrels per day
 - cost of producing extra 0.8 million barrels domestically = $C + G$
 - had Americans bought this oil at world price, cost would have been only G
- $-E$ = consumption distortion loss from American consumers' buying too little oil
 - U.S. consumers value extra output as $E + H$
 - value in international markets is only H

Free trade versus a quota

- effect of a positive quota is similar to that of a tariff
 - gain to domestic producers are same as with a tariff
 - but government gets no tariff revenues
 - foreign exporters get what would be tariff revenues
- thus, DWL from quota $>$ greater than under tariff

Rent seeking

- *rent seeking*: efforts and expenditures to gain a rent or a profit from government actions
 - producers lobby for trade protection
 - they spend up to their potential gain
- some economists argue that government revenues from tariffs are completely offset by administrative costs and rent-seeking behavior

Table 9.2 Welfare Cost of Trade Barriers (millions of 1999 dollars)

Industry	DWL	ΔPS	Government Revenues	ΔCS
Meat products	-27	2,227	64	-2,318
Dairy products*	-14,527	26,525	995	-38,902
Sugar confectionery*	-907	4,160	264	-5,329
Grain mill products	-9	1,083	9	-1,101
Fats and oils	-126	2,246	5	-2,377
Beverages	-8	1,038	139	-1,185
Tobacco	-194	3,625	90	-3,908
All food and tobacco	-12,798	46,308	1,878	-60,982

* Import quotas are the primary instrument of protection.

Notes: As estimated, $\Delta CS = DWL - \Delta PS - \text{government revenue}$. Dollar amounts were adjusted using the Consumer Price Index.

Source: Lopez and Pagoulatos (1994).

1 Consumer welfare

- CS = area under consumer's demand curve above market price up to quantity that consumer buys
- how much consumers are harmed by an increase in price is measured by change in CS

2 Producer welfare

- PS = area above MC and below demand (price line) up to quantity produced
- PS = a firm's gain from trading
- PS = largest amount of money that you could take from a firm's and it would still produce
- $PS = R - VC$ ($= \pi$ in LR)

3 Competition maximizes welfare

- one standard measure of welfare:
- $W = CS + PS$
- more p is above MC , lower is W
- in competitive equilibrium, where $p = MC$, W is maximized

4 Policies that shift supply curves

- governments limit # of firms by
 - limiting number of firms (licensing)
 - raising costs of entry or exit to new firms
- results
 - higher price
 - hurts consumers
 - helps existing firms
 - lowers welfare ($DWL > 0$)

5 Policies that create a wedge between supply and demand

- policy creates a gap between price consumers pay and price firms receive
 - taxes
 - price ceilings
 - price floors
- consequently, $p > MC$ and DWL

6 Comparing both types of policies: Imports

- welfare highest with free trade
- welfare lowest with ban on imports
- if a tariff and quota produce same equilibrium, tariff better for home country as it produces tariff revenues for government