Tax/economic Incidence

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In the news: who pays for tariffs?

- President Trump raised tariffs on imports to at least 10%.[1]
- His administration insists foreign producers pay the tariffs.
- Critics insist U.S. consumers and producers pay the tariffs.
- What do you need to know to make an educated guess? Elasticities (we use theory!)
- How can we estimate incidence? Causal inference tools (diff-in-diff, IV, shift-share, etc.)

[1] These are increases beyond the increases in his first term, which President Biden largely left in place.

Learning goals

1. Differentiate statutory from economic tax incidence
2. Derive formula for tax incidence in partial equilibrium
3. Evaluate the role of elasticity in determining tax incidence

Incidence of taxation and other policies

Tax incidence: who bears the burden of a tax (or other policy)?

An example: a tax on imported SUVs

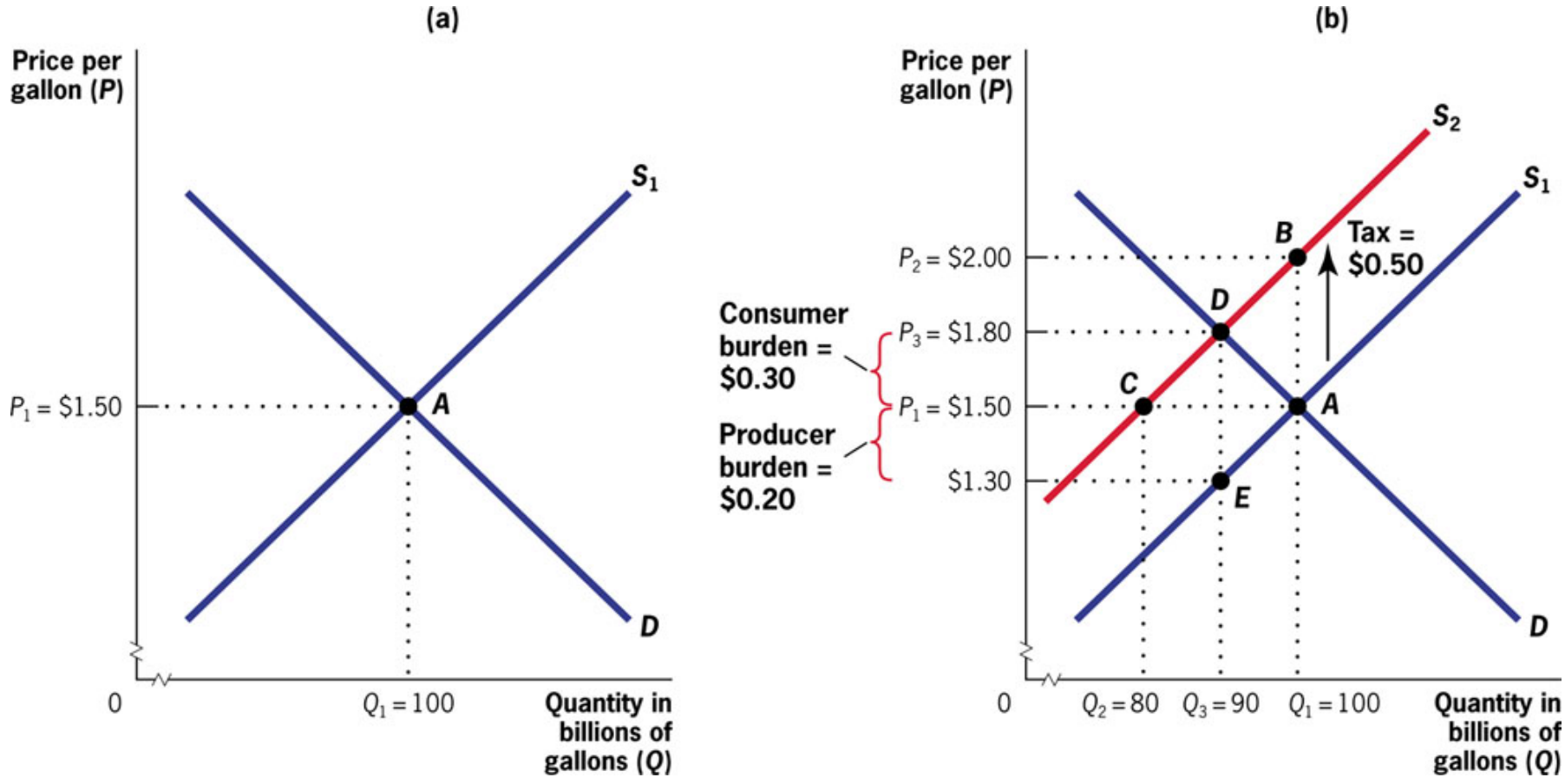
Who bears its cost? Who benefits? There are potential implications for many parties involved.

- buyers of SUVs
- buyers of other cars
- car manufacturers
- producers of gasoline and other types of cars
- workers and shareholders of all these companies
- suppliers of all these companies

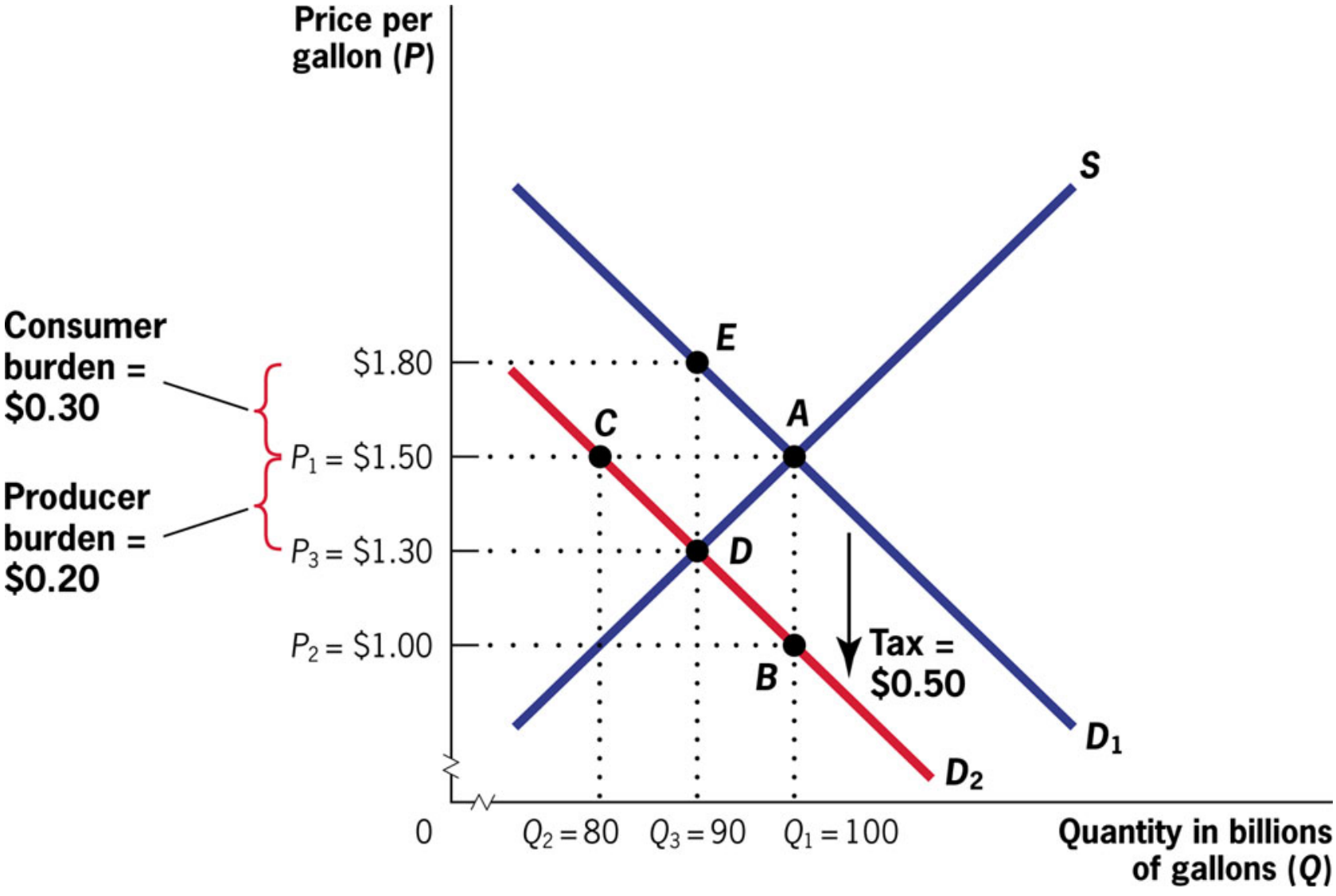
Remarks

- **Partial equilibrium**: study one market (e.g. Just SUVs)
- **Statutory incidence**: who pays "on paper"
- **Economic incidence**: how much parties pay relative to tax-free equilibrium
- Statutory is irrelevant in standard models
- Demand and supply elasticities jointly determine the share of tax paid by each party, or "incidence"
  - Well-identified, empirical elasticities are critical to tax policy
- Of course, statutory incidence may matter for other reasons:
  - Imperfect tax compliance
  - Price frictions
  - Tax misperceptions
  - Other markets (general equilibrium)
- Ultimately, it is an empirical question

Tax incidence in partial equilibrium



Shifting the tax to the other side



Statutory incidence irrelevance

Consider a \$10 tax on mugs. $D(p) = 130 - 2.5p$, $S(p) = 5 + 2.5p$.

Without taxes: $130 - 2.5p = 5 + 2.5p \Rightarrow p = 25$

Different tax schemes (t_C and t_P): *Each pays \$5 of \$10 tax*

1. Buyers pay $t_C = 10$

$$130 - 2.5(p + \underbrace{10}_{t_C}) = 5 + 2.5p \begin{cases} \text{sellers: } p(t_C) = 20 \\ \text{buyers: } p(t_C) + t_C = 30 \end{cases}$$

2. Sellers pay $t_P = 10$

$$130 - 2.5p = 5 + 2.5(p - \underbrace{10}_{t_P}) \begin{cases} \text{sellers: } p(t_P) - t_P = 20 \\ \text{buyers: } p(t_P) = 30 \end{cases}$$

3. Buyers pay $t_C = 5$, sellers pay $t_P = 5$, $p(t_C, t_P) = 25$

$$130 - 2.5(p + \underbrace{5}_{t_C}) = 5 + 2.5(p - \underbrace{5}_{t_P}) \begin{cases} \text{sellers: } p(t_P, t_C) - t_P = 20 \\ \text{buyers: } p(t_P, t_C) + t_C = 30 \end{cases}$$

Tax on consumers, different markets

Tax on consumers, but supply/demand change.

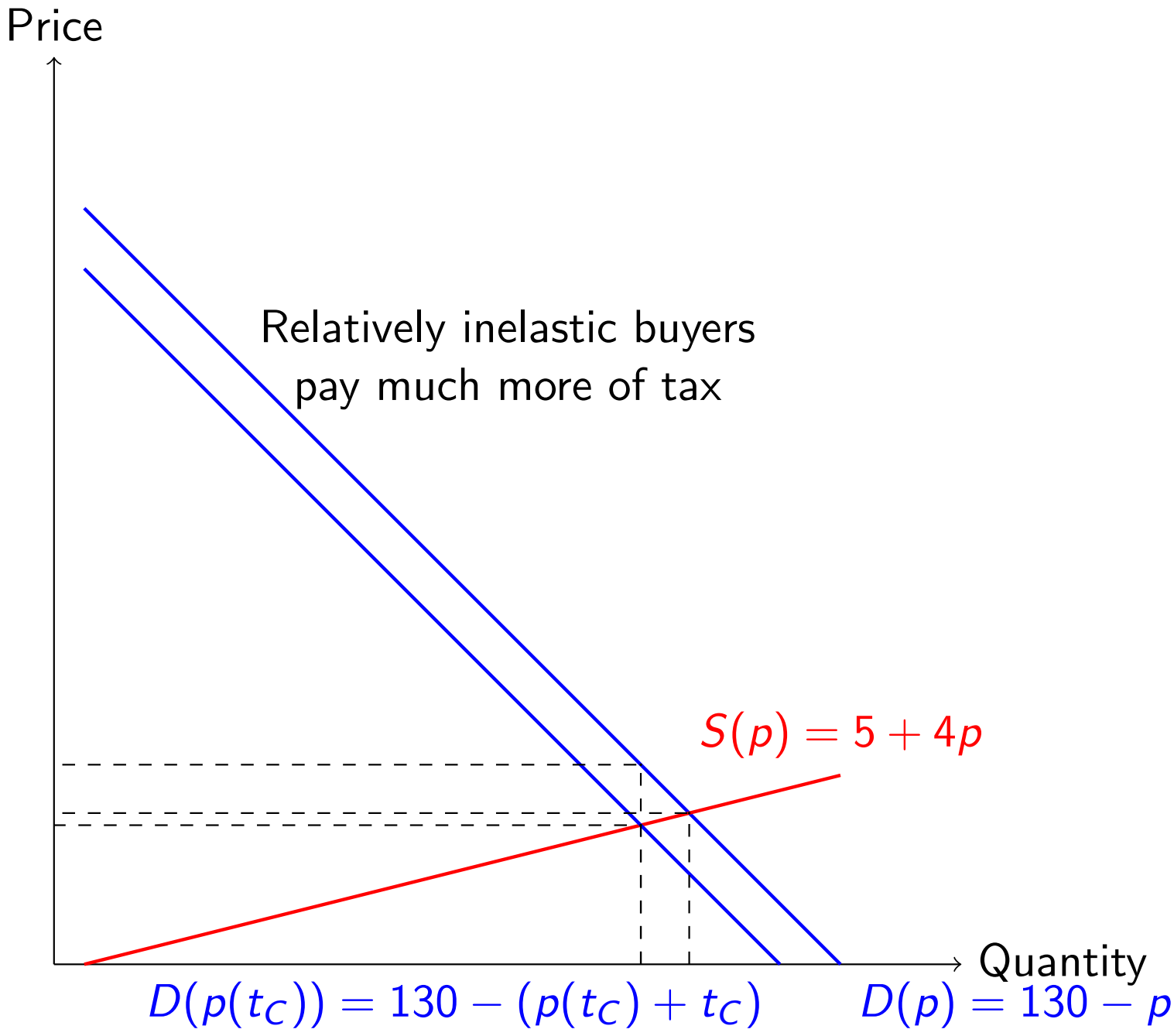
1. $D(p) = 130 - p$, $S(p) = 5 + 4p$, $t_C = 10$

$$\left.\begin{array}{l} \text{sellers: } p(t_C) = 23 \\ \text{buyers: } p(t_C) + t_C = 33 \end{array}\right\} \Rightarrow \text{Sellers: } 20\%, \text{ buyers: } 80\%$$

2. $D(p) = 130 - 4p$, $S(p) = 5 + p$, $t_C = 10$

$$\left.\begin{array}{l} \text{sellers: } p(t_C) = 17 \\ \text{buyers: } p(t_C) + t_C = 27 \end{array}\right\} \Rightarrow \text{Sellers: } 80\%, \text{ buyers: } 20\%$$

For more examples, try out:
https://demonstrations.wolfram.com/TaxIncidence/


Price
Relatively inelastic buyers
pay much more of tax
$S(p) = 5 + 4p$
Quantity
$D(p(t_C)) = 130 - (p(t_C) + t_C)$
$D(p) = 130 - p$

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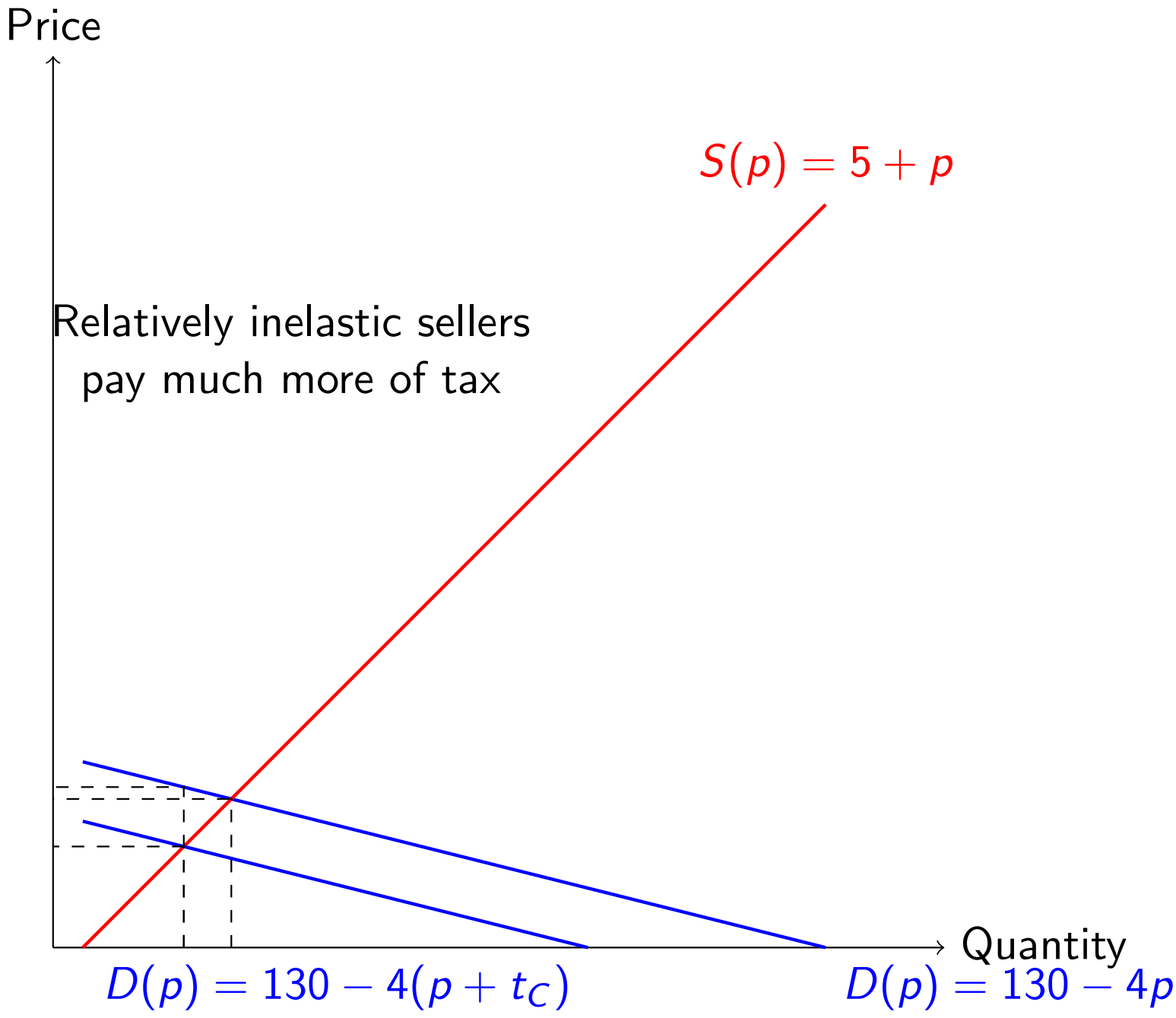

Price
$S(p) = 5 + p$
Relatively inelastic sellers
pay much more of tax
Quantity
$D(p) = 130 - 4(p + t_C)$
$D(p) = 130 - 4p$

What does tax incidence depend on?

- Tax incidence depends on the slopes of demand and supply.
- Equilibrium: $D(p+t) = S(p)$.
- Solution: price depends on the tax, $p(t)$.
- Equilibrium again (for any level of the tax):

$$D(p(t)+t) = S(p(t))$$

- The slopes are the derivatives D' and S', so...[2]

$$D'(p+t)\cdot(\frac{\partial p}{\partial t}+1) = S'(p)\cdot\frac{\partial p}{\partial t} \;\Rightarrow\; \frac{\partial p}{\partial t} = \frac{D'(p+t)}{S'(p)-D'(p+t)}$$

- But slopes could change... is there a better formula?

[2] Note: this is for sellers' price. For buyers, it is: $\frac{S'(p)}{S'(p)-D'(p+t)}$

Incidence: From slopes to elasticities

$$\frac{\partial p}{\partial t} = \frac{D'(p+t)}{S'(p) - D'(p+t)}$$

Multiply num. and denom. by $\frac{p}{S(p)}$ (in equil. $D(p+t) = S(p)$):

- In equilibrium, $D(p+t) = S(p)$
- $D'(p+t) = \frac{\partial D}{\partial p}$, $S'(p) = \frac{\partial S}{\partial p}$ (definition of derivative)

$$\frac{\partial p}{\partial t} = \frac{D'(p+t)}{(S'(p) - D'(p+t))} \cdot \frac{\frac{p}{S(p)}}{\frac{p}{S(p)}} = \frac{\frac{\partial D}{\partial p} \cdot \frac{p}{D(p+t)}}{\frac{\partial S}{\partial p} \cdot \frac{p}{S(p)} - \frac{\partial D}{\partial p} \cdot \frac{p}{D(p+t)}}$$

So that

$$\frac{\partial p}{\partial t} = \frac{\varepsilon_p^D}{\varepsilon_p^S - \varepsilon_p^D}$$

where ε_p^D and ε_p^S are price elasticities

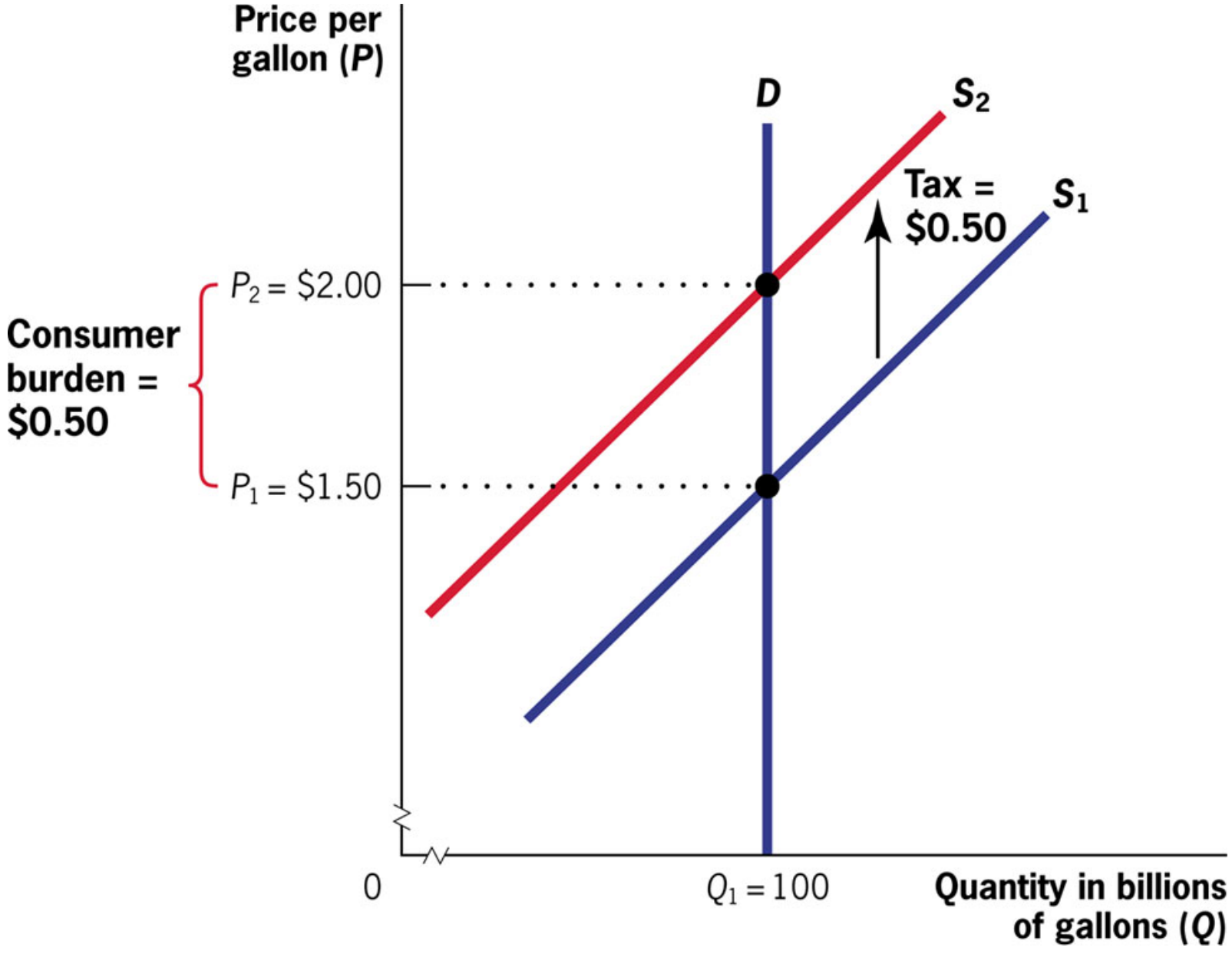
Abuse of notation to simplify expression: ε_D defined as $D'(p+t)\frac{p}{D(p+t)}$ rather than $D'(p+t)\frac{p+t}{D(p+t)}$.

Special cases

Denoting p_C is the price paid by consumers, p is the price paid by producers, and t is the tax:

- vertical (inelastic) demand (smoking?)
  $D'(p) = \varepsilon_p^D = 0$, $\frac{\partial p}{\partial t} = 0$, $p'_C(t) = 1$
- horizontal (elastic) demand (yellow M&Ms)
  $D'(p) = \varepsilon_p^D = \infty$, $\frac{\partial p}{\partial t} = -1$, $p'_C(t) = 0$
- horizontal (elastic) supply (speculative capital in an open economy)
  $S'(p) = \varepsilon_p^S = \infty$, $\frac{\partial p}{\partial t} = 0$, $p'_C(t) = 1$
- vertical (inelastic) supply (labor in the short term?, land?)
  $S'(p) = \varepsilon_p^S = 0$, $\frac{\partial p}{\partial t} = -1$, $p'_C(t) = 0$

What kind of demand elasticity is this?



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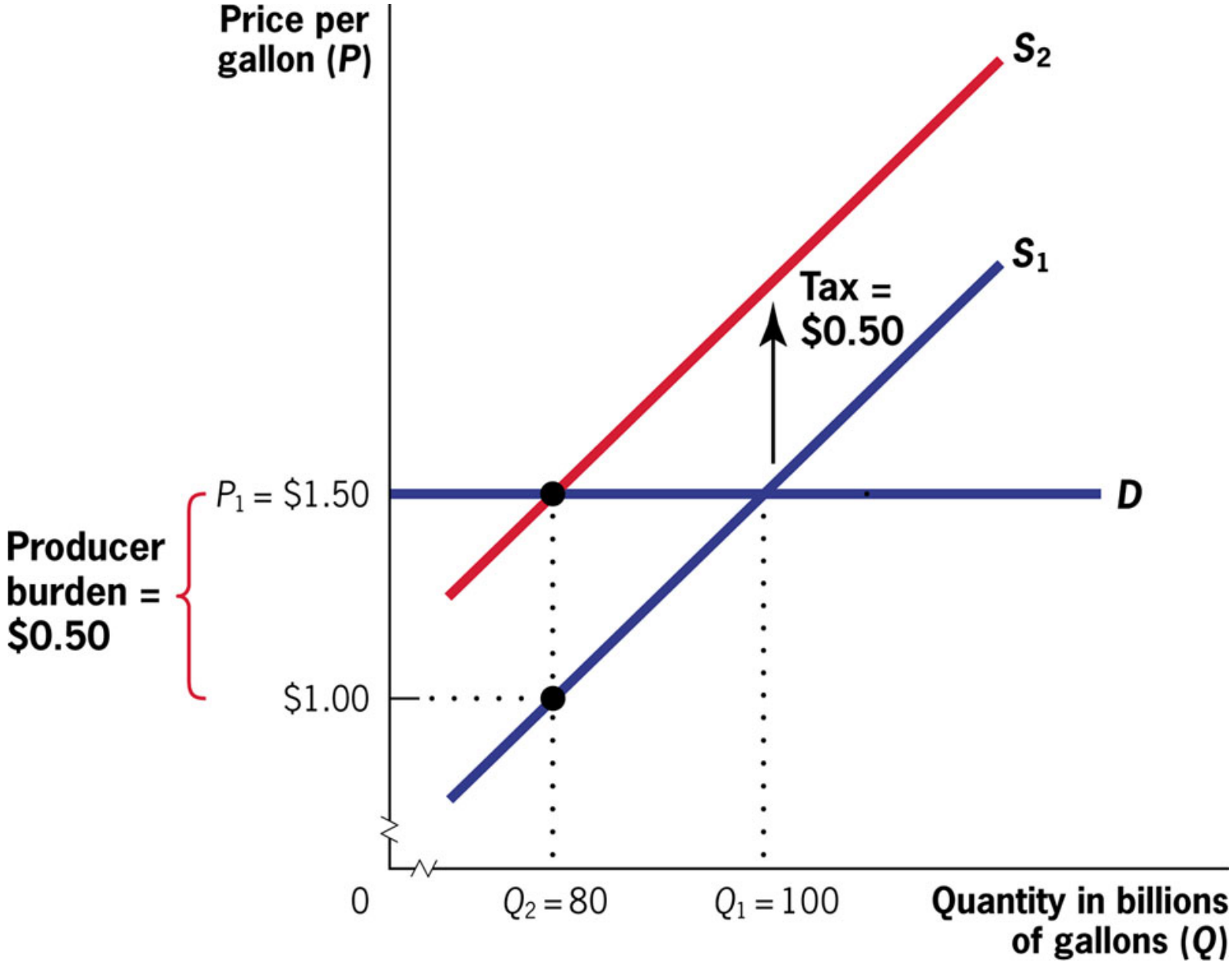
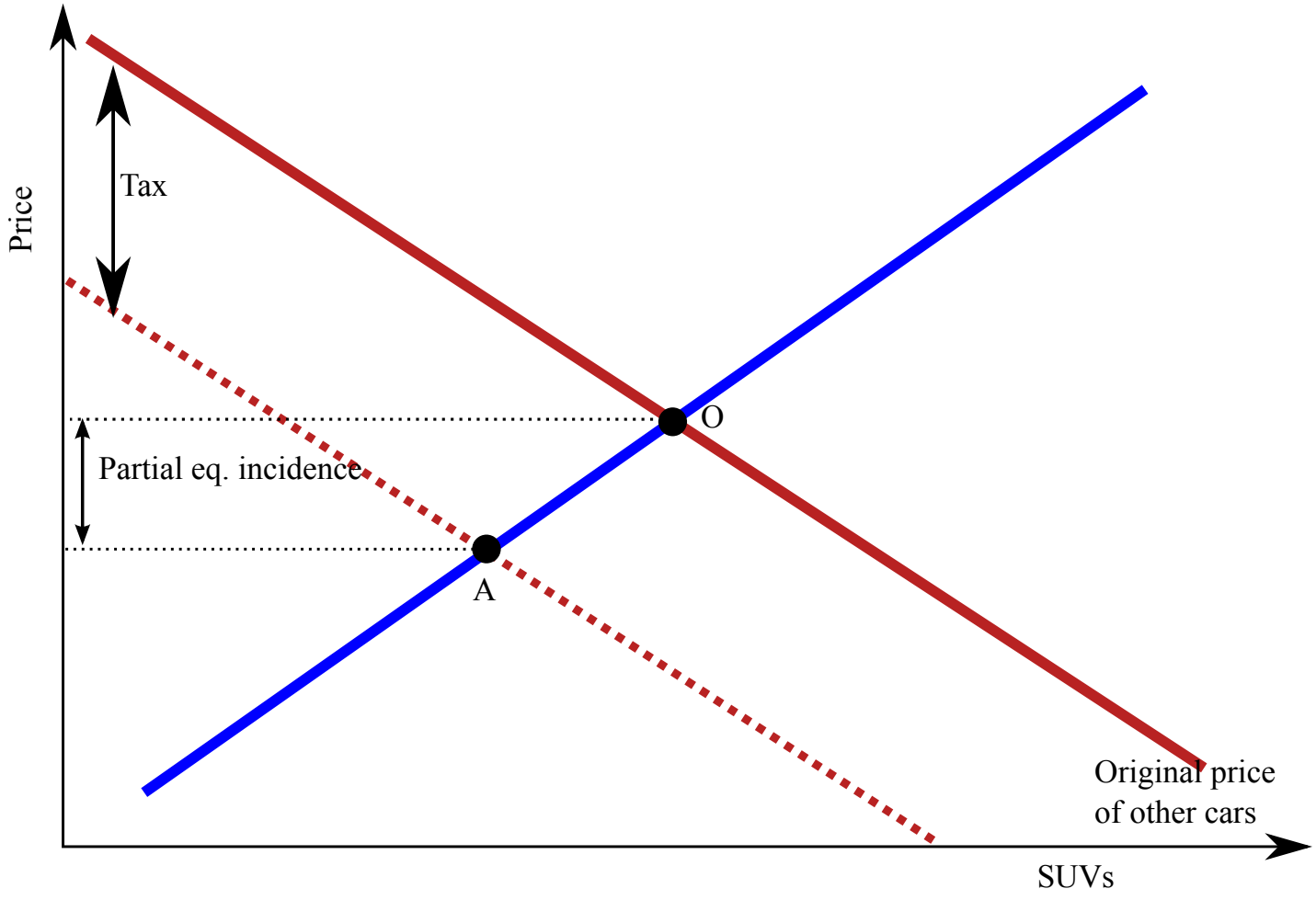


General equilibrium

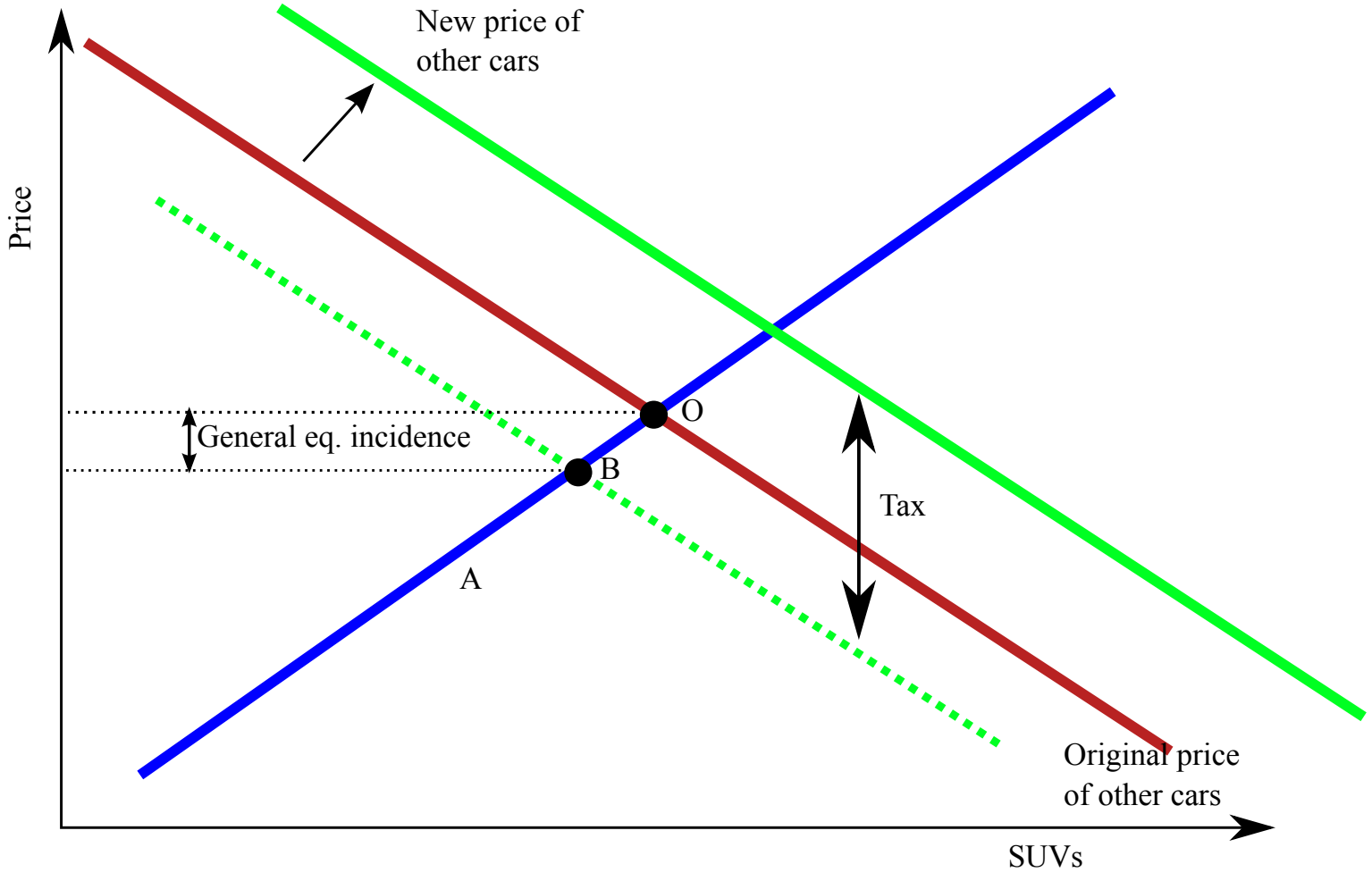
- in general, markets are interrelated
- responses on other markets may mitigate or strengthen the effects on the original market
- partial and general equilibrium answers may be very different
- Demand: $D(p, p^2) = (a + c \cdot p^S) - b \cdot p$, where p^s is the price of a substitute
- Supply: $S(p) = d \cdot p$
- The same thing will be happening in the other market; we should analyze both of them at the same time.

General equilibrium incidence: What about other cars?



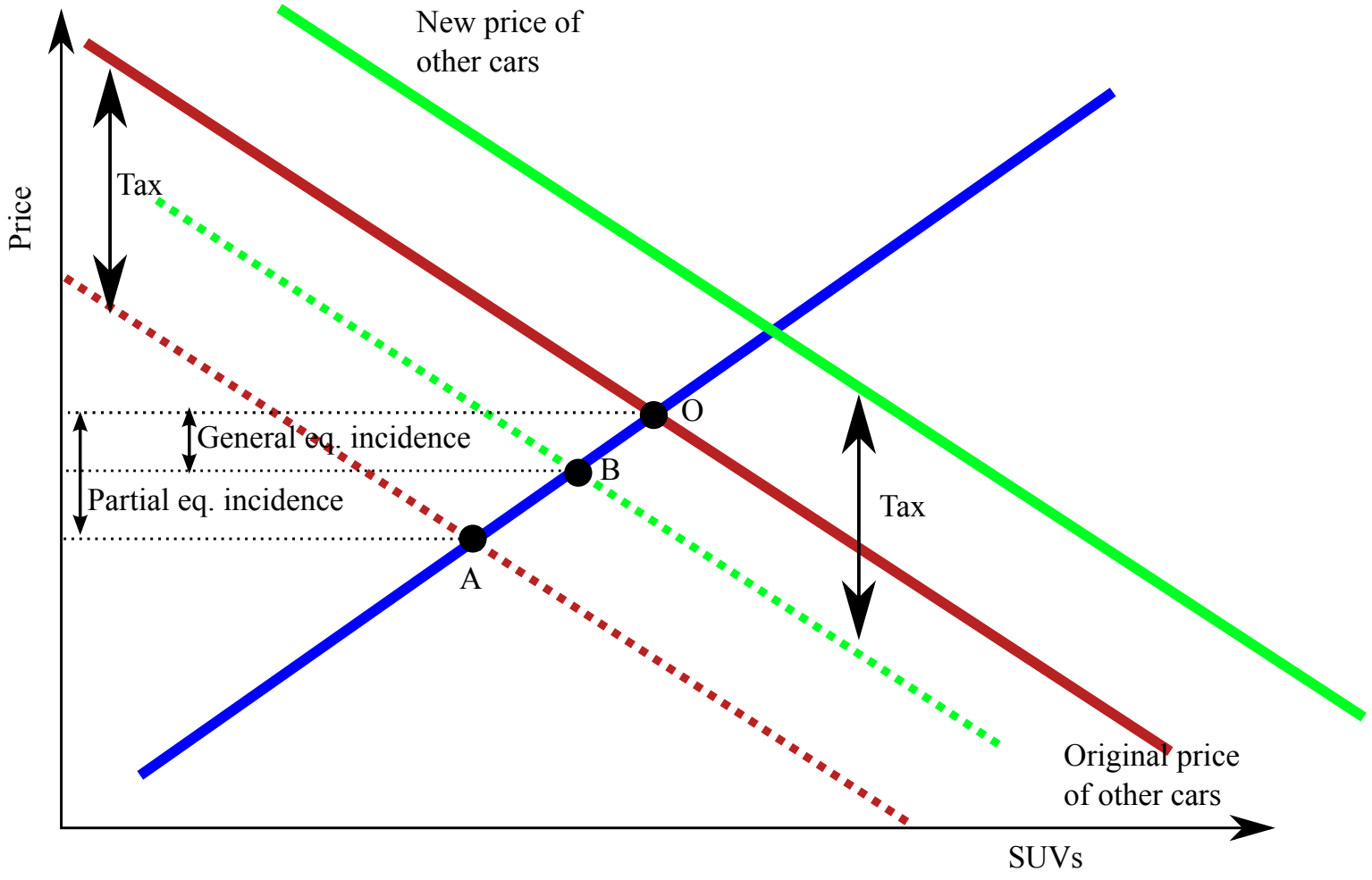
Less demand for SUVs due to tax. Eq: $O \rightarrow A$

General equilibrium incidence



1. Demand for other cars up, raising their price (not pictured).
2. SUV Demand up when substitutes more expensive. $A \rightarrow B$

General equilibrium incidence

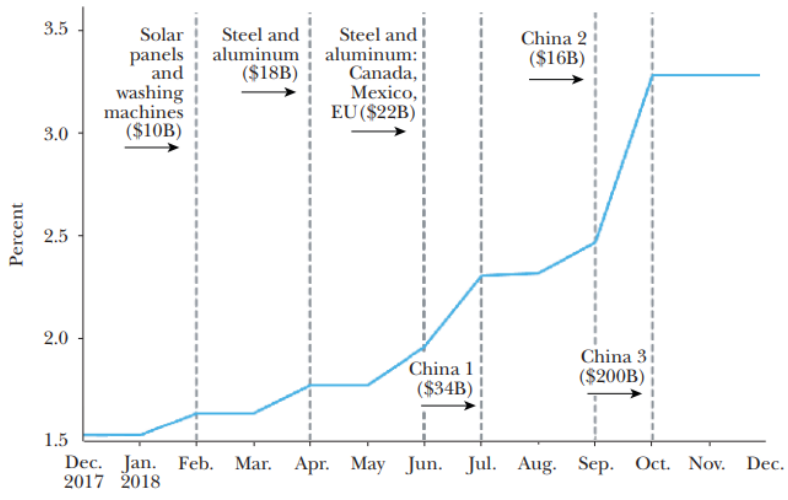


Gen eq. incidence $O \to B$ smaller than partial equilibrium $O \to A$ – tax burden shifts from SUV market to other car markets.

Empirical examples

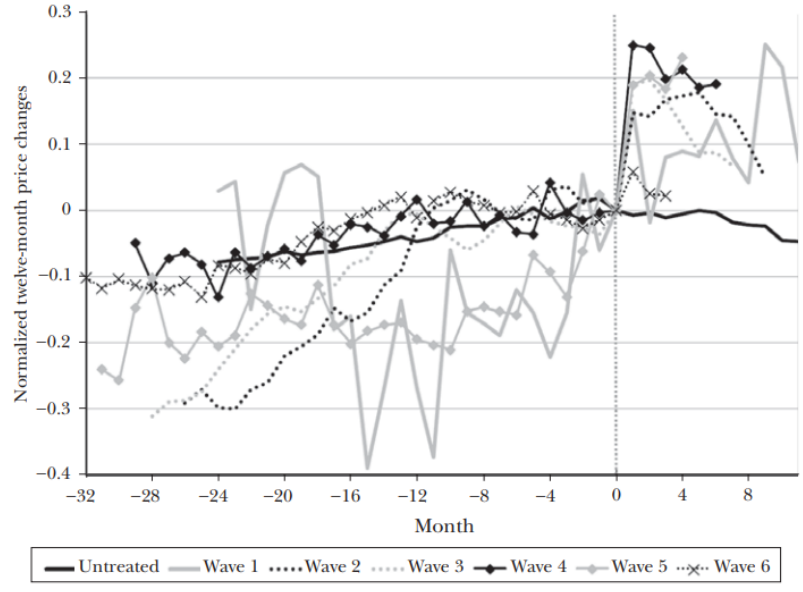
- Amiti et al. (2019): tariffs percentage and coverage of imports increased in roughly six waves during 2018
- What is a possible empirical method for this scenario?
- Estimated that consumers bore the entire tax burden ($\frac{\partial p}{\partial t} \approx 1,\ p'_C(t) \approx 0$)
- Kopczuk & Munroe (2015): discontinuous mansion tax in NJ and NY
  - 1% tax on sales of houses/apartments over \$1M
  - \$0 if the price is \$999,999 and \$1K when the price is \$1M.
  - Introduced in NJ in 2004.
- Unexpectedly large incidence $\approx 200\%$ if taken at face value, but more than just price adjustments is going on (quality changes, delaying transactions, searching more)

Figure 3
Average Tariff Rates



Average tariff rates.

Figure 4
Twelve-Month Proportional Change in Import Prices by Tariff Wave



Import prices increased substantially.

Figure: Tariff rates and relative import prices in 2018. (Source: Amiti et al. (2019))

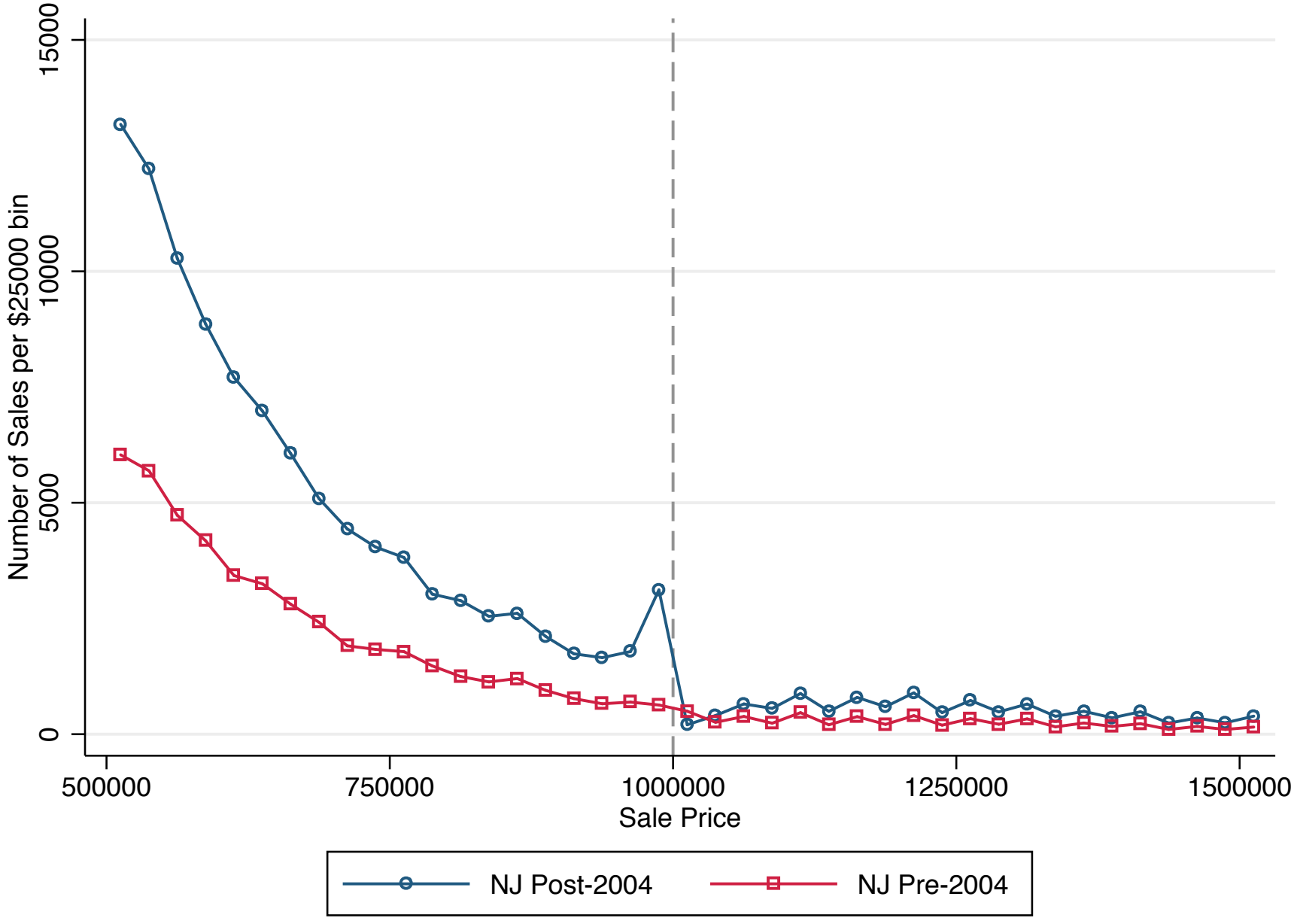
Table 1

Impact of US Tariffs on Importing

	log change foreign exporter prices (1)	*log change import quantities* (2)	*log change import quantities* (3)	*log change import values* (4)	*log change import values* (5)
	$\Delta \ln(p_{ijt})$	$\Delta \ln(m_{ijt})$	$\Delta \ln(m_{ijt})$	$\Delta \ln(p_{ijt} \times m_{ijt})$	$\Delta \ln(p_{ijt} \times m_{ijt})$
log change tariff	−0.012	−1.310***	−5.890***	−1.424***	−6.364***
$\Delta \ln(1 + Tariff_{ijt})$	(0.023)	(0.090)	(0.590)	(0.086)	(0.773)
N	1,647,617	1,647,617	3,318,912	2,487,370	4,461,376
R^2	0.021	0.024	0.099	0.012	0.102

Foreign exporters saw effectively no change in their prices, implying consumers bore the price increases. (Source: Amiti et al. (2019))

Distribution of Taxable Sales in New Jersey



Final remarks

- Short-term and long-term incidence can be quite different. For example, the demand for gasoline is very inelastic in the short-run but may be elastic in the long-run.
- Examples of empirical work related to economic incidence:
  - Tax salience — whether the tax is included in the price or presented separately seems to matter (Chetty, Looney and Kroft, American Economic Review, 2009)
  - The effect of EITC on wages — result: $1 increase, $.23 decline in wages (Rothstein, American Economic Journal: Economic Policy, 2010)
  - The effect of simultaneous Food Stamp payments on prices in local stores — not much (Hastings and Washington, American Economic Journal: Economic Policy, 2010)