Gerald R. Ford School of Public Policy

Public Policy 558
Economic Analysis in the Practice of Public Policy

Tariffs and Trade

Lecture 4

January 22, 2025

Professor Kevin Stange

Announcements? Discussion?

- Complete welfare quiz on Canvas
- Section on Friday moved to 1120 Weill
- Assignment 1 – Due Monday. Bring Qs to section/OH!

look @ assignment tonight

Today….

- Continue incidence analysis

- Recap the DC Paid Family Leave Program
- Another application: Trump's 2018 Trade Tariffs
- Readings:
  - Amiti, Mary, Stephen J. Redding, and David E. Weinstein. 2019. "The Impact of the 2018 Tariffs on Prices and Welfare." *Journal of Economic Perspectives*, 33 (4): 187-210.

Incidence of tariffs

Think of the simple case (competitive market, partial equilibrium). A very small country imposes tariffs (=taxes) on imports. The welfare consequences of those tariffs is likely to be born mostly by

A. Home country importers (and consumers)
B. Foreign country exporters
C. Foreign country workers

Incidence of tax

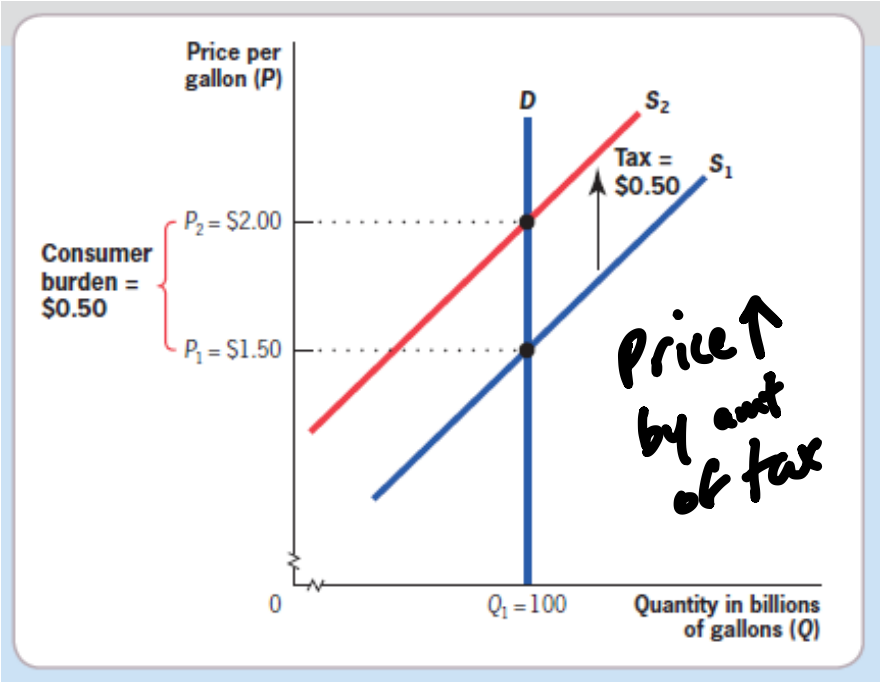
Think of the simple case (competitive market, no distortions). The city of DC imposes a tax on payroll. Labor supply to DC is very elastic. The incidence of this tax is likely to be born mostly by

A. DC employers

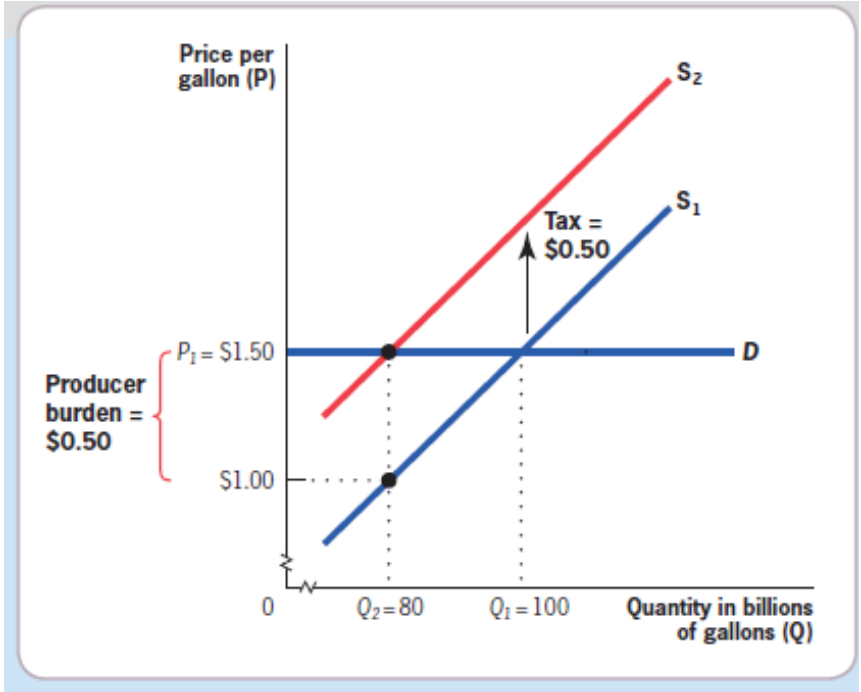
B. DC workers

Recall tax incidence: Elasticity is key

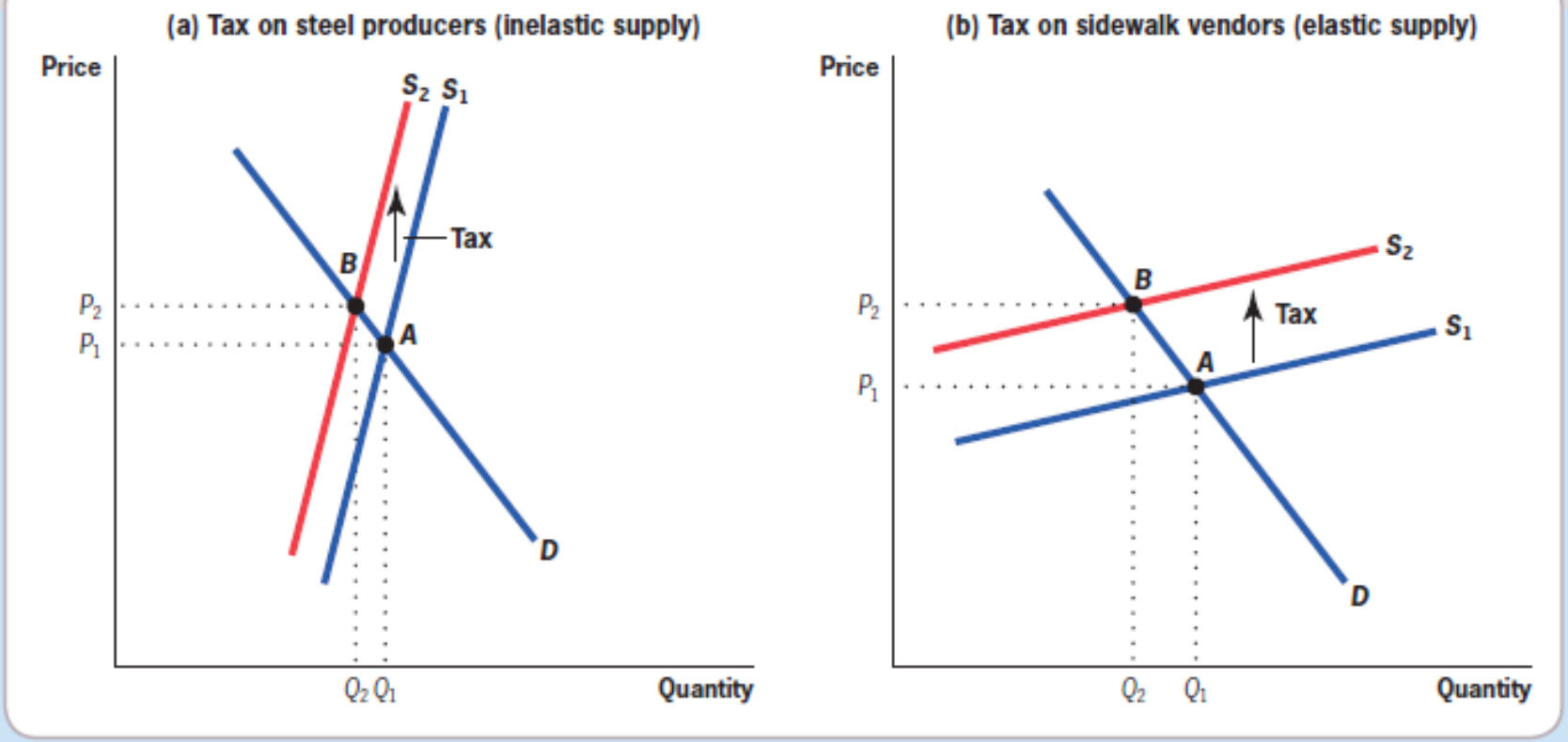
Inelastic Factors Bear Taxes • A tax on producers of an inelastically demanded good is fully reflected in increased prices, so consumers bear the full tax.



Elastic Factors Avoid Taxes • A tax on producers of a perfectly elastically demanded good cannot be passed along to consumers through an increase in prices, so producers bear the full burden of the tax.

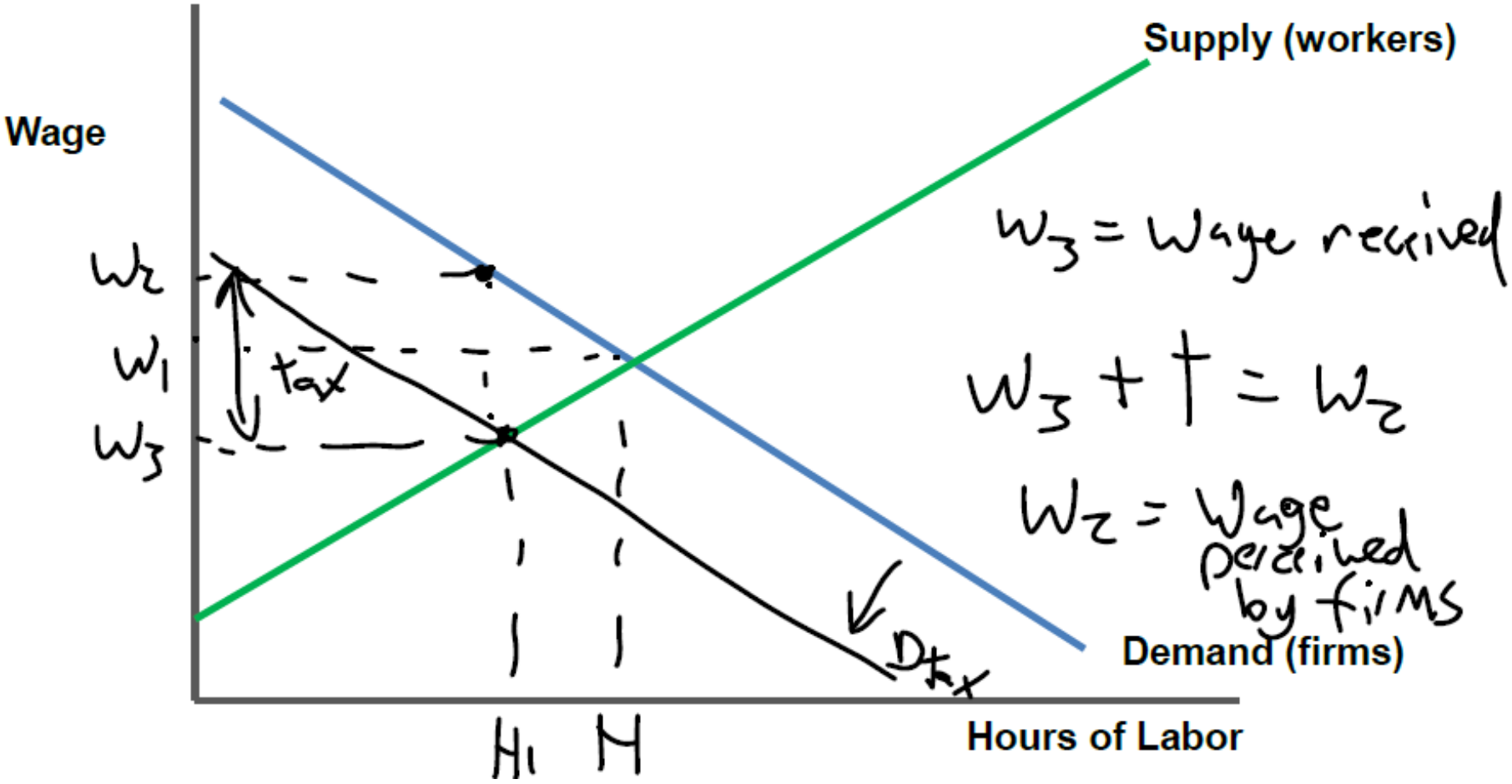


Elasticity is key

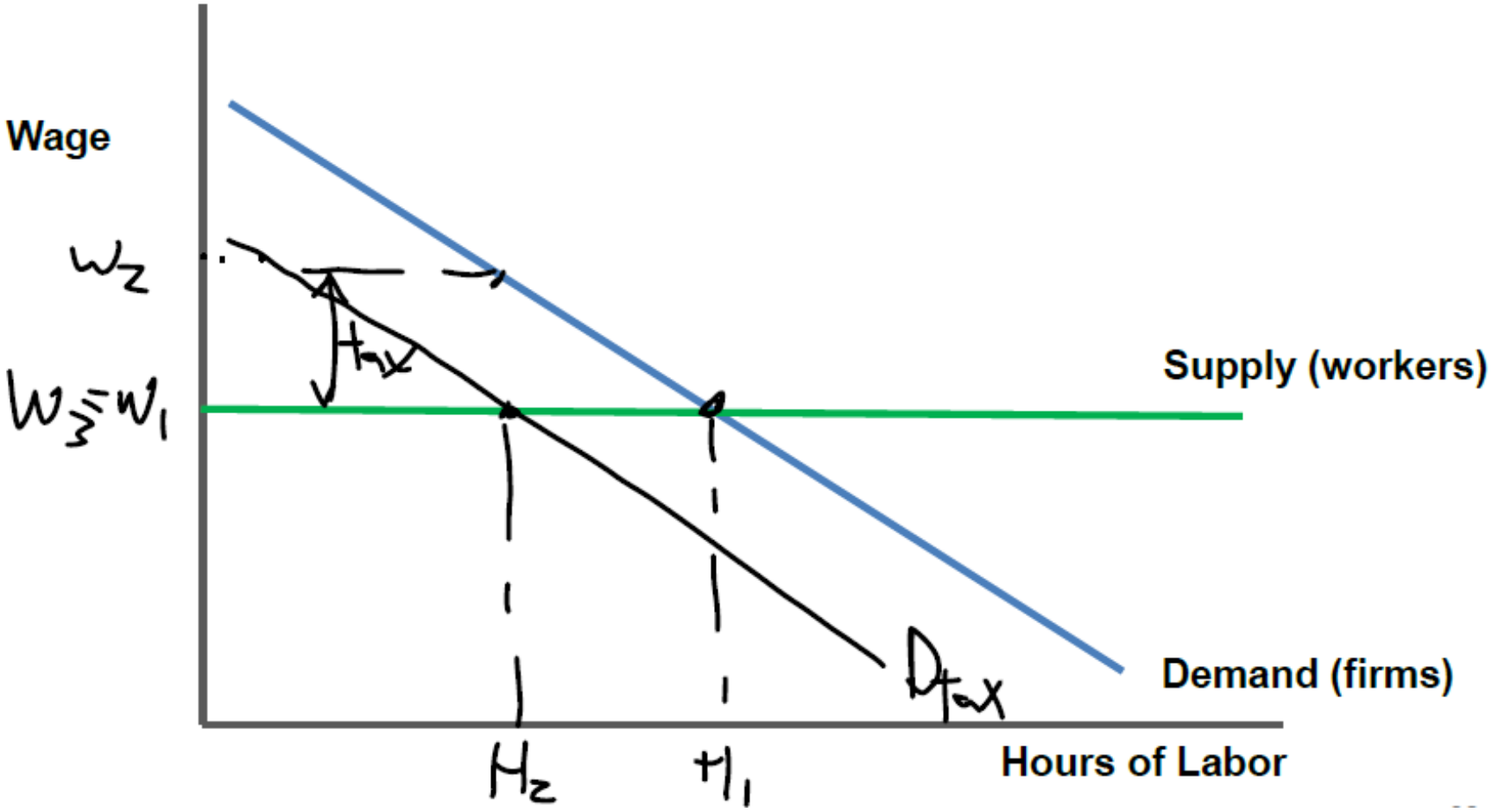


Elasticity of Supply Also Matters • A tax on producers of an inelastically supplied good, as in panel (a), leads to a very small rise in prices, so producers bear most of the burden of the tax. An equal-sized tax on producers of an elastically supplied good, as in panel (b), leads to a large rise in prices, so producers bear little of the burden of the tax (and consumers bear most of the burden).

Hybrid Tax Absorption: This behavioral response scenario assumes that firms would respond to the new tax by shifting approximately half of it on to employees and absorbing the rest. Some firms also react by raising their prices.



Firms Absorb the Tax: This behavioral response scenario assumes that businesses would mostly absorb the payroll tax primarily by reducing their labor cost. Firms would also react by raising the prices they charge for their goods and services. Per employee labor costs would be the same as they would be under the baseline forecast, but some businesses would react by shrinking the relative size of their workforce.



Key ideas

- Generally speaking, the side of the market that a tax is imposed on doesn't influence who bears the burden of the tax
  - Relative elasticities are what matters
    - Incidence falls more on the inelastic side of the market
    - Elastic consumers or producers can avoid a tax

- Exceptions
  - Price floors (minimum wage) or ceilings
  - Market power (monopoly or monopsony)

What and why of trade policy

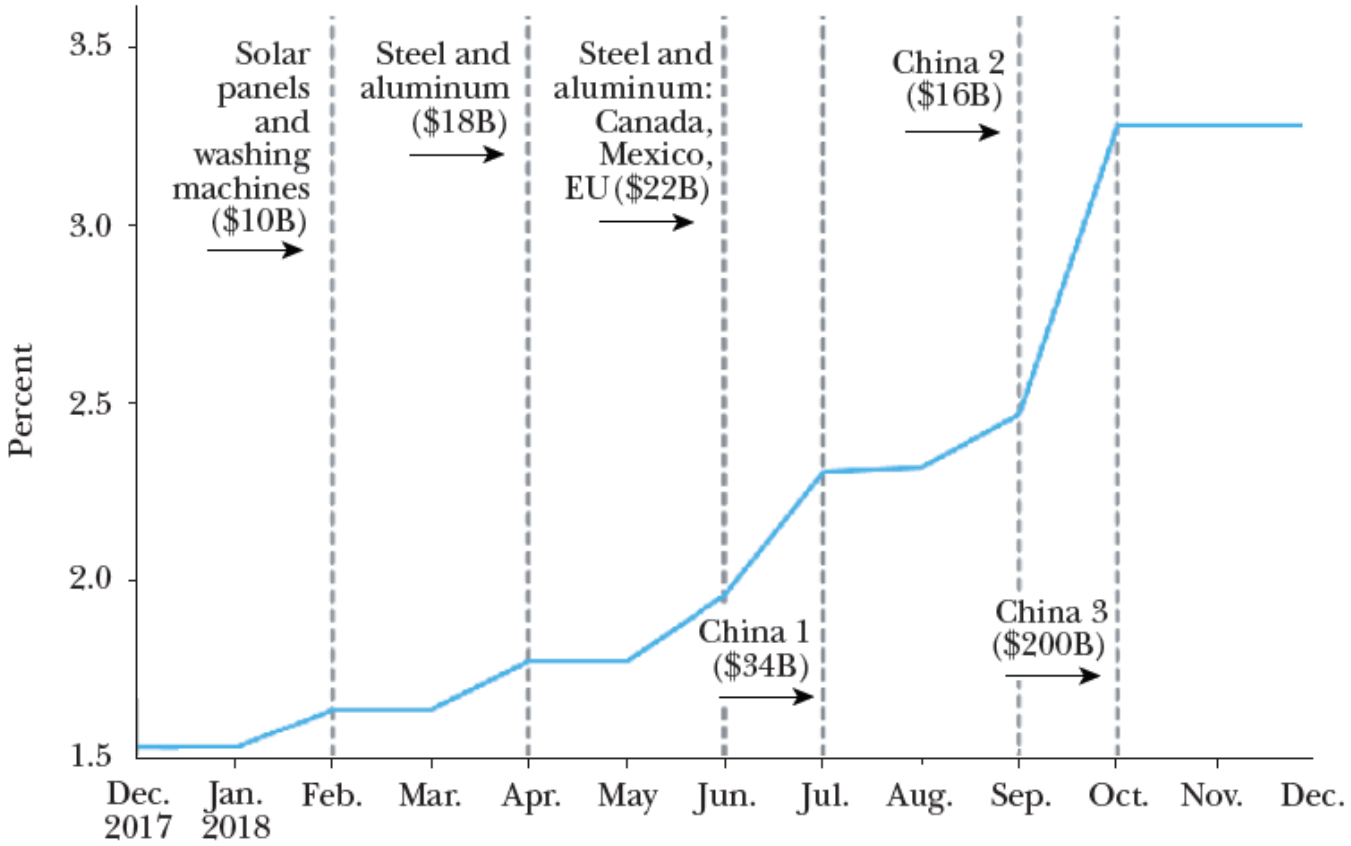
[2] Governments influence international trade through eight main policy instruments: import taxes (tariffs), export taxes, export subsidies, import subsidies, antidumping actions, quantitative restrictions (in the form of import quotas or export restraints), and standards protection. Of these instruments, export taxes are explicitly prohibited by the US Constitution and import subsidies are rare; the majority of interventions come in the form of tariffs, quantitative restraints, antidumping actions, and standards protection. Of these, tariffs are by far the most common. As argued in the seminal history of US trade policy in Irwin (2017), governments have traditionally used these tariffs for three main objectives: (1) raising revenue, (2) restricting imports to protect domestic producers from foreign competition, and (3) negotiating reciprocity agreements to reduce trade barriers and expand exports.

Trump 2025 tariffs on China (10%)

2018 Tariffs

- During 2018, the Trump administration imposed import tariffs on approximately $283 billion of U.S. imports (12% of all imports), with rates ranging between 10 percent and 50 percent.
- U.S. trading partners, especially China, retaliated with tariffs averaging 16 percent on approximately $121 billion of U.S. exports
- First episode of large-scale reciprocal tariff protection since the Great Depression of the 1930s.

Average Tariff Rates

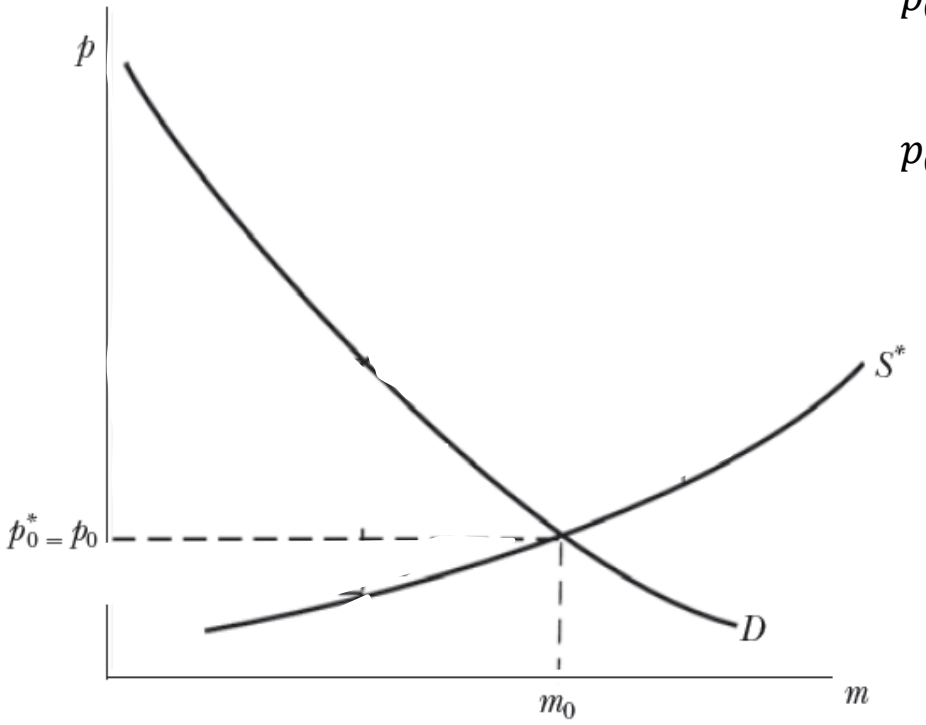


Source: US Census Bureau; US Trade Representative (USTR); US International Trade Commission (USITC); authors' calculations.

Note: Tariffs on the ten-digit Harmonized Tariff Schedule (HTS10) product code by country, weighted by 2017 annual import value. Dashed vertical lines indicate the implementation of each of the six major waves of new tariffs during 2018; tariffs implemented after the fifteenth of the month counted for the subsequent month. Three tranches of tariffs were imposed on China, designated by 1, 2, and 3.

Market for imports

Impact of a Tariff on Prices



p_0 =importer price before tariff

p_0^*=exporter price before tariff

D = Demand for importers

S= World producers

M= quantity of imports

Source: Authors.

Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

2018 Tariffs

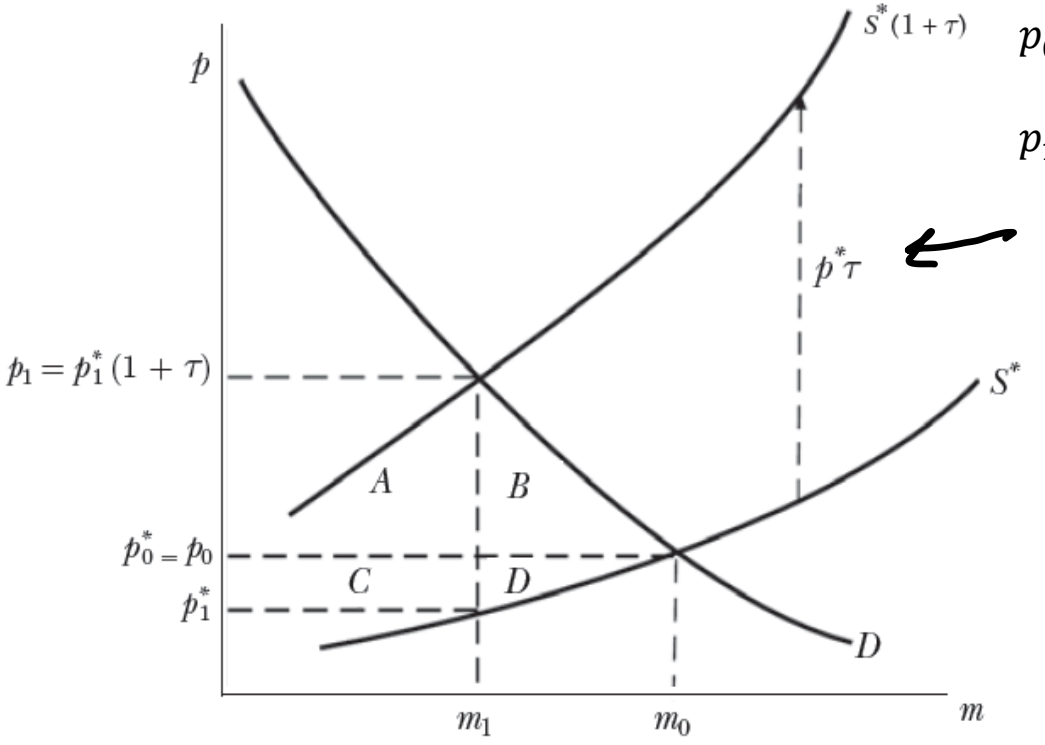
p_0 =importer price before tariff

p_1 =importer price after tariff

p_0^*=exporter price before tariff

p_1^*=exporter price after tariff

Impact of a Tariff on Prices



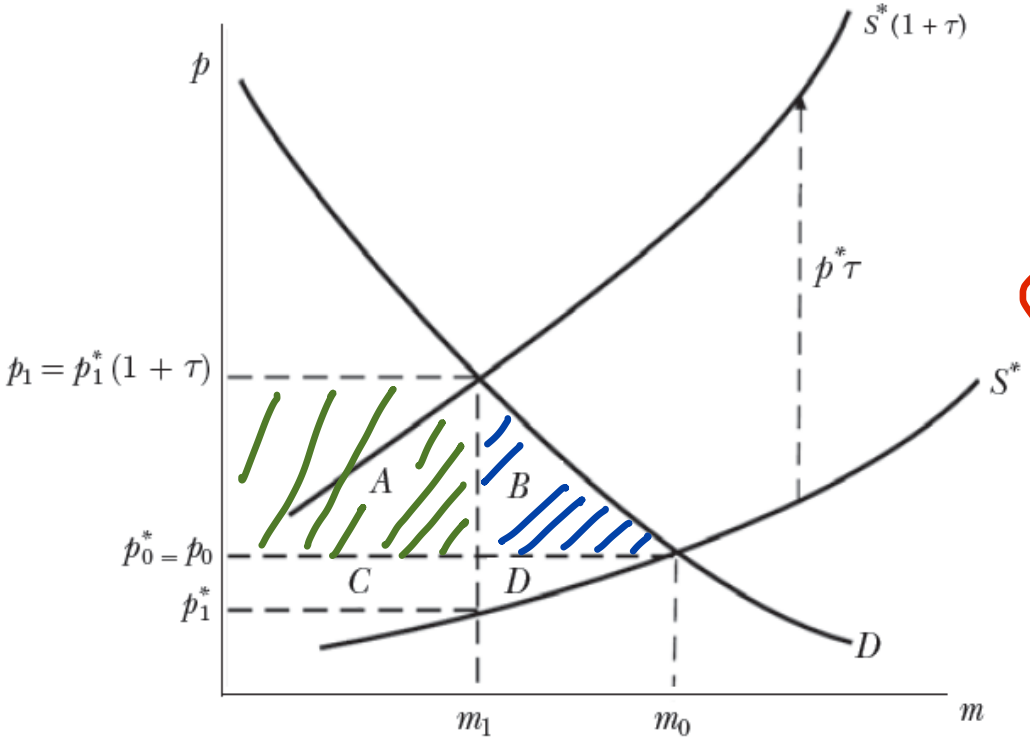
Per unit tax ↑ as price ↑

Source: Authors.

Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

2018 Tariffs

Impact of a Tariff on Prices



Change in Consumer Surplus is

A. A
B. B
C. C
D. D
E. A+B

A = transfer from consumers to govt (tariff)

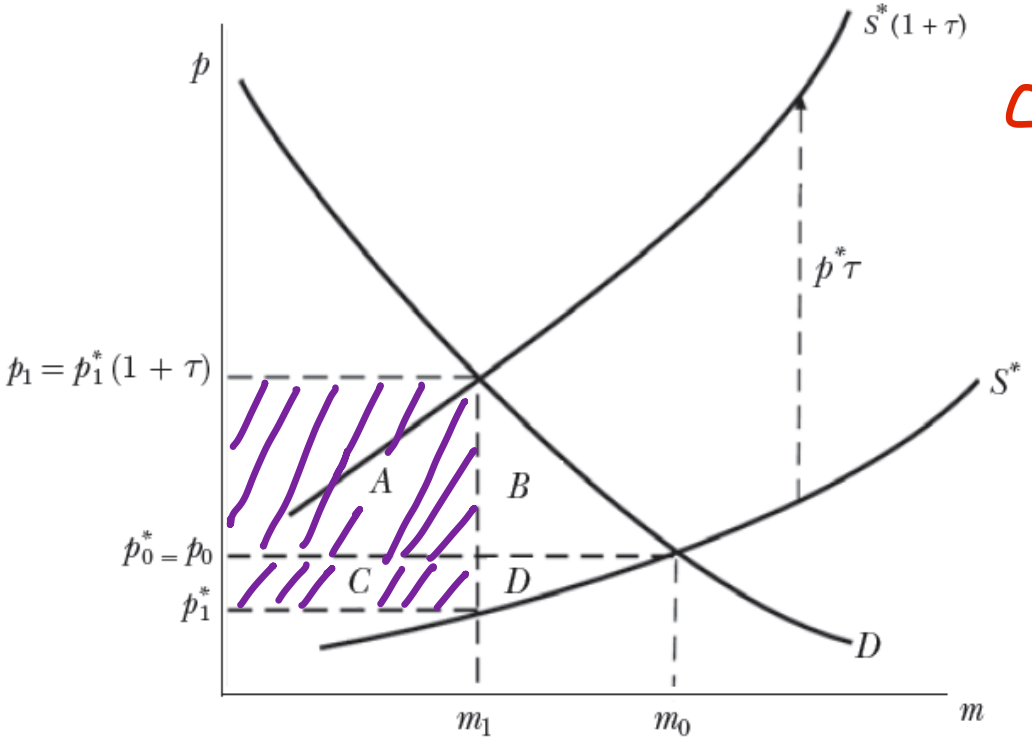
B = Dead Weight loss (units - NOT consumed)

Source: Authors.

Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

2018 Tariffs

Impact of a Tariff on Prices



Revenue raised is

A. A

B. C

C. A+C

D. B+D

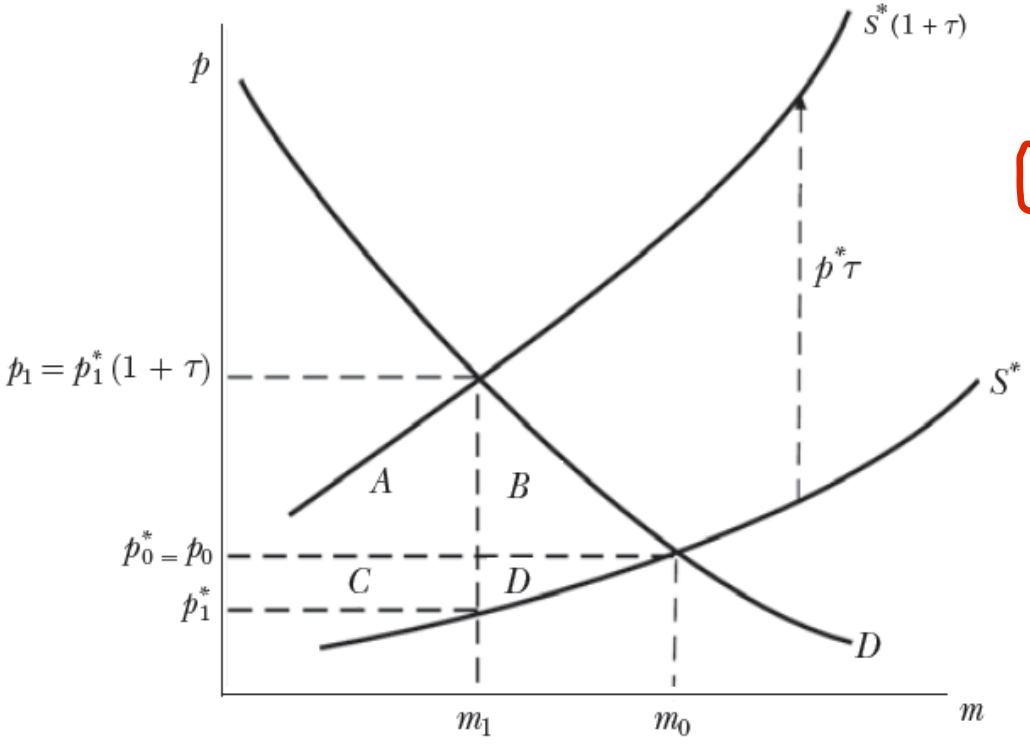
C = Amount Paid by Foreign Producers to Govt in Form of Tariff

Source: Authors.

Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

2018 Tariffs

Impact of a Tariff on Prices



DWL is

A. A

B. C

C. A+C

D. B+D

B+D = DWL

B ← DWL for consumer

D ← DWL for producer

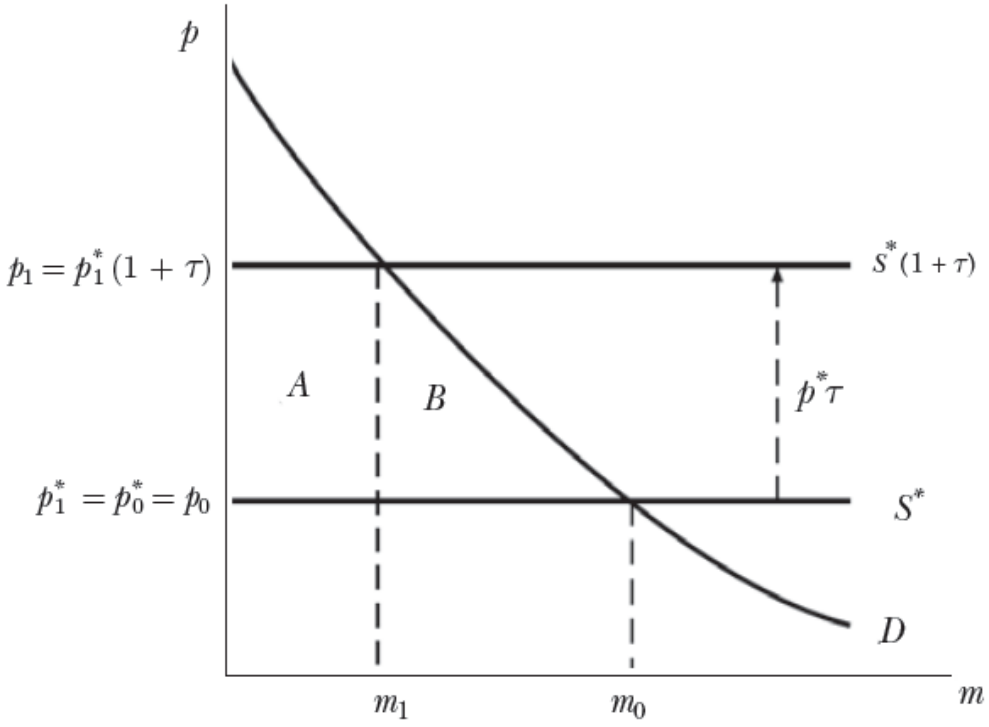
Source: Authors.

Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

Perfectly Elastic Export Supply

Price ↑ all paid by consumers, not producers.

Impact of a Tariff on Prices with Perfectly Elastic Export Supply



Source: Authors.
Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

How to assess welfare consequences

- What would we need to know?

- Where can we get these numbers?

Data

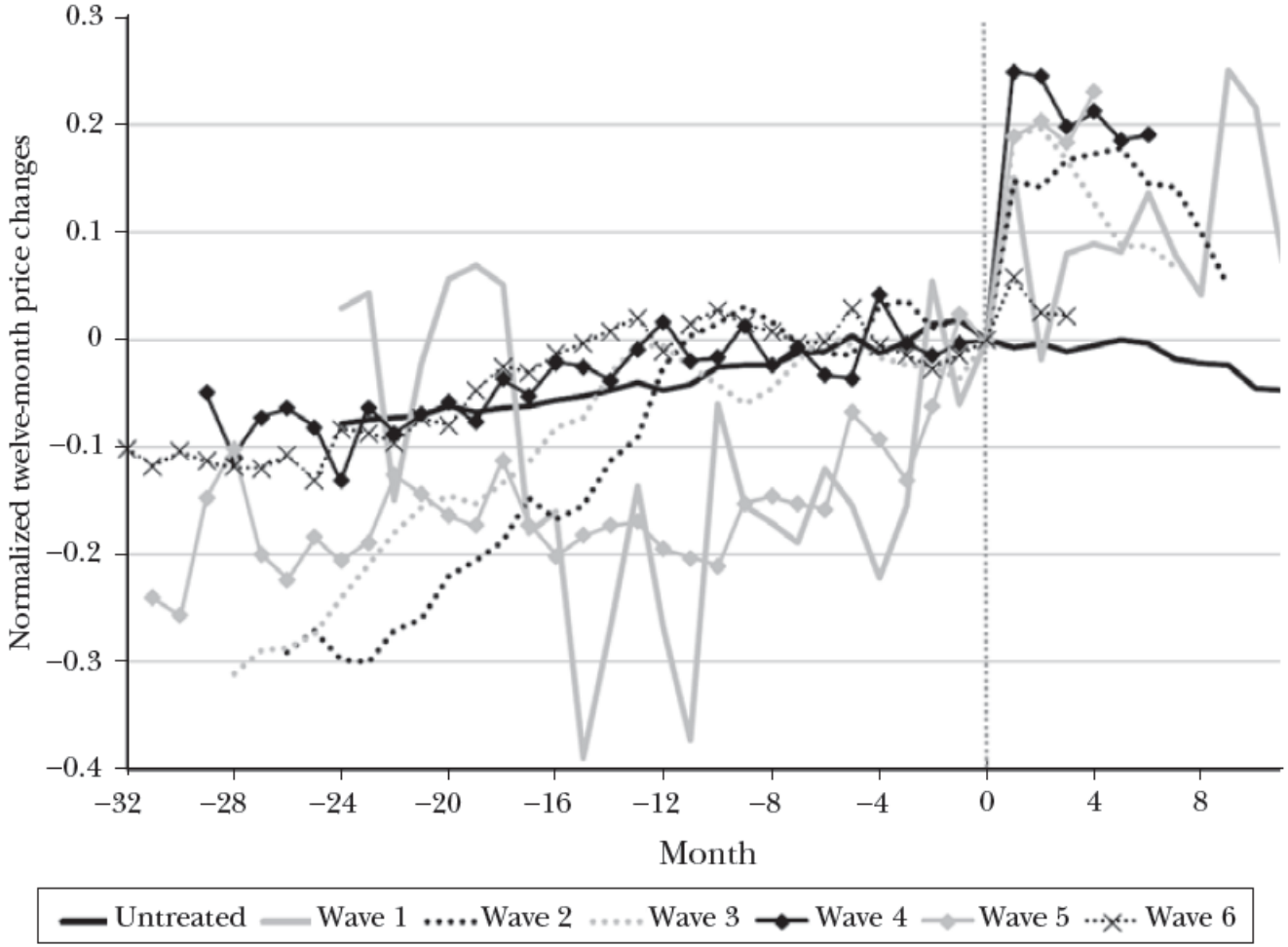
- U.S. customs data report the values and quantities of imports by source country at the 10-digit level of harmonised tariff system (HTS10 data) for around 16,000 narrowly defined categories.

- Dividing the import values by the quantities, we compute unit values at a very disaggregated level (e.g, 'baseball and softball gloves and mitts made in China'). Importantly, unit values are computed before tariffs are applied, so they correspond to foreign export prices.

- Therefore, if we multiply these unit values by the duty rates available from the U.S. International Trade Commission (ITC), we can compute tariff-inclusive import prices.

  → gives us both the consumer (importer) price and the producer (foreign exporter) price. The difference is the amount of the tariff

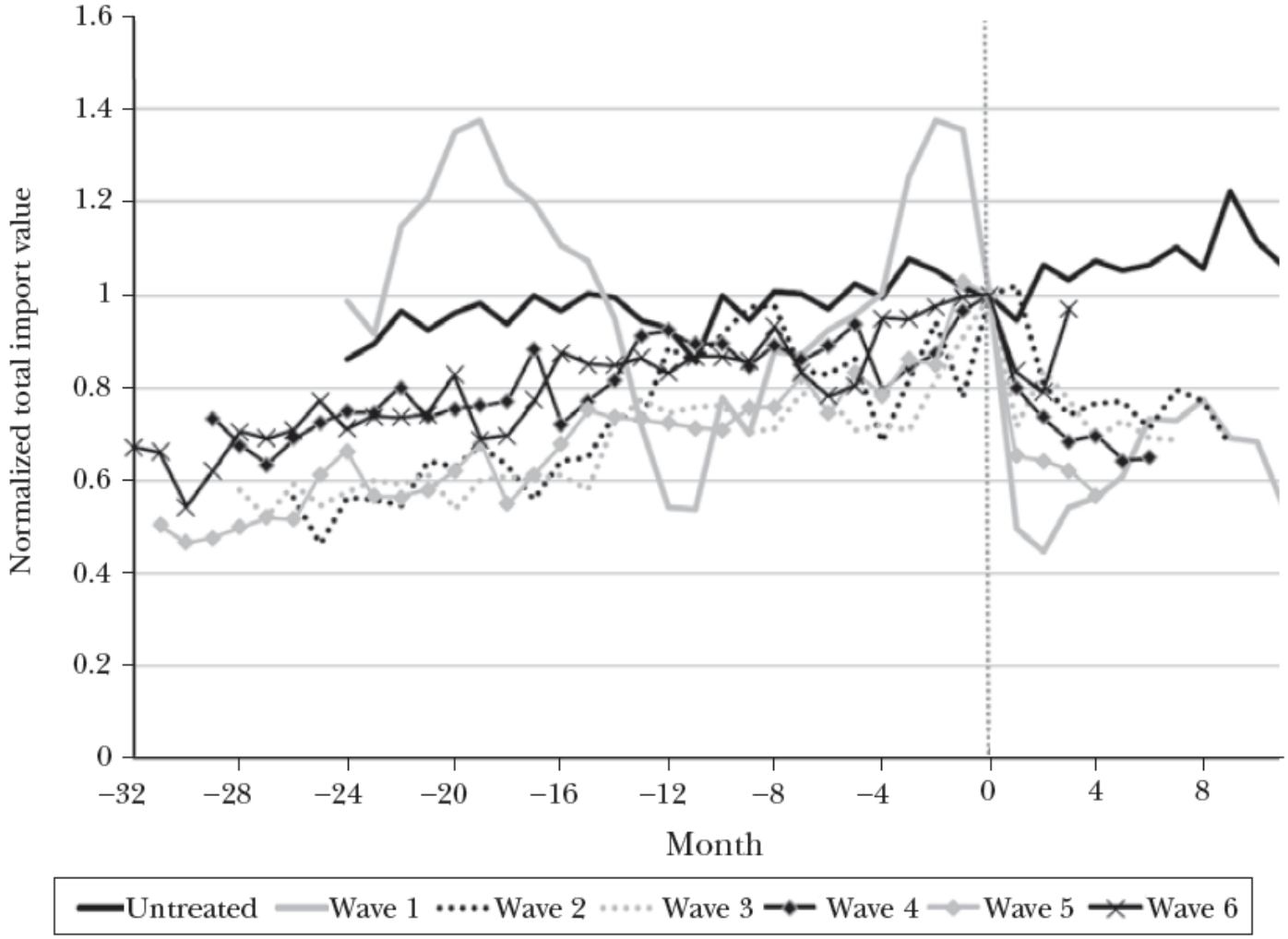
Twelve-Month Proportional Change in Import Prices by Tariff Wave



Source: US Census Bureau; US Trade Representative (USTR); US International Trade Commission (USITC); authors' calculations.

Note: Proportional change in an import share–weighted average of twelve-month relative changes in US import unit values inclusive of tariffs (import values divided by import quantities) for each tariff wave and for unaffected countries and products. Proportional changes for each wave are normalized to equal zero in the month prior to the introduction of the tariff; for the untreated month, zero is defined as in the first tariff wave. Tariff waves are defined in the section "How Did Tariffs Affect US Prices?"

Total Import Values by Tariff Wave



Source: US Census Bureau; US Trade Representative (USTR); US International Trade Commission (USITC); authors' calculations.

Note: Twelve-month proportional changes in the value of US imports by tariff wave and for unaffected countries and products. Each series is normalized to the value one in the month prior to the introduction of the tariff; for the untreated month, zero is defined as in the first tariff wave. Tariff waves are defined in the section "How Did Tariffs Affect US Prices?"

How to assess welfare consequences?

- How do exporter prices move when a tariff is imposed? What about quantities?

$$\Delta log\left(ExportPrice_{ijt}\right) = \beta \Delta log\left(1 + tariff_{ijt}\right) + \alpha_i + \gamma_{jt} + \varepsilon_{ijt}$$

$$\Delta log\left(Quantity_{ijt}\right) = \beta \Delta log\left(1 + tariff_{ijt}\right) + \alpha_i + \gamma_{jt} + \varepsilon_{ijt}$$

- All of the fixed effects means we are comparing the price (quantity) change for a specific product from a country relative to the price (quantity) change for the same product from other countries and other products from the same country (that did not experience a tariff)

Regression analysis gives us the numbers

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 $\Delta \ln(1 + Tariff_{ijt})$	–0.012 (0.023)	–1.310*** (0.090)	–5.890*** (0.590)	–1.424*** (0.086)	–6.364*** (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

(1) No price change for exporters

→ tells us supply is perfectly elastic

(2) and (3) 1%↑ tariff leads to 1.3% - 5.9% ↓ imports

→ tells us how quantities change

These findings together with the amount of the tariff (τp_1^*) tell us the DWL

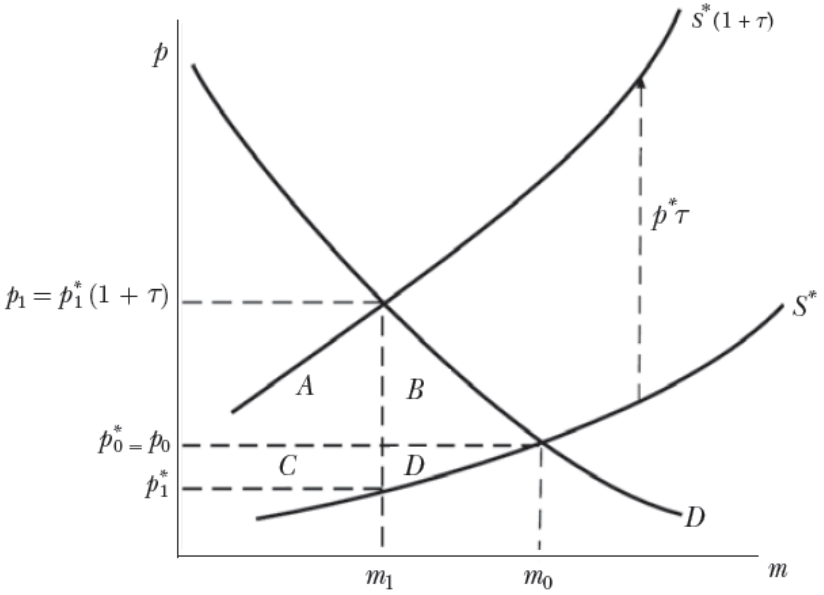
Interpretation

- Why is there no price effect on foreign exporters? (prior work has found some tariff incidence on foreign exporters)

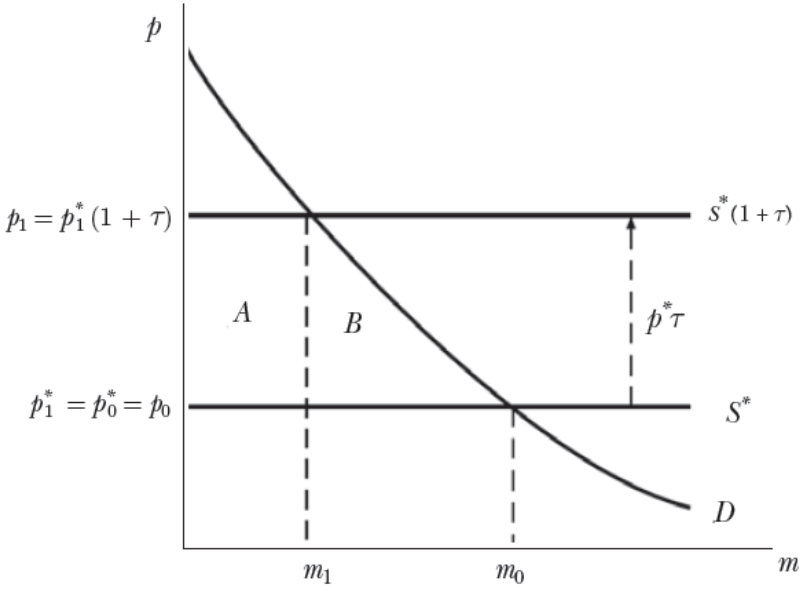
- How might this result be misleading?
  - Short run
  - Uncertainty about length of tariffs (not permanent)

2018 Tariffs: Which world are we in?

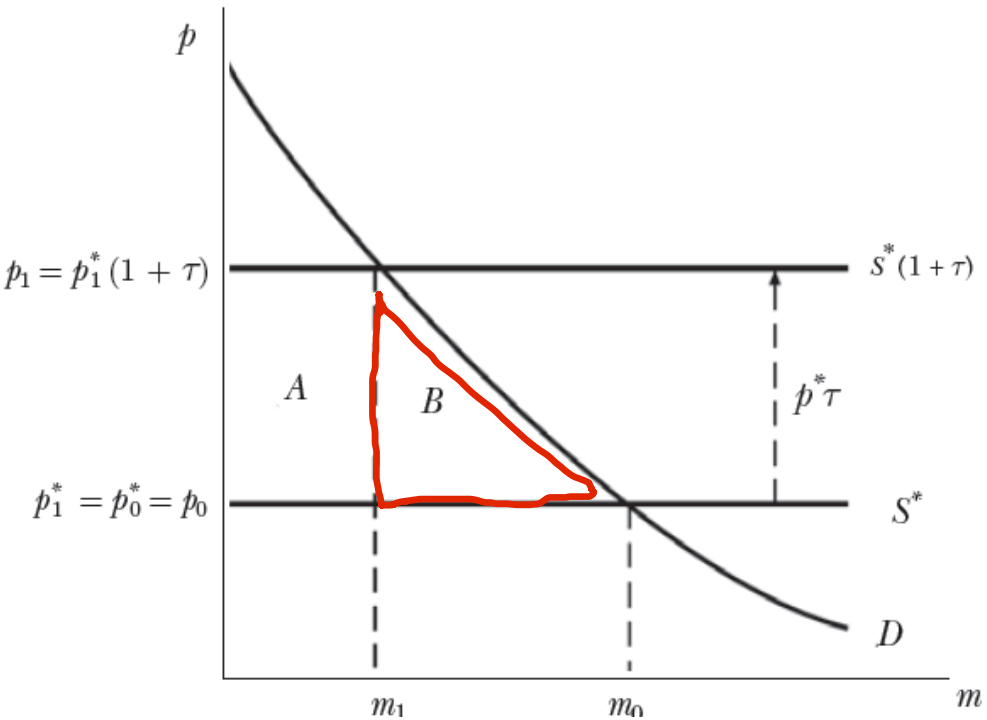
"Standard case": Incidence is split (though more on US importers given how curves are drawn)



Perfectly elastic supply of imports: Incidence falls entirely on US importers (and their consumers)



Deadweight Loss



- Assuming import demand curve has a constant slope
- The height of the triangle is the size of the tariff (τ p ∗1) , which is observed in the data.
- The width of the triangle is the change in imports due to the tariff (m0 – m1), can be estimated using the coefficient from the quantity regression in column 3 of Table 1.

$$DWL = \frac{1}{2}(p_1 - p_0)(m_0 - m_1)$$

$$DWL = \frac{1}{2}(\tau \cdot p_1^*)(m_0 - m_1)$$

DWL Results

Deadweight Welfare Loss and Tariff Revenue

(current prices in billions of dollars)

Month (2018)	*Deadweight loss (1)*	*Tariff revenue (2)*	*Total cost to importers (3)*
January	0	0	0
February	0.1	0.1	0.2
March	0.1	0.1	0.2
April	0.3	0.4	0.7
May	0.2	0.4	0.6
June	0.4	0.7	1.2
July	0.9	1.4	2.4
August	0.9	1.4	2.3
September	1.0	1.6	2.6
October	1.5	3.2	4.6
November	1.4	3.0	4.4
December	1.4	3.2	4.7
Total	8.2	15.6	23.8

Note: Column 3 is the sum of columns 1 and 2; see the text for the details of these calculations.

DWL vs. Tariff Revenue

We can also compare these deadweight losses to the value of the tariff revenue raised, which was $15.6 billion for the twelve months of 2018. Given that we find no effect of the tariffs on the prices received by foreign exporters, this **tariff revenue is a pure transfer from domestic consumers to the government**.

If we assume that the US government uses the tariff revenue to generate social welfare benefits equal to the tax burden, the reduction in welfare from the tariff for the economy as a whole is captured by the deadweight loss, while the cost to the consumer and importer equals the sum of the deadweight welfare loss and the tariff revenue transferred to the government.

If we were instead to assume that the US government does not generate social welfare benefits equal to the tax payments they receive, the losses to taxpayers could rise by as much as the full value of their tariff payments.

Putting the magnitudes in perspective

- What are some ways to think about this $8.2 billion loss?
  - NAFTA
  - Royalties obtained from China for US intellectual property
  - Per steel/aluminum job saved in past 10 years

Assumptions and limitations

- Partial equilibrium
- Perfect competition
- Exogenous tariffs
- Retaliatory tariffs
- Domestic prices
- Import varieties

Concluding

Conventional trade models provide a powerful framework for understanding how tariffs affect prices, quantities, and welfare. We find that the US import tariffs were almost completely passed through into US domestic prices in 2018, so that the entire incidence of the tariffs fell on domestic consumers and importers up to now, with no impact so far on the prices received by foreign exporters.

The deleterious impacts of the tariffs imposed by the Trump administration in 2018 have been largely in line with what one might have predicted on the basis of a simple supply and demand framework. During 2018, prices of US-made intermediate and final goods rose significantly in sectors affected by the tariffs relative to unaffected sectors, and the US economy experienced large changes to its supply-chain network, reductions in the availability of imported varieties, and complete pass-through of the tariffs into domestic prices of imported goods. We estimate the cumulative deadweight welfare cost (reduction in real income) from the US tariffs to be around $8.2 billion during 2018, with an additional cost of $14 billion to domestic consumers and importers in the form of tariff revenues transferred to the government. The deadweight welfare costs alone reached $1.4 billion per month by December 2018. These estimates are in line with the findings of a growing number

Questions? Comments?

- What is missing from this incidence analysis?

Wrapping up welfare/incidence analysis

- Welfare consequences are captured by change in surplus
  - Consumers and Producers
  - Deadweight loss
  - Tax revenue (or spending) for the government
- Incidence depends on relative elasticity
  - Party that is very elastic will be able to avoid the tax
  - Party that is inelastic will be most affected by the tax
- Incidence does not depend on who has to formally pay the tax (unless there are pre-existing market distortions)
- To put numbers on the welfare change and DWL, need
  - Shape of demand and supply curves
  - Change in prices and quantities following the policy change (e.g. tax or tariff)

NEXT: EXTERNALITIES