Lecture 01

Introduction to Environmental Economics

Ivan Rudik
AEM 4510

Roadmap

- Course set up and SDS testing program
- What is environmental economics?
- What are the goals for this class?
- Microeconomics recap

Course set up and SDS testing program

AEM 4510 / AEM 5510 / ECON 3865: Basics

Professor: Ivan Rudik

TAs: Virginia Callison, Mike Huang, Tianzi Liu, Toni Marcheva

Office hours: every day of the week (see syllabus for time and location)

Readings: Markets and the Environment by Keohane and Olmstead, papers available through the course website or library

Prereqs: MATH 1110, and either AEM 2600 or ECON 3030

Course website: https://aem4510.ivanrudik.com

AEM 4510 / AEM 5510 / ECON 3865: Grading

10 Online Quizzes (2%): canvas-based, simple questions (solo)

- On Thursdays where there is no prelim that week, you have all day to start/finish

3 Problem Sets (10%): mix of quantitative and conceptual problems to give you practice in learning key concepts (teams of 3)

- 1 before each prelim: Feb 6, Mar 13, Apr 17

AEM 4510 / AEM 5510 / ECON 3865: Grading

3 Prelims (15%, 15%, 10%): test your understanding of key concepts (solo)

- Feb 15, Mar 22, Apr 26
- **SDS:** This class is in the Alternative Test Program, if approved for exam accommodations, you must request your exam accommodation(s) for this course and fill out an exam request form for each exam in this course via the SDS student portal by February 8th

1 Final Project (5% paper, 2% presentation, 3% team eval): put your understanding of key concepts to work on real world issues (teams of 3)

- Presentations last 3ish days of class, paper due May 16 during finals week

AEM 4510 / AEM 5510 / ECON 3865: Content

Weeks 1-6ish: the economics of environmental regulation

- More theory, graphical
- Taxes, cap and trade, regulating monopolies, etc

Weeks 6-13ish: using markets (real and financial) to tell us about the environment

- Some theory, also real world analyses
- valuing recreation, housing markets, bond markets, green instruments

AEM 4510 / AEM 5510 / ECON 3865: Last words

This was just an overview, syllabus on canvas and course website has a lot more details about specific requirements

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Any questions about the course?

What is environmental economics?

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These ideas can be applied to the environment

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The value of mitigating pollution

How agents will response to climate change policies

Whether investment tax credits for wind power are cost-effective

Air pollution is bad

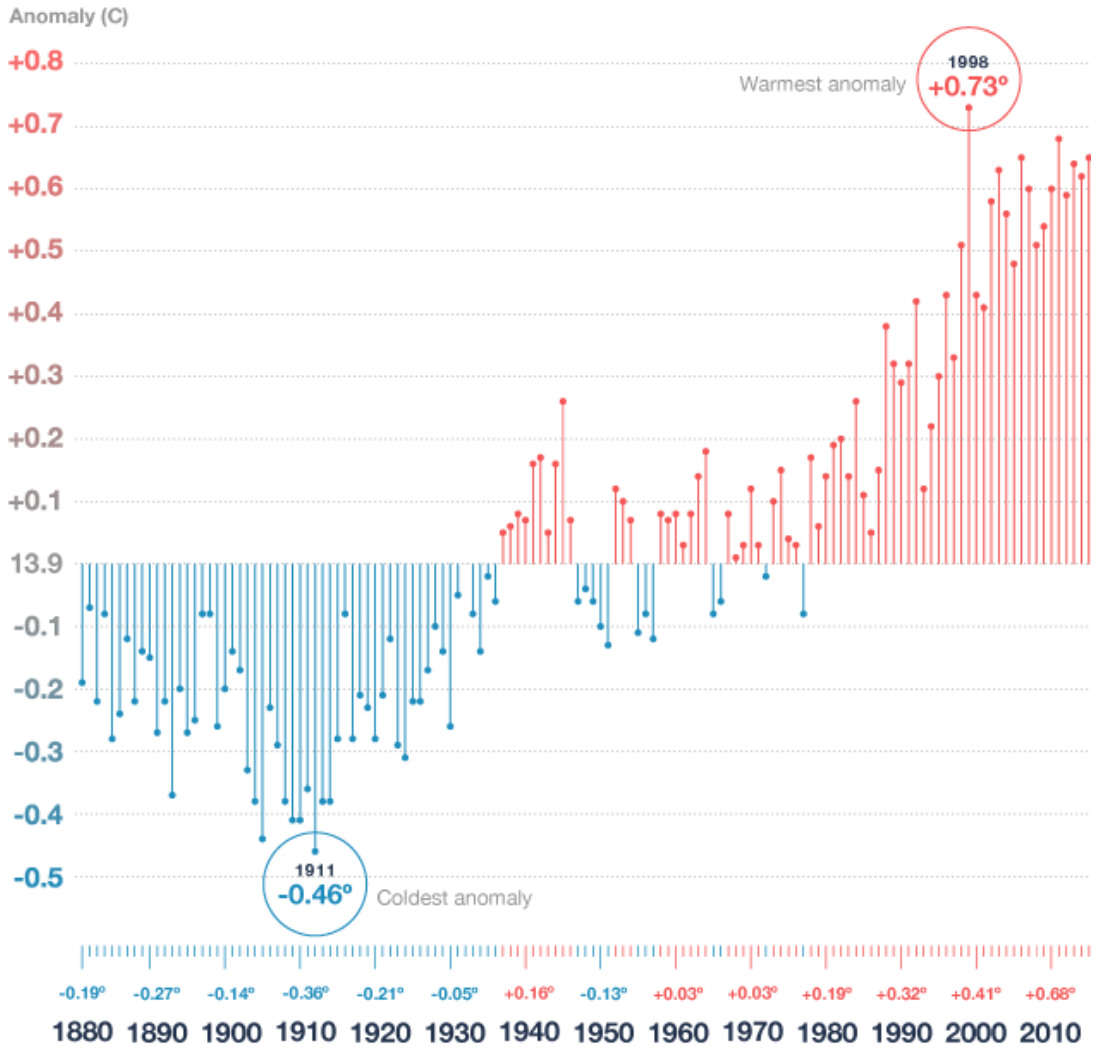
How do people respond to info?

Places provide info to help people avoid air pollution

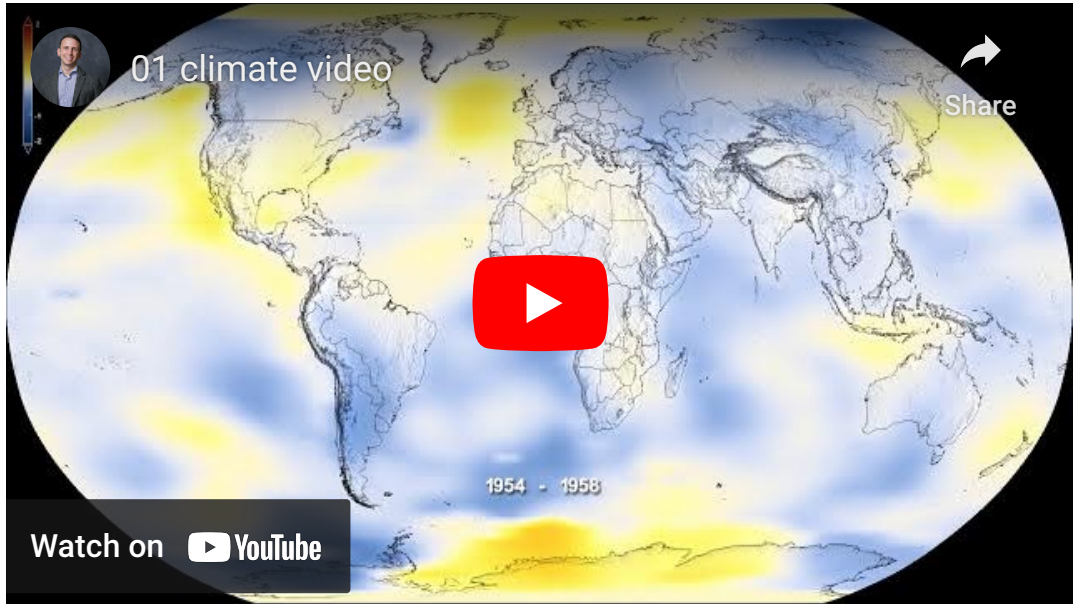
Does it work?

How well?

Climate change



Climate change



Climate change

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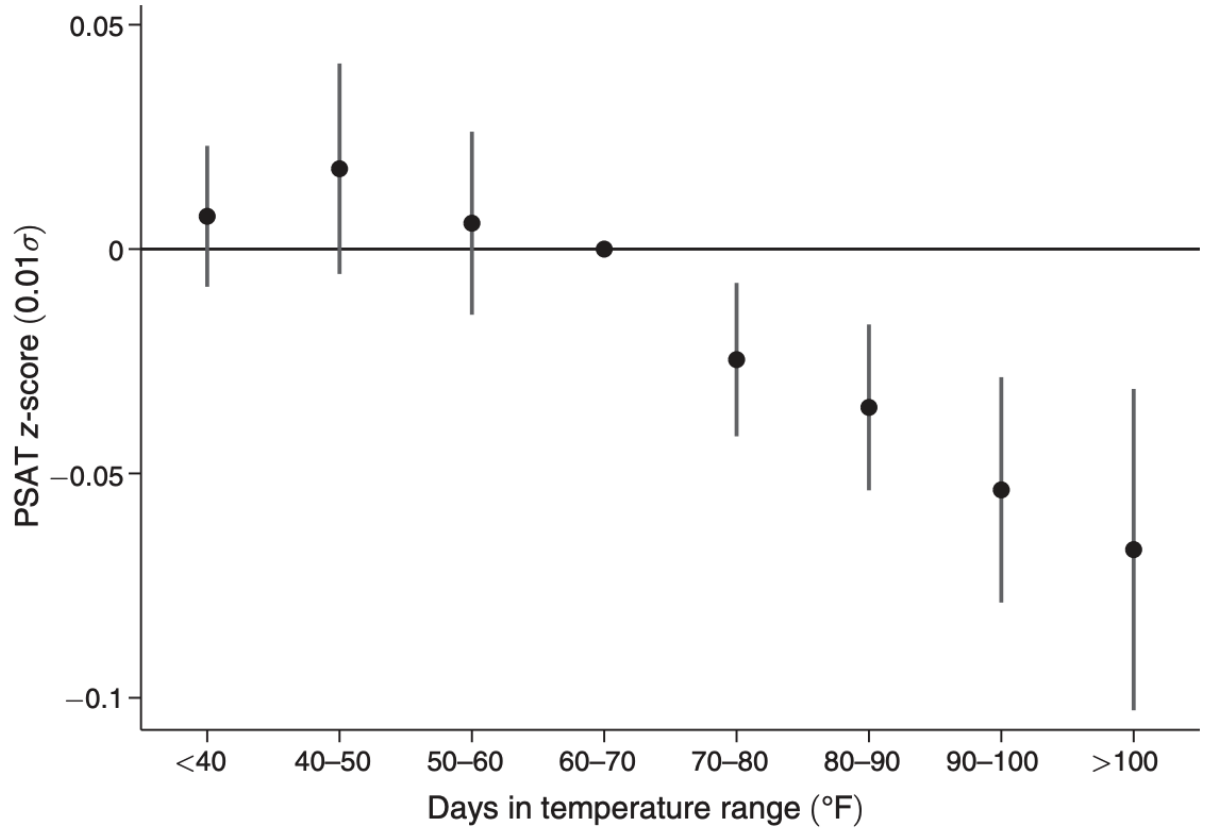
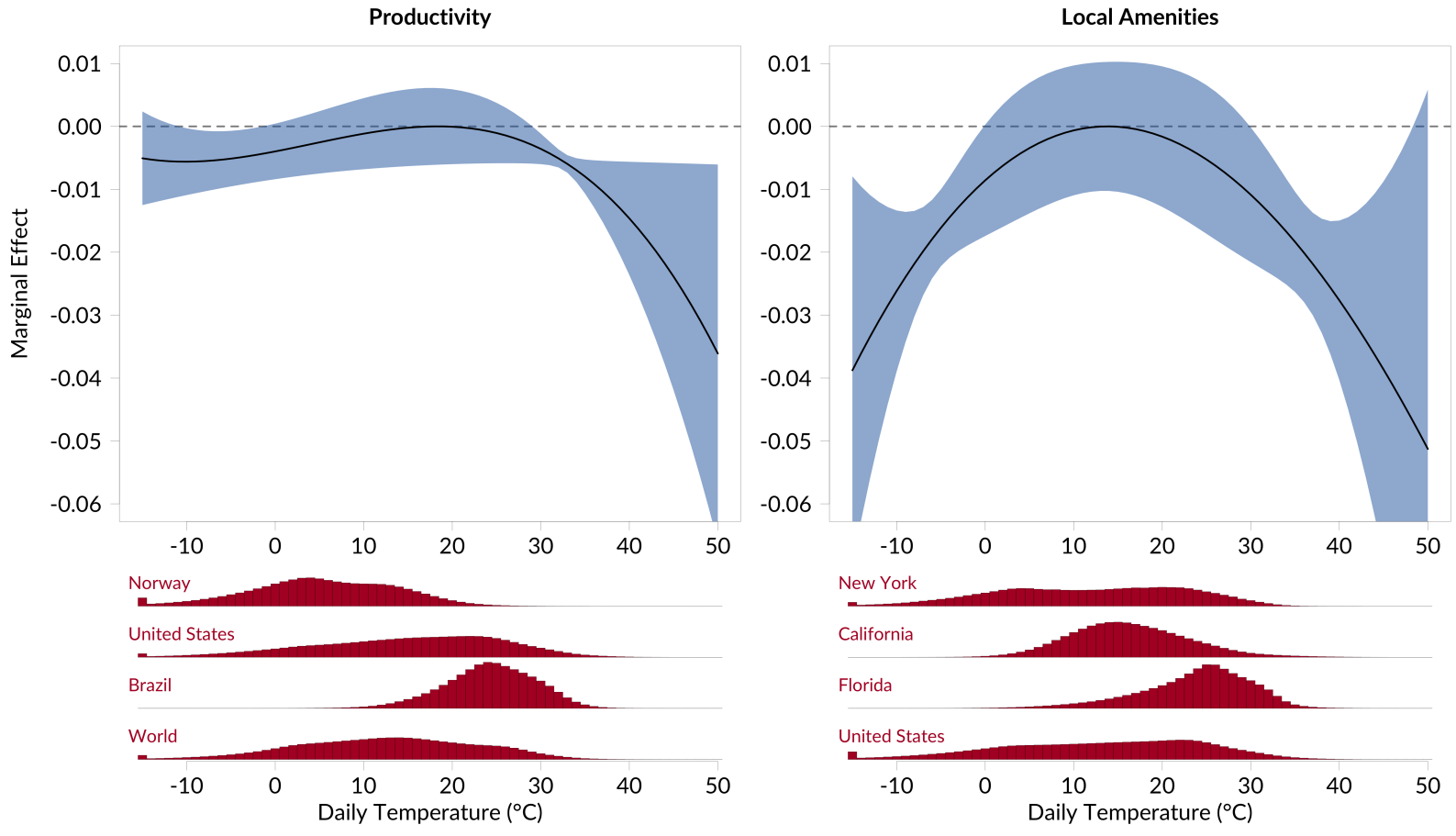
- etc, etc

Climate change: heat hurts learning



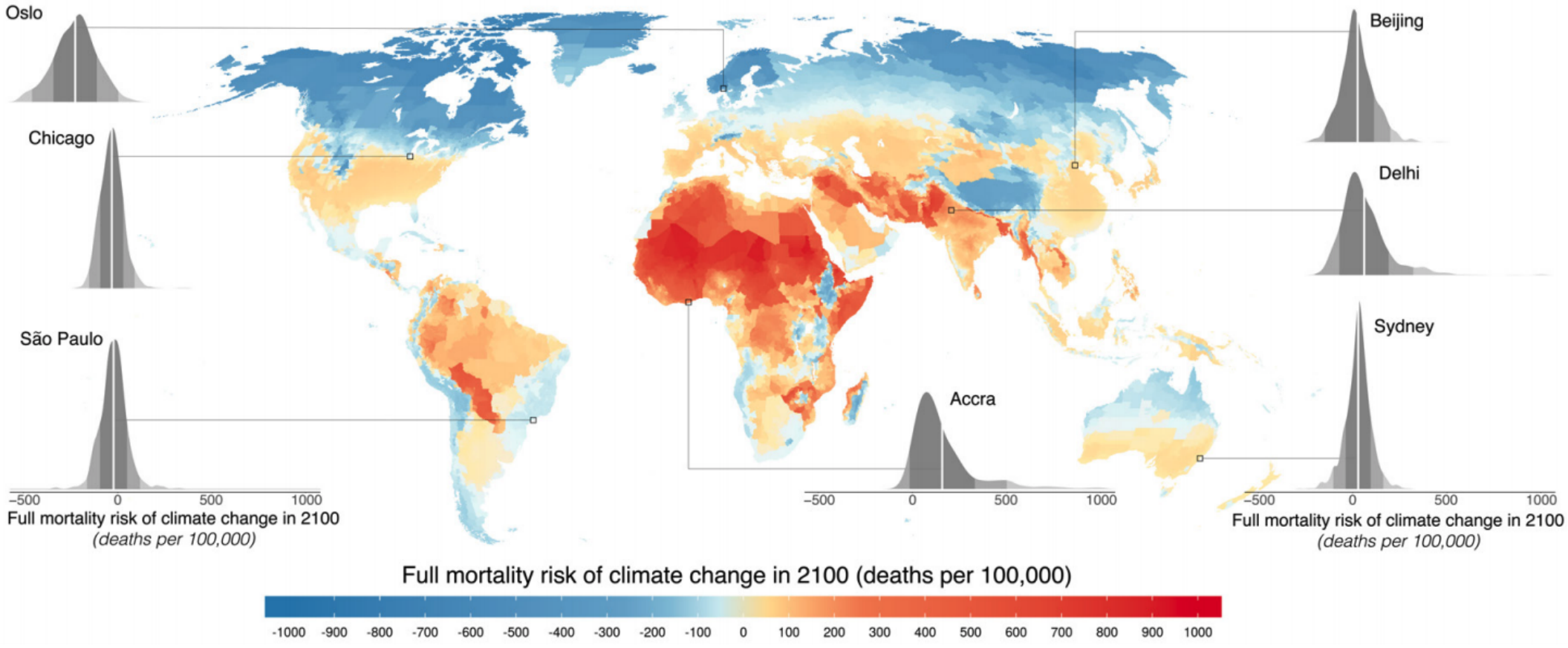
Park et al. (2020)

Climate change: heat hurts the economy



Rudik et al. (2021)

Climate change: extreme heat/cold increases mortality



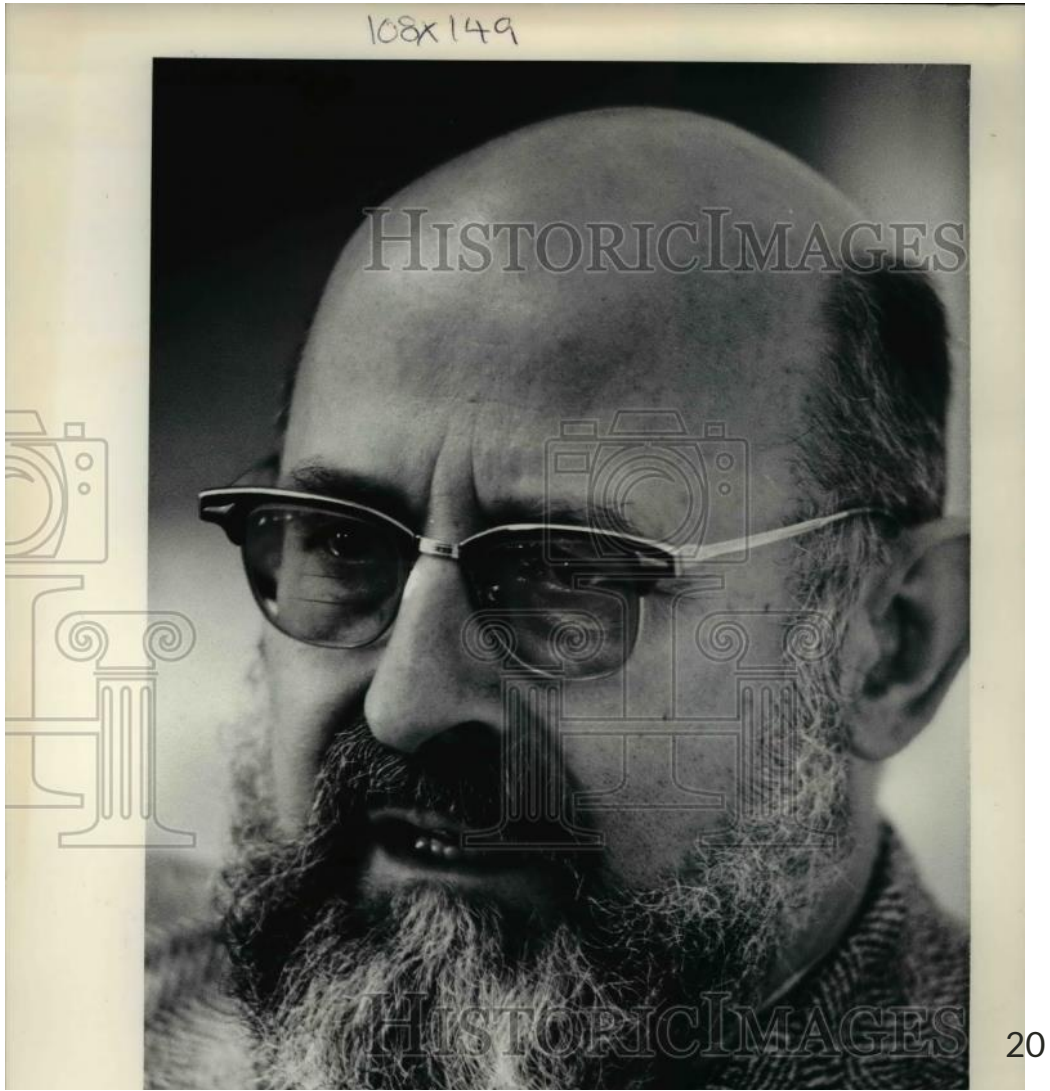
Carleton et al. (2020)

What is enviro econ?

Environmental economics is actually pretty new

Spurred by **John Krutilla** in the 1950s

His paper Conservation Reconsidered is the landmark paper in the field (sort of like Wealth of Nations and economics as a whole)



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- Industry jobs (energy, transportation, finance)
- Public sector and NGOs (EPA, DOE, RFF, Brookings, Federal Reserve)
- Graduate programs

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Learn both the theory and **applications** of environmental economics

Microeconomics recap

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Is Intro to Micro applicable everywhere?

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Creating markets to solve problems

How do we solve some problems in practice?

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Micro recap: terminology

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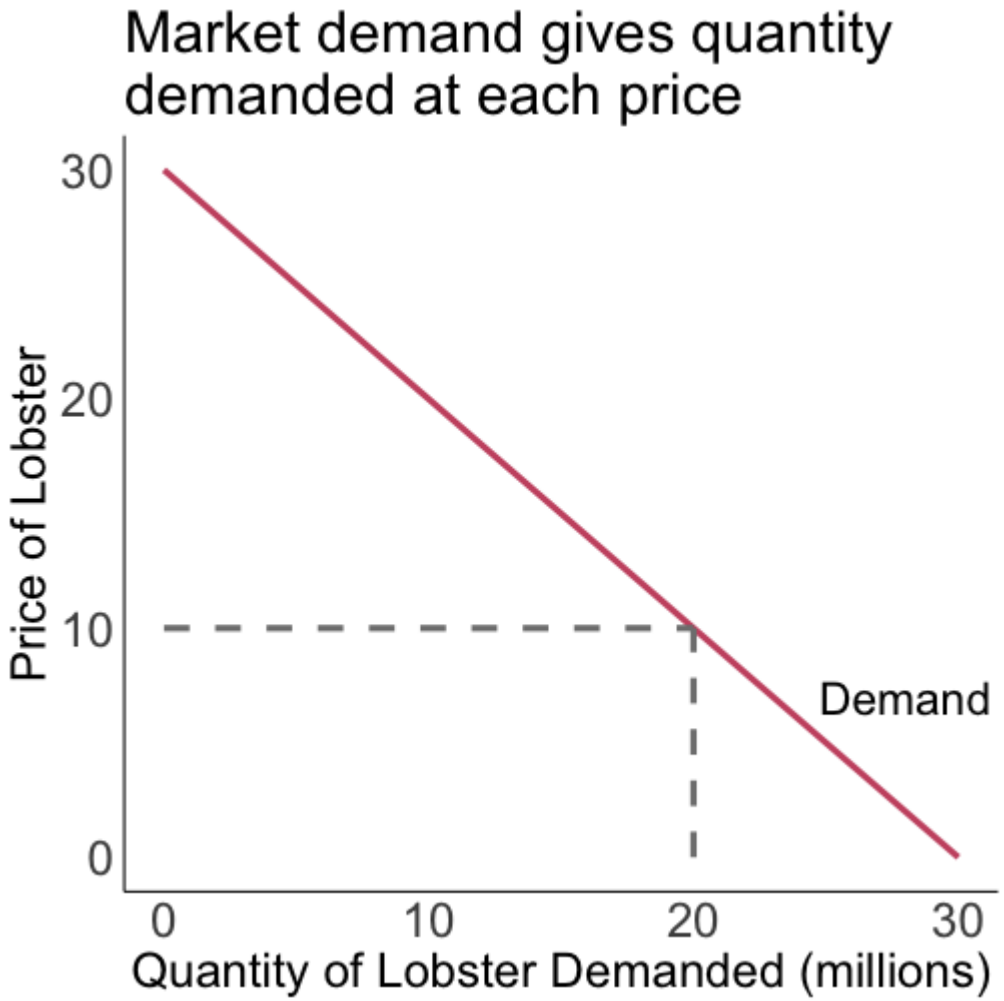
Supply curve: A schedule or graph showing the quantity of a good that sellers wish to sell at each price; it gives us the marginal willingness to accept or the marginal cost

Market demand



Market demand is aggregated from all individual demand curves

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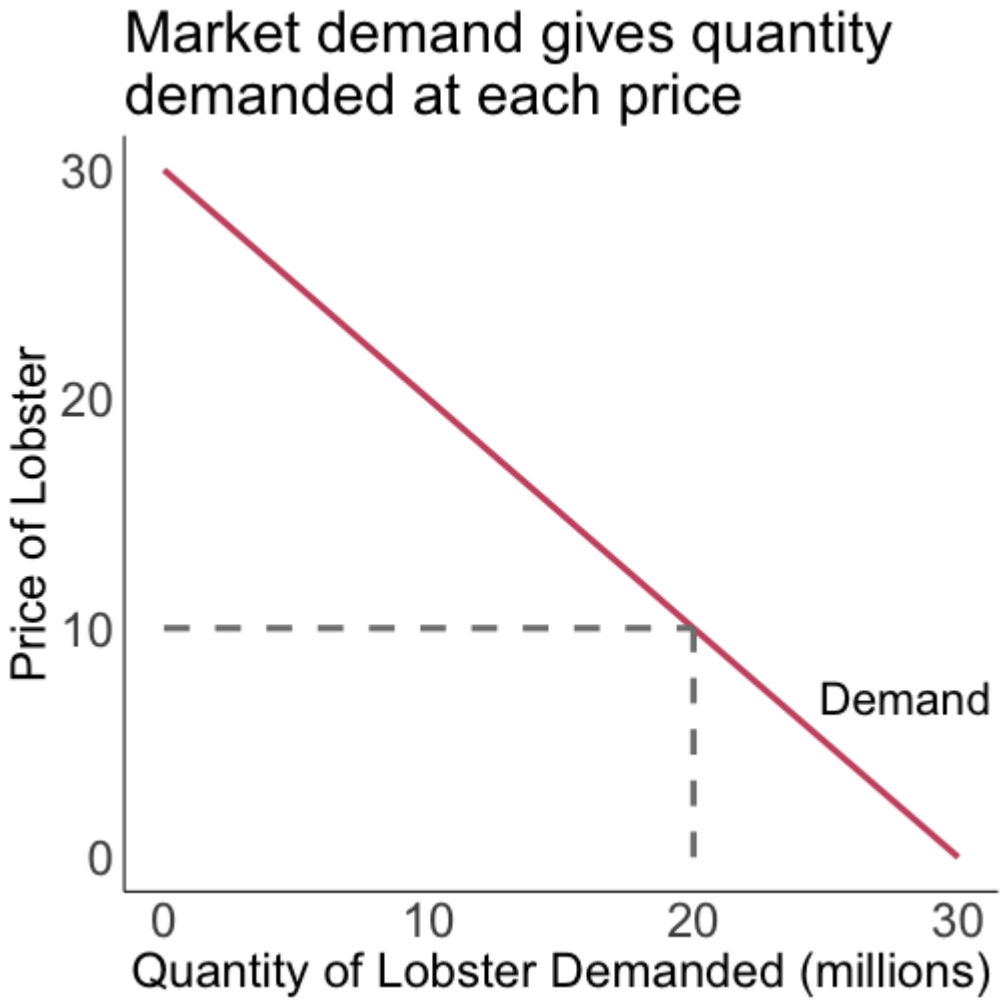

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Horizontal interpretation: if buyers face a price of $10/lobster they will want to purchase 20 million

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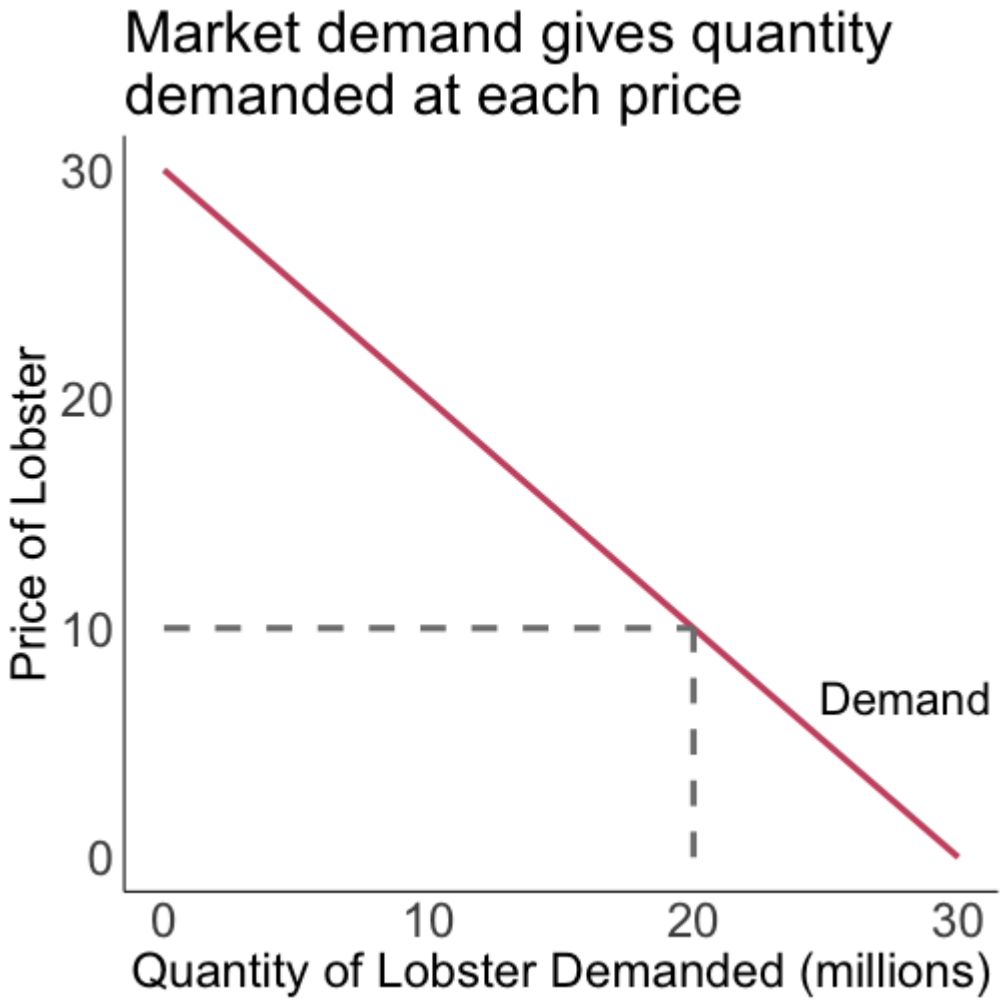

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Vertical interpretation: if buyers are buying 20 million lobsters, the marginal buyer is willing to pay at most $10

Market demand slopes down

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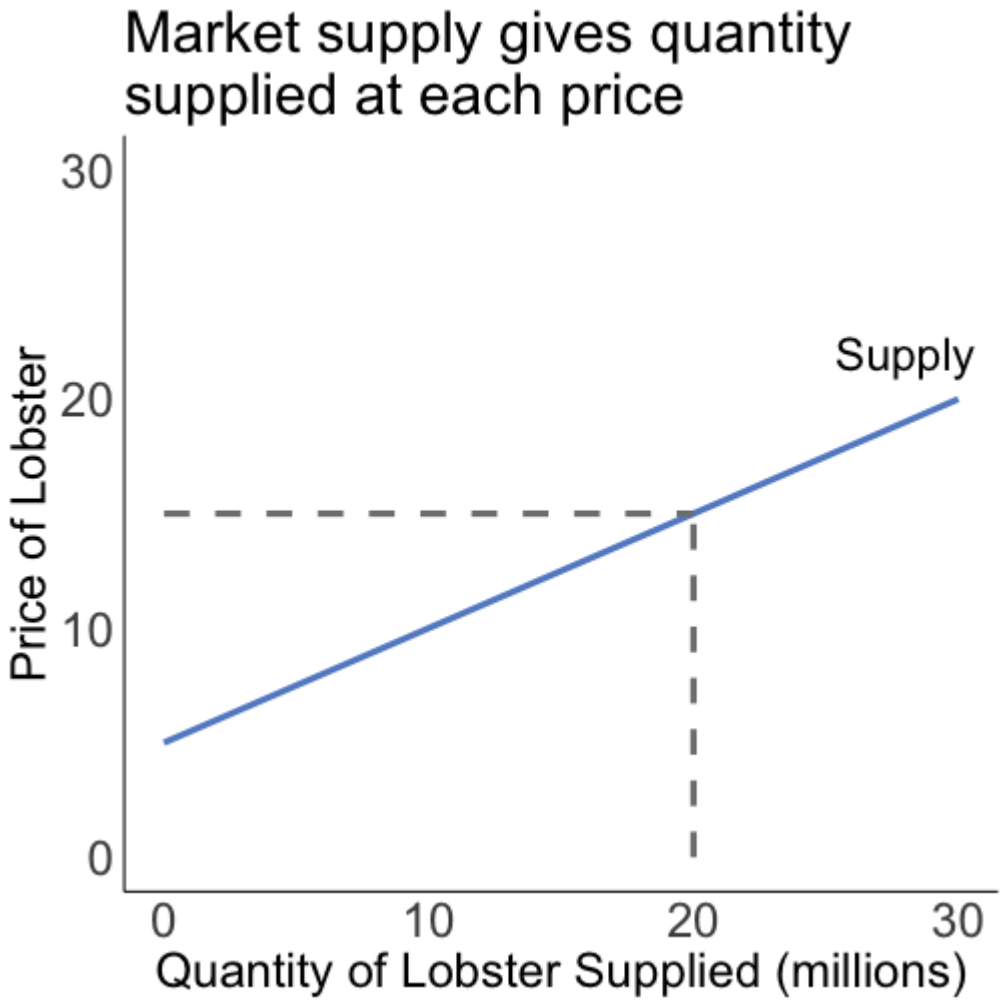
As the price of a good increases, they can't afford as much of it: purchasing power goes down

This is the **income effect**: if the price of pizza goes up, we have a lower real budget

Market supply



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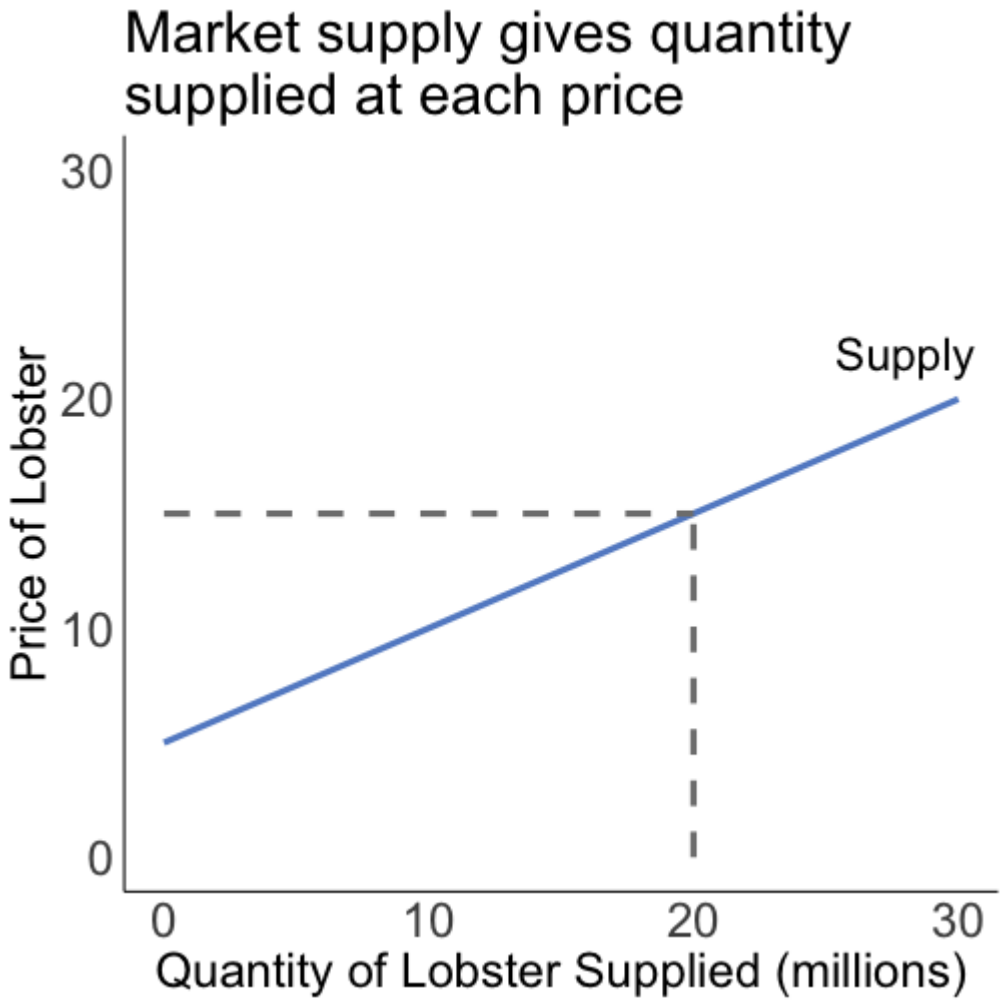

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Horizontal interpretation: if sellers face a price of $15/lobster they will want to sell 20 million

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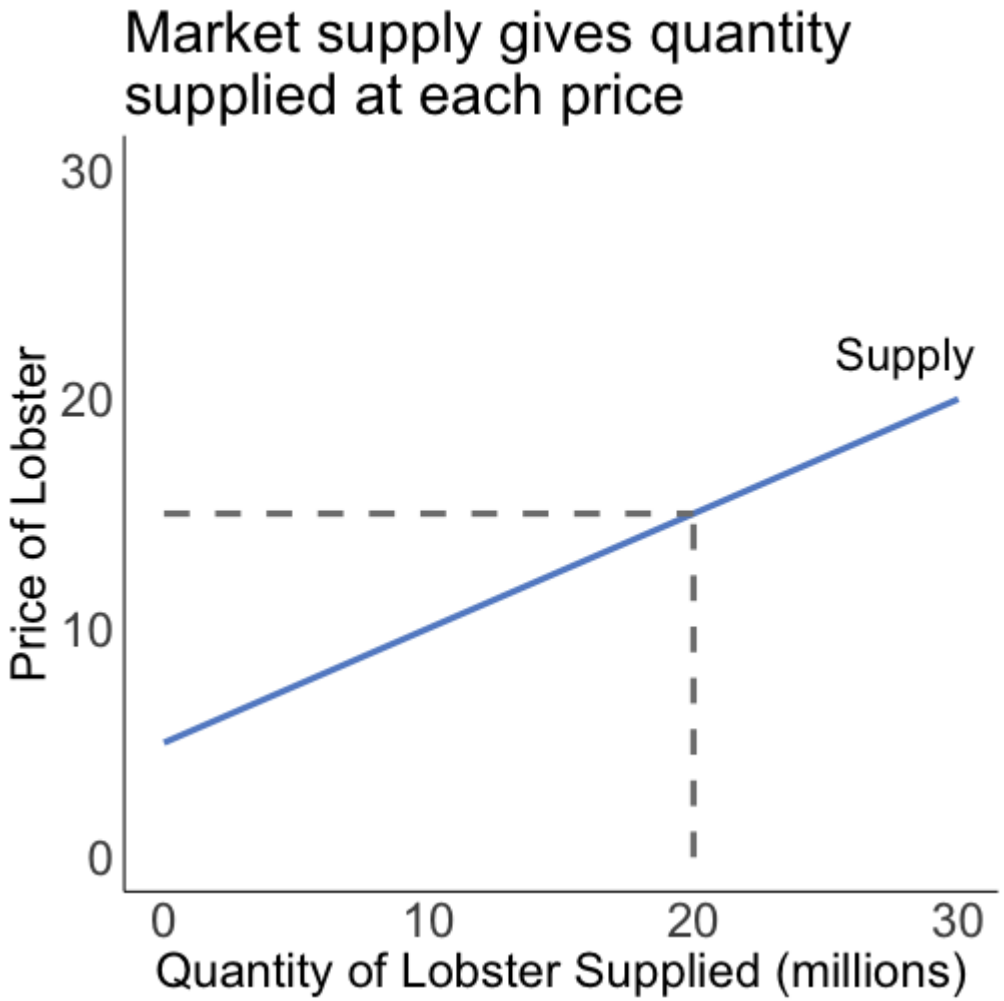

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Vertical interpretation: if sellers are selling 20 million lobsters, the marginal cost of the last lobster is $15

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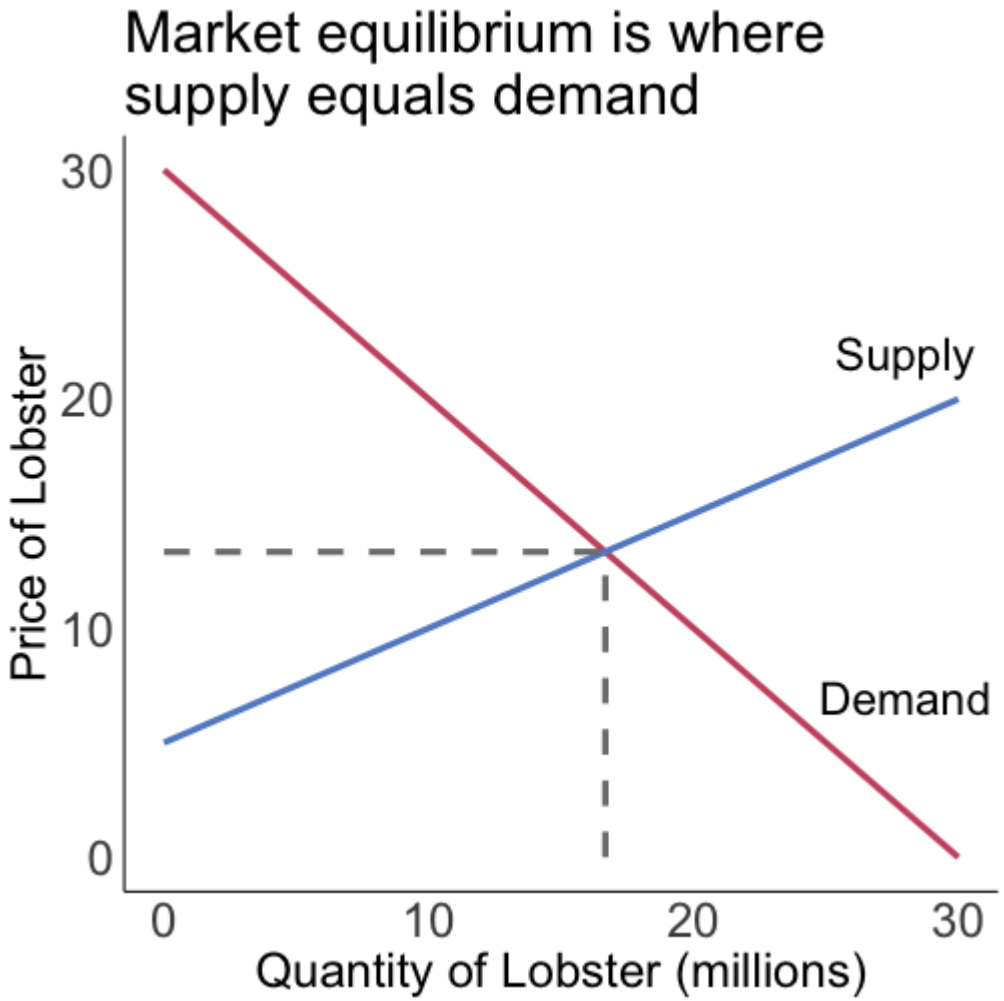
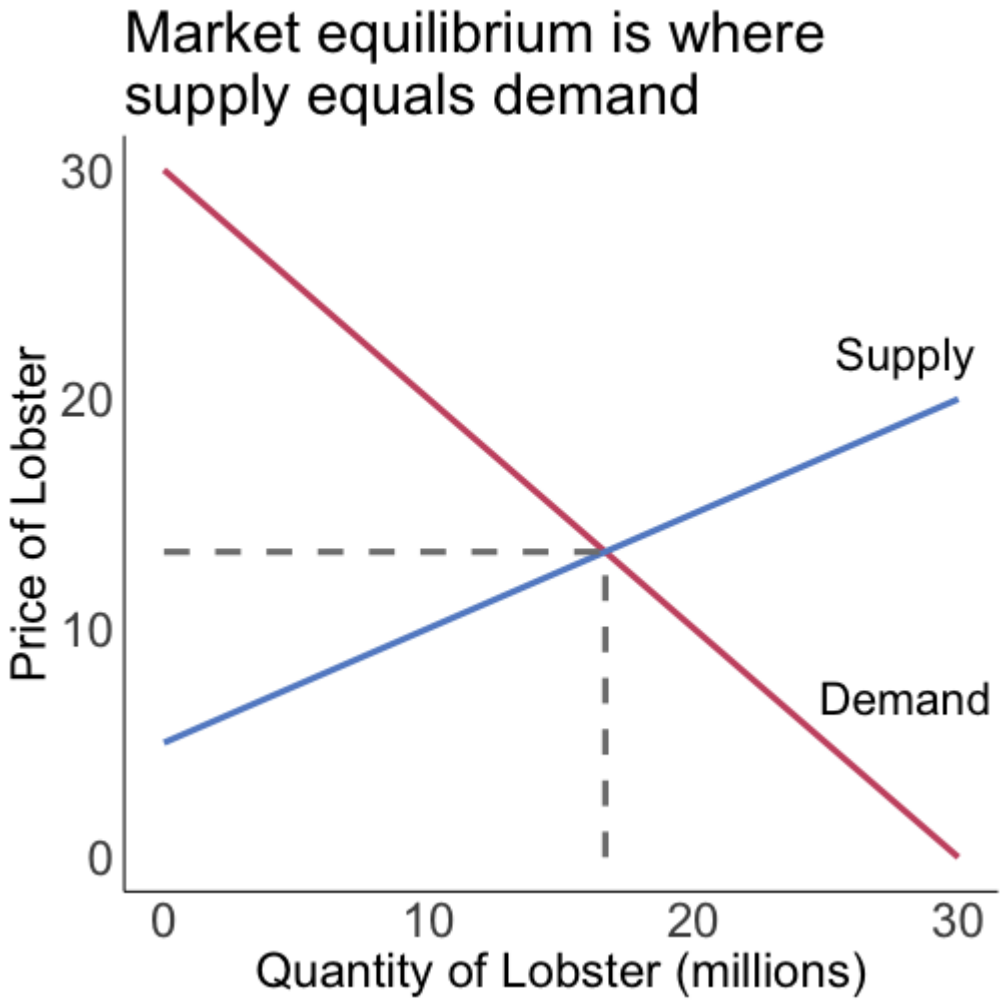
Marginal costs go up as production goes up $\rightarrow$ producers need higher prices in order to produce more goods

Market equilibrium



A market equilibrium is a price/quantity pair where the demand curve crosses the supply curve

Market equilibrium



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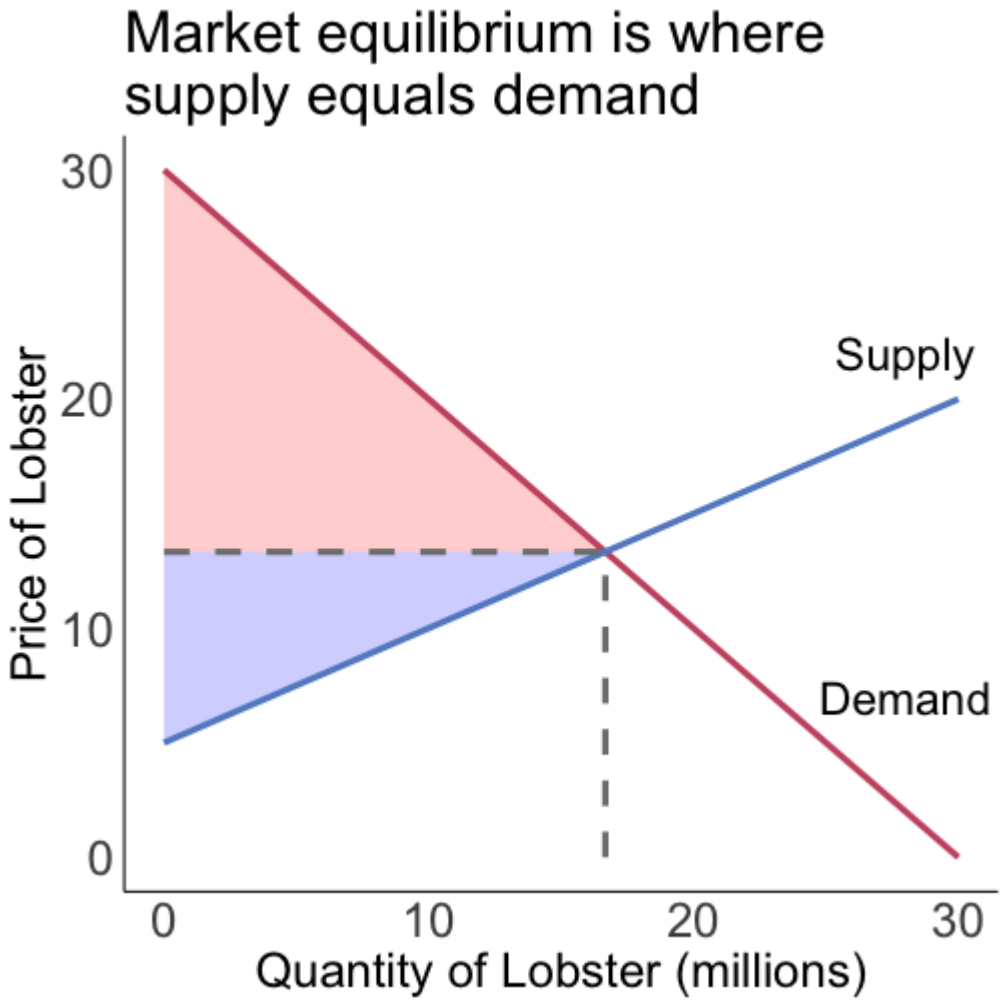
This gives us the price where the quantity demanded exactly equals the quantity supplied: no shortages, no surpluses

Market equilibrium



Consumer surplus is the difference between willingness to pay (demand) and price

Producer surplus is the difference between price and marginal cost (supply)

Total surplus is the sum of CS and PS

Efficiency

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If you can make one person better off without making anyone else worse off its called a **Pareto improvement**

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Main takeaway: markets are often a nice way to allocate scarce resources

Under what assumptions are markets efficient?

What are the underlying assumptions for market efficiency?

1. Perfect competition
2. Perfect information
3. Complete markets (minimal transactions costs)
4. **No externalities**

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They drive a wedge between private and social marginal cost, or private and social marginal benefit

The key departures in environmental economics

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	Excludable	**Non-Excludable**
Rival	Private goods (food)	Common-pool resources (fish, timber)
Non-rival	Club goods (parks, netflix)	Public goods (air, national defense)

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Without the adequate information, buyers or sellers cannot make the choices in their best interest

Efficiency and equity

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- If Elon Musk held **all** the wealth in the world, that would be a Pareto efficient outcome even though it goes against basically all people's notions of equity
- Perfect price discrimination is also Pareto efficient: producers capture all the surplus but it is maximized

Ecological wealth