

# Lecture 01

## Introduction to Environmental Economics

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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

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# 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)

- Lowest two scores are replaced with the highest two scores (effectively two free drops)
- On Thursdays where there is no prelim that week, you have all day to start/finish

**3 Problem Sets (15%, 10%, 5%):** 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 theoretical, 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 and data
- 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?

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These ideas can be applied to the environment

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Environmental economics helps us understand things like:

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?

ADVISORY: [#ozone](#) is exp  
around the foothills area o  
entrance) [pic.twitter.com/h](#)

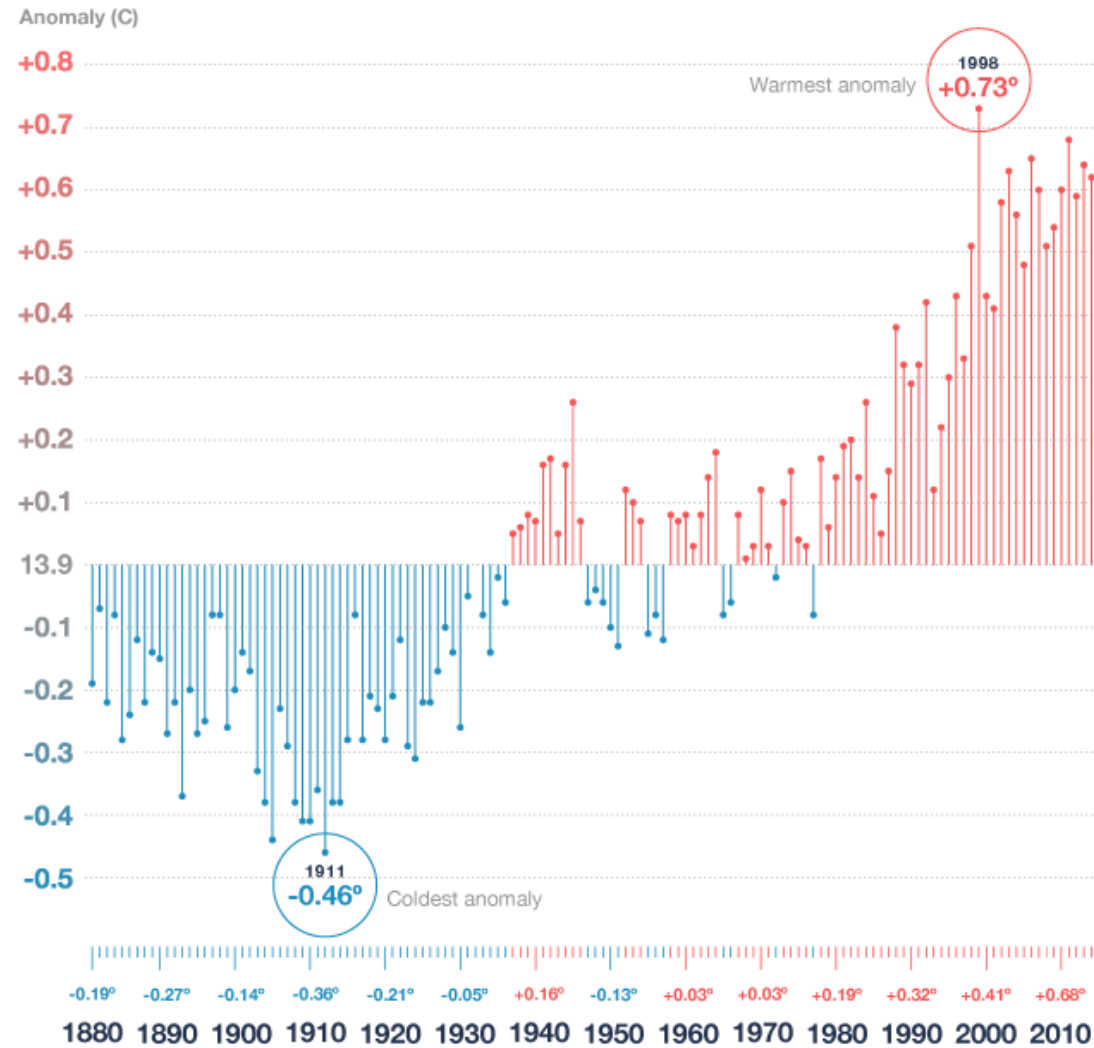
— Sequoia Kings Air (@S

Places provide info to help people  
avoid air pollution

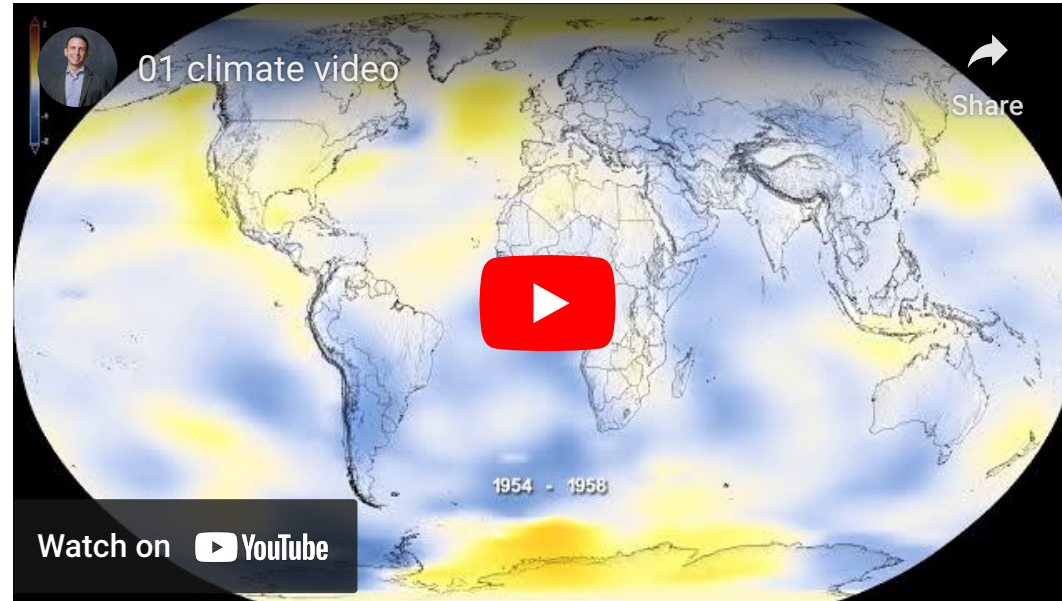
Does it work?

How well?

# Climate change



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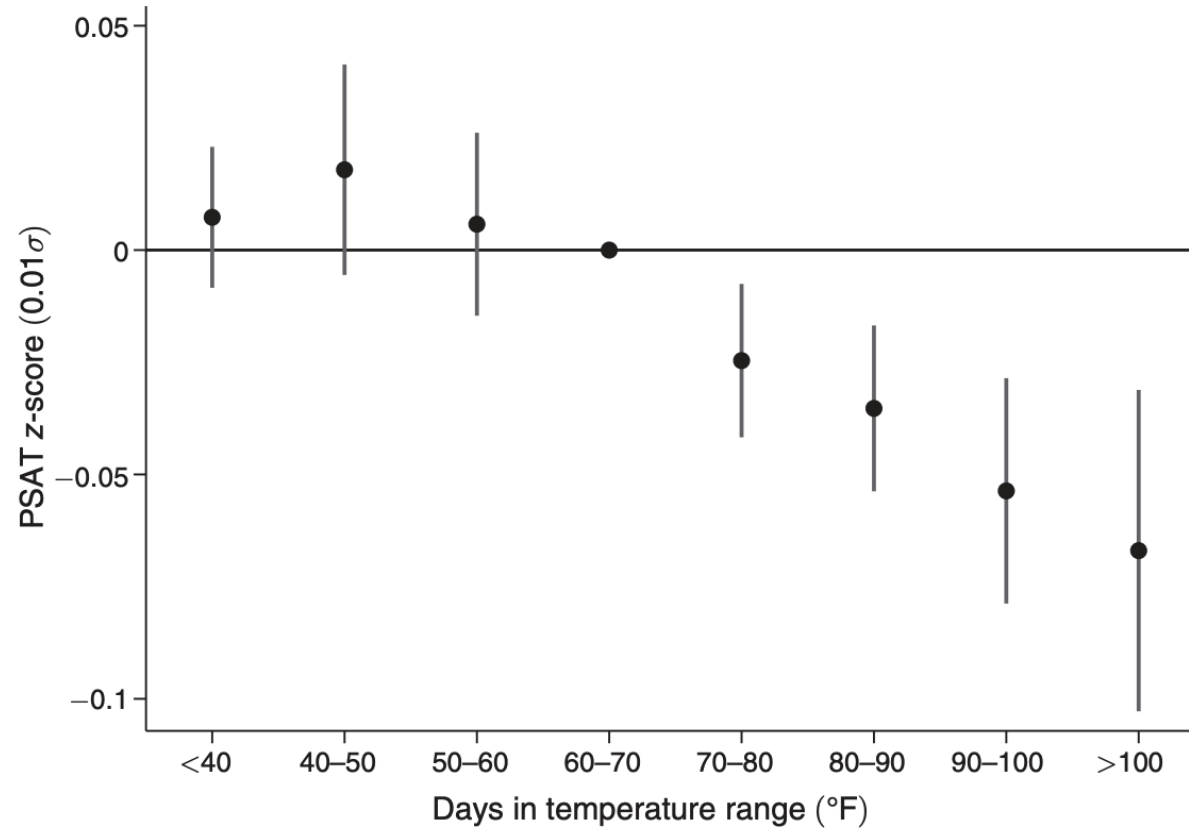
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- etc, etc

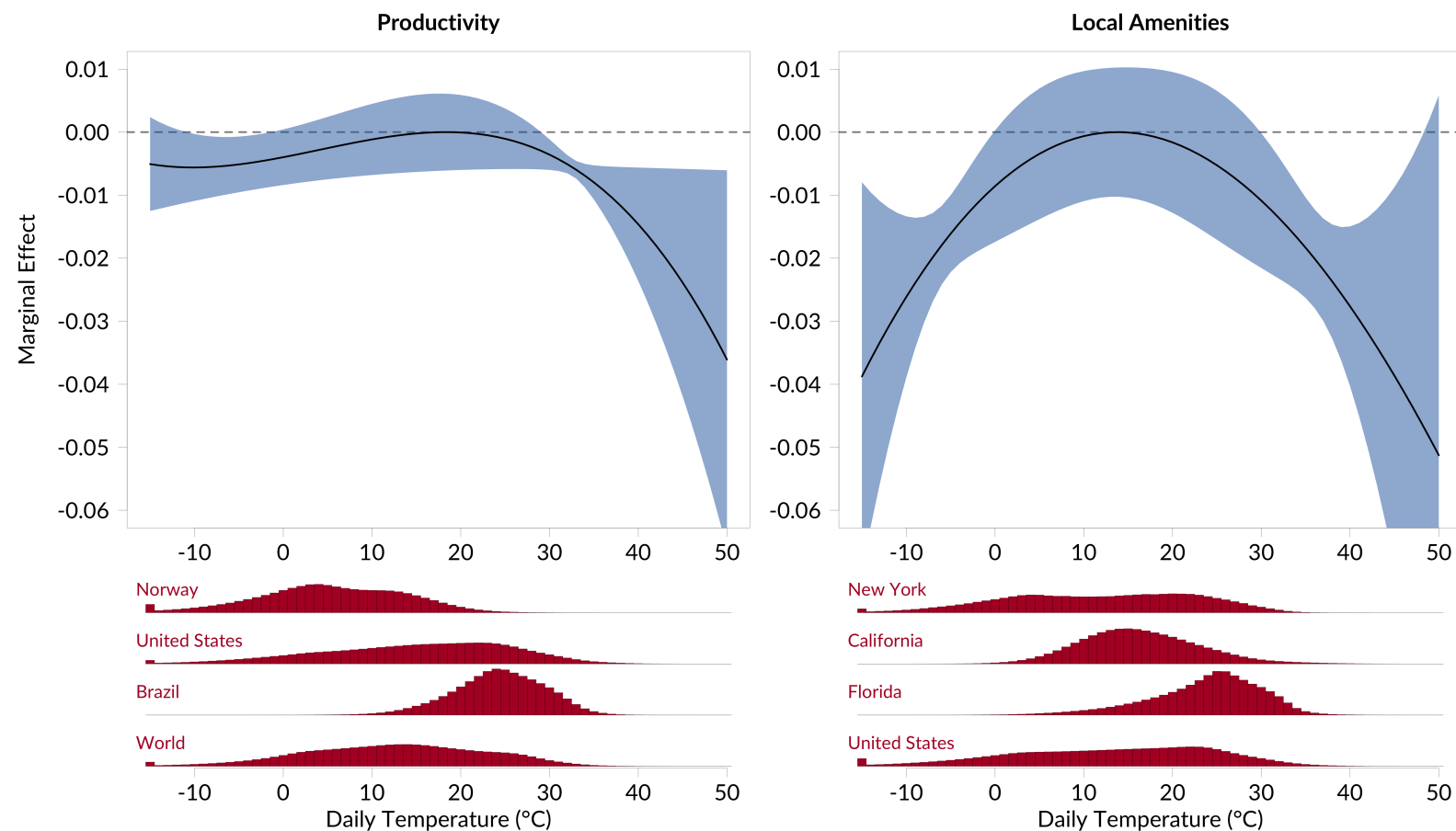
# Climate change: heat hurts learning



Park et al. (2020)

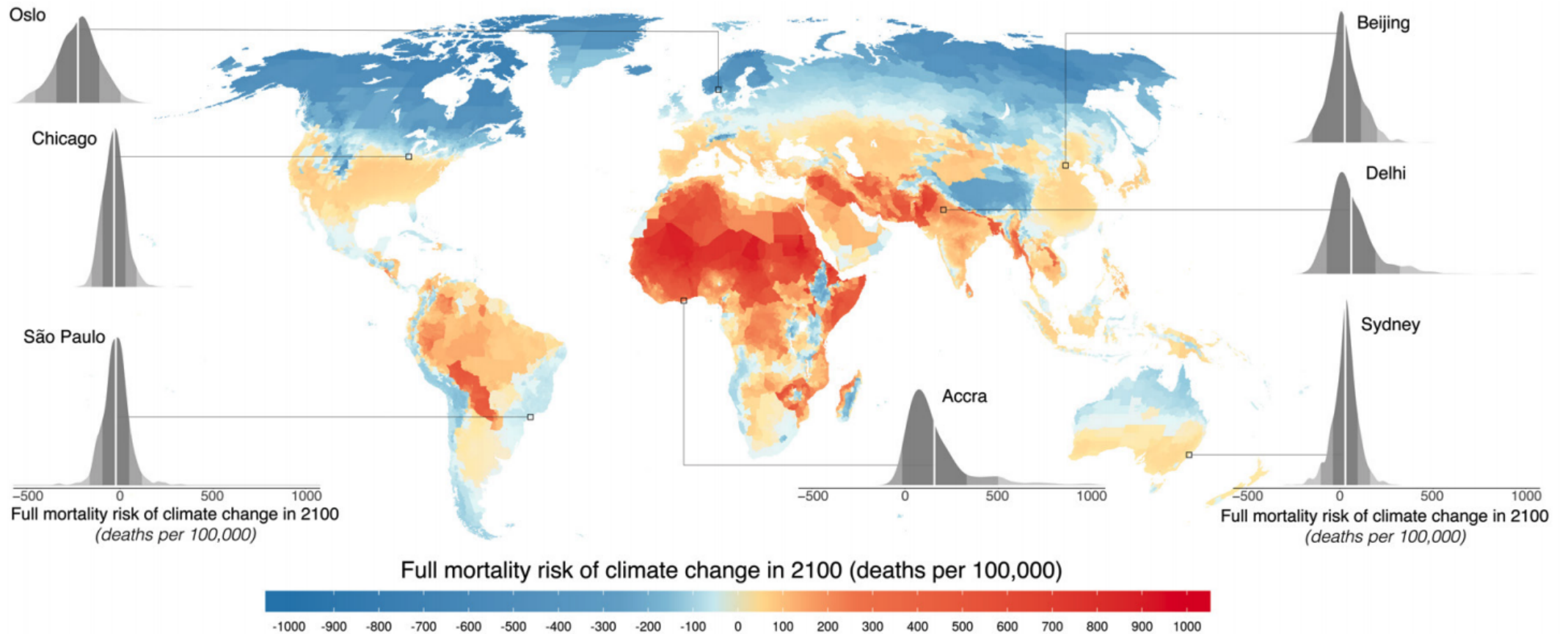


# Climate change: heat hurts the economy



Rudik et al. (2021)

# Climate change: extreme heat/cold increases mortality

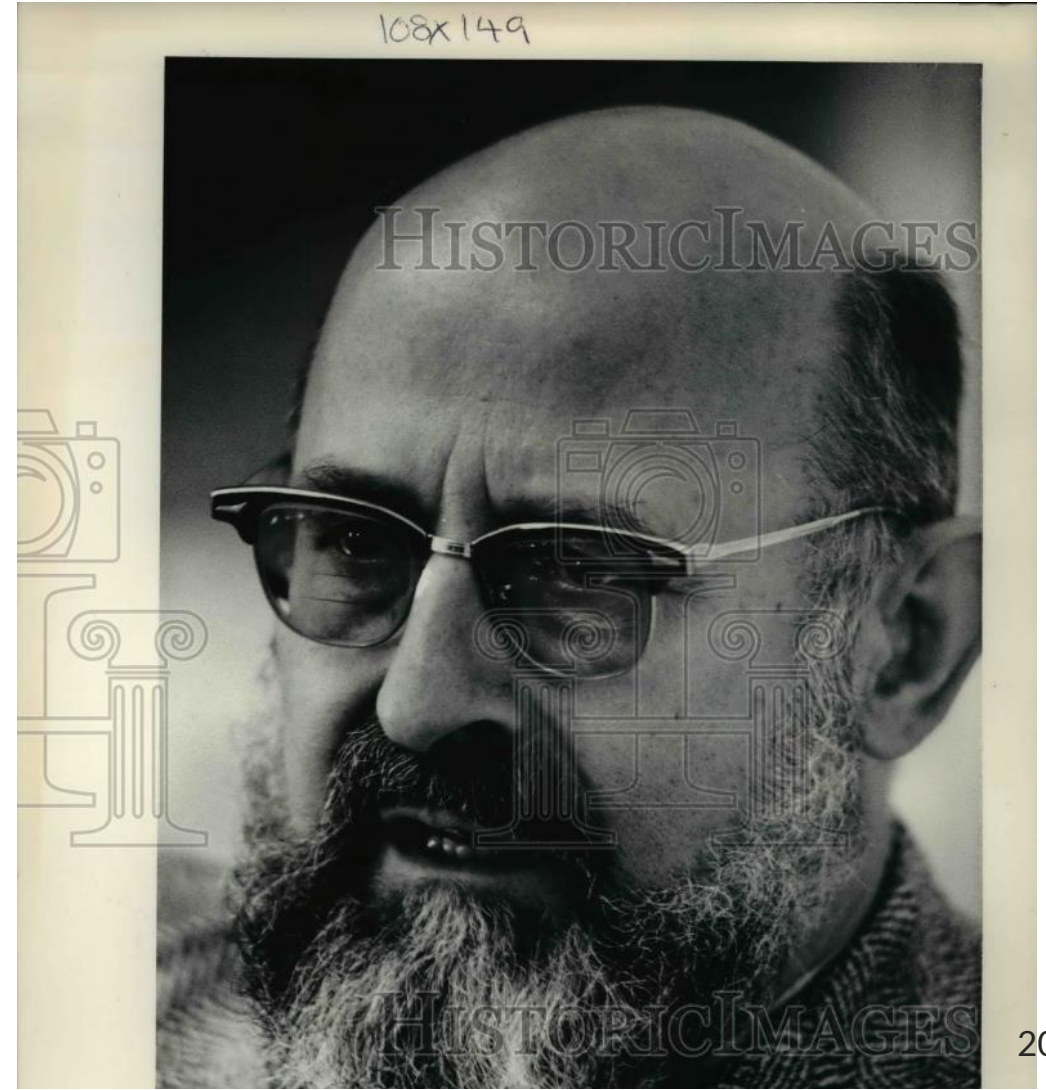


# What is enviro econ?

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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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

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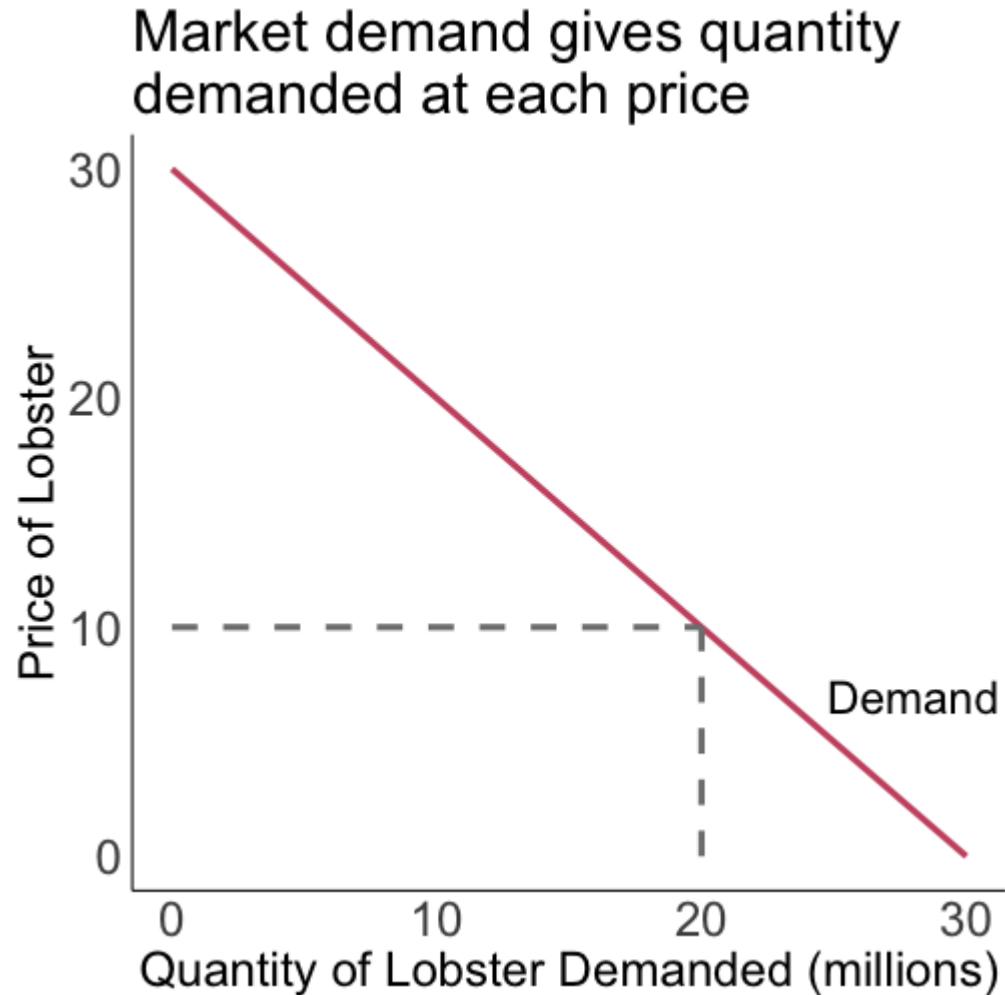
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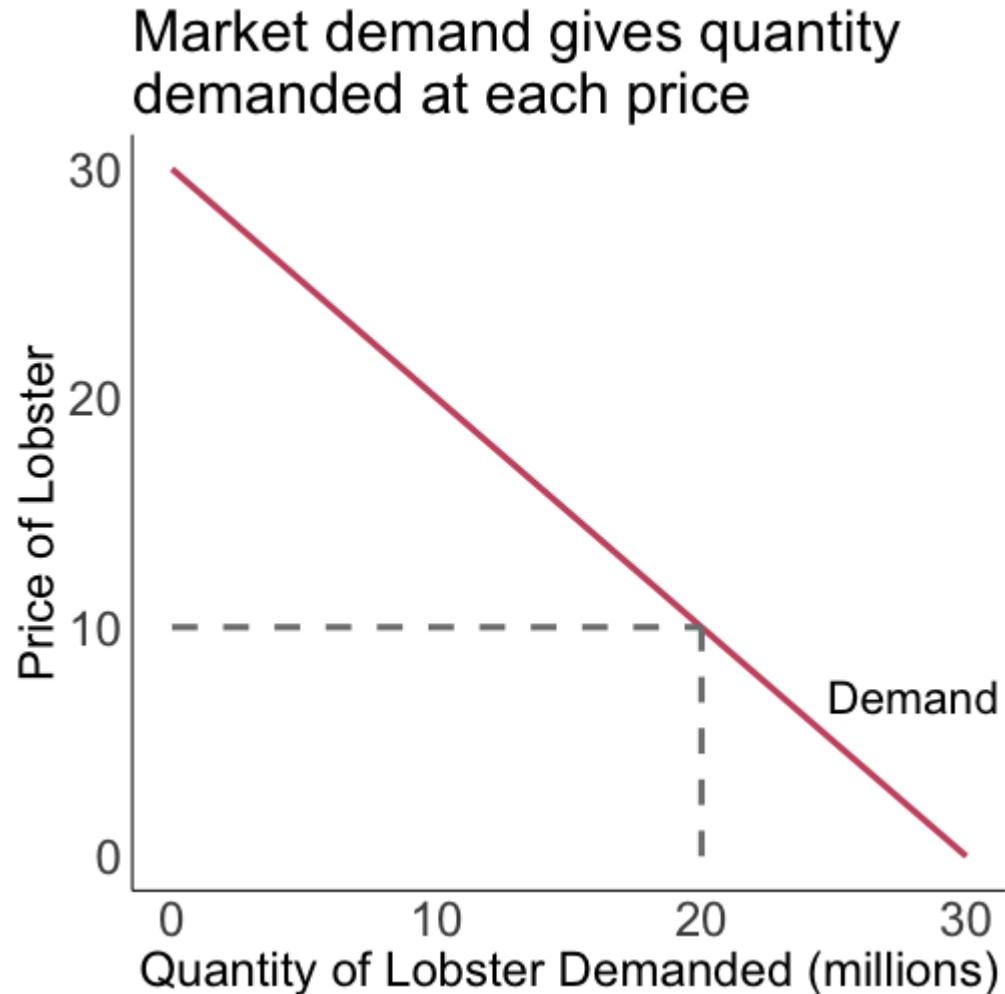
**Supply curve:** A schedule or graph showing the quantity of a good that sellers wish to sell at each price; it gives us the marginal willingness to accept or the marginal cost

# Market demand



Market demand is aggregated from all individual demand curves

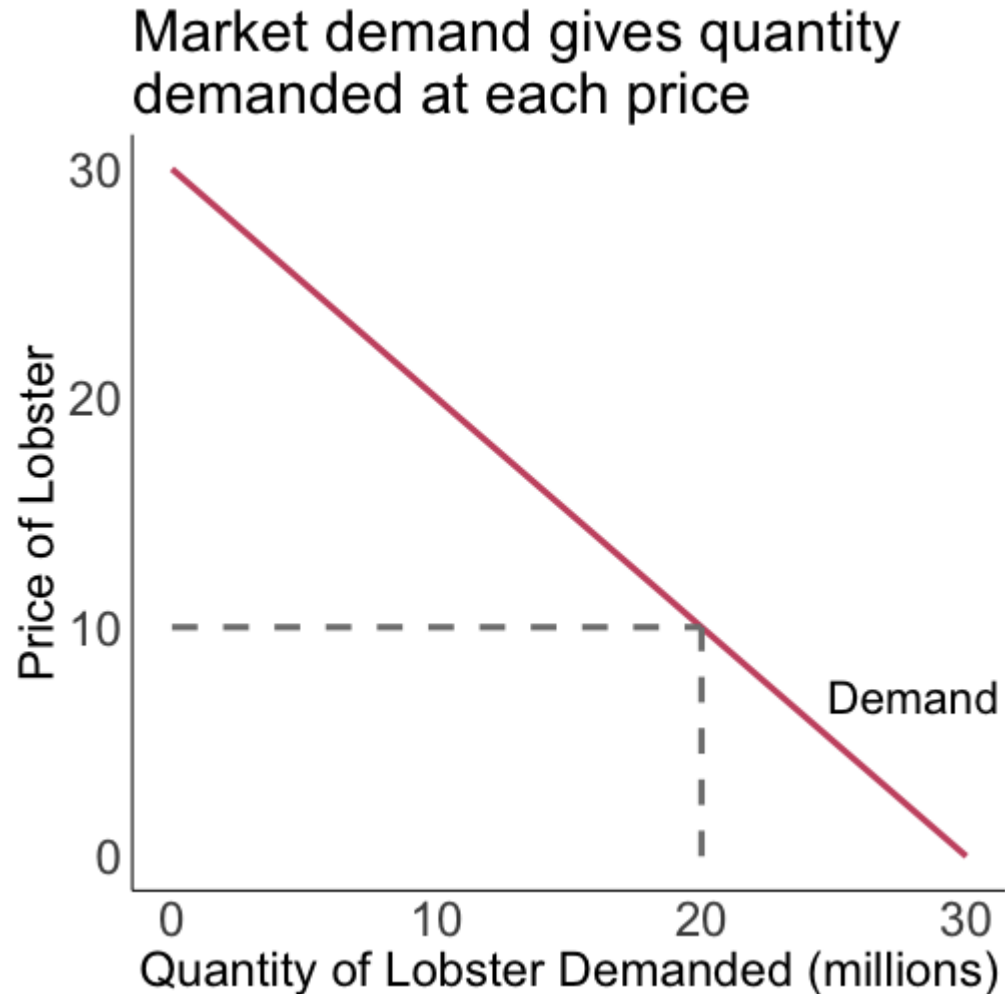
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**Vertical interpretation:** if buyers are buying 20 million lobsters, the marginal buyer is willing to pay at most \$10

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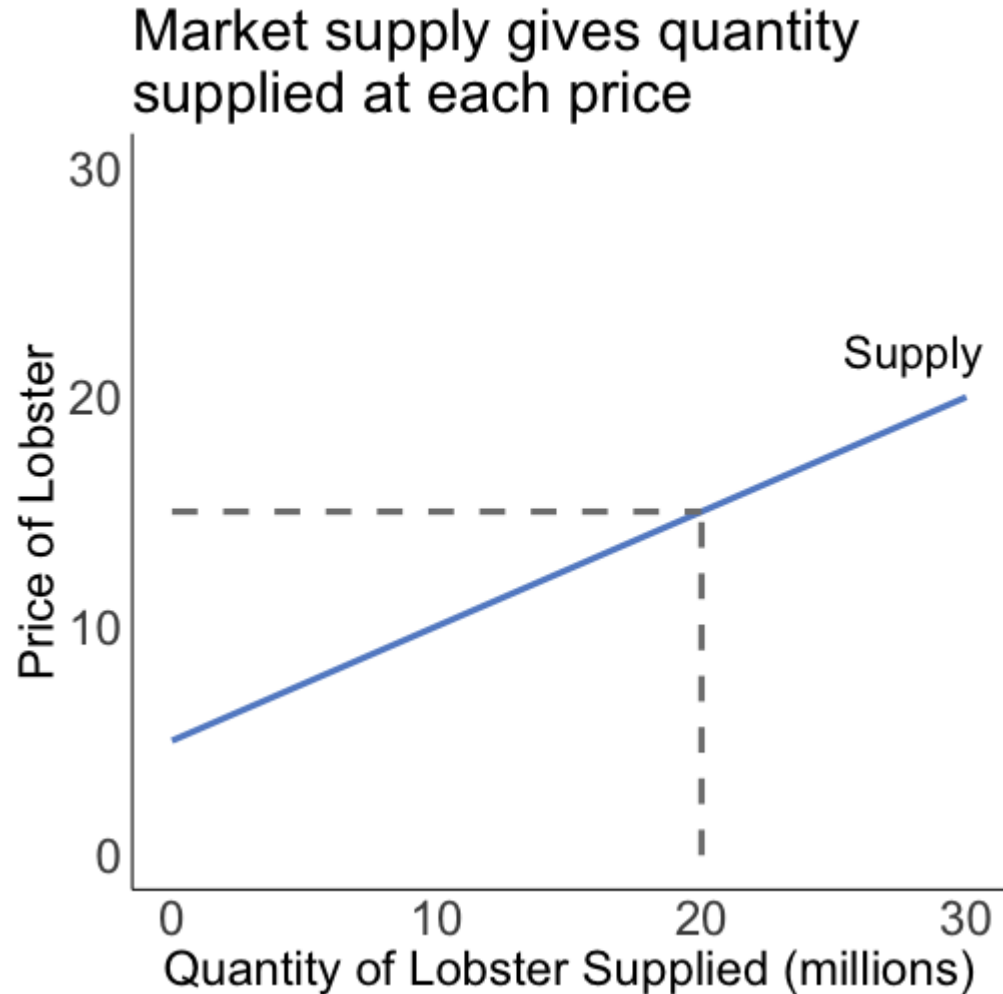
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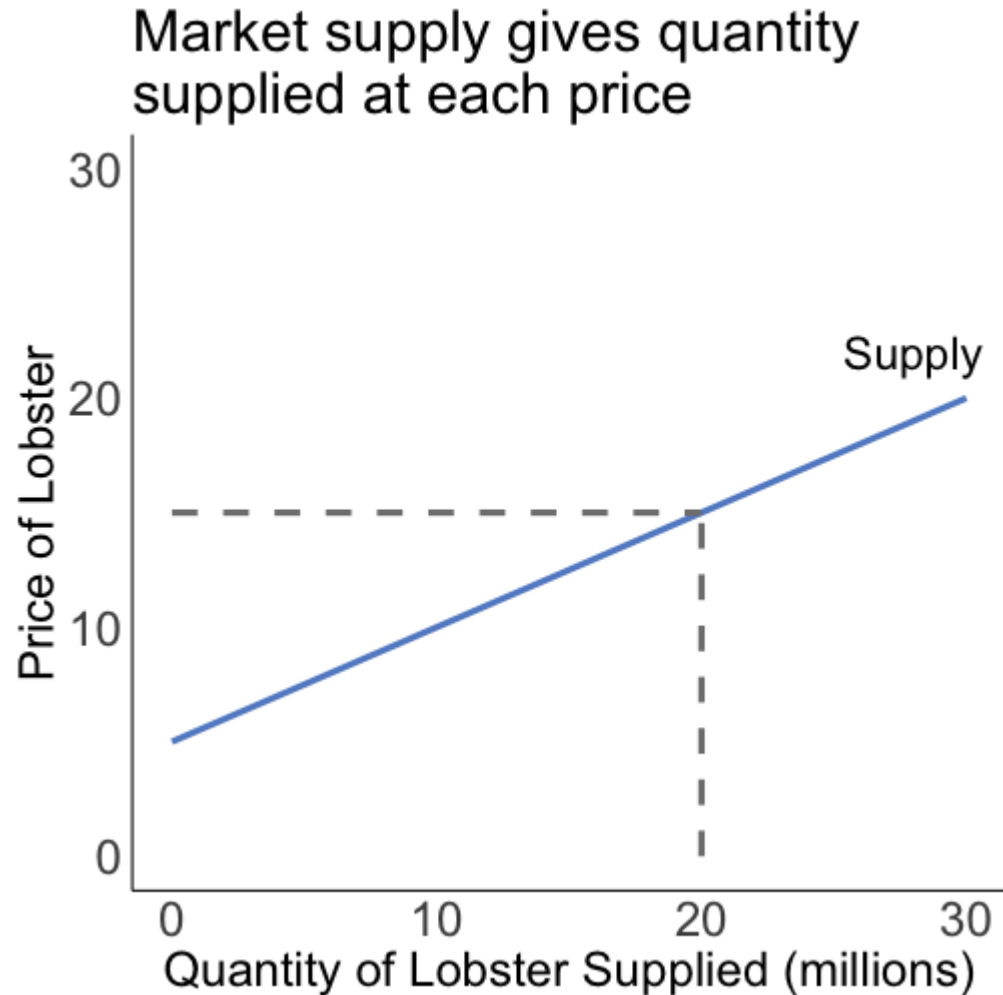
This is the **income effect**: if the price of pizza goes up, we have a lower real budget

# Market supply



Market supply is aggregated from all individual supply/MC curves

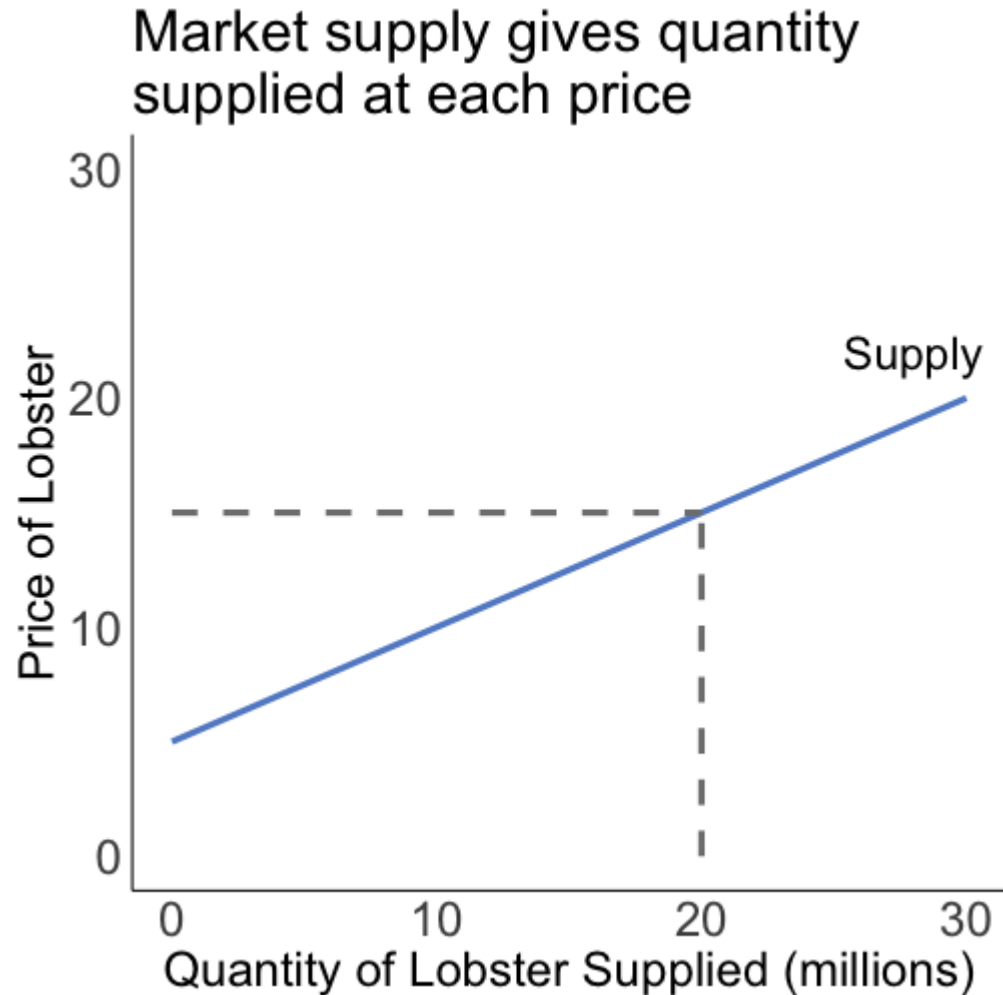
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**Vertical interpretation:** if sellers are selling 20 million lobsters, the marginal cost of the last lobster is \$15

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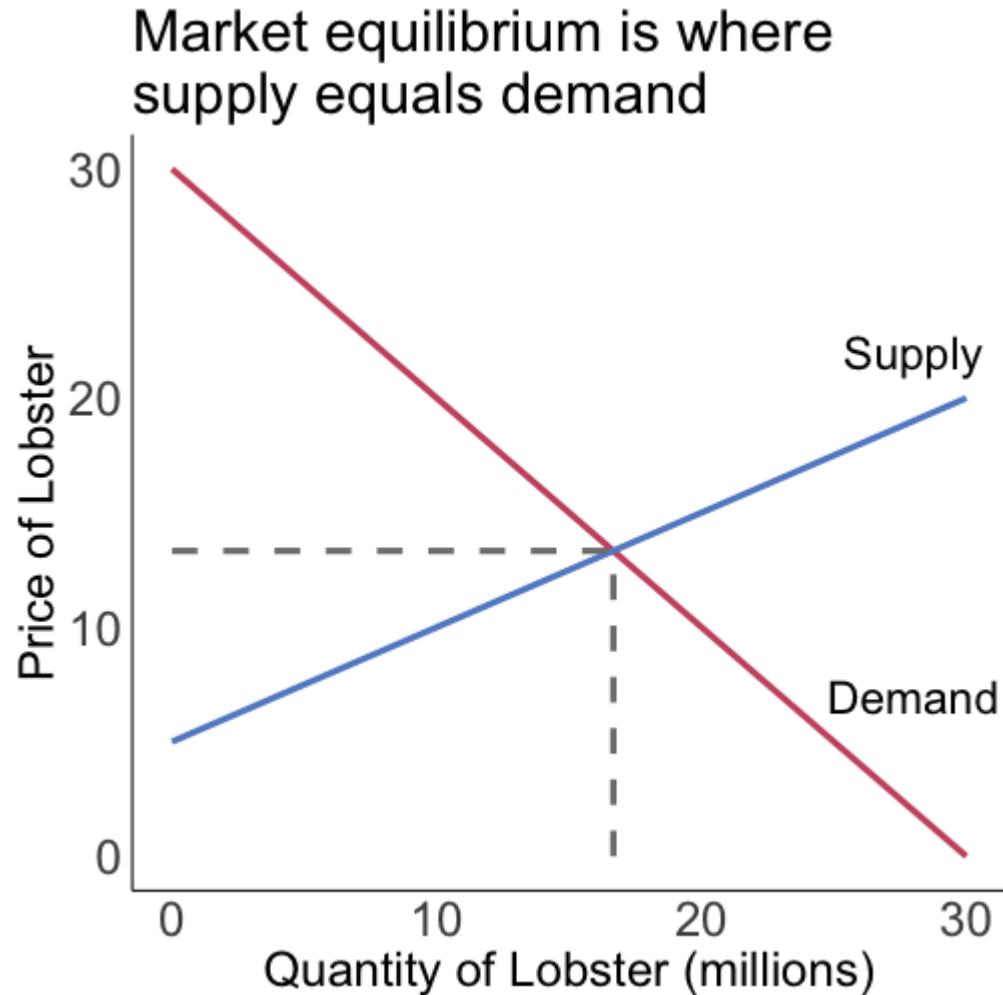
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Marginal costs go up as production goes up → producers need higher prices in order to produce more goods

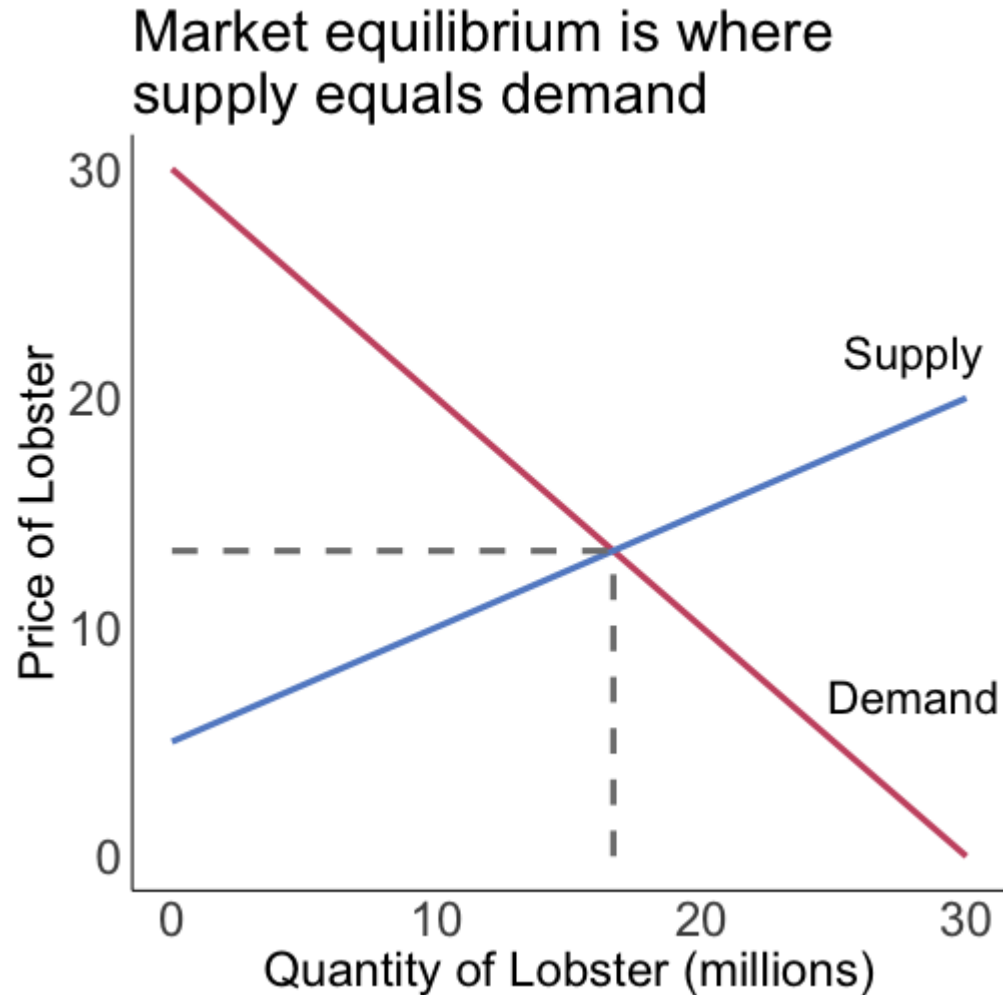


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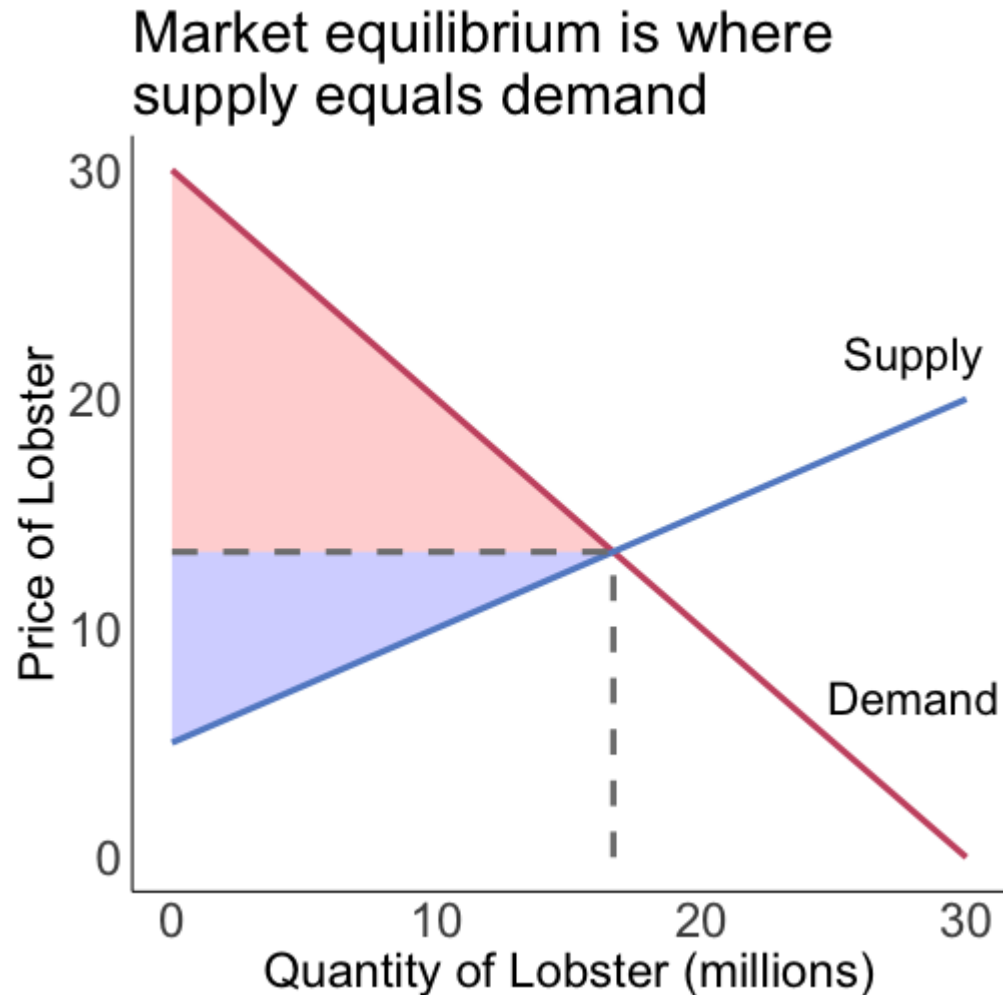
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This gives us the price where the quantity demanded exactly equals the quantity supplied: no shortages, no surpluses

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**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 it's called a **Pareto improvement**

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

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What are the underlying assumptions for market efficiency?

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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)

# Imperfect information

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

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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

