Environmental Economics: Principles, Practices, FAQs

Do Economists Disagree Among Themselves?

- Answer 1: Of course
- Answer 2: No, not about the important stuff
  - Neoclassical economics
    - A shared paradigm
    - Evolves in its details, methods, capabilities
    - But foundations are remarkably resistant to internal critique

The Foundations

- Self-interest
  - The key human & institutional impulse
- Rationality
  - We have rational preferences among alternatives
    - More (of a good thing) is preferred to less, and vice versa
    - Transitivity
- Maximization
  - Subject to constraints

Are we always self-interested?

Are we always rational?

Do we always maximize?

Philosophical Foundations

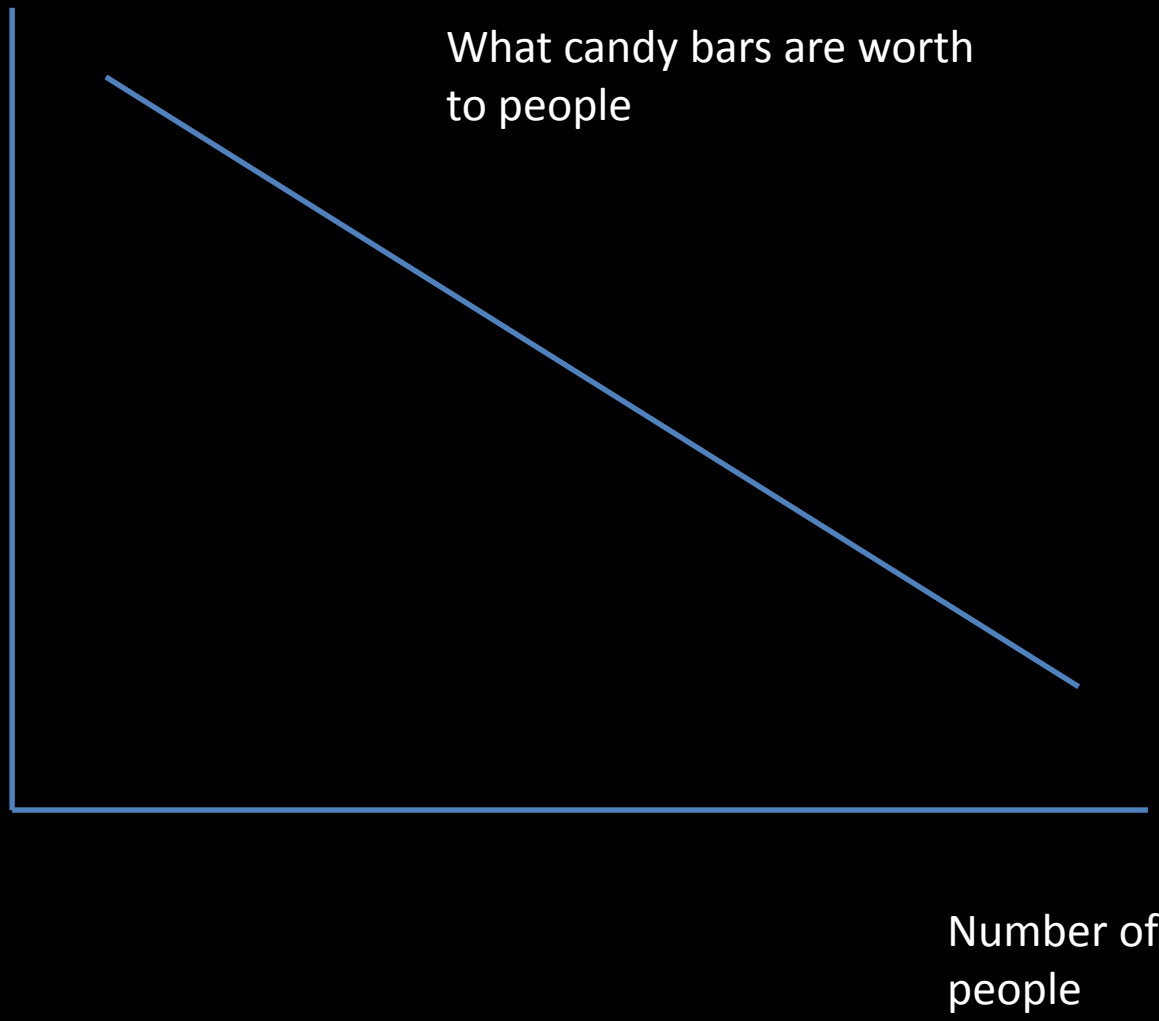
- Economics not just about profits and money
  - Beauty, aesthetics, stewardship, awe etc. matter
- *Actual* behavior
  - As opposed to aspirational behavior
- There is no free lunch
  - Every choice involves tradeoffs
  - Every choice is constrained
- Its objectives are anthropocentric
  - The goal of institutions and policy is to maximize human welfare

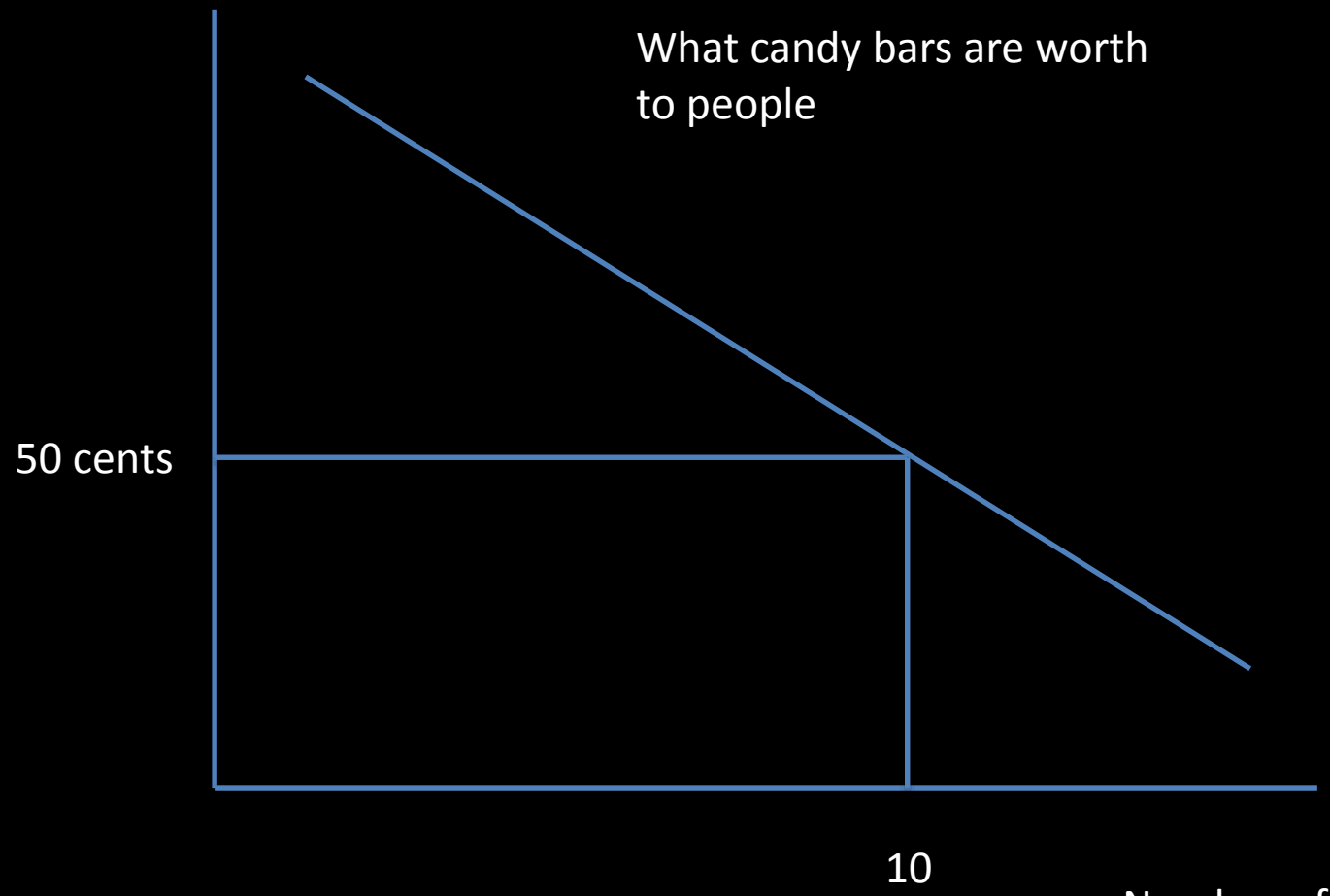
Efficiency v. Equity

- Economics takes equity seriously
  - Helps measure the distribution of gains and costs
  - Understands that it is important
  - Thinks about how winners can compensate losers
- But *efficiency* is the policy goal we feel equipped to define
  - What is *fair* is murkier, a matter for ethics and politics

Demand

- What is this worth to me (the utility/wellbeing I get from it)?
- Self-interest means I am rationally willing to pay the monetary equivalent, or less

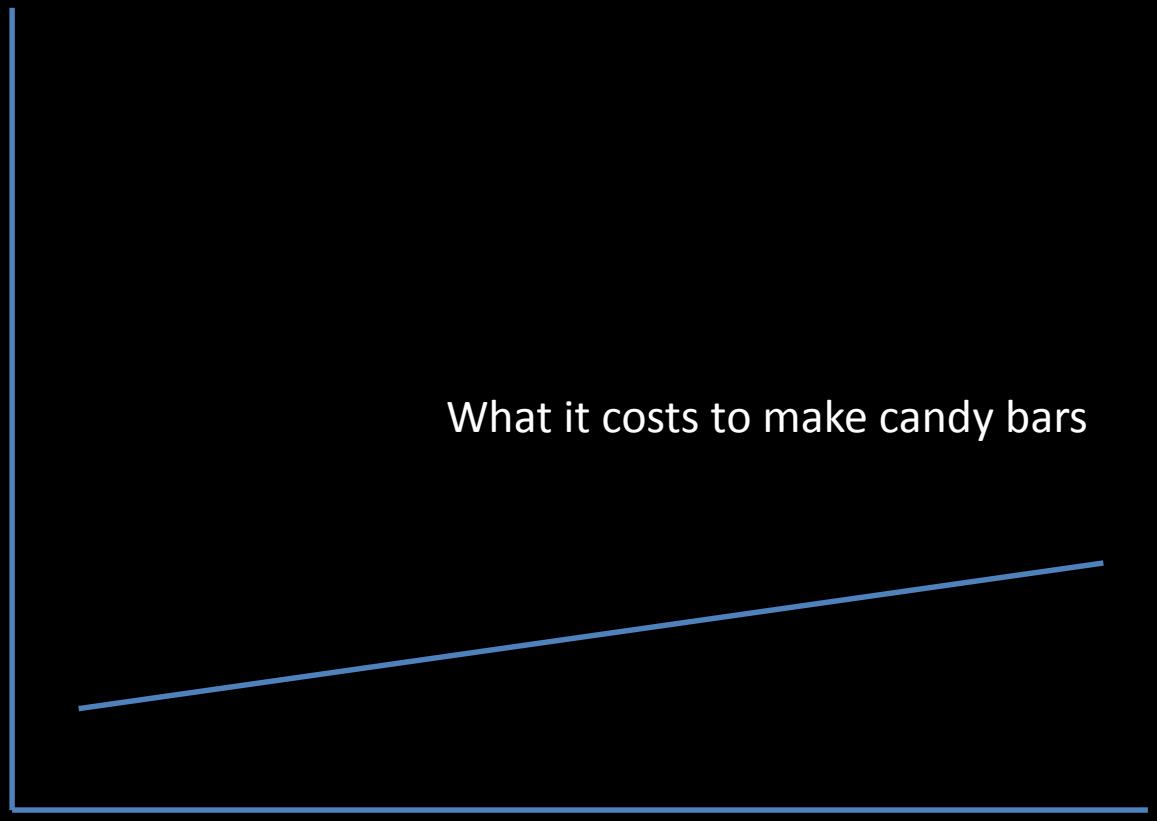

What candy bars are worth to people
Number of people

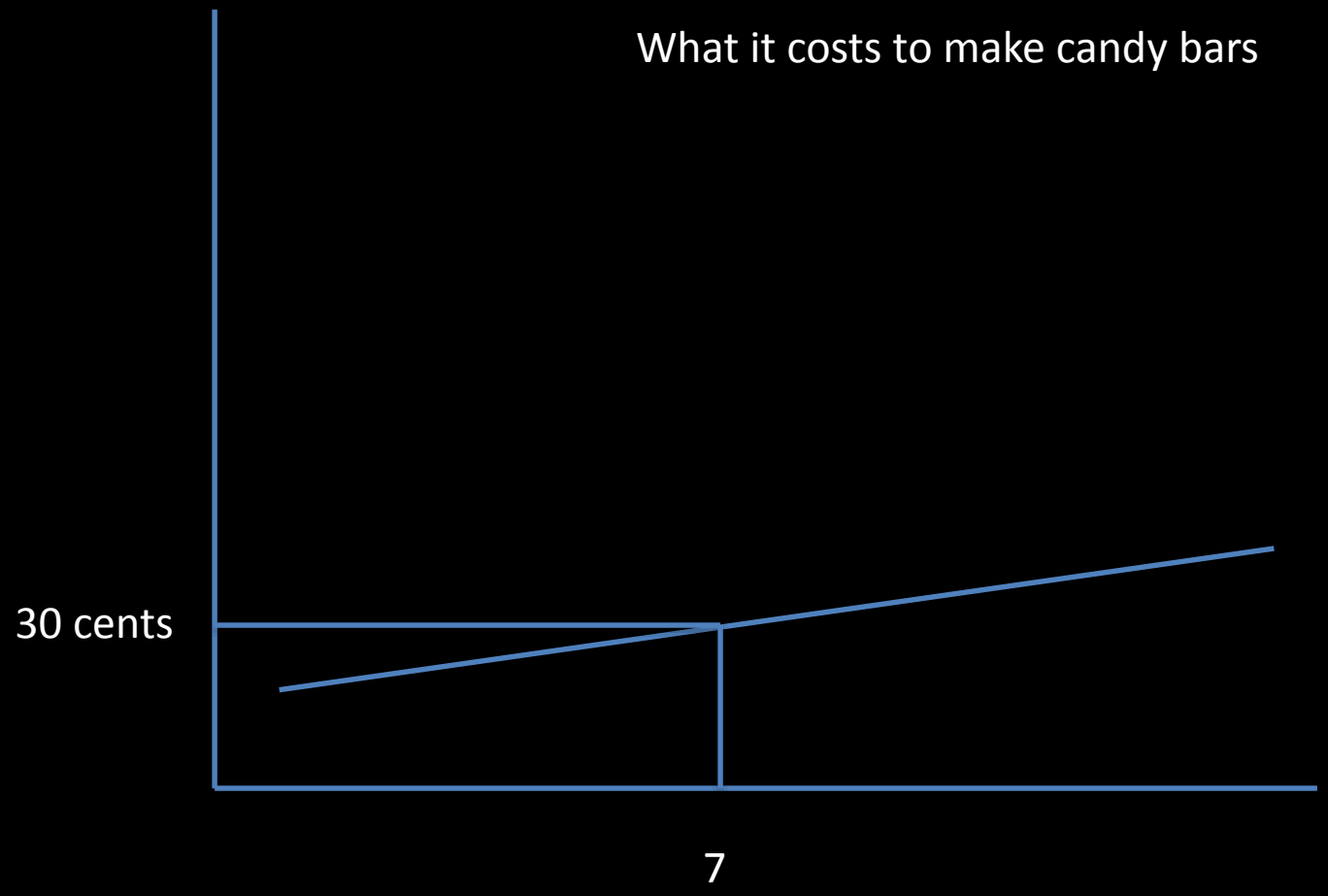


Prediction #1
If the price of candy bars is 50 cents, 10 of you will buy (demand) the candy bar

Supply

- What does it cost to produce something?
- What price will leade me to produce it, if I am self-interested and rational?

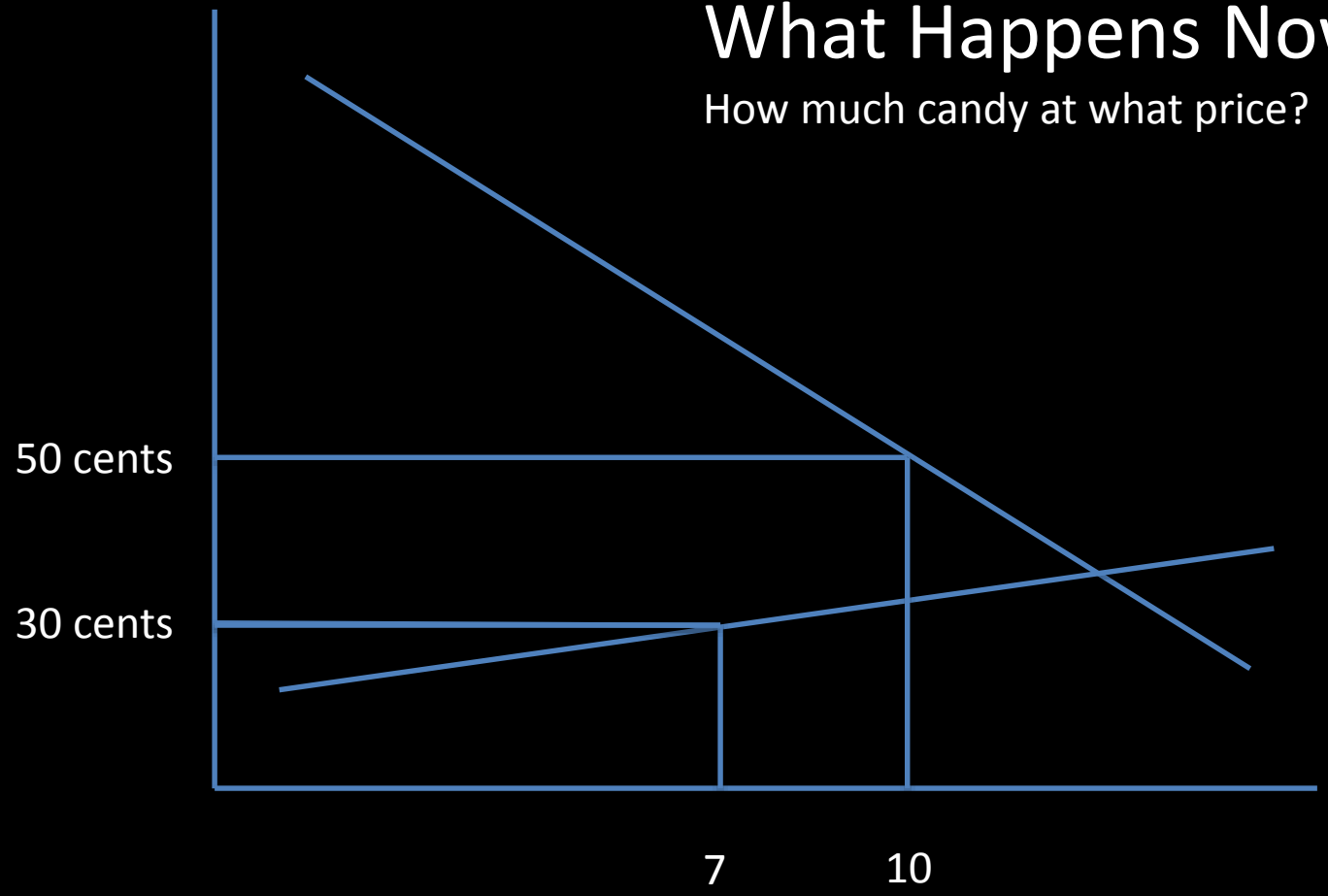

What it costs to make candy bars
Number of candy bars

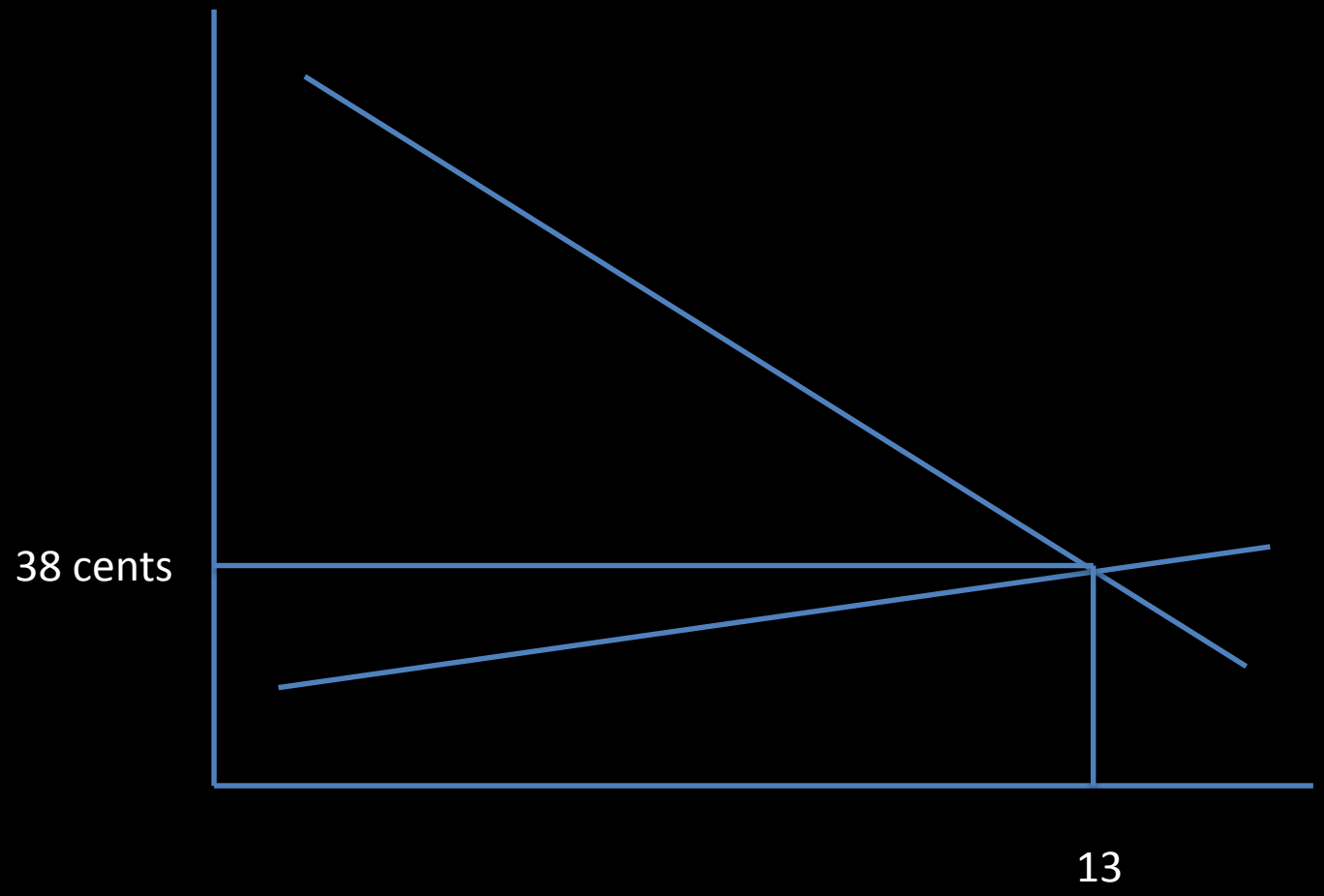


Prediction #2
If the price of candy bars is 30 cents, 7 of them will be produced (supplied)

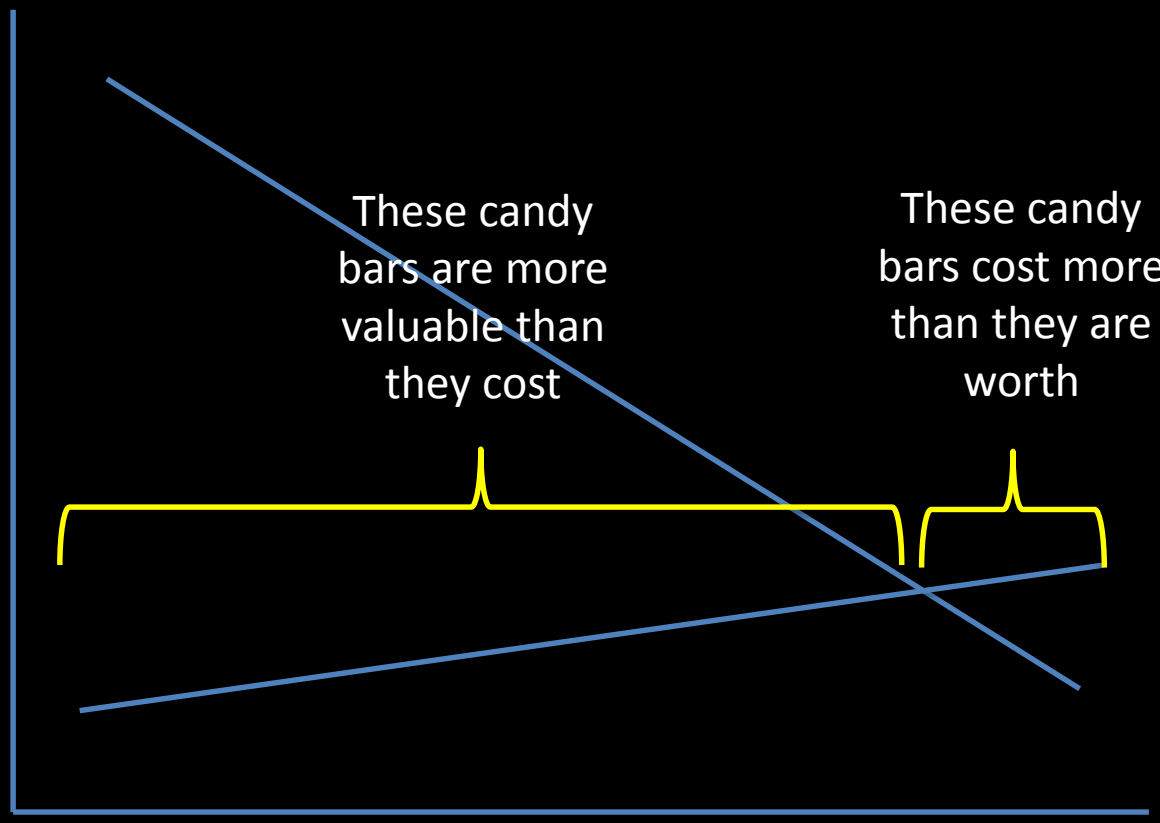
What Happens Now?

How much candy at what price?



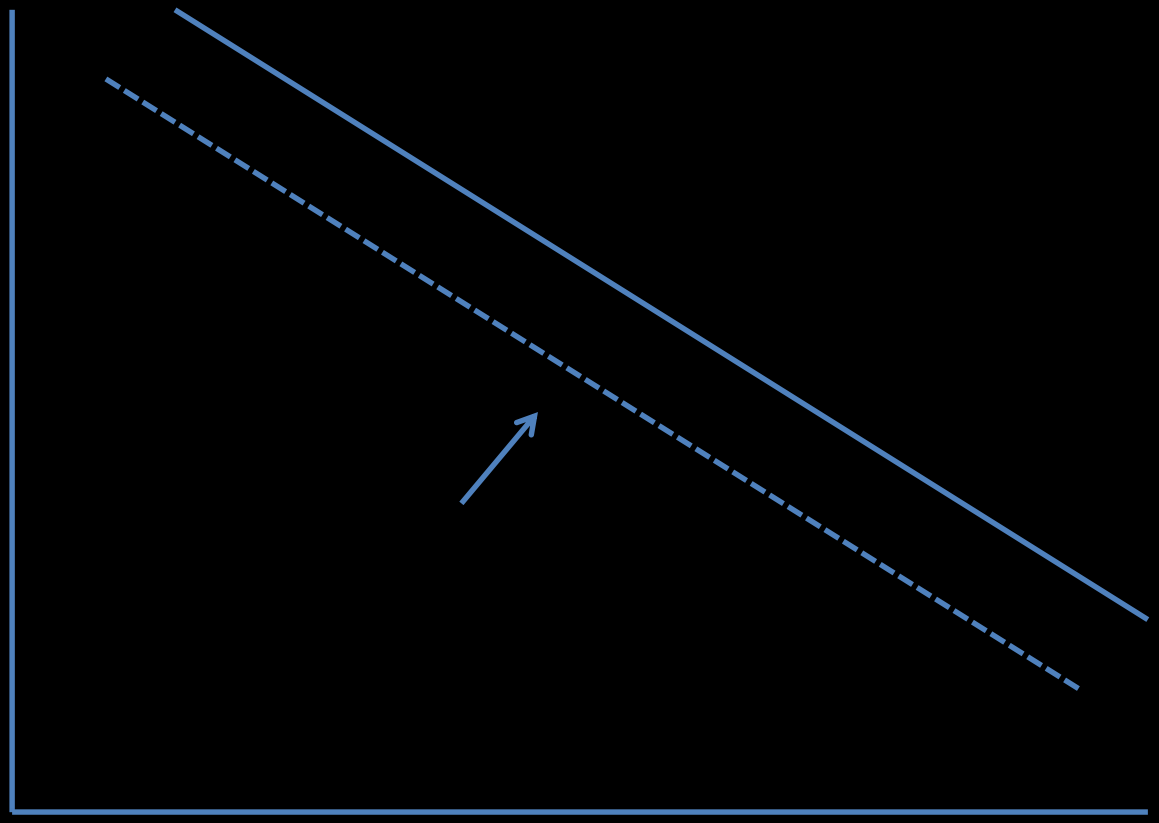


Prediction #3
The market price of candy bars will be 38 cents,
and 13 of them will be demanded/supplied



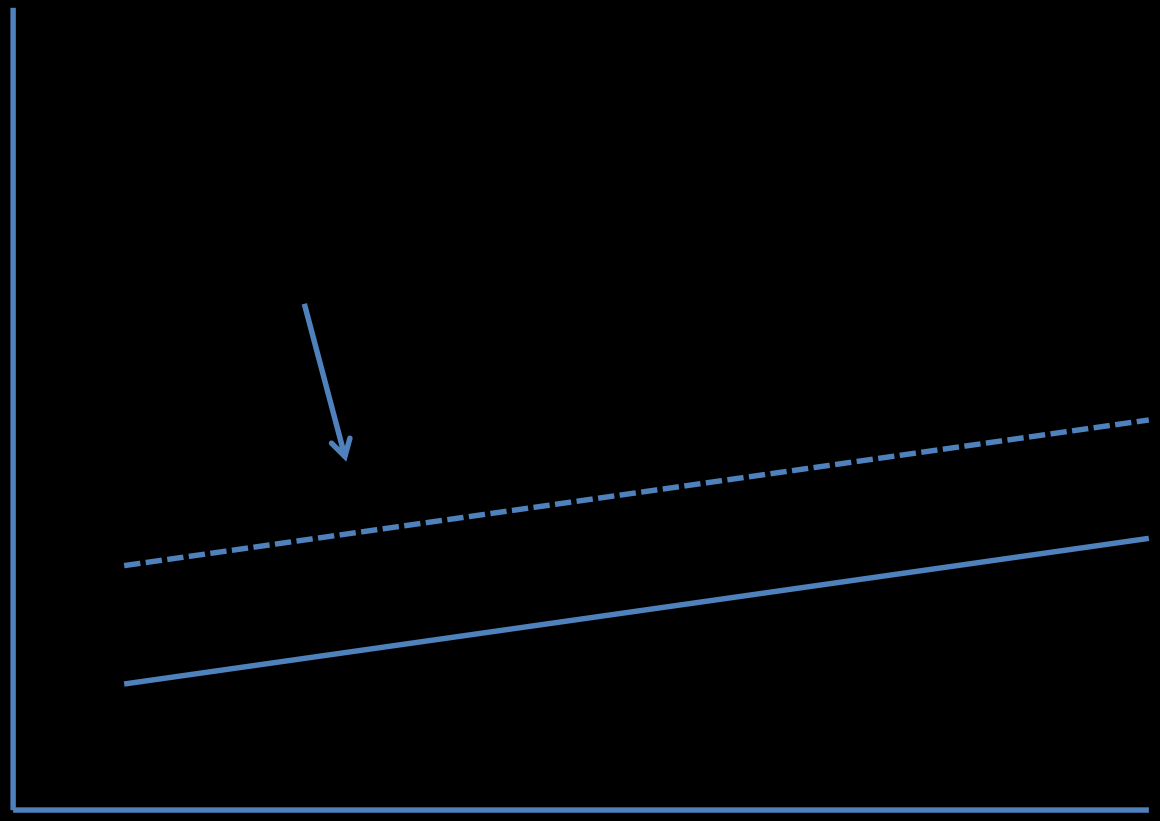
“The Invisible Hand”

Individual, Uncoordinated Self-Interest Leads to a Socially Optimal Equilibrium Outcome



Demand for beef as income increases

Demand for NPR as education increases



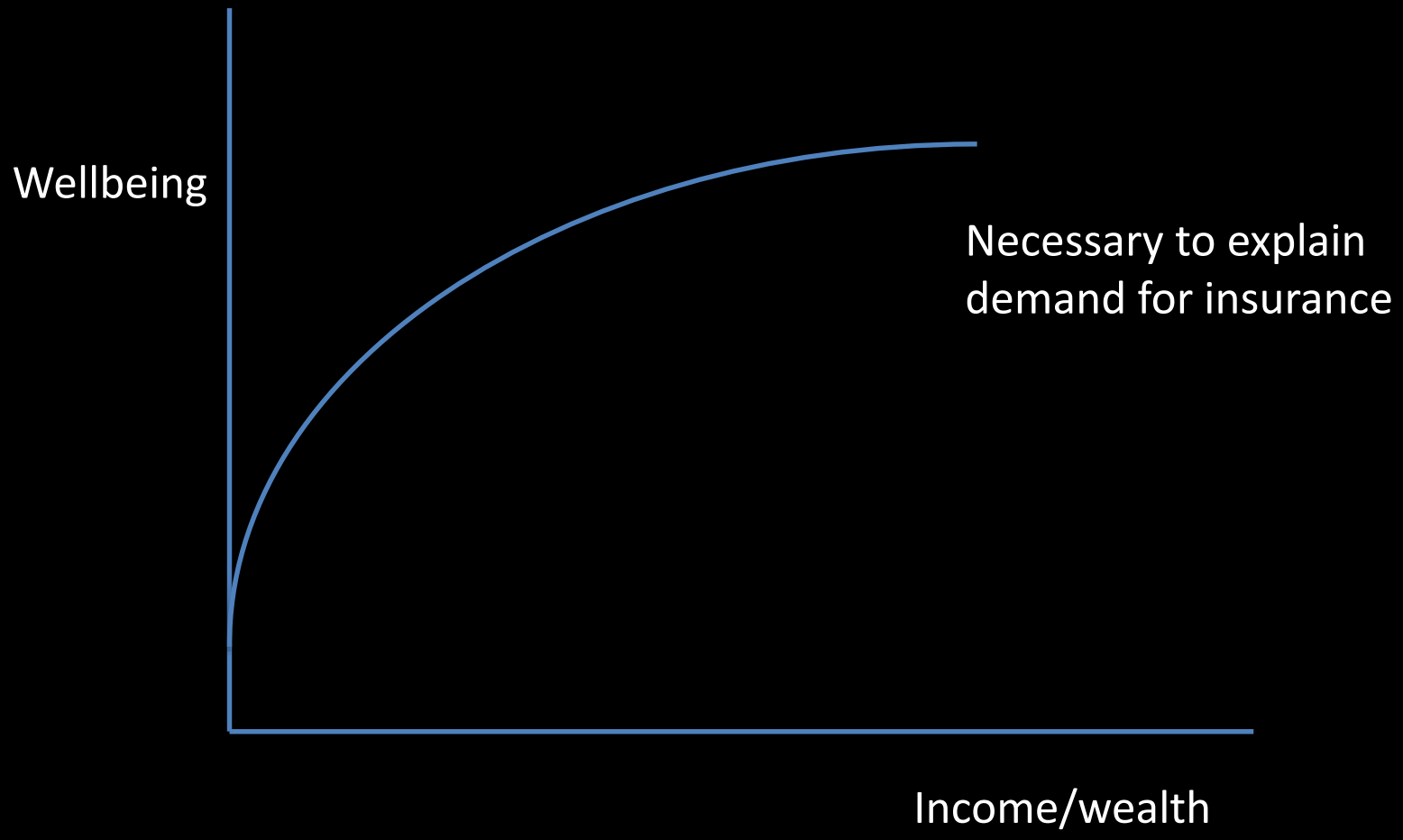
Innovation's affect on cost to produce 1GB RAM

Affect of lower labor costs from free trade

Another Shape

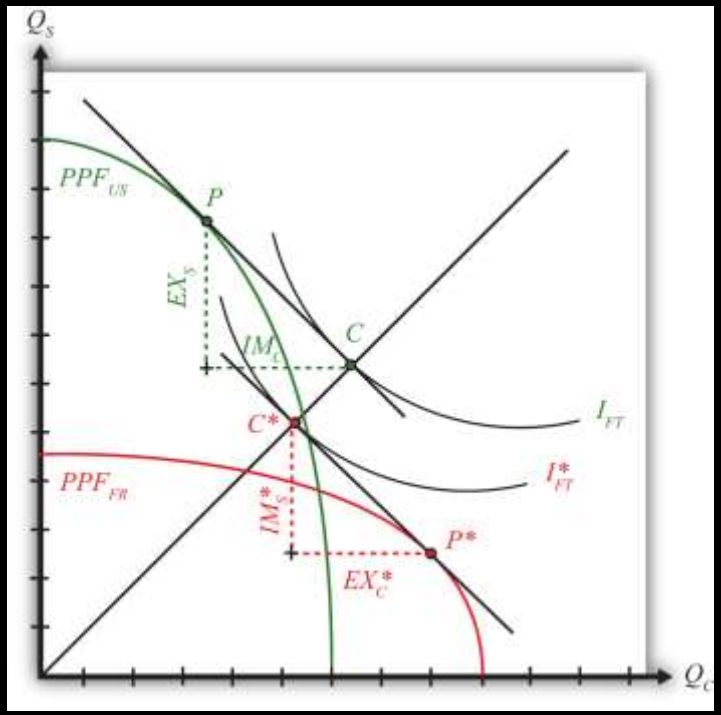
- Another kind of data

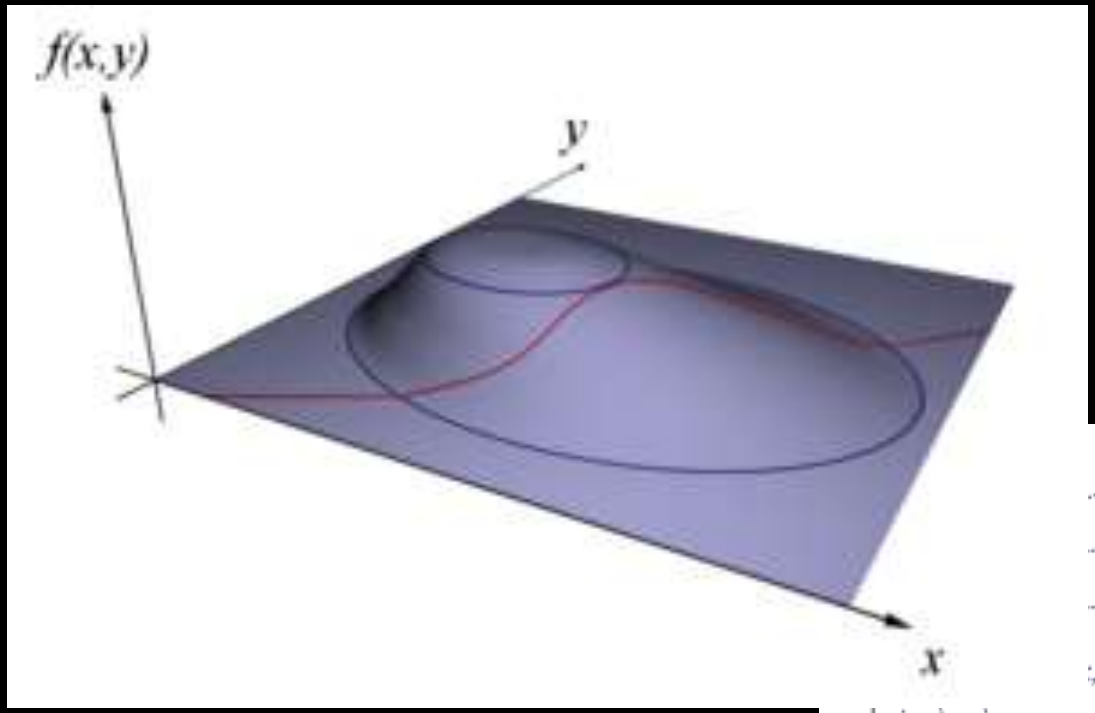
Curvature

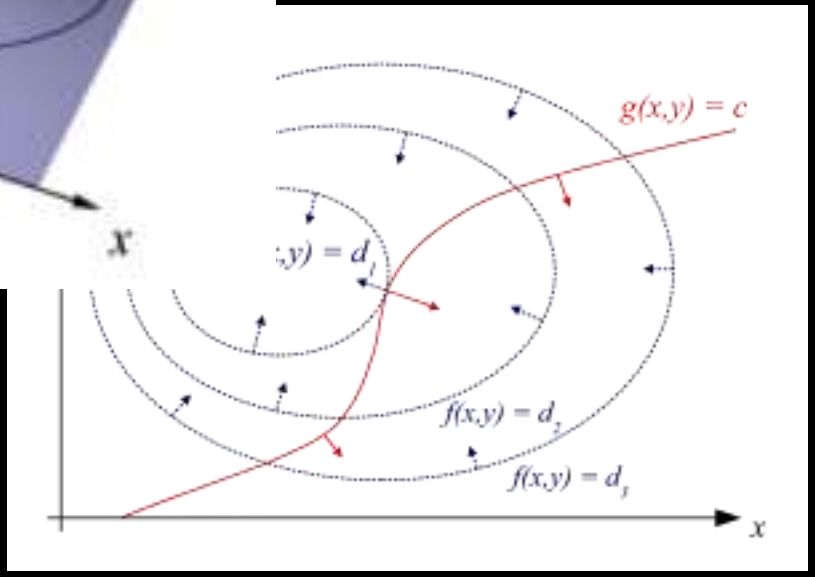

Wellbeing
Necessary to explain
demand for insurance
Income/wealth

Our Math

- Shapes
  - Depicted visually, numerically, symbolically
    - Surprisingly, predictively powerful
  - Topology
    - Set theory, tangencies
    - Lagrangian methods







Find x and y to maximize $f(x, y)$ subject to a constraint $g(x, y) = c$

Other Math

- Optimal control theory
  - For dynamic optimization
- Game theory
  - A way to model conflict, cooperation

In all of these, the math is used to depict incentives, maximization, constraints

p.s. also a ton of “statistics math”

An Empirical Note

- *Everyone* has economic intuition and experience
  - This disciplines, shapes our paradigm
- Examples
  - Your response to wages?
  - The effect of rent control?
  - Market economies vs. central planning?

My Friend David

My Friend David

High and Declining Prices Signal Product Quality

By KYLE BAGWELL AND MICHAEL H. RIORDAN *

High and declining prices signal a high-quality product. High prices are the efficient means of signaling, because the consequent loss of sales volume is most damaging for lower-cost, lower-quality products. As time passes and the number of informed consumers increases, the signaling distortion lessens, resulting in a declining price profile. The prediction of high and declining prices is robust across a variety of dynamic models and is consistent with recent empirical findings. (*JEL* 022, 026)

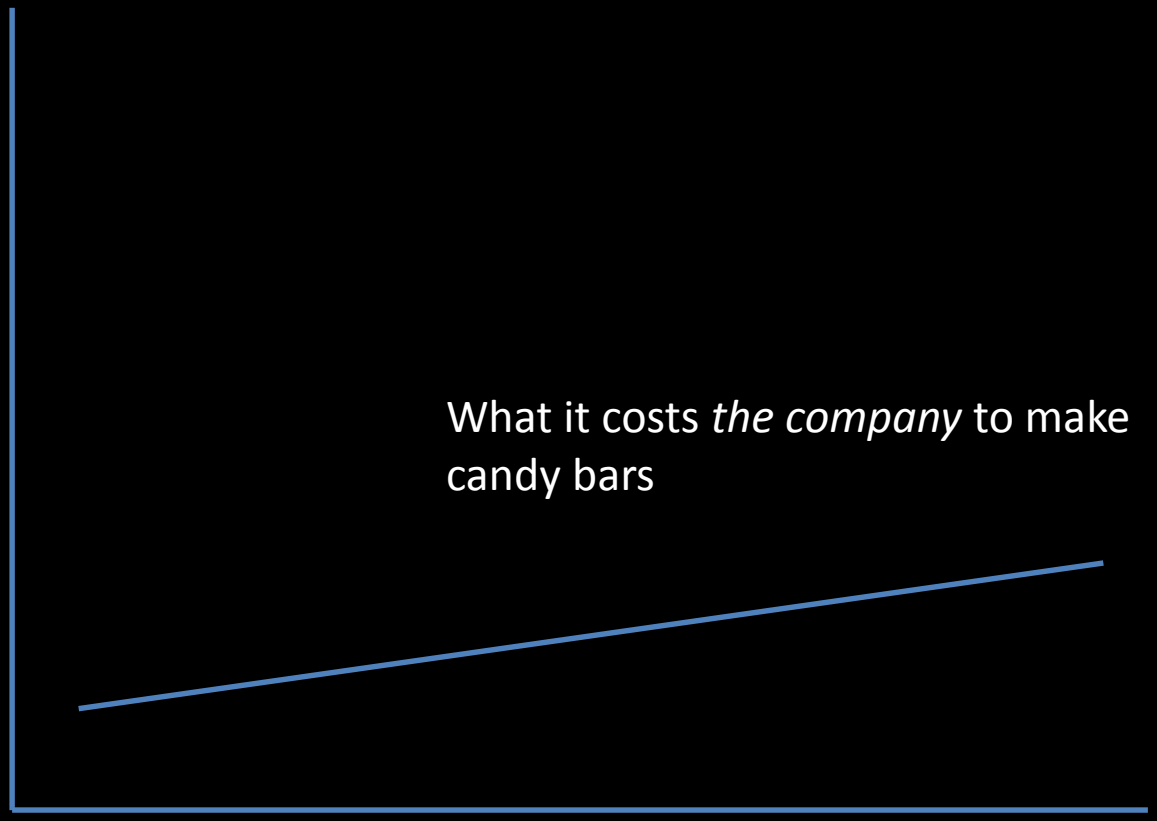
Market Failure

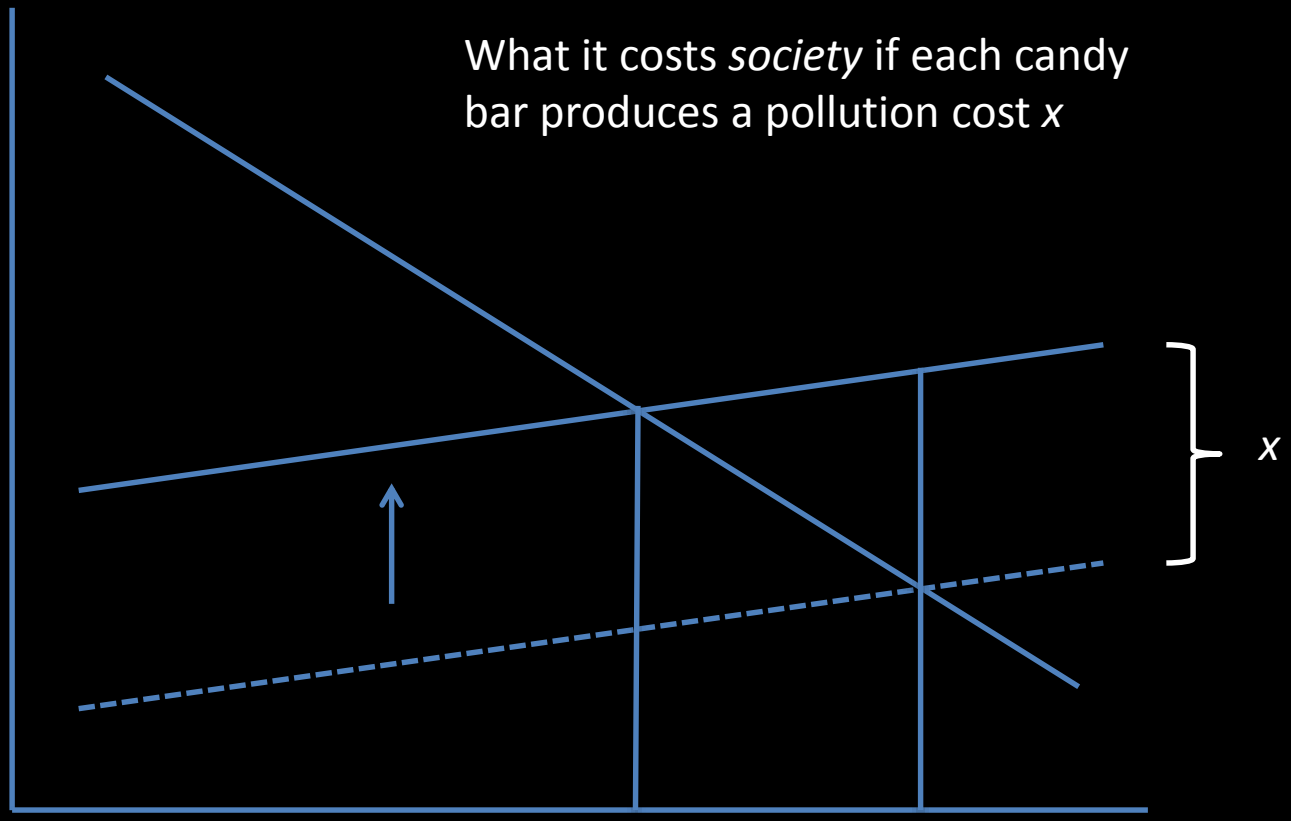
- What is the optimum outcome for society?
- Does the invisible hand achieve that?
- If not, what do we do?

Prescriptive economic and policy analysis

Environmental Market Failures

- Externalized costs
- Public goods and bads
- Information problems


What it costs *the company* to make candy bars
Number of candy bars



Compare the market outcome to the socially optimal outcome

Number of candy bars

Interventions

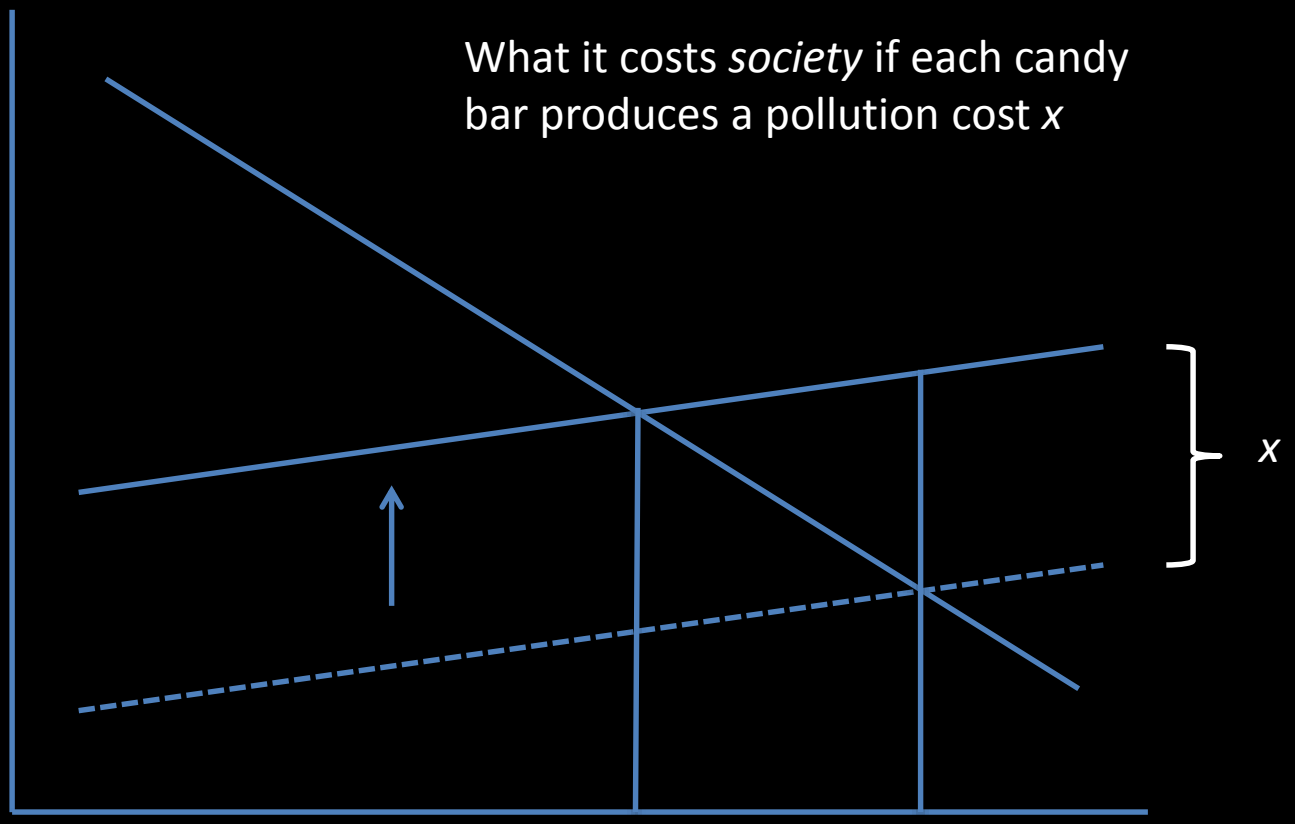
- Environmental liability law
  - The polluter pays
- Environmental taxation

  To internalize the external cost
- Technology standards

  To shrink or eliminate the external cost
- "Caps"

To shrink the total amount of pollution allowed

Efficiency vs Fairness



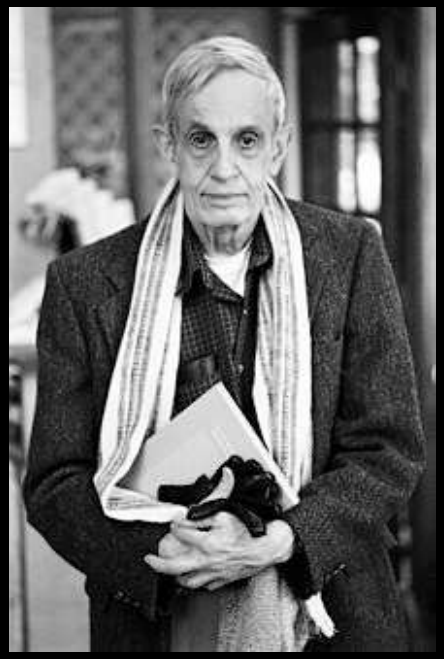
Public Goods and Market Failure

A public good:

Consumption by one does not reduce amount consumed by others

Beautiful Minds

- Non-cooperative vs cooperative “games”
  - Equilibrium strategies among self-interested actors
  - What do I do, given what you do? And vice versa



Game Theory and Public Goods

- It costs $4 to keep the river clean
- You and I can pay the cost, or share it
- A clean river is worth $3 to each of us

Is it “optimal” to clean the river?

Yes, $6 benefit at $4 cost

Is that what happens?

	You Pay	You Don't Pay
I Pay	(My Profit, Your Profit) (1,1)	(-1, 3)
I Don't Pay	(3,-1)	(0,0)

The Optimum Is Not What Happens
An argument for government intervention

Tragedy of the Commons

- You and I can own and graze 1 or 2 cows each
- The value of the cows declines as the number grows
- Each extra cow yields $3 more for the cow owner, but creates a $4 *shared* biological cost

Number of Cows	Total Value of the Cows
2	10
3	9
4	8

	You Have 1 Cow	You Have 2 Cows
I Have 1 Cow	(5, 5)	(3, 6)
I Have 2 Cows	(6, 3)	(4,4)

Each extra cow yields $3 more for the cow owner, but creates a $4 *shared* biological cost

Remedy?

- Private ownership of the land
- Management requirements
  - “There shall only be 2 cows”
- “Informal” social cooperation

The Foundations (Redux)

- Self-interest
- Rationality
- Maximization

- Yield robust *predictions*
- Powerful institutional *prescriptions*