

1.1 – The Tools of Microeconomics

ECON 306 • Microeconomic Analysis • Fall 2021

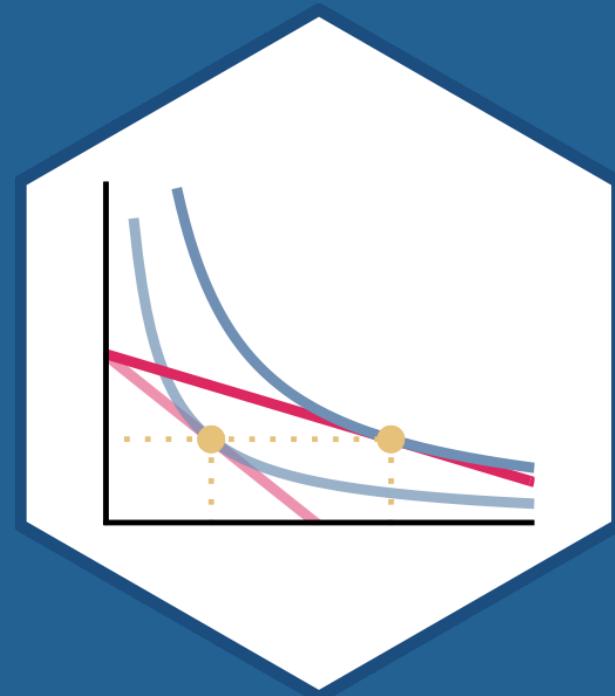
Ryan Safner

Assistant Professor of Economics

 safner@hood.edu

 [ryansafner/microF21](https://github.com/ryansafner/microF21)

 microF21.classes.ryansafner.com



Outline



The Tools of Microeconomics

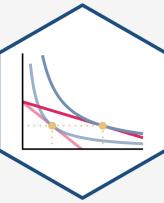
Incentives

Equilibrium

Real Talk: The Math

About This Course

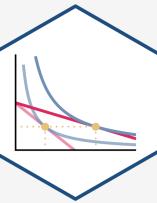
About Me



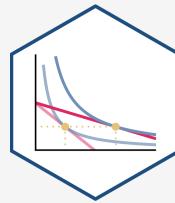
Edinburgh, 2019

- Ph.D (Economics) – George Mason University, 2015
- B.A. (Economics) – University of Connecticut, 2011
- Specializations:
 - Law and Economics
 - Austrian Economics
- Research interests
 - modeling innovation & economic growth
 - political economy & economic history of intellectual property
- Expecting a son in March 😊 (expect cameos!)

Micro-economics



Micro- vs. Macro-economics

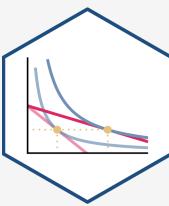


- What is “an economy?”
- Where do aggregates (“GDP”, “unemployment”, & “inflation”) come from?
- **Micro:** [modeling] **Choices** and **consequences**
- **Macro:** [modeling] **Systemic interaction** of choosers & **emergent behavior**

A word cloud centered around the term **MACROECONOMICS**, with various related terms and concepts surrounding it.

Key words include: GROWTH, INFLATION, FIELD, MACRO, MICROECONOMICS, MONETARISM, NEOCRASSICAL, ADJUSTMENTS, CORPORATION, CONSEQUENCES, OTHER, FORECASTS, STRUCTURE, WAGES, INDICATORS, RELATIONSHIP, BEHAVIOR, APPROACHES, EVERYWHERE, THEORETICAL, CONSIDERING, UNIT, QUANTITIES, REPRESENTS, NECESSARY, MANY, REGULATIONS, ADJUST, FORECASTS, EARLIER, EMPHASIZING, KEYNESIAN, DEFLATION, TYPICALLY, CONTRAST, EXAMINES, STABILIZE, INCLUDES, EXAMPLE, EFFECTS, FACTORS.

Where You Are Now



- **Basic concepts** of markets, individuals (consumers & firms), economies:

- ECON 205: Principles of Macroeconomics
- ECON 206: Principles of Microeconomics

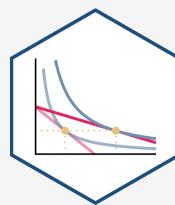
- **Modelling** markets, individuals (consumers & firms), economies

- ECON 306: Microeconomic Analysis
- ECON 305: Macroeconomic Analysis^{magenta[t]}



[†] Required for ECON majors only. Calculus I required.

Economists Speak a Foreign Language...

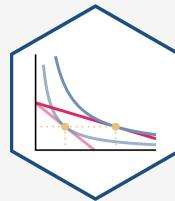


- Terms you “know” from ordinary life mean **very different things** to economists:

Cost, efficiency, welfare, competition, marginal, equilibrium, profit, public good, discrimination, elasticity
- Using these words’ “ordinary” meanings can lead to *wrong* economic conclusions!
- You will need to “**relearn**” the economic meanings of these words



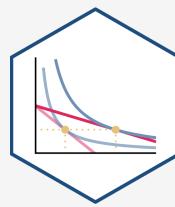
...But You Can Learn It



- You'll need to master a new vocabulary:
 - marginal rate of substitution,
 - marginal cost, consumer surplus,
 - allocative efficiency, externality
- Avoid excessive jargon, but these concepts are useful to explain reality!



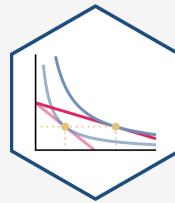
Don't Think You Know It Already!



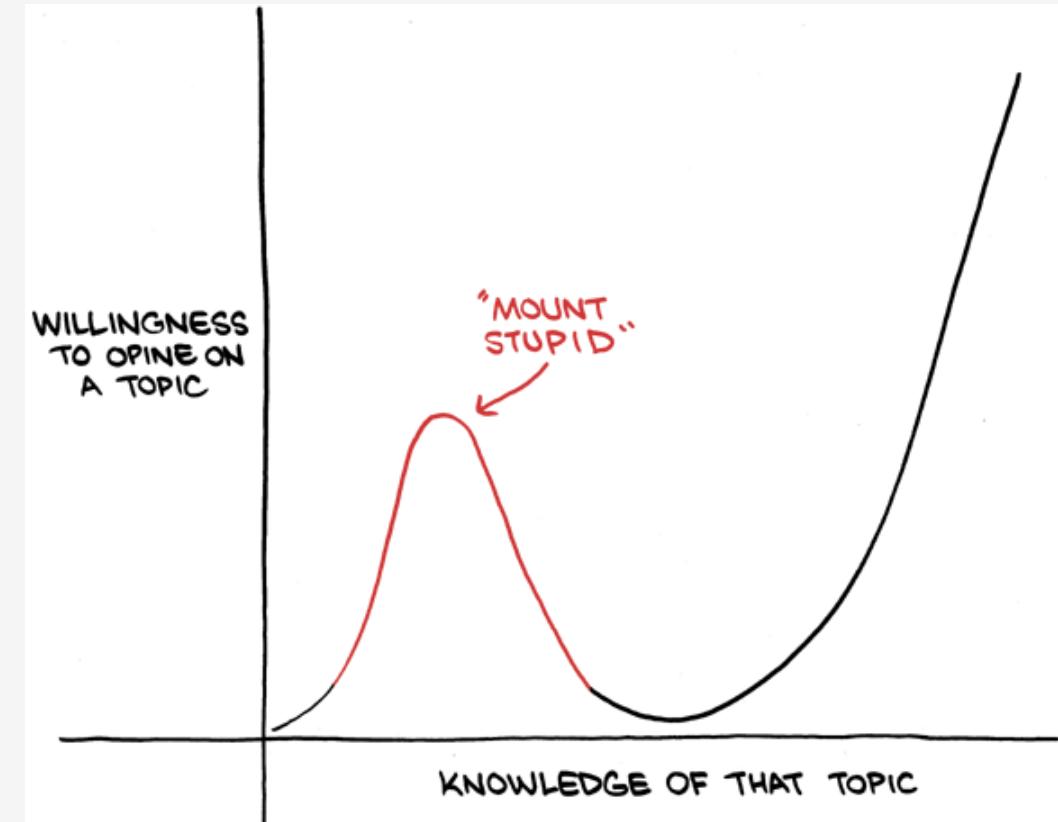
- Everyone thinks they are *already* an economist and can speak this foreign language
- Be humble!
- Economics is *often* common sense, but reached via deep analytical thinking



And Tread Cautiously

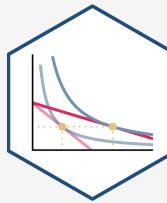


- But be careful, *a little bit of knowledge* is a dangerous thing!
- An application of the famous "Dunning-Kreuger effect" in social psychology



Source: [SMBC](#)

Economics ≠ Business or \$\$\$



Mike Simpson, M.D.

@DrMikeSimpson

Follow



The fact that every person with a PhD in economics is NOT a billionaire should tell you all you need to know about the worth of that particular field of study.

2:25 PM - 2 Jun 2018

213 Retweets 1,035 Likes



236

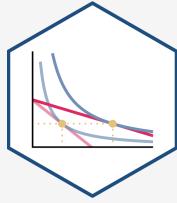
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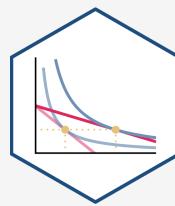
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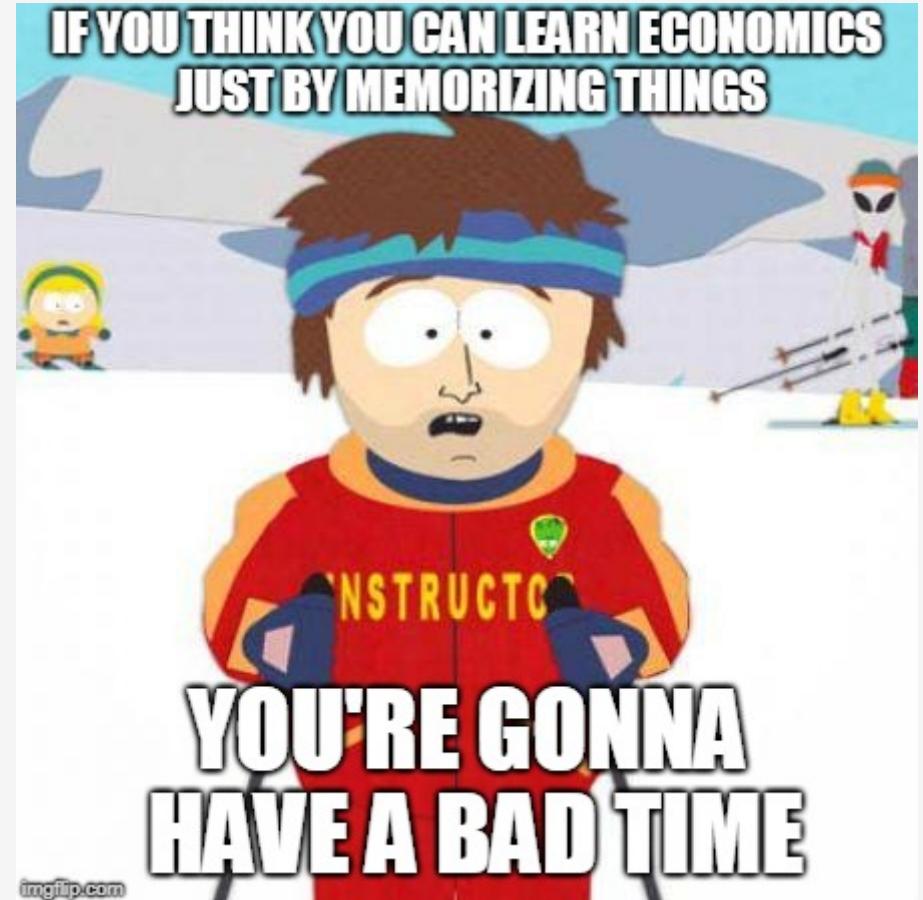
Economics \neq Business or \$\$\$



Economics Can Be Difficult

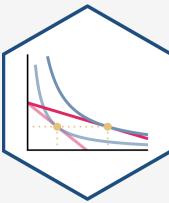


- Economics is hard!
- We are literally retraining and rewiring your brain to see the world in a new way
- If you “don't get it” you can't just try to memorize a bunch of facts



imgflip.com

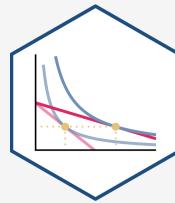
Economics Can Be Difficult



- Not trying to scare you! (I'd rather say this now than after Exam 1.)
 - **Grades don't reflect your worth as a person!**
- **Comparative advantage:** nobody can be good at everything!
 - I'm awful at accounting, chemistry, etc.



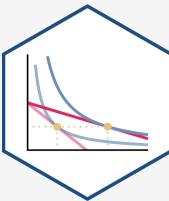
The Uses of Economics



- Most of you will not become professional economists – that's OK
 - Economics is a **liberal art**, useful to you even if it's not your career
- Understand “**how the world works**”

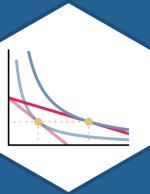


The Uses of Economics



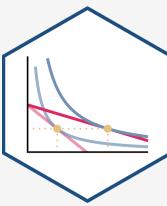
- A great **bullshit-detector**, especially about self-interested, squishy, or political statements
- People love to forget that we have to make tradeoffs
 - “Economics puts parameters on people's utopias”





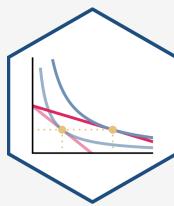
The Tools of Microeconomics

Economics as a *Way of Thinking*

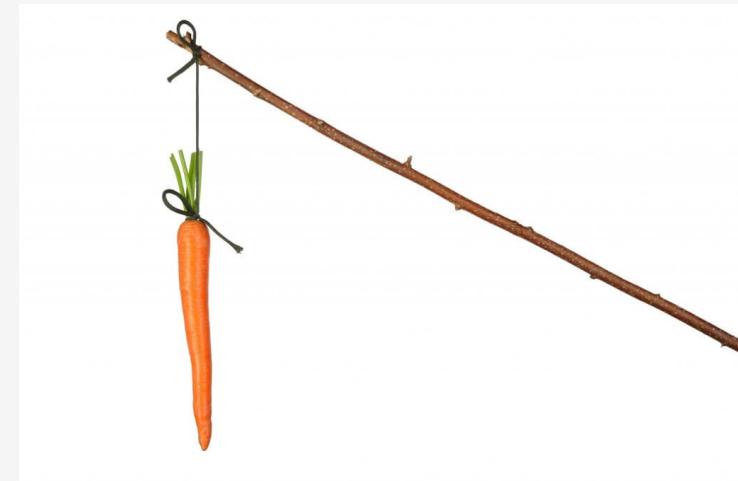


- Economics is a **way of thinking** based on a few core ideas:

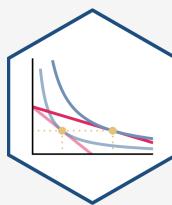
Economics as a *Way of Thinking*



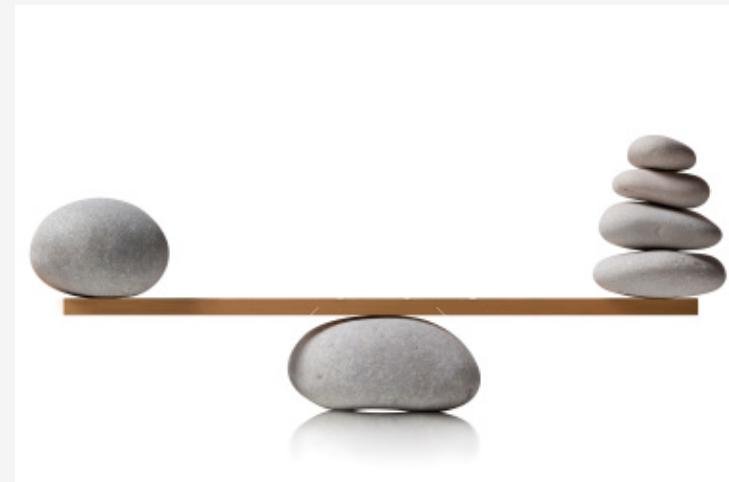
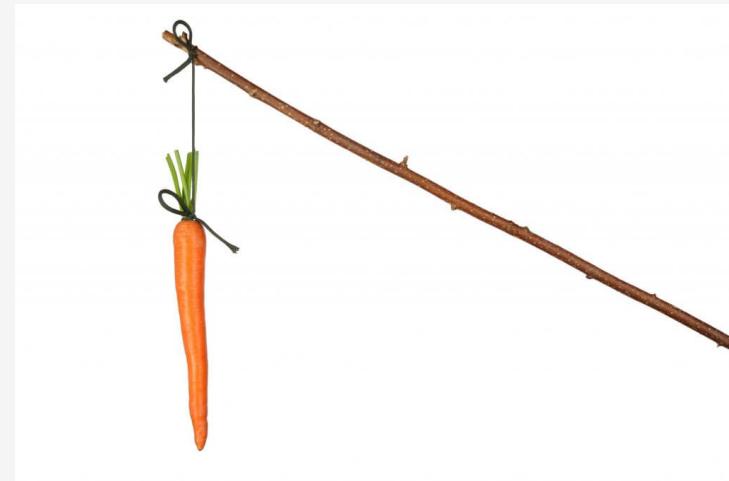
- Economics is a **way of thinking** based on a few core ideas:
- **People respond to incentives**
 - Money, punishment, taxes and subsidies, risk of injury, reputation, profits, sex, effort, morals

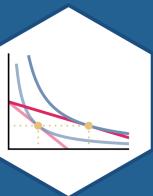


Economics as a *Way of Thinking*



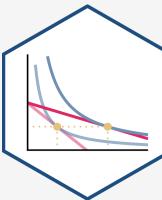
- Economics is a **way of thinking** based on a few core ideas:
- **People respond to incentives**
 - Money, punishment, taxes and subsidies, risk of injury, reputation, profits, sex, effort, morals
- **Environments adjust until they are in equilibrium**
 - People adjust their choices until optimal, given others' actions





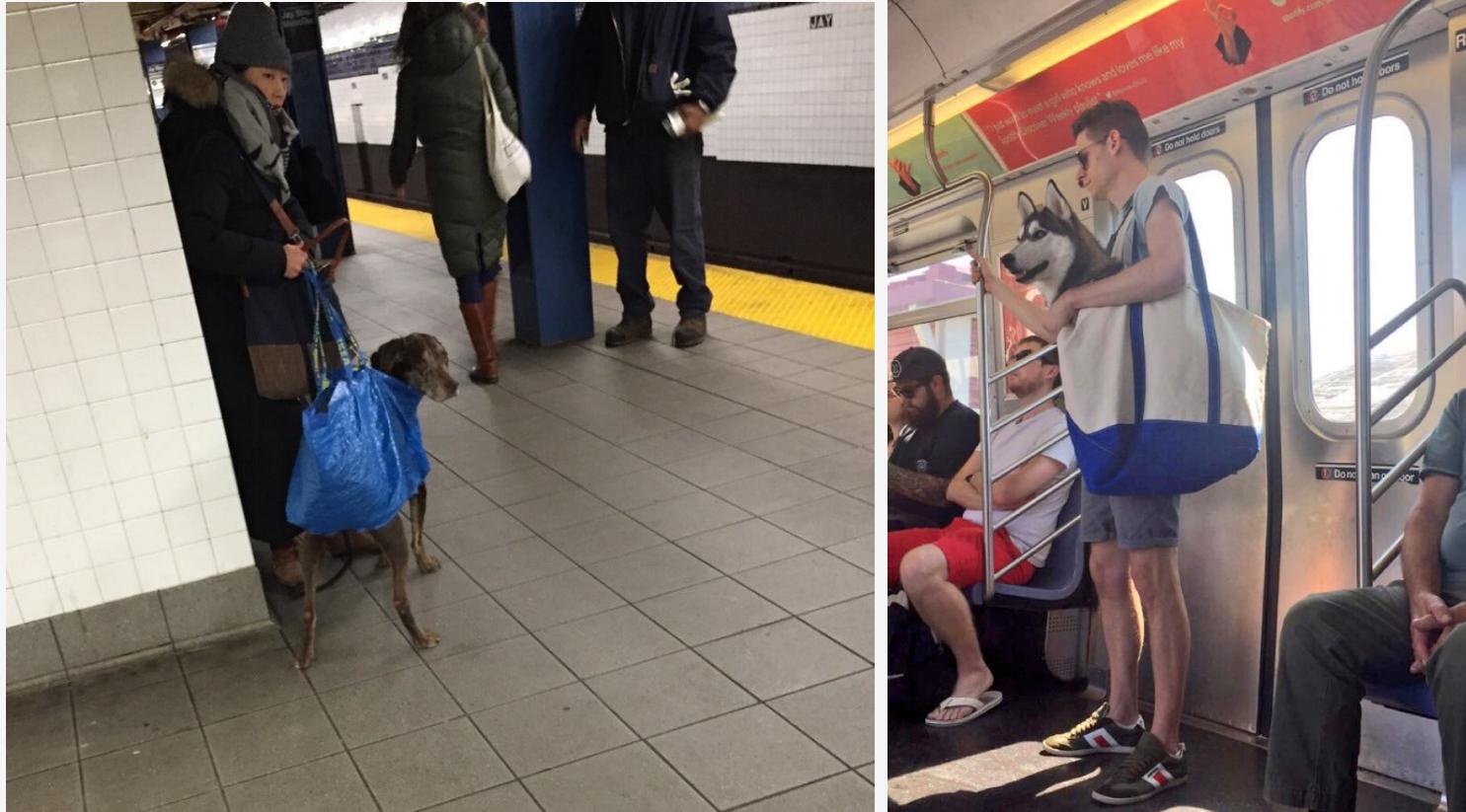
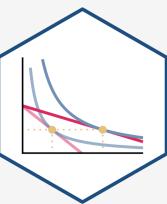
Incentives

Incentives Example: Subway I



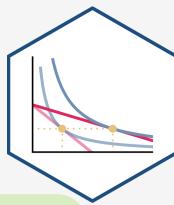
The NYC Subway bans dogs unless they can be "enclosed in a container"

Incentives Example: Subway II



Pictures [Source](#)

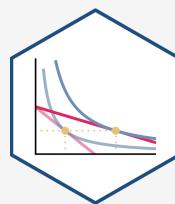
Incentives Example: Rat Bounty



Some governments pay bounties to reduce pest populations such as rats.

Example: Suppose the government were to pay \$250 for every rat tail turned in.

Incentives: Even Dolphins Understand I



Animal behaviour

Why dolphins are deep thinkers

The more we study dolphins, the brighter they turn out to be, writes **Anuschka de Rohan**

Anuschka de Rohan

Wed 2 Jul '03 21.25 EDT

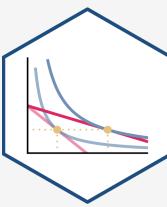


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i The brain of an adult bottlenose dolphin is about 25% heavier than the average human adult's brain.
Photograph: Stephen Frink/Getty Images

Incentives: Even Dolphins Understand II

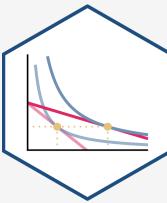


At the Institute for Marine Mammal Studies in Mississippi, Kelly the dolphin has built up quite a reputation. All the dolphins at the institute are trained to hold onto any litter that falls into their pools until they see a trainer, when they can trade the litter for fish. In this way, the dolphins help to keep their pools clean.

Kelly has taken this task one step further. When people drop paper into the water she hides it under a rock at the bottom of the pool. The next time a trainer passes, she goes down to the rock and tears off a piece of paper to give to the trainer. After a fish reward, she goes back down, tears off another piece of paper, gets another fish, and so on. This behaviour is interesting because it shows that Kelly has a sense of the future and delays gratification. She has realised that a big piece of paper gets the same reward as a small piece and so delivers only small pieces to keep the extra food coming. She has, in effect, trained the humans.

July 2 2003, ["Why Dolphins are Deep Thinkers"](#), *The Guardian*

Incentives: Monkeys Too



These Monkeys Understand Economics and Intentionally Steal High-Ticket Items to Barter for Better Food, Study Finds



Jody Serrano
1/17/21 8:43PM

54

1



A Balinese long-tailed monkeys, *Macaca fascicularis*, eats an apple in the Sacred Monkey Forest in Ubud, Bali, Indonesia, on November 16, 2018.

Photo: Gabriel Bouys / AFP (Getty Images)

Some of you all may be familiar with the [crime ring of long-tailed macaque monkeys](#) that reside around the Uluwatu Temple in Bali, Indonesia, who were

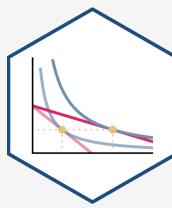
Recent Video



The 5 Facebook Messenger Features You Need to Know

Caitlin McGarry | 0:12

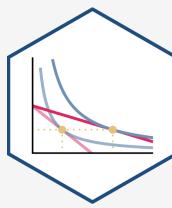
Takeaways About Incentives I



- People respond to (changes in) incentives
- People have goals they seek to attain
- Making one alternative more costly \neq people *stop* pursuing their goals
- People will seek (less preferred) *alternative* methods to attain goals
- **Unintended consequences!**



Takeaways About Incentives II



Peter Fortune AM 

@PeterTFortune

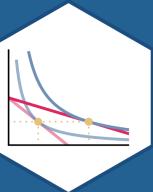


Whenever I am working on policy decisions I think of this image... 



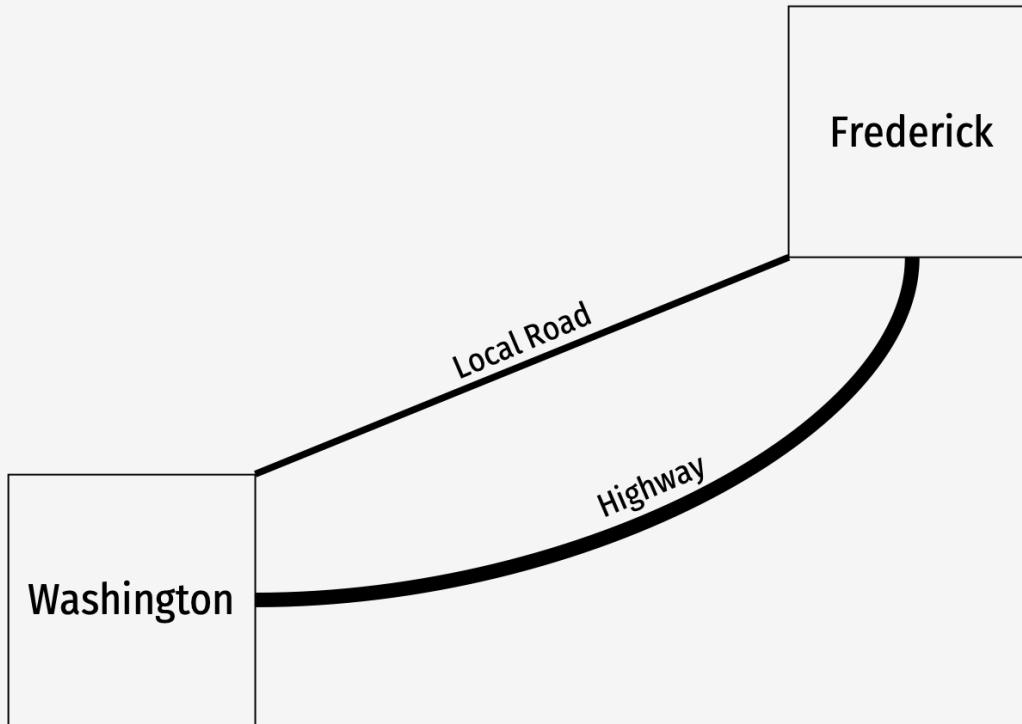
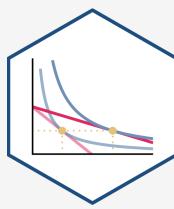
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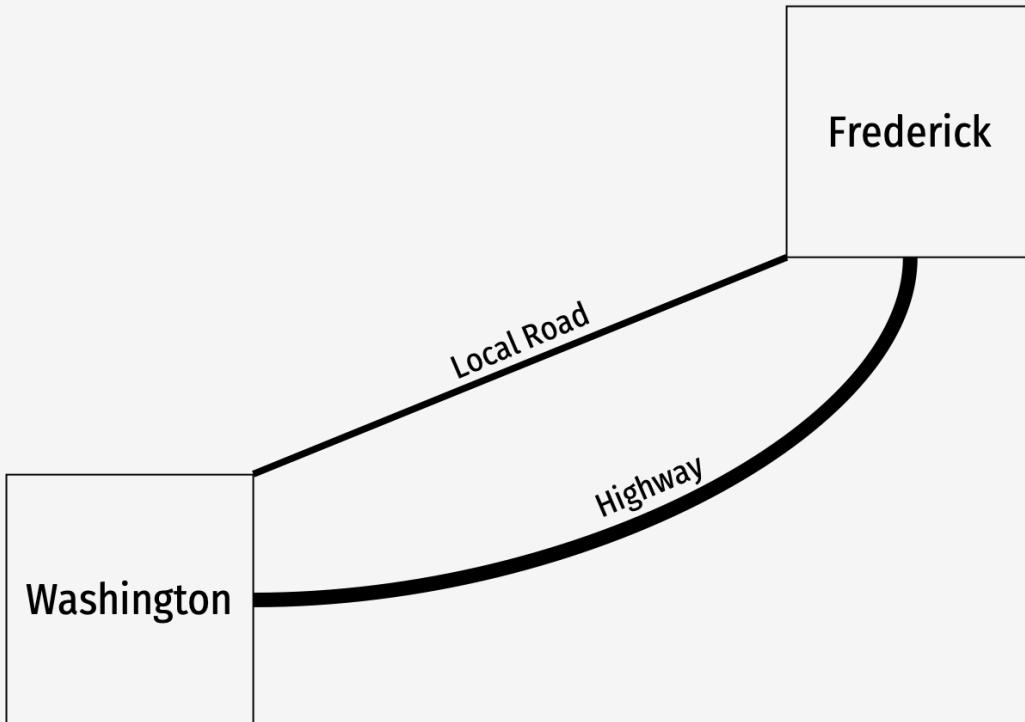
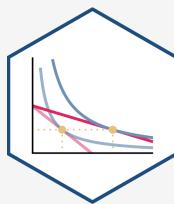
Equilibrium

Equilibrium Example I



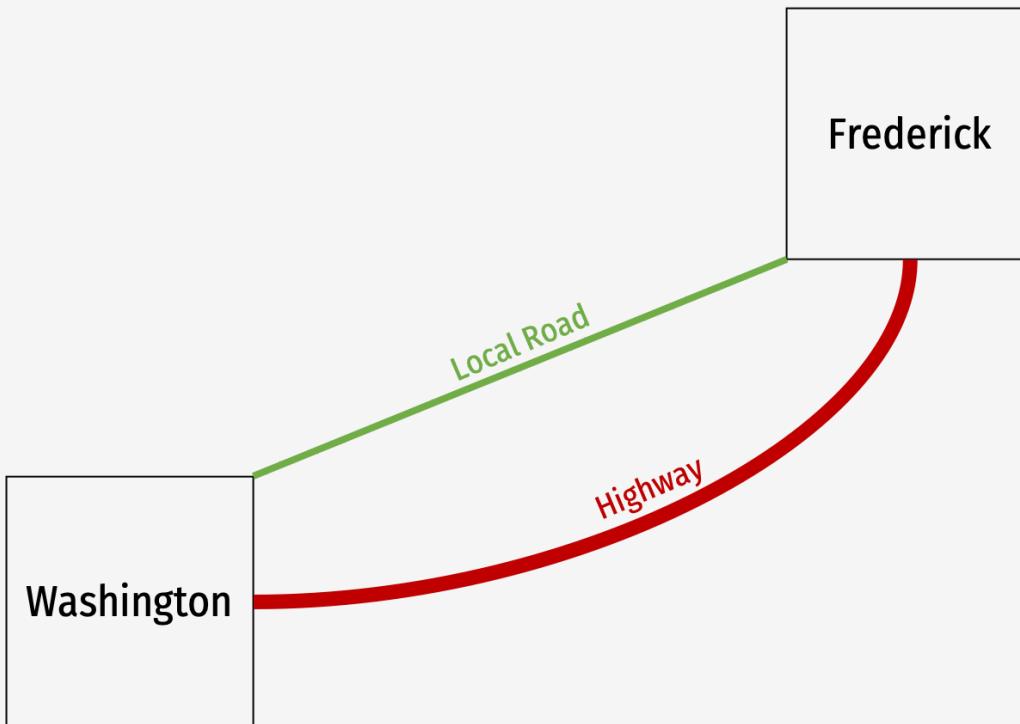
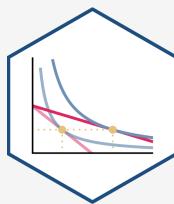
- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

Equilibrium Example I



- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)
- Assume people **optimize**: choose road to **minimize travel time** between cities

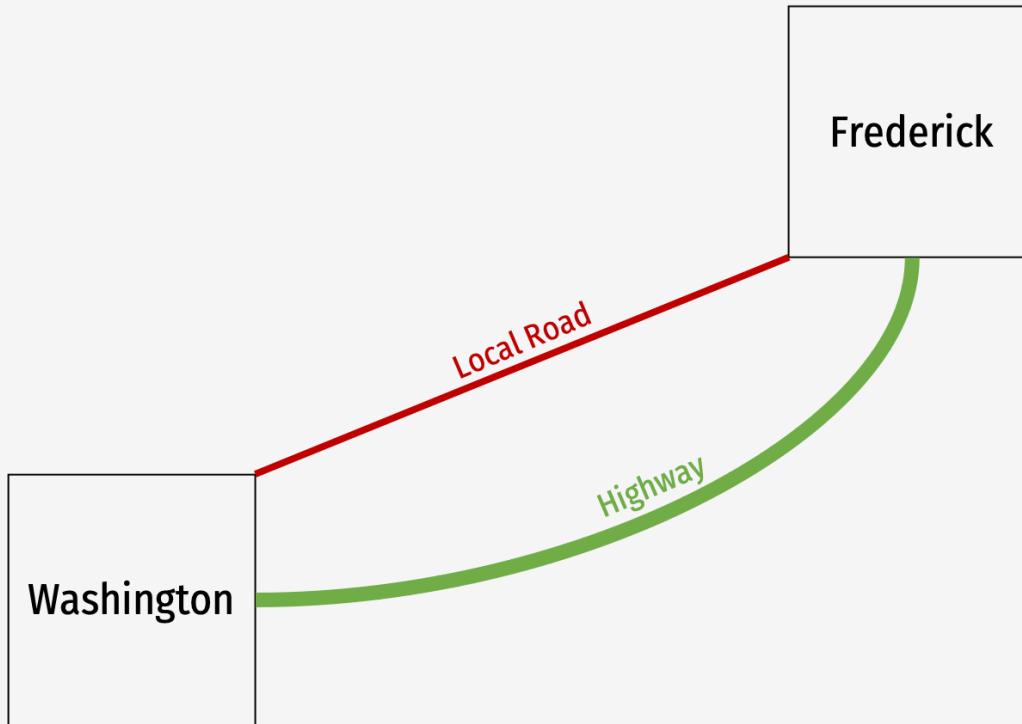
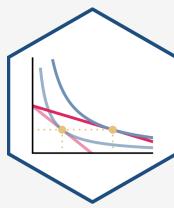
Equilibrium Example II



- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

Scenario I: There are **less than 30 cars** on the local road

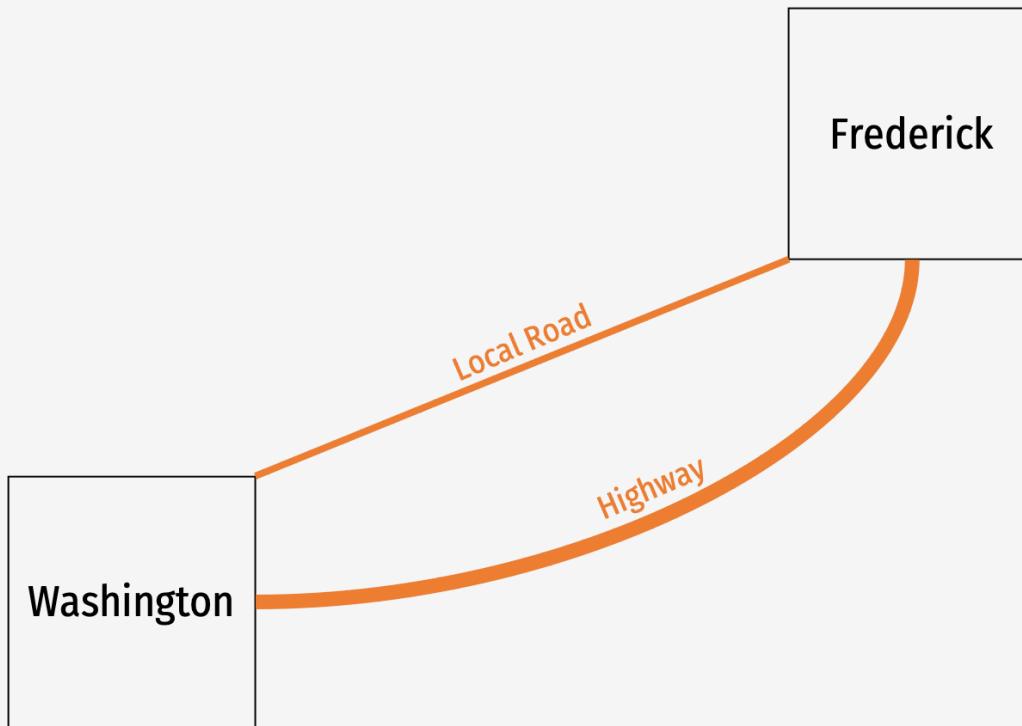
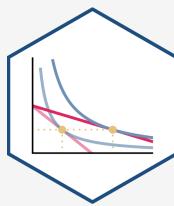
Equilibrium Example III



- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

Scenario II: There are **more than 30 cars** on the local road

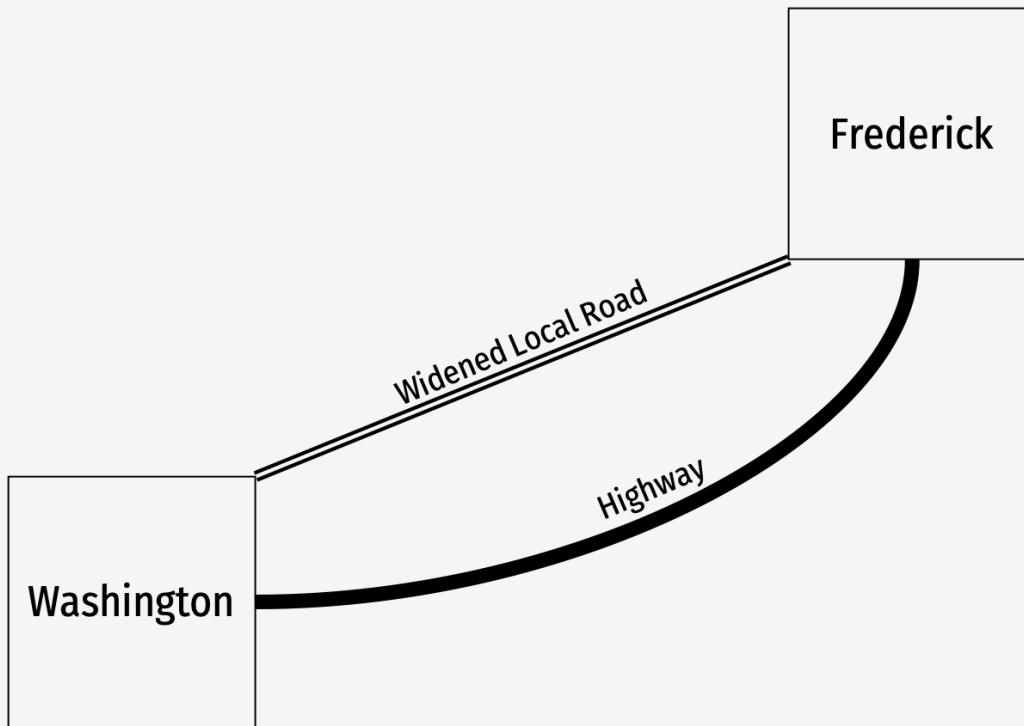
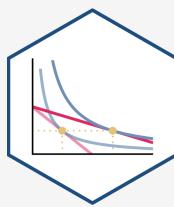
Equilibrium Example IV



- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

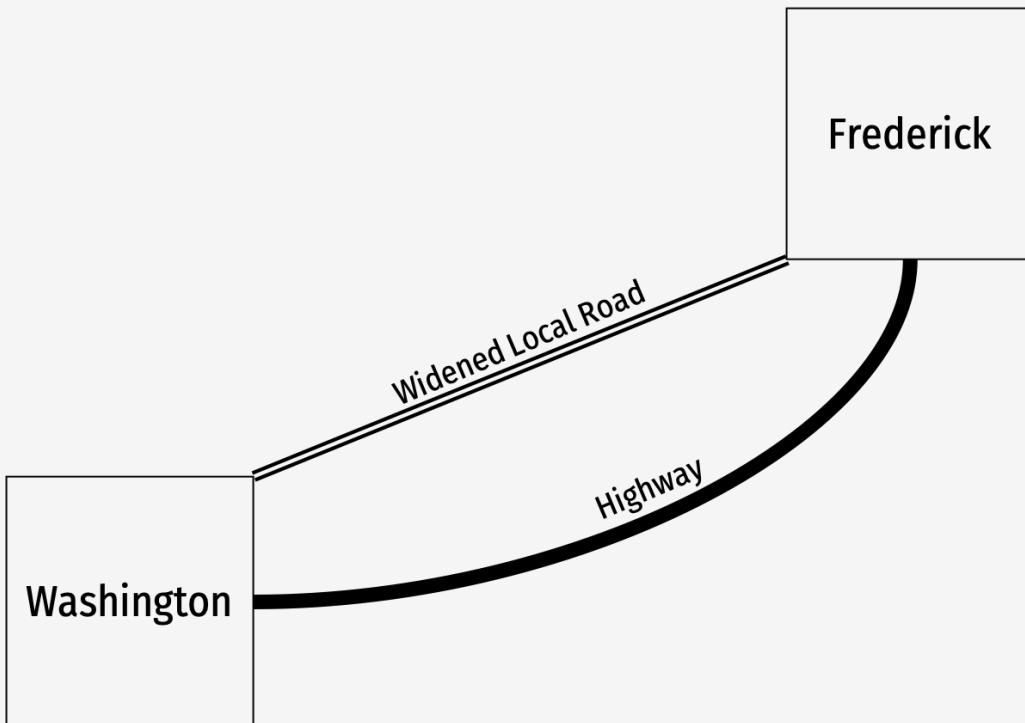
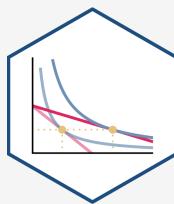
Equilibrium: How many cars are on each road? (Why?)

Equilibrium Example V



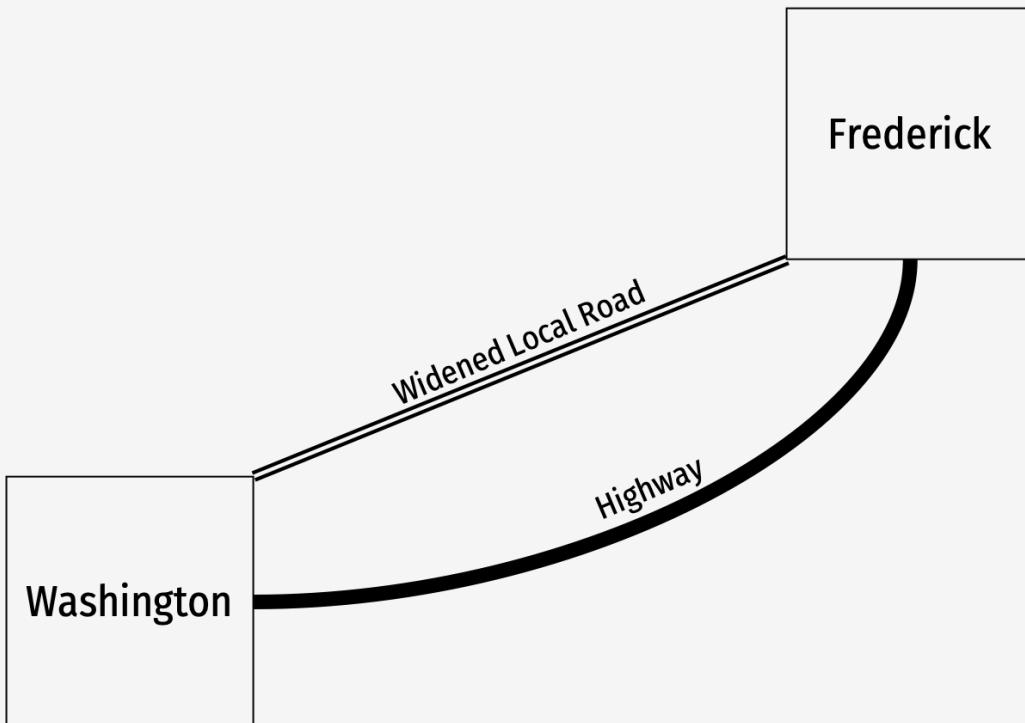
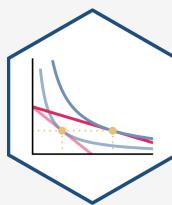
- Suppose the State *doubles the capacity of the local road*
- Local road travel time: **30 min + 0.5 min/car**
- Highway travel time: 1 hour (always)

Equilibrium Example V



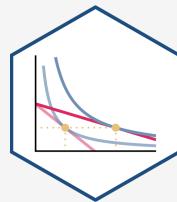
- Suppose the State *doubles the capacity of the local road*
- Local road travel time: **30 min + 0.5 min/car**
- Highway travel time: 1 hour (always)
- Will this reduce travel time?
- Yes! says the State:
 - 30 cars use the local road, takes 1 hour
 - With wider road it takes 45 min!

Equilibrium Example V



- Suppose the State *doubles the capacity of the local road*
- Local road travel time: **30 min + 0.5 min/car**
- Highway travel time: 1 hour (always)
- Will this reduce travel time?
- Yes! says the State:
 - 30 cars use the local road, takes 1 hour
 - With wider road it takes 45 min!
- Is this an equilibrium?

In the Long Run...(& Repeating the Same Mistake)

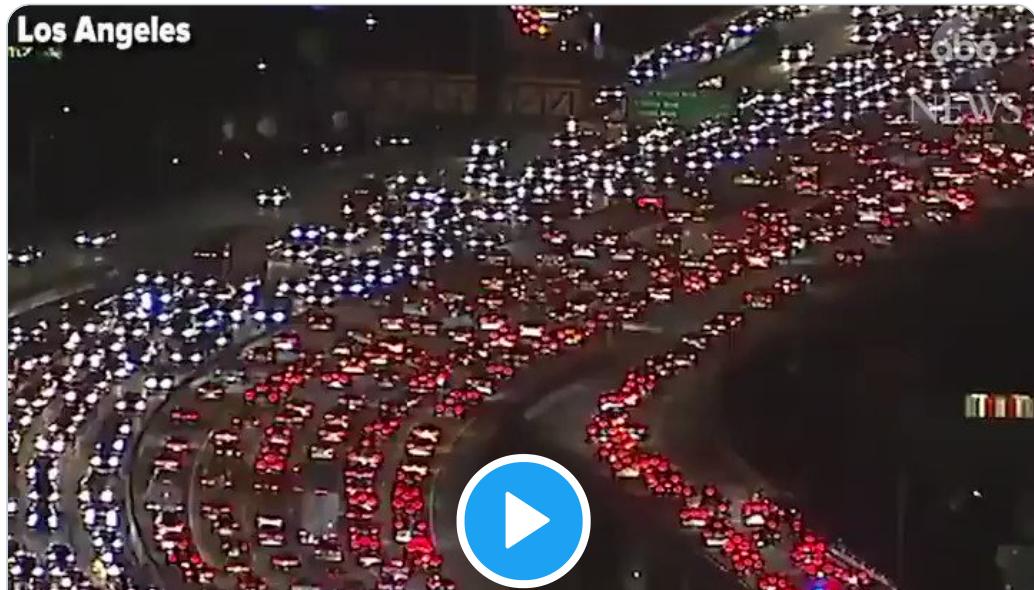


21st Century Urban Planning & Mobility
@urbanthoughts11

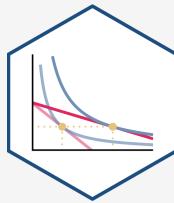


1970: One more lane will fix it.
1980: One more lane will fix it.
1990: One more lane will fix it.
2000: One more lane will fix it.
2010: One more lane will fix it.
2020: ?

via [@avelezig](#)

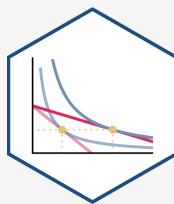


Comparative Statics

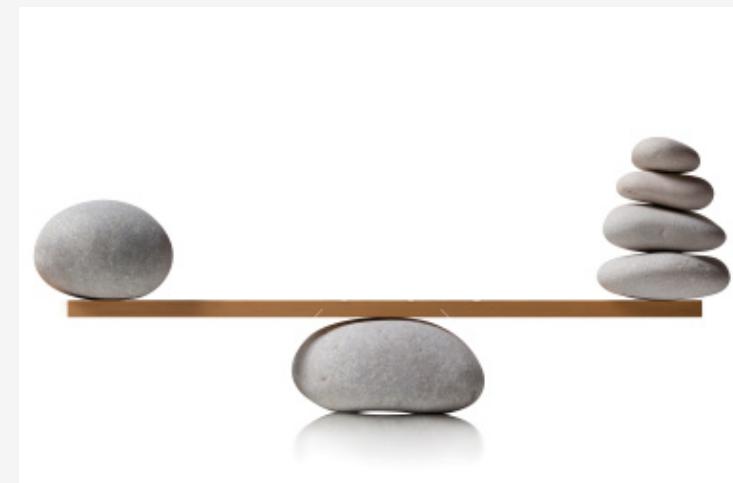
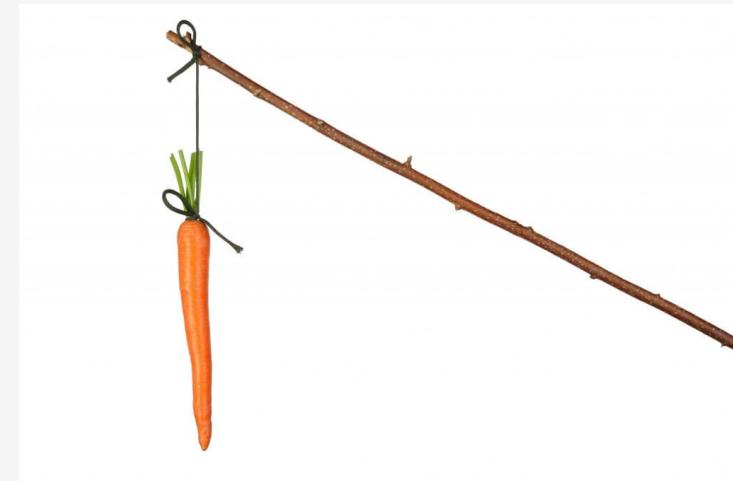


- **Comparative statics:** examining changes in equilibria cased by an external change (in incentives, constraints, etc.)

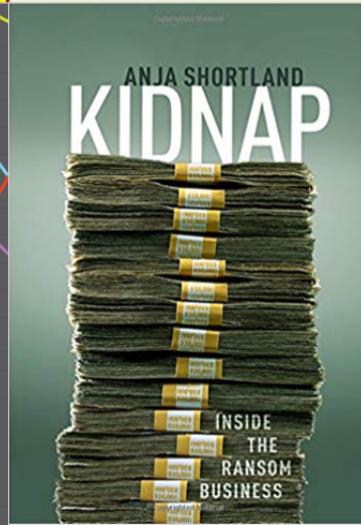
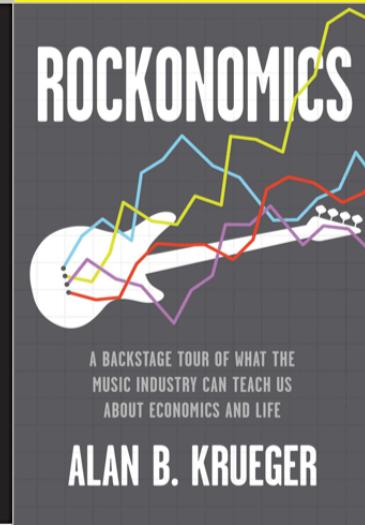
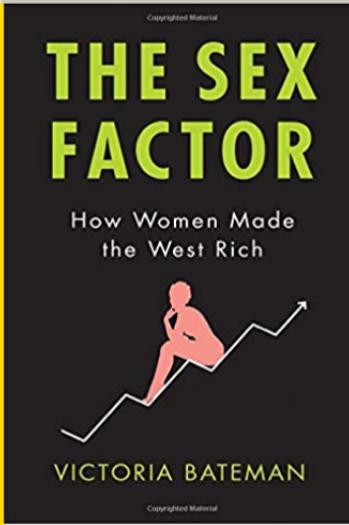
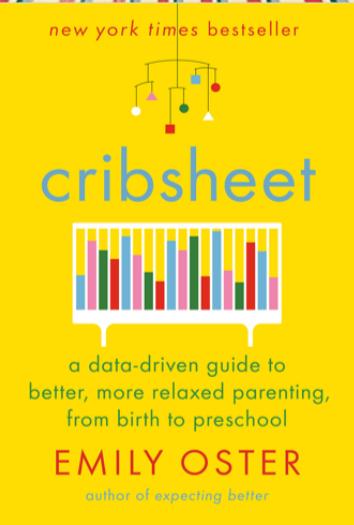
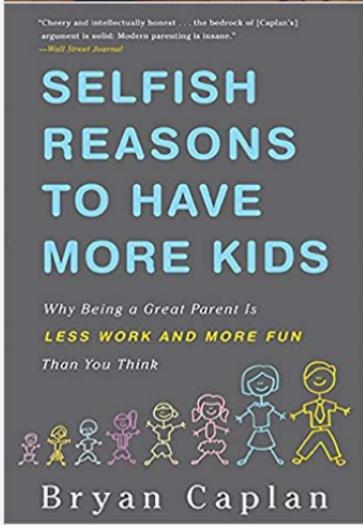
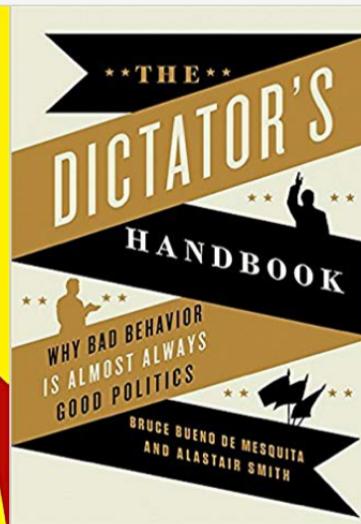
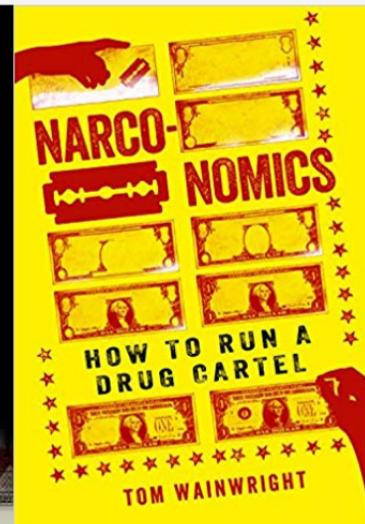
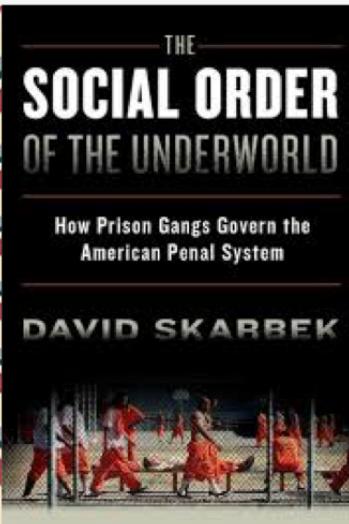
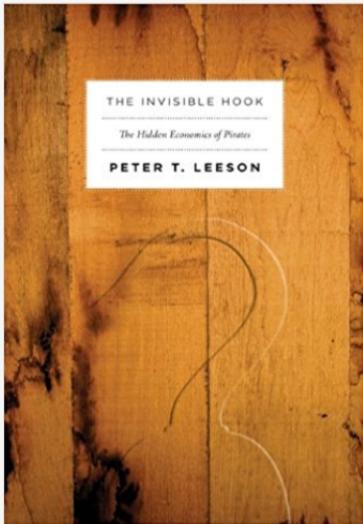
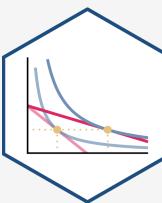
Optimization and Equilibrium

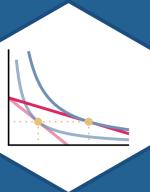


- If people can **learn** and **change** their behavior, they will tend to **switch** to a higher-valued option
- If there are no alternatives that are better, a person is at an **optimum**
- Everyone is at an optimum \iff the system is in **equilibrium**



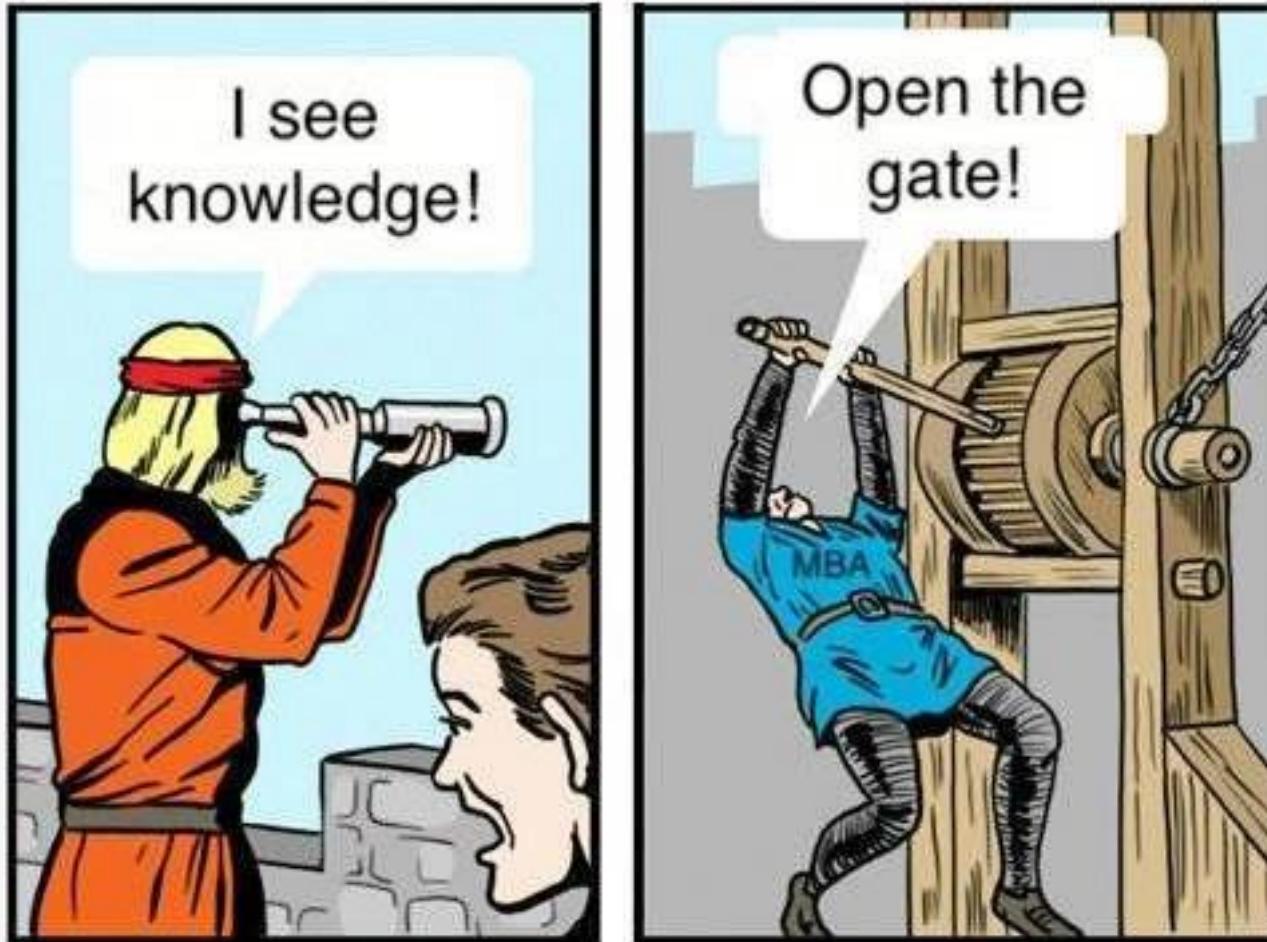
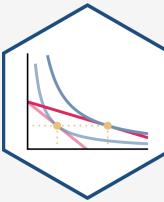
Economics Is Broader Than You Think



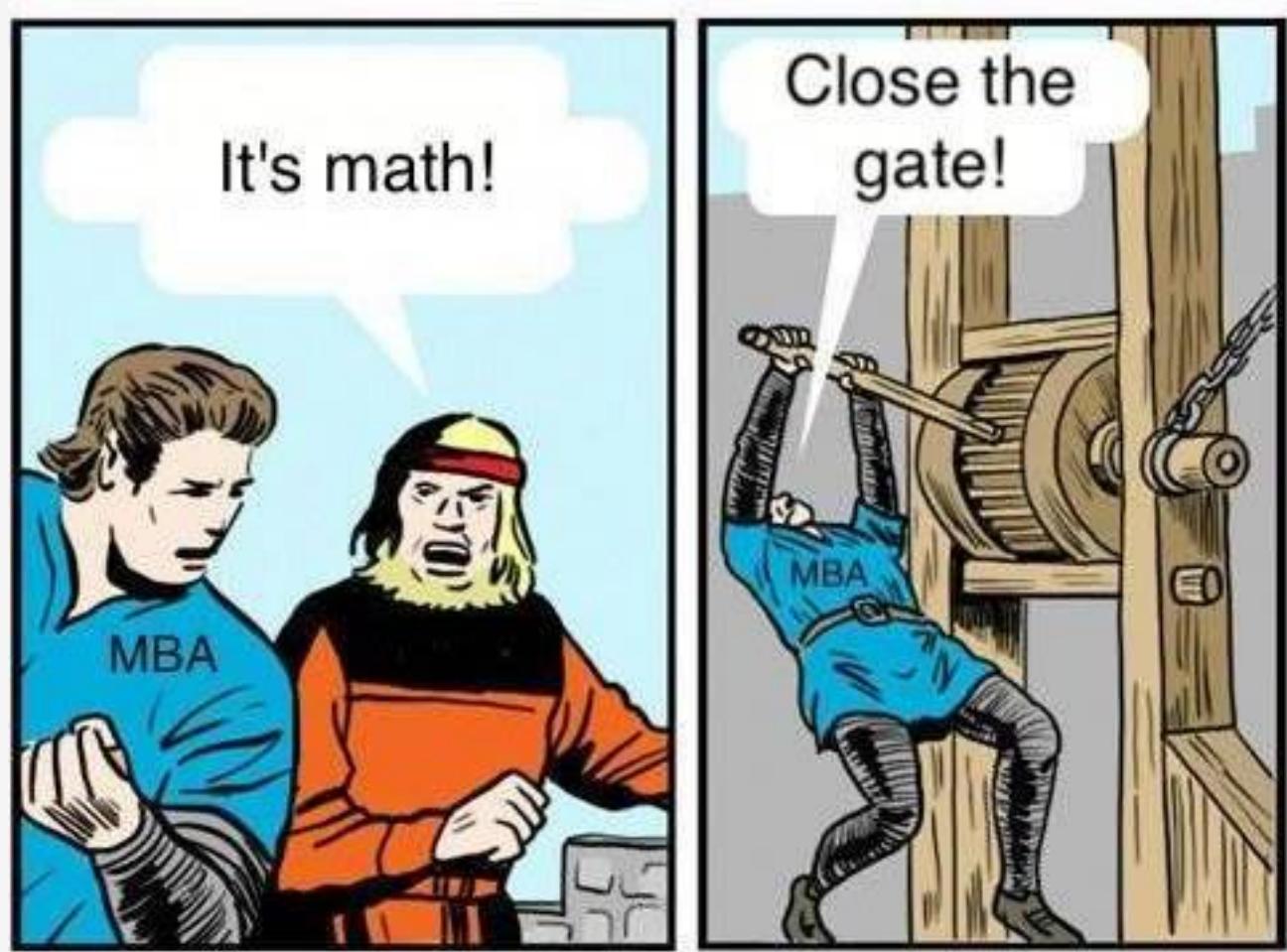
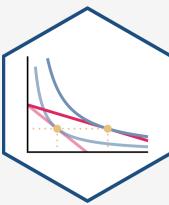


Real Talk: The Math

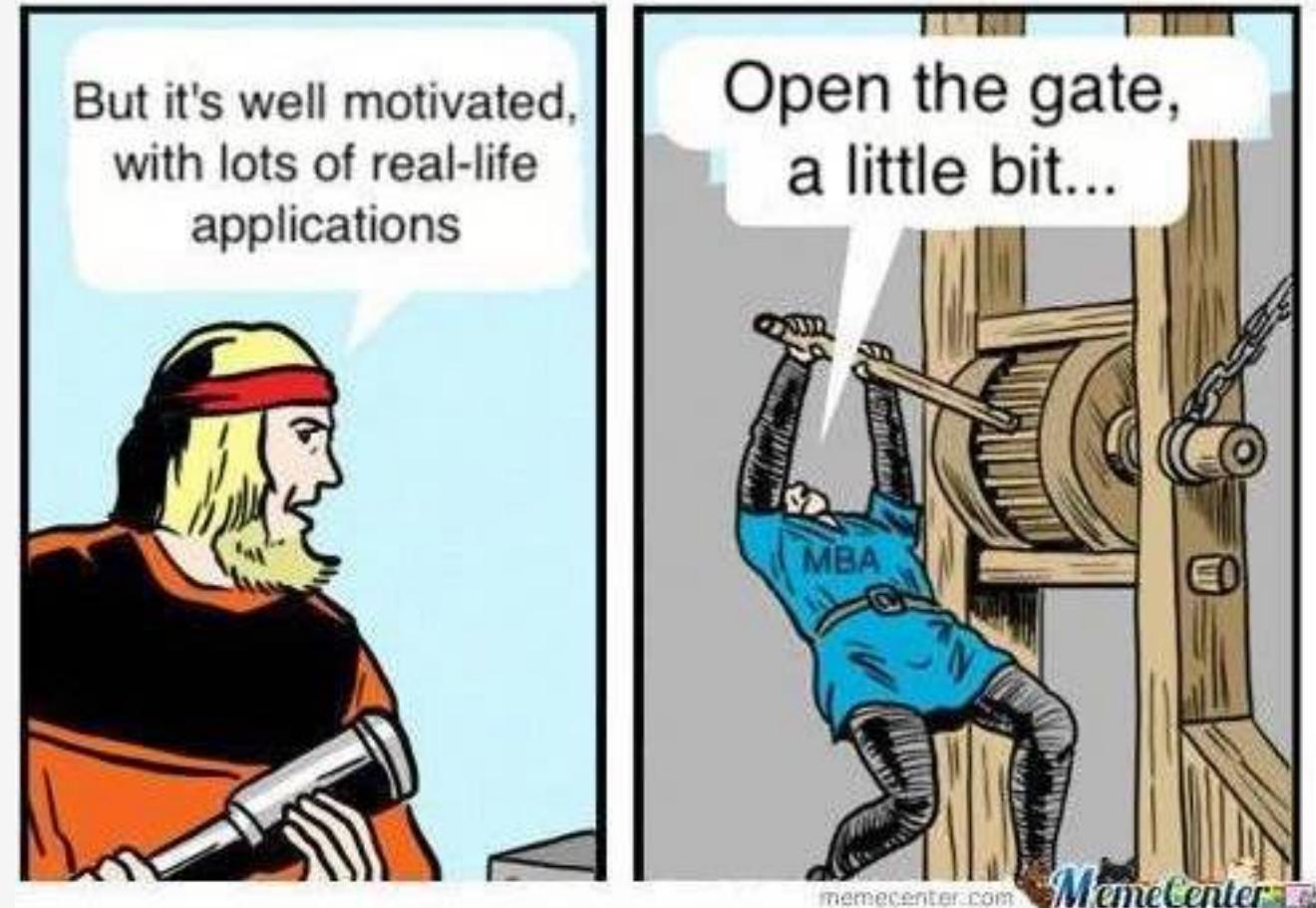
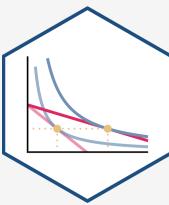
Real Talk



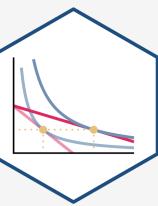
Real Talk



Real Talk



Real Talk



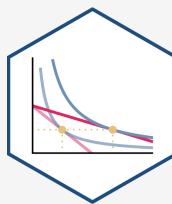
Screenshot of a web browser showing the ECON 306: MICROECONOMIC ANALYSIS course page. The page includes a navigation bar with links to SYLLABUS, SCHEDULE, ASSIGNMENTS, REFERENCE, and SLACK. A section titled "PRELIMINARY SURVEY ON MATH BACKGROUND" is displayed, with a due date of "Due by 11:59PM Sunday, August 23, 2020". The survey instructions state it is ungraded and anonymous. It asks students to draw a graph of the equation $R = 4 - \frac{1}{2}W$. There are three numbered questions:

1. Draw a graph of the following linear equation, $R = 4 - \frac{1}{2}W$. Plot W on the vertical axis and R on the horizontal axis.
2. Draw a continuous function which begins at the origin, increases at a *decreasing* rate, reaches an inflection point, and then increases at an *increasing* rate. Show where each part of the function is concave or convex.
3. (This question is partially visible)

Below the first question, there is a note: "1. Ordinarily I would have you submit paper copies in class to maintain anonymity, but this is the best method right now instead of email or Blackboard." A "Download as PDF" button is also present.

- Complete the **preliminary math survey**
- Help me help you with the math!

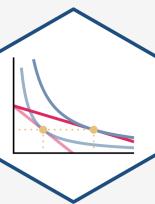
Why We Model I



- Economists often “speak” in models that explain and predict human behavior
- The pure language of models is mathematics
 - things that are universally true, deducible from axioms, can easily spot errors
 - often equations and graphs
 - this is what scares students most about economics

$$\begin{aligned} \zeta(s) &= \sum_{m=1}^{\infty} (m^{-s}) \quad \text{with } a \cos(\theta a) = b/c \\ \psi(x) &= \frac{d}{dx} \ln(\Gamma(x)) \quad \sqrt{1+\sqrt{1+\sqrt{1}}} \quad \frac{x}{3x} \\ \langle a, b \rangle \cdot \langle c, d \rangle &= ac + bd \\ y &= 2\sin 5x \quad \sum_n \begin{cases} y \\ x \end{cases} \\ A &= 2; P = \frac{2\pi}{3} \\ y &= 2\cos 2t \\ A &= 2; P = \pi \\ y &= 2\cos 5x \\ m+n &= \sqrt{1-\frac{v^2}{c^2}} \\ 11-3 &= \Delta - 1^2 - 1 \times c - \frac{c}{n} \end{aligned}$$

Why We Model II

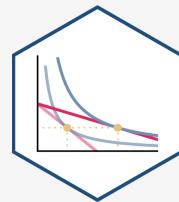


- Economists use conceptual models: fictional constructions to logically examine consequences
- Very different from other sciences
 - No social experiments
 - Purposive, strategic human beings
 - Introspective understanding

“All models lie. The art is telling useful lies.” - George Box



The Two Major Models of Economics as a “Science”



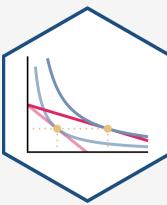
Optimization

- Agents have **objectives** they value
- Agents face **constraints**
- Make **tradeoffs** to maximize objectives within constraints

Equilibrium

- Agents **compete** with others over **scarce** resources
- Agents **adjust** behaviors based on prices
- **Stable outcomes** when adjustments stop

Remember: All Models are Wrong!

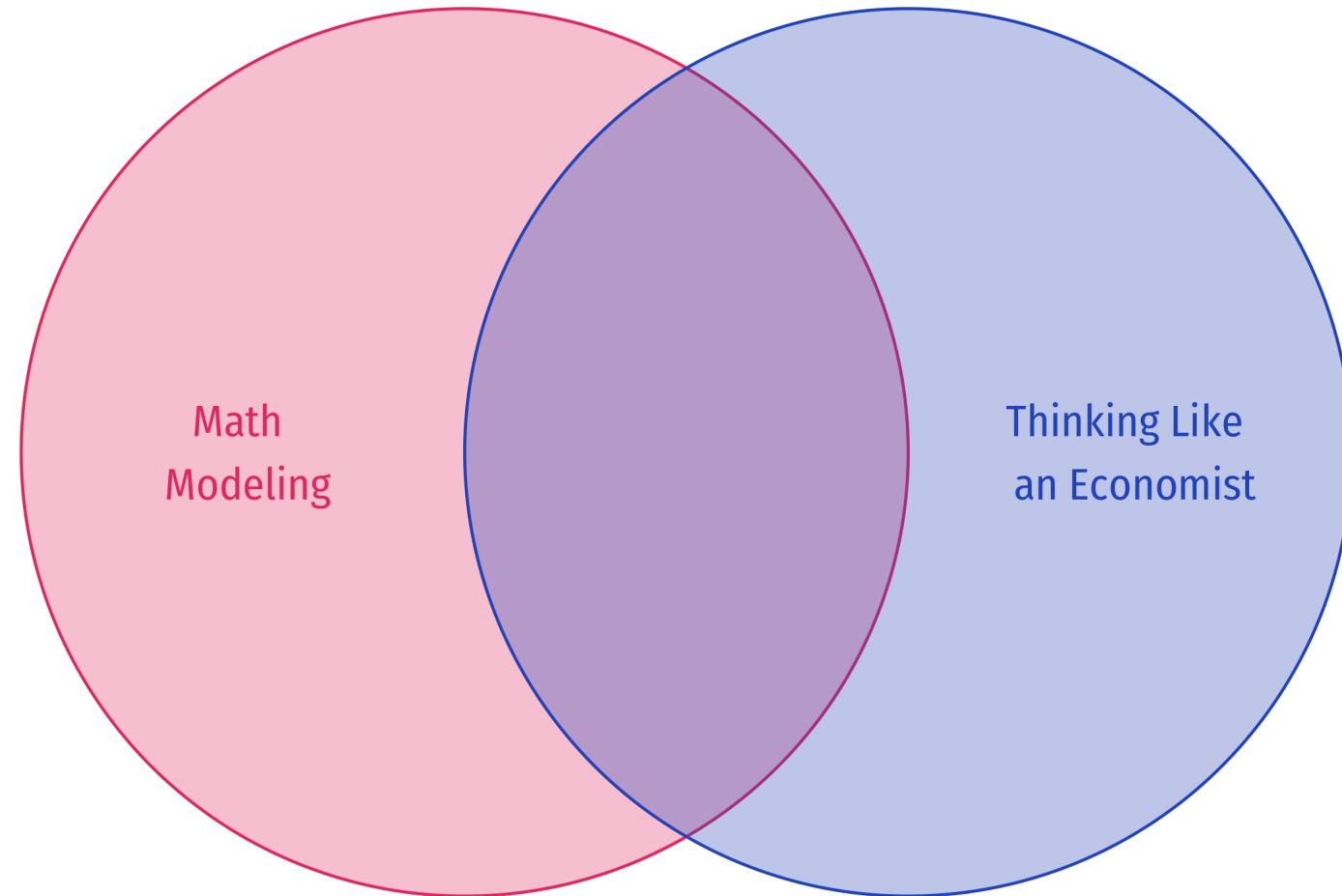
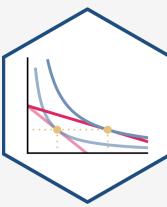


Caution: Don't conflate models with reality!

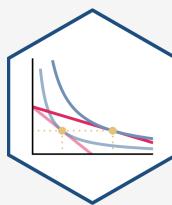
- Models help us *understand* reality.
- A good economist is always aware of:
 - “*ceterus paribus*”
 - “...and then what?”
 - “...compared to what?”



Economics Uses, but Is Not Limited to, Math



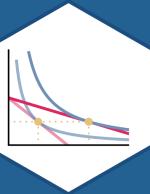
Again, Beware Mt. Stupid



Caution: Two types of (advanced) mistakes:

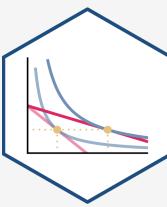
1. Believing the model accurately describes reality (100%)
2. Believing reality needs to be *corrected* because it doesn't match the model





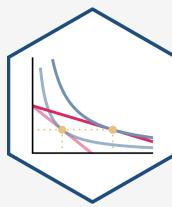
About This Course

Logistics: Hybrid Course



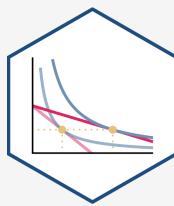
- **Hybrid:** more **synchronous** material than **asynchronous** material
- I will always be teaching **remotely**
 - A classroom is available to you
- Office hours: Tu/Th 3:30-5:00 PM on Zoom
 - Zoom link in Blackboard's **LIVE CLASS SESSIONS** link
 - Slack channels
- Teaching Assistant(s): TBD
 - grade HWs & hold (likely virtual) office hours

Logistics: Hybrid Course



- We will have **synchronous** sessions on **Zoom**
 - Section 1: Mon/Wed 2:00-3:15 PM
 - Section 2: Tu/Thu 2:00-3:15 PM
- Lecture videos will be posted on **Blackboard** via Panopto for students unable to join synchronously
 - If you were present, you do not need to watch the video (again)!
 - You are not *required* to attend synchronously, but it will help you
- All graded assignments are **asynchronous**
 - Submitted on Blackboard by 11:59 PM Sundays
 - Timed exams on Blackboard

Using Zoom (& Slack, etc): A Polite Request



Adrianna

@adri_holmes00



My professor teaching to class on zoom:



Me, trying to prevent my professor from teaching into the void:



1:18 PM · Oct 8, 2020 from Maryville, MO



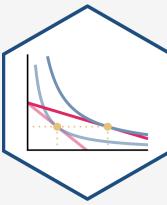
345.3K

1.1K



Copy link to Tweet

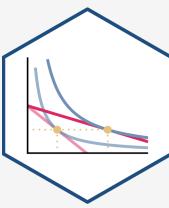
Learning Goals



By the end of this course, you will:

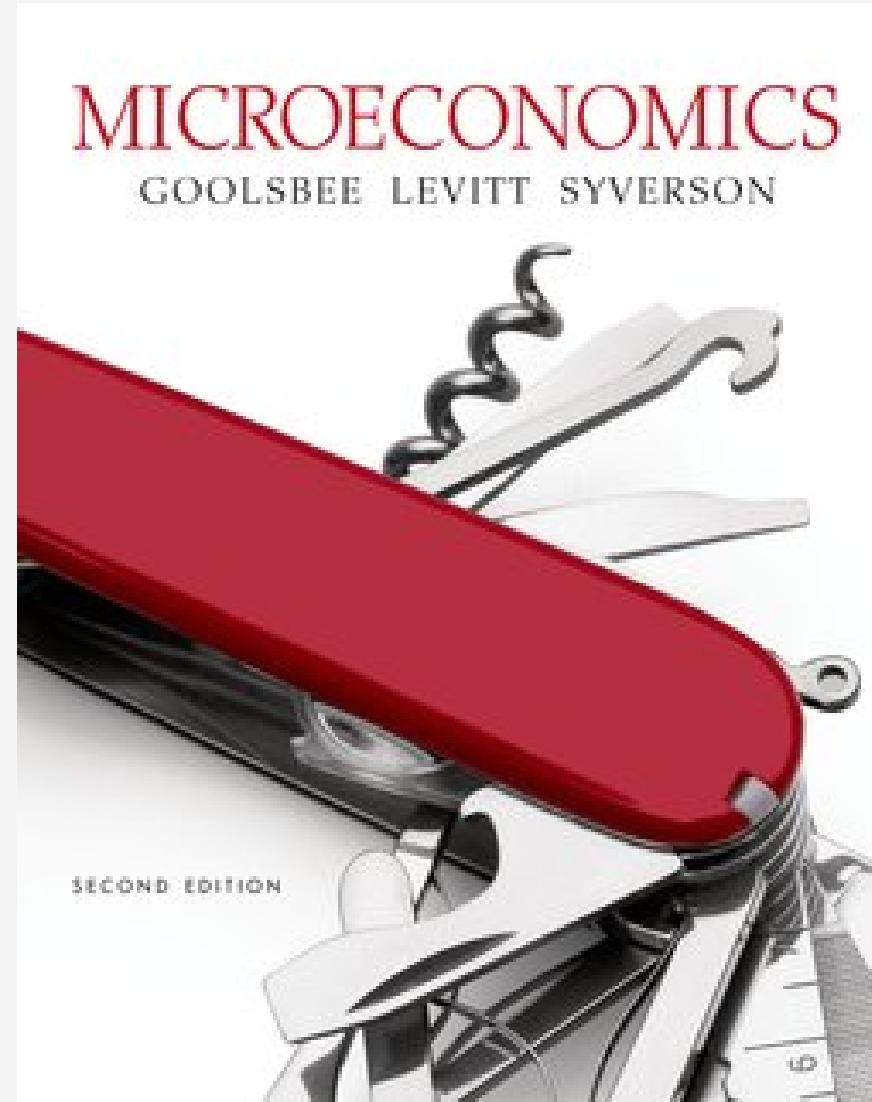
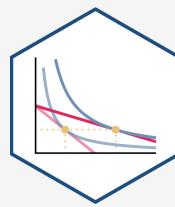
1. apply the models of microeconomics (constrained optimization and equilibrium) towards explaining real world behavior of individuals, firms, and governments
2. explore the effects of economic and political processes on market performance (competition, market prices, profits and losses, property rights, entrepreneurship, market power, market failures, public policy, government failures)
3. apply the economic way of thinking to real world issues in writing

Assignments

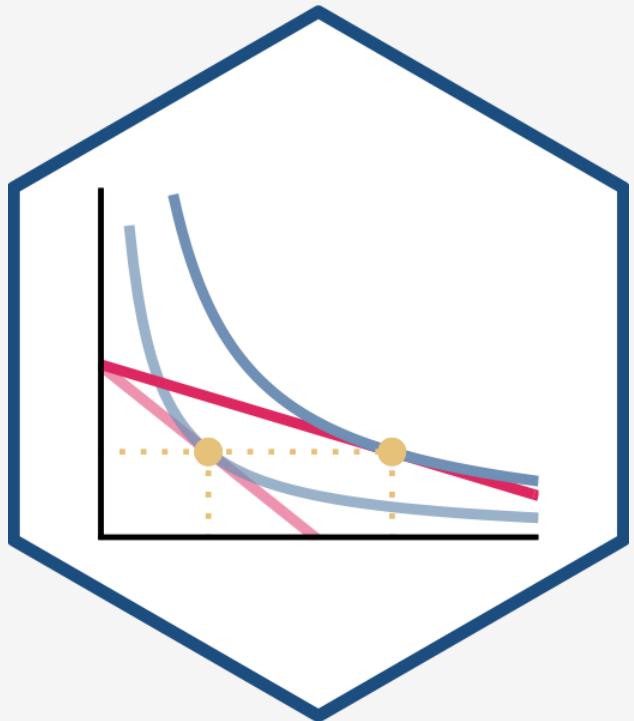
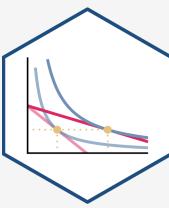


Assignment	Percent
1 Opinion-Editorial	20%
n Homeworks (Average)	20%
3 Exams	20% each

Your “Textbook”



Course Website



Screenshot of a course website for ECON 306 – Microeconomic Analysis.

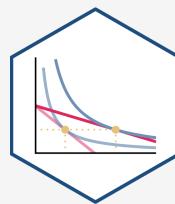
The page includes:

- Navigation bar with links: Syllabus, Schedule, Assignments, Reference, Slack.
- Schedule** section: Describes resources for class meetings, including Content materials, Slides, Practice problems, and Assignments.
- Note: Please note, the lesson numbers (e.g. 1.1) are my design, and do not match up with the textbook!
- Relevant materials (if applicable, icons will become links) will be posted before class meets.
- Table for **Ia. Rational Choice Theory: Consumers**:

	Content	Slides	Practice	Assignment
Preliminary Survey				
1.1 The Tools of Microeconomics				
1.2 Scarcity, Choice, & Cost				
1.3 Utility Maximization I				
1.4 Utility Maximization II				

microS21.classes.ryansafner.com

Tips for Success, Or: How to College



- Take notes. On paper. Really.
- Read the readings.
- Ask questions, come to office hours.
Don't struggle in silence, you are not alone!
- You are learning how to learn
- See the [resources page](#) for more



Roadmap for the Semester

