

1.1 – The Tools of Microeconomics

ECON 306 • Microeconomic Analysis • Fall 2020

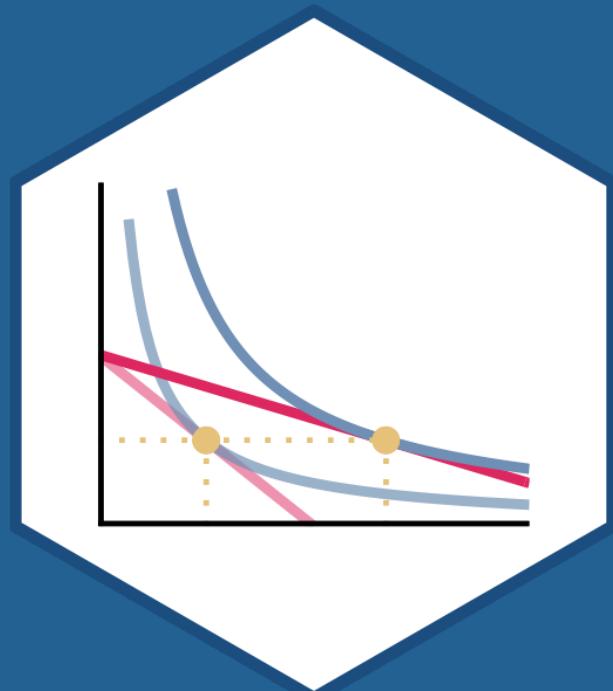
Ryan Safner

Assistant Professor of Economics

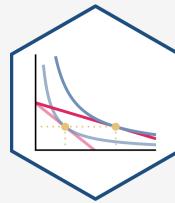
 safner@hood.edu

 [ryansafner/microF20](https://github.com/ryansafner/microF20)

 microF20.classes.ryansafner.com

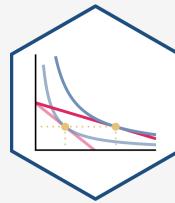


Micro-economics



ENVIRONMENTAL USE GOVERNMENT DETERMINING
EQUILIBRIUM POLICIES FINANCIAL ESTABLISHING
INDIRECT ECONOMIC BEHAVIOR REGULATION
MAXIMIZING PROFIT DEVENEMENTS APPICATION
DEFINITION MAXIMISATION SPENDING
COMPONENTS UNCERTAINITY APPLICATION
MACROECONOMIC DKS
EFFICIENT MACROECONOMIC
SUPPLY ELASTICITY OPPORTUNITY FAILS ACTIVITIES
INFLATION AFOREMENTIONED COMPETITION HIDE
ALONE HARD CONSTRAINTS ASSUMPTIONS HIDE
UNDERSTANDING EXPENDITURE SUBJECTIVE EARNED PRODUCTION
ATIONSHIP CHALLENGES FAILURE SIMILARLY
K CHALLENGES QUISITE TOTAL SPECIALIZED DETERMINES
OPERATION RESOURCE FAILURE USES MULTIPLIED
EXAMINES CONTENTS SIMILARLY
NATIONAL PAYMENT DIVERGE USES
ASPECTS VARIANT SYSTEMS RECIPES
INCOSSES
CHALLENGE UNIVERSAL PRODUCTS POLITICAL
DUCE SUPPLIED COMPARE PRODUCT
STUDIED CLASSIC LED EFFECTS
EXTERNAL THOUGHT PARKING
DIFFICULTY SPRAWL MISSING CAPITAL
HAPPIEST HISTORY FREE NOT
PERFECT HISTORY FREE NOT
MISSING CAPITAL
RAFFIC BOUGHT ANY UTILITIES
HE

Micro- vs. Macro-economics

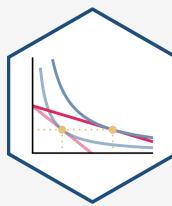


- What is “an economy?”
- Where do aggregates (“GDP”, “unemployment”, & “inflation”) come from?
- **Micro:** [modelling] **Choices** and **consequences**
- **Macro:** [modelling] **Systemic interaction** of choosers & **emergent behavior**

A word cloud centered around the term **MACROECONOMICS**, with various related concepts and theories represented by different colors and sizes.

Key terms include: GROWTH, INFLATION, FIELD, MACRO, INEFFICIENCIES, MONETARISM, NEOCLASSICAL, 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, EXAMINING, STABILIZE, INCLUDES, EXAMPLE, EFFECTS, FACTORS.

Where You Are Now

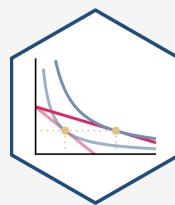


- **Basic concepts** of markets, individuals (consumers & firms), economies:
 - ECON 205: Principles of Macroeconomics
 - ECON 206: Principles of Microeconomics
- **Modelling** markets, individuals (consumers & firms), economies
 - ECON 306: Microeconomic Analysis
 - ECON 305: Macroeconomic Analysis¹



¹ Required for ECON majors only. Calculus I is required.

Economists Speak a Foreign Language...

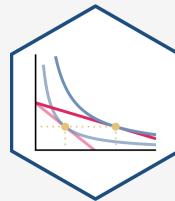


- Terms you “know” from ordinary life mean **very different things** to economists:

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



...But You Can Learn It



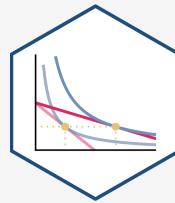
- You'll need to master a new vocabulary:

externality, marginal rate of substitution, marginal cost, consumer surplus, allocative efficiency

- Avoid excessive jargon, but these concepts are useful to explain reality!



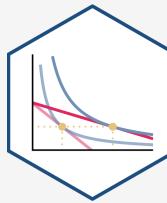
...But You Can Learn It



- 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



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



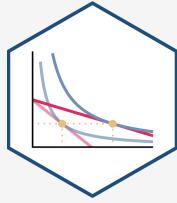
236

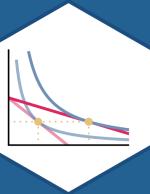
213

1.0K



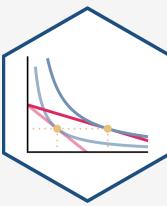
Economics \neq Business or \$\$\$





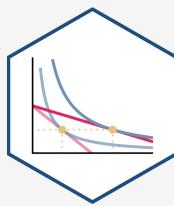
The Tools of Microeconomics

Economics as a *Way of Thinking*

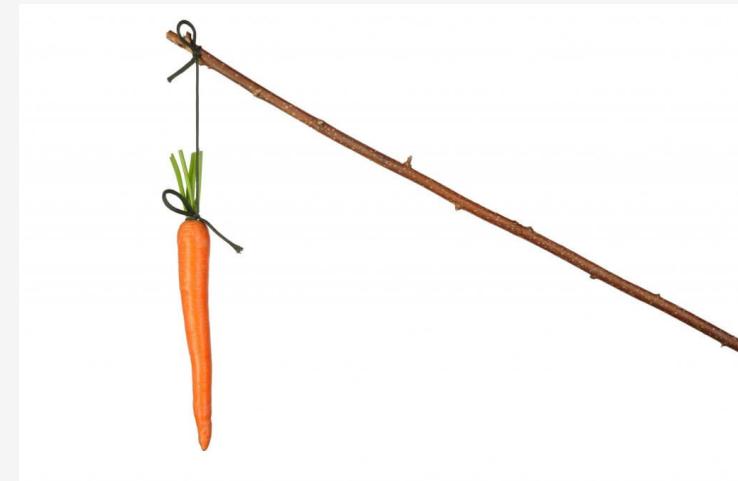


- Economics is a **way of thinking** based on a few core ideas:

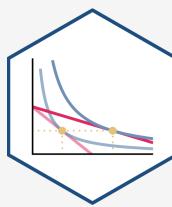
Economics as a *Way of Thinking*



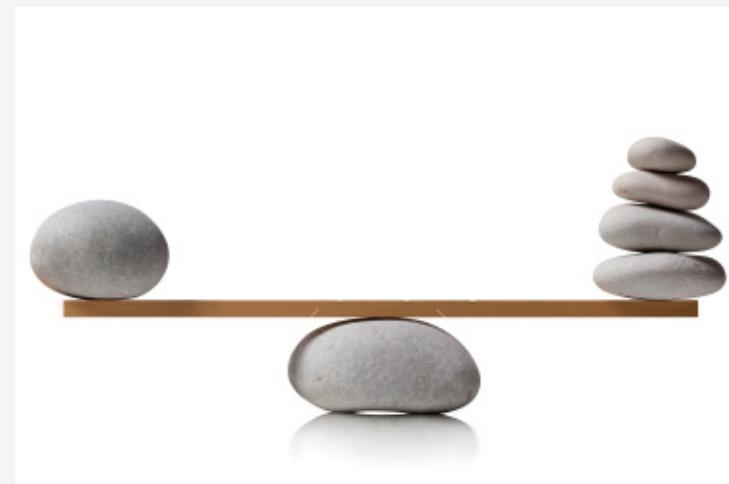
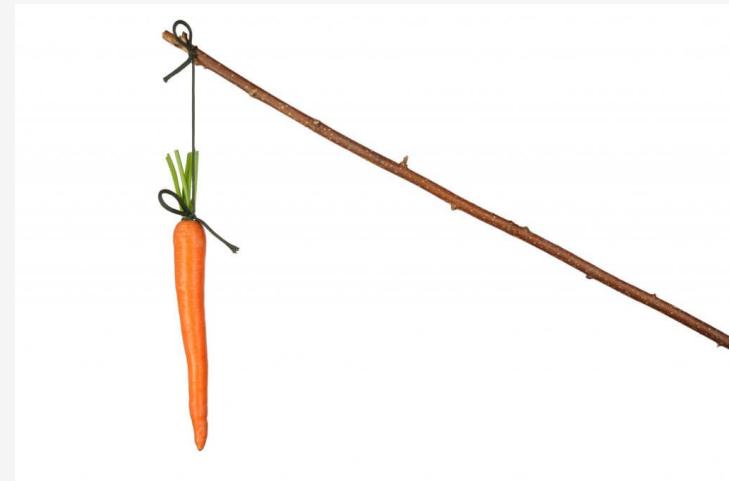
- Economics is a **way of thinking** based on a few core ideas:
- **People respond to incentives**
 - Money, punishment, taxes and subsidies, risk of injury, reputation, profits, sex, effort, morals

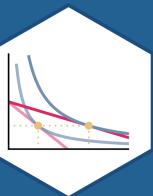


Economics as a *Way of Thinking*



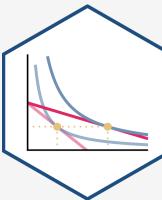
- Economics is a **way of thinking** based on a few core ideas:
- **People respond to incentives**
 - Money, punishment, taxes and subsidies, risk of injury, reputation, profits, sex, effort, morals
- **Environments adjust until they are in equilibrium**
 - People adjust their choices until optimal,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





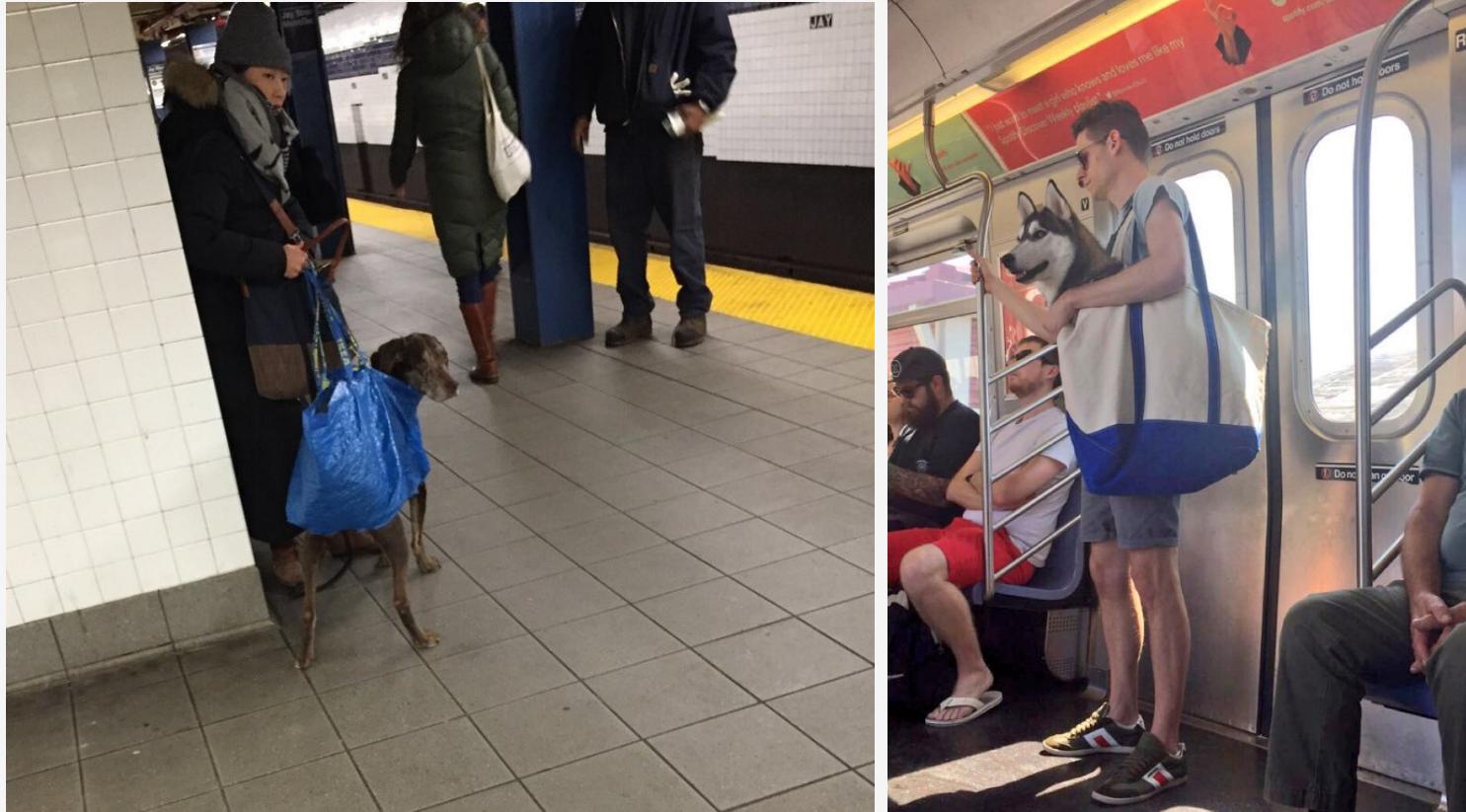
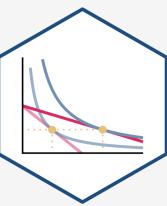
Incentives

Incentives Example: Subway I



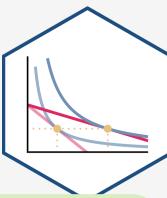
The NYC Subway bans dogs unless they can be "enclosed in a container"

Incentives Example: Subway II



Pictures [Source](#)

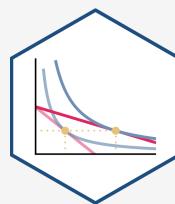
Incentives Example: Rat Bounty



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

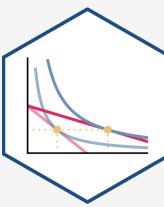


20,181



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

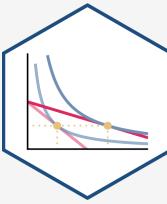


At the Institute for Marine Mammal Studies in Mississippi, Kelly the dolphin has built up quite a reputation. All the dolphins at the institute are trained to hold onto any litter that falls into their pools until they see a trainer, when they can trade the litter for fish. In this way, the dolphins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

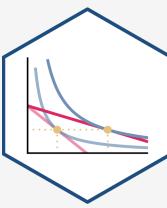
July 2 2003, ["Why Dolphins are Deep Thinkers"](#), *The Guardian*

Takeaways About Incentives I



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

Takeaways About Incentives II



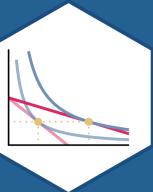
Peter Fortune
@PeterTFortune



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

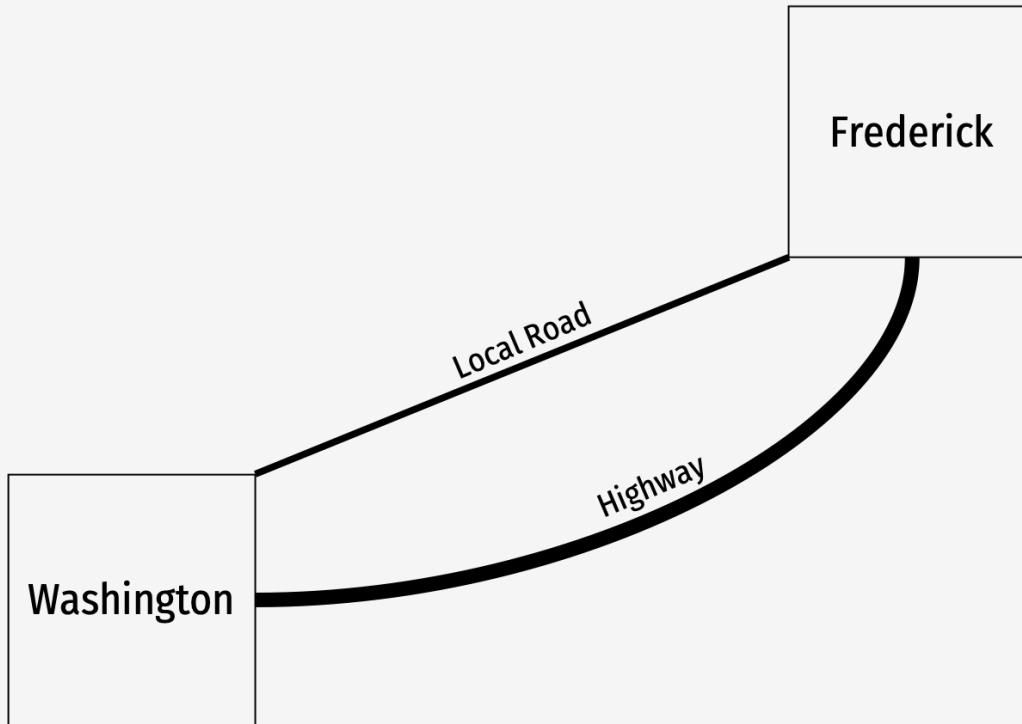
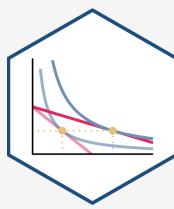


2:54 PM · Aug 7, 2019



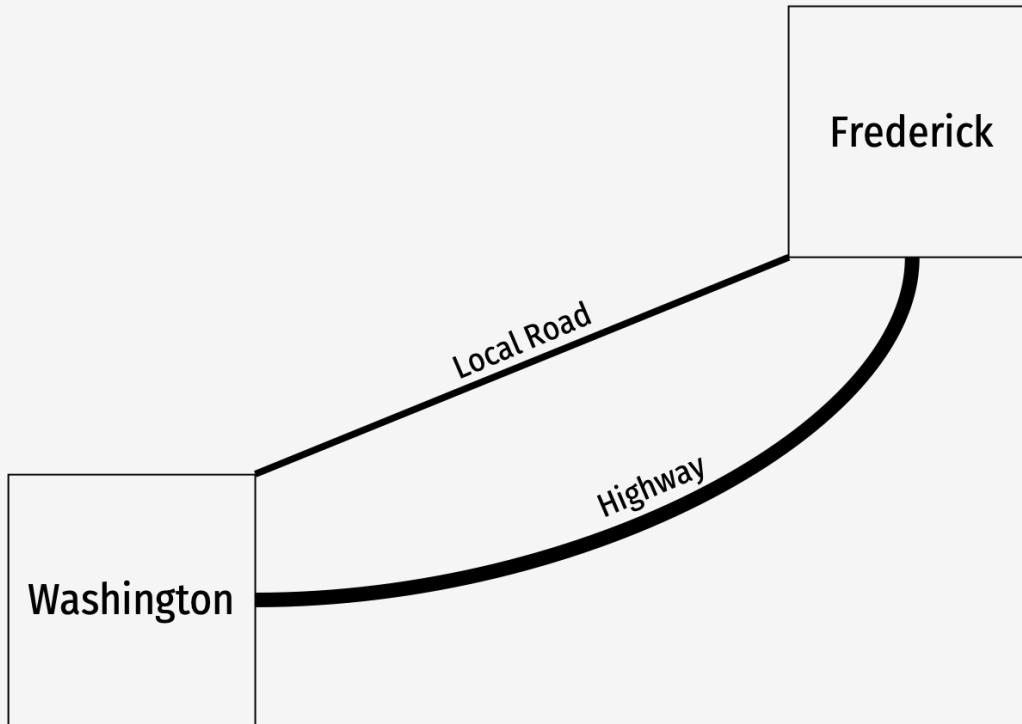
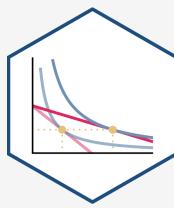
Equilibrium

Equilibrium Example I



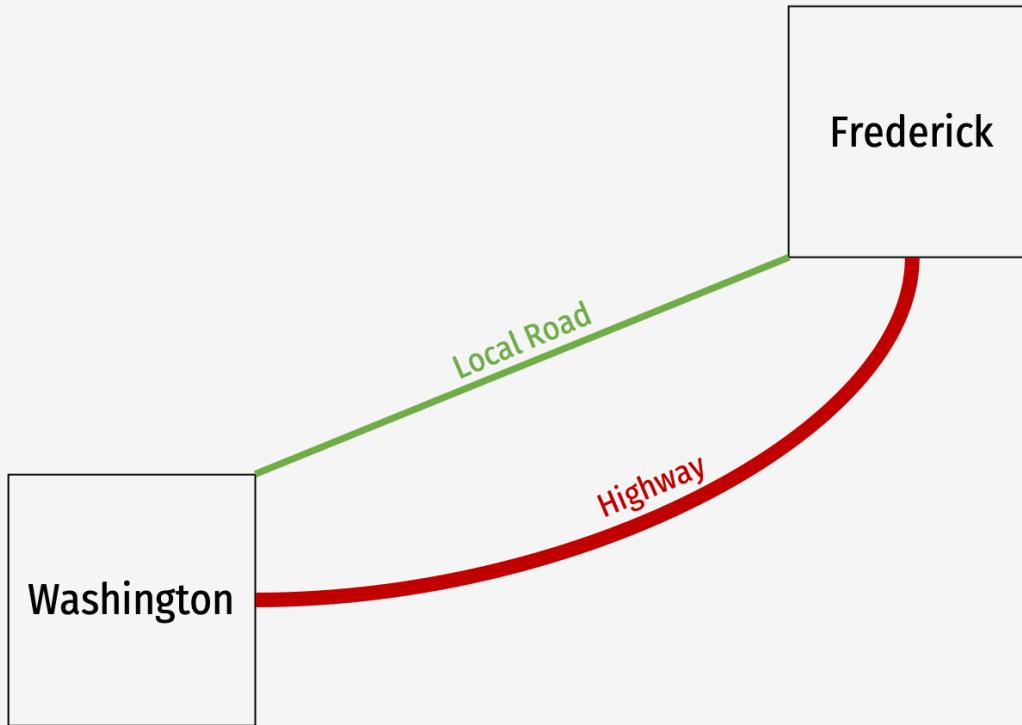
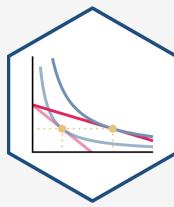
- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

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

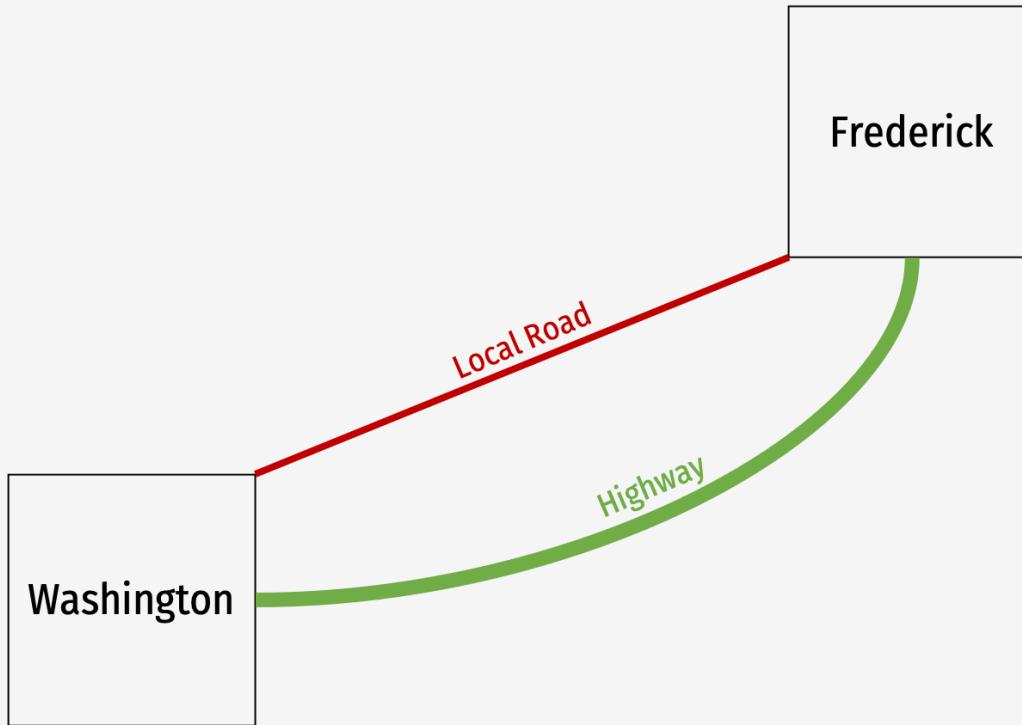
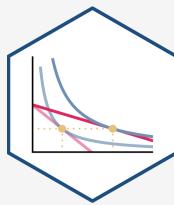


- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

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

- What will people do?

Equilibrium Example III

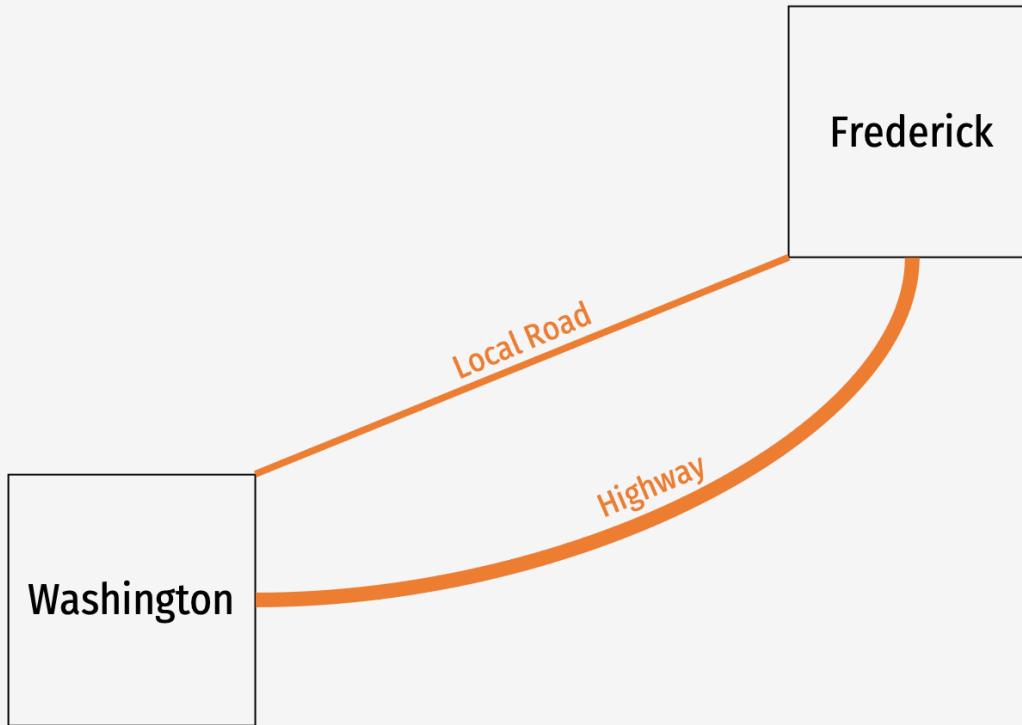
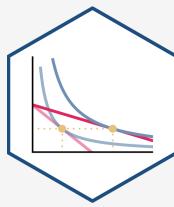


- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

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

- What will people do?

Equilibrium Example IV

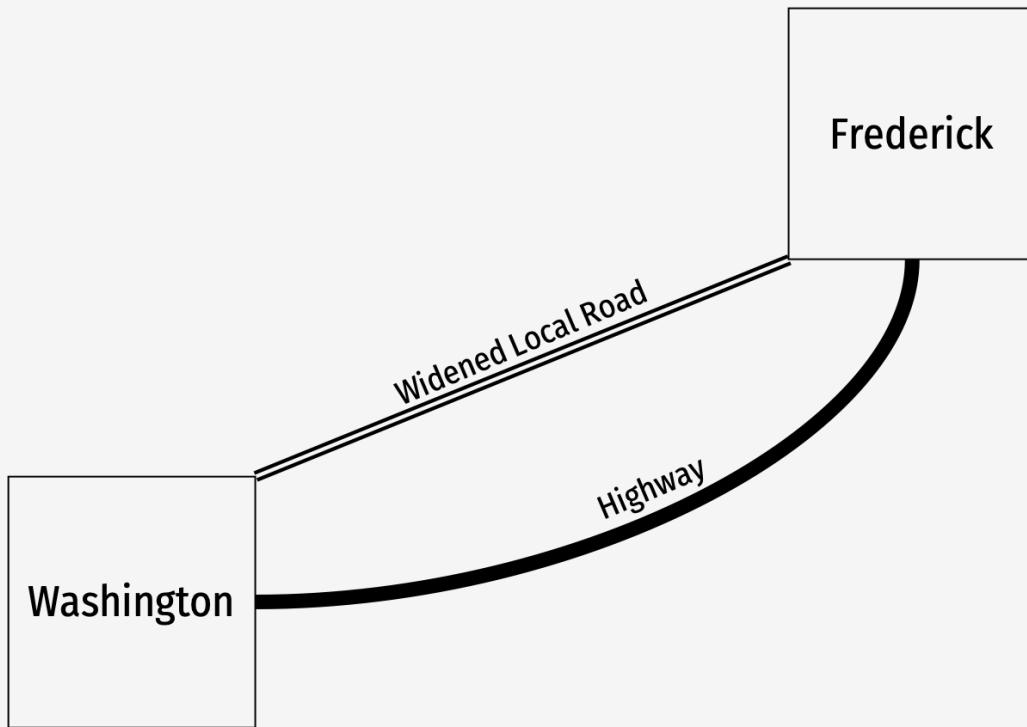
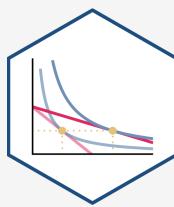


- Suppose 2 roads connect Frederick and Washington
- 100 cars commute
- Local road travel time: $30 \text{ min} + 1 \text{ min/car}$
- Highway travel time: 1 hour (always)

Equilibrium: How many cars are on each road?

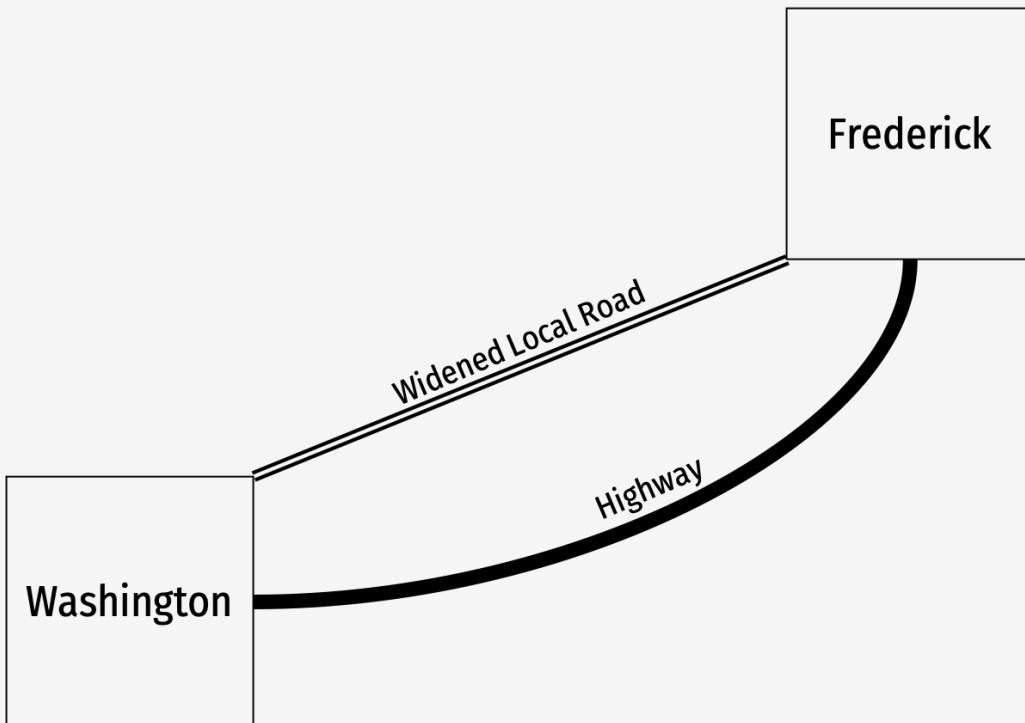
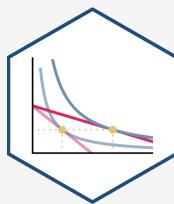
- Why?

Equilibrium Example V



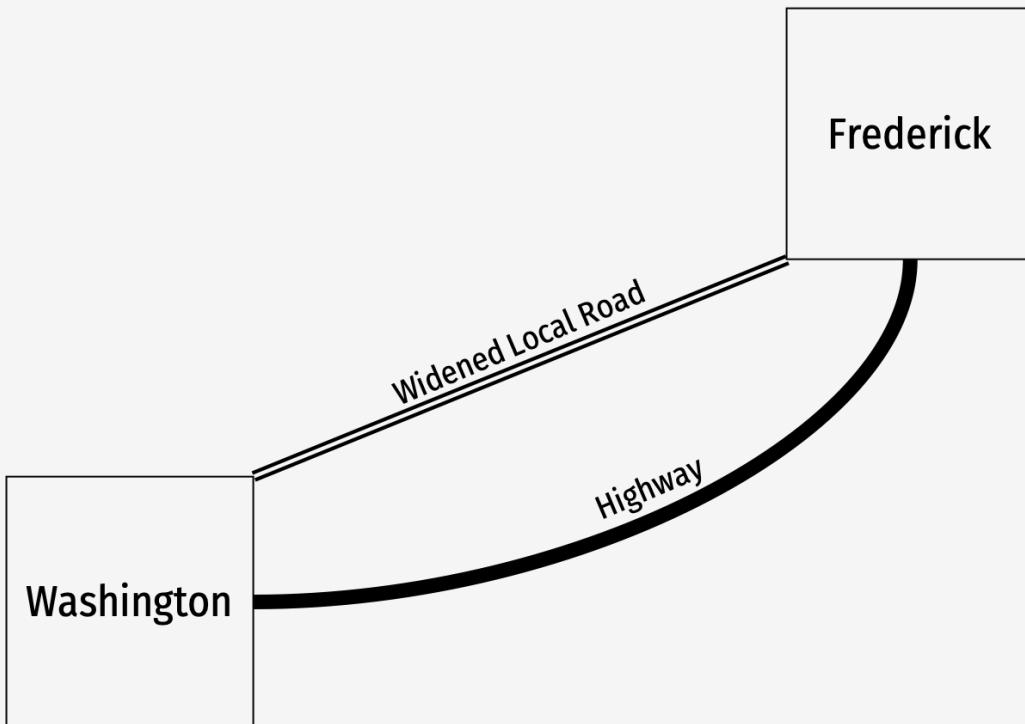
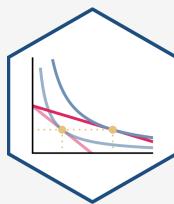
- Suppose the State *doubles the capacity* of the local road
- Local road travel time: **30 min + 0.5 min/car**
- Highway travel time: 1 hour (always)

Equilibrium Example V



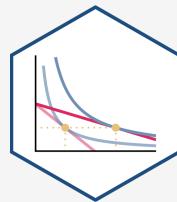
- Suppose the State *doubles the capacity* of the local road
- Local road travel time: **30 min + 0.5 min/car**
- Highway travel time: 1 hour (always)
- Will this reduce travel time?
- Yes! says the State:
 - 30 cars use the local road, takes 1 hour
 - With wider road it takes 45 min!

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)

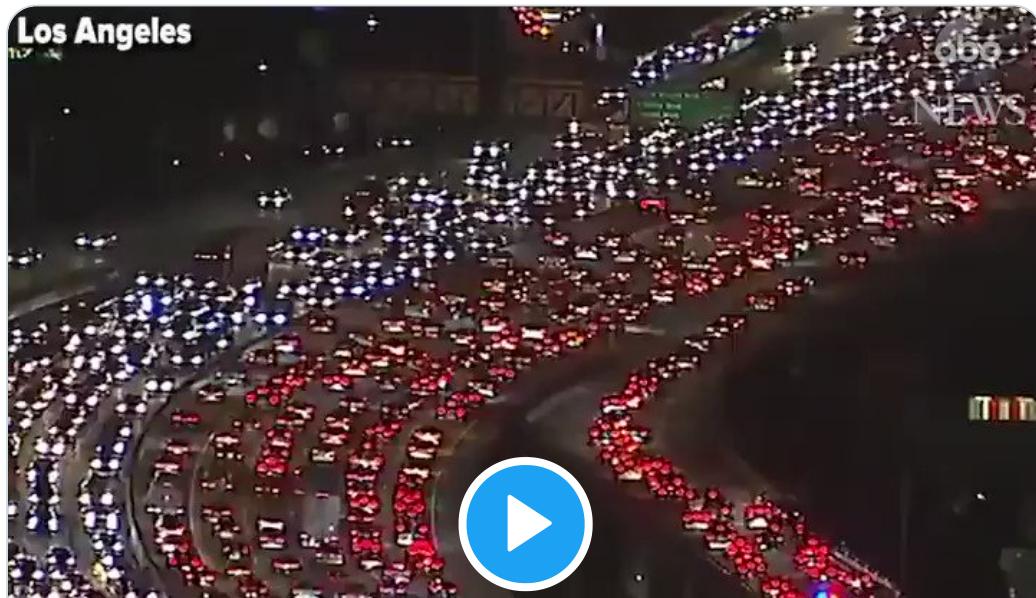


Urban Planning & Mobility
@urbanthoughts11

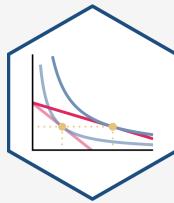


1970: One more lane will fix it.
1980: One more lane will fix it.
1990: One more lane will fix it.
2000: One more lane will fix it.
2010: One more lane will fix it.
2020: ?

via [@avelezig](#)

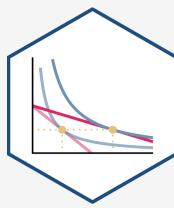


Comparative Statics

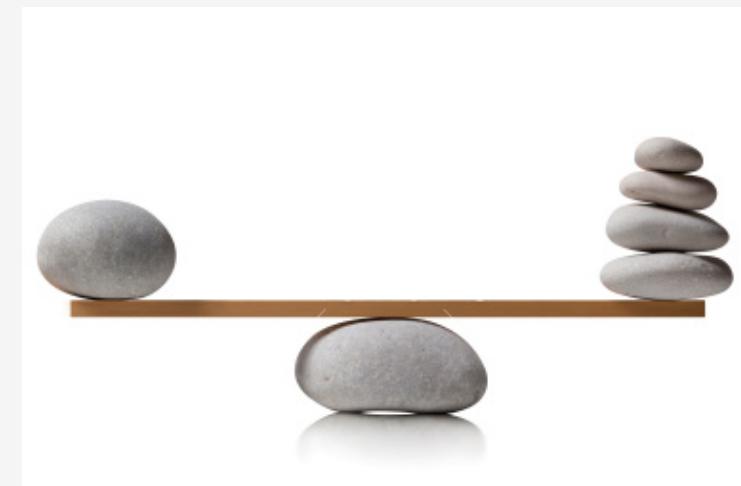


- **Comparative statics:** examining changes in equilibria cased by an external change (in incentives, constraints, etc.)

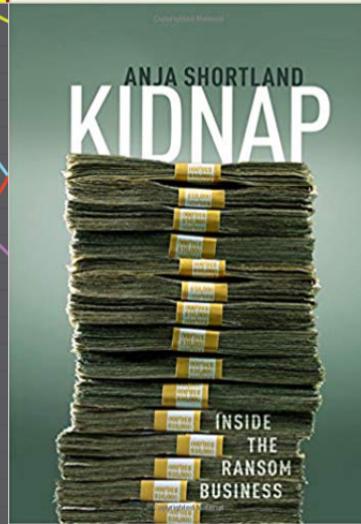
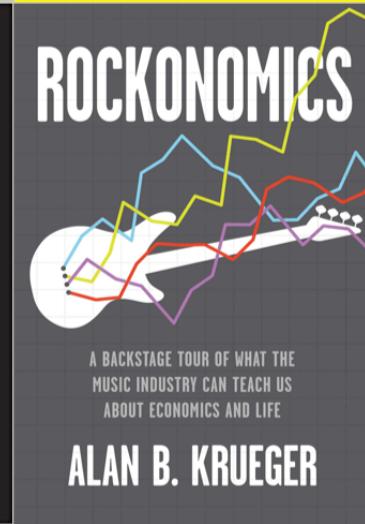
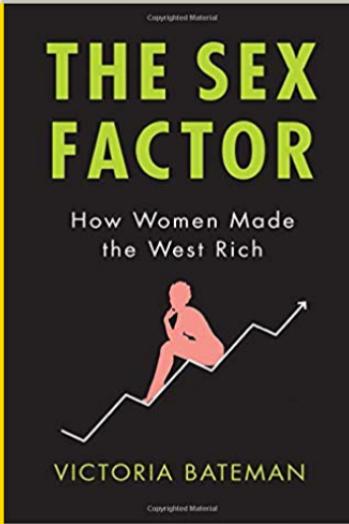
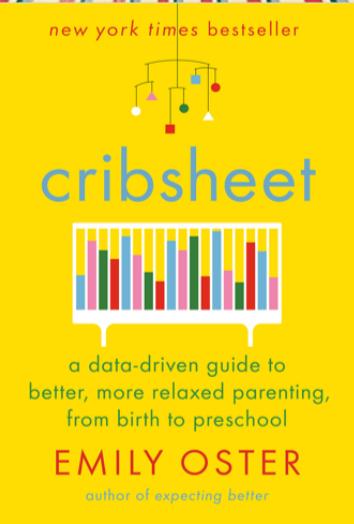
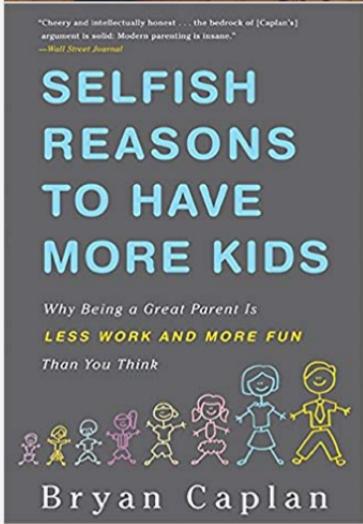
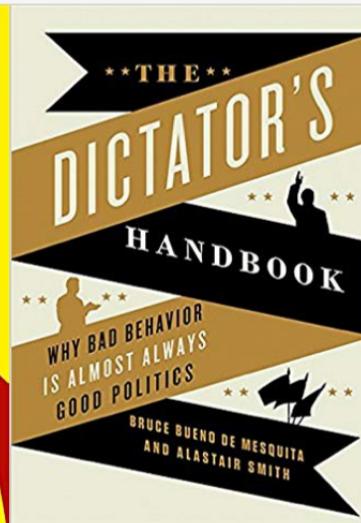
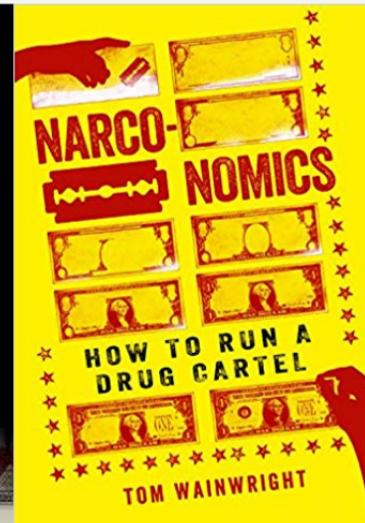
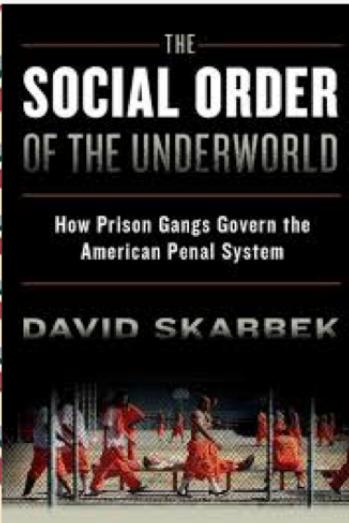
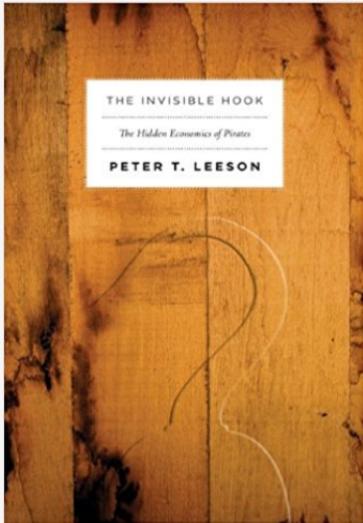
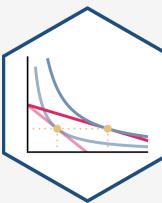
Optimization and Equilibrium

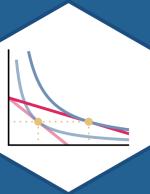


- If people can **learn** and **change** their behavior, they will always **switch** to a higher-valued option
- If there are no alternatives that are better, people are at an **optimum**
- If everyone is at an optimum, the system is in **equilibrium**



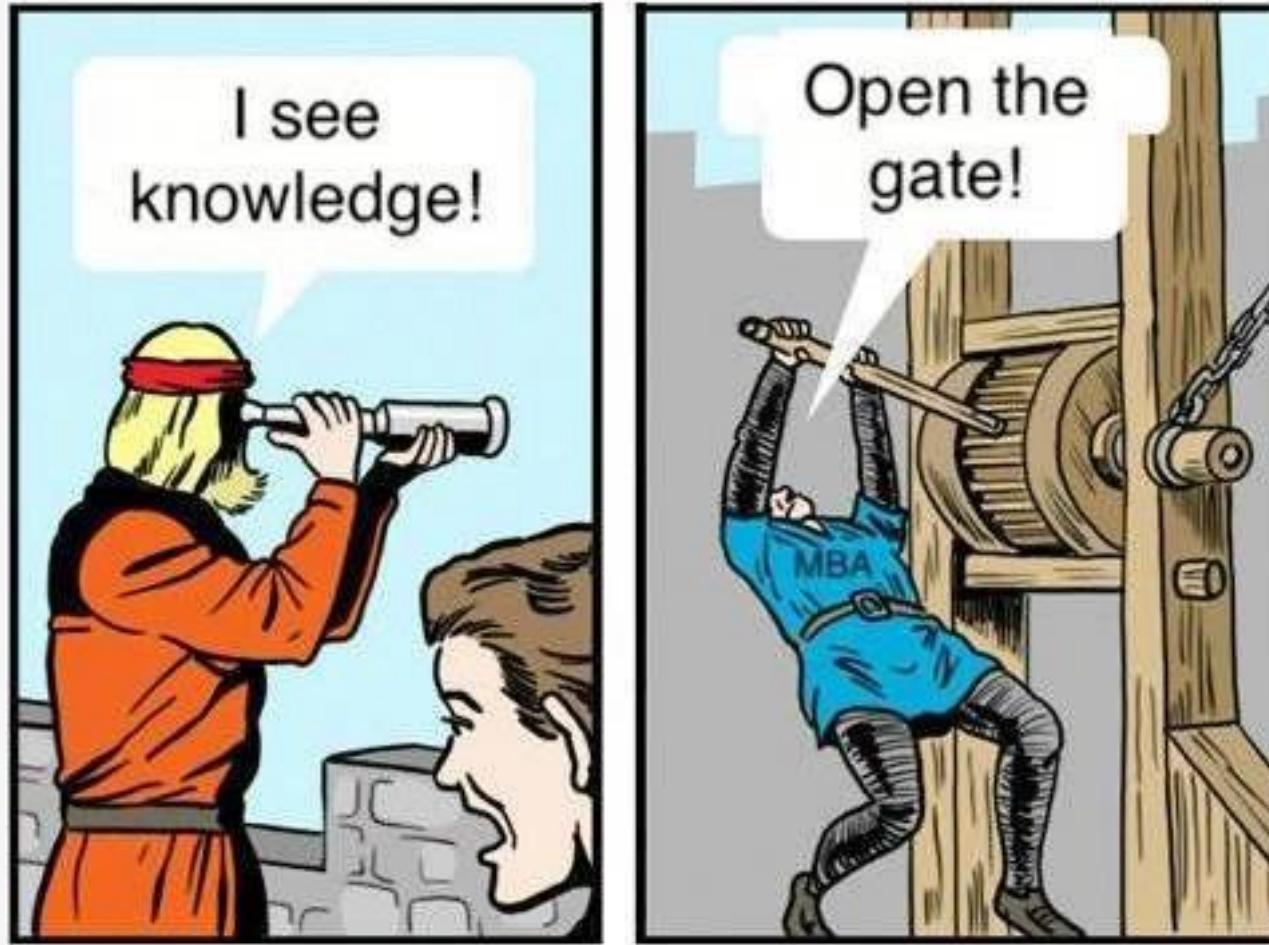
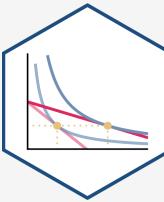
Economics Is Broader Than You Think



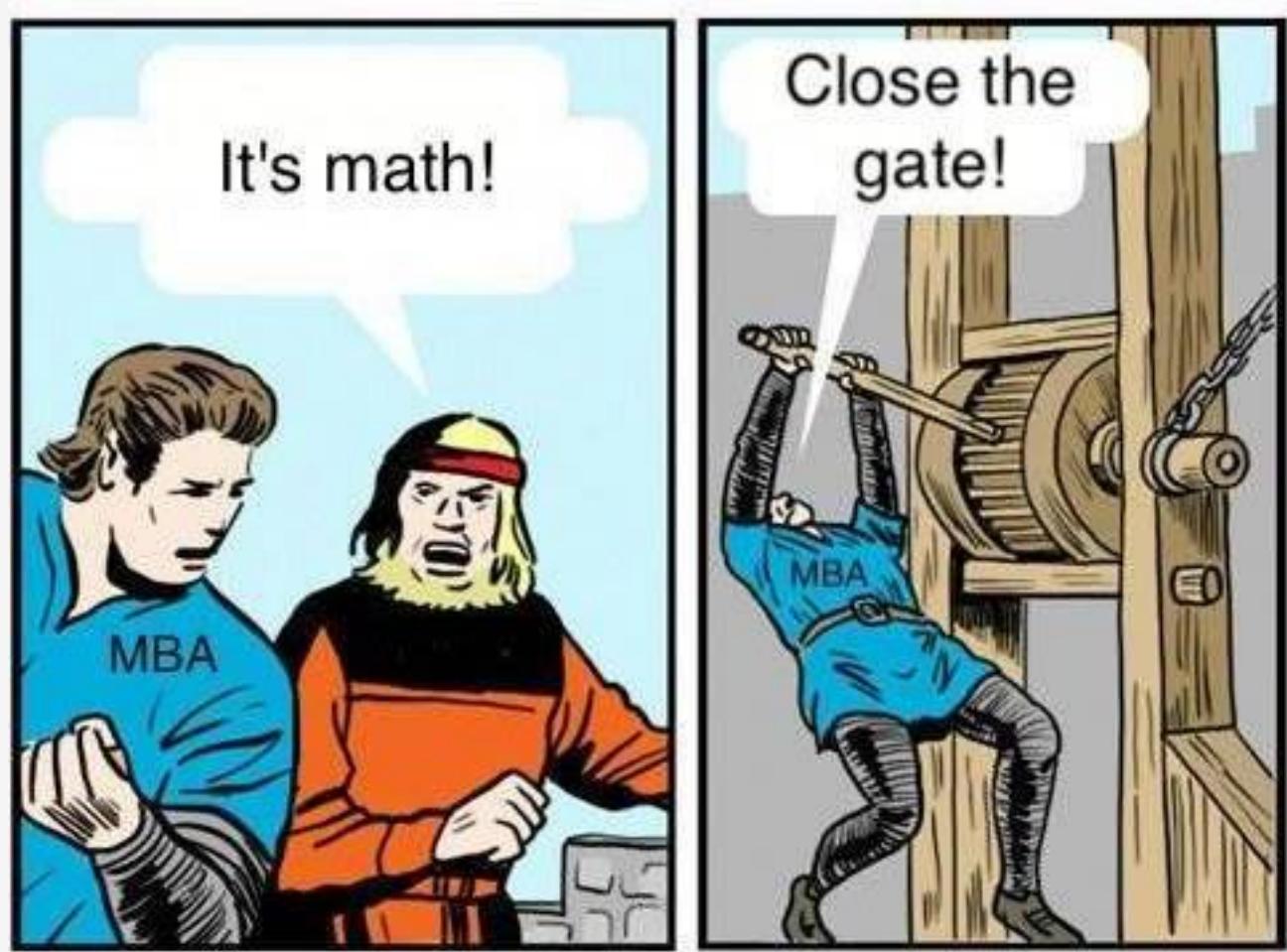
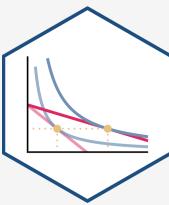


Real Talk: The Math

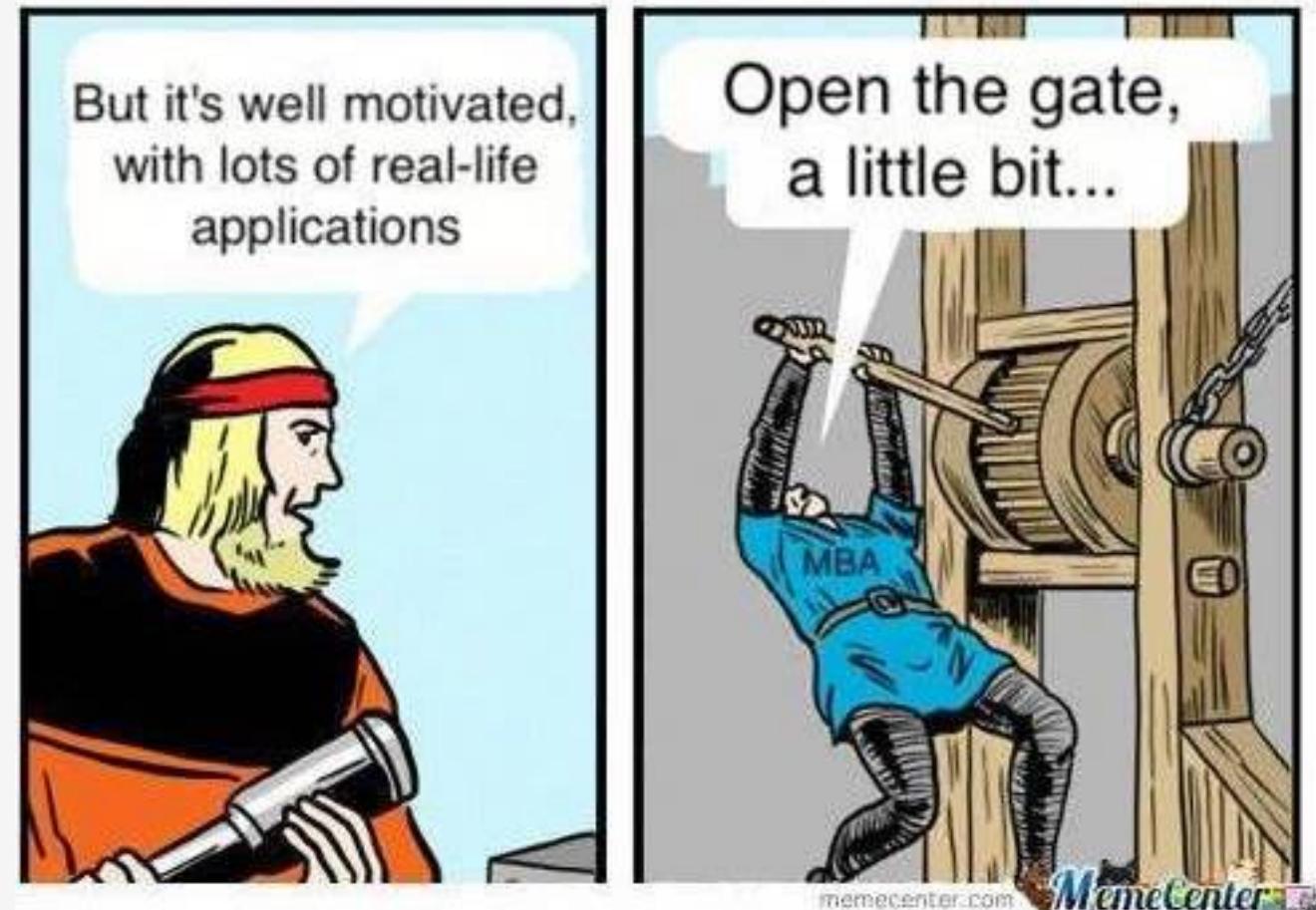
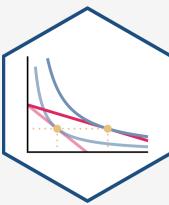
Real Talk



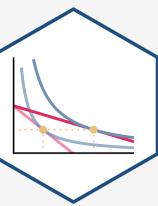
Real Talk



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 $R = 4 - \frac{1}{2}W$. Below the instructions, there is a note about paper submission and a link to download the assignment as a PDF. Three numbered questions are listed at the bottom.

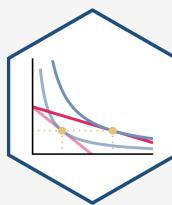
1
Draw a graph of the following linear equation, $R = 4 - \frac{1}{2}W$. Plot W on the vertical axis and R on the horizontal axis.

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

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

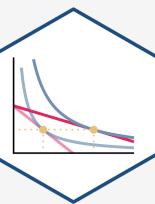
Why We Model I



- 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

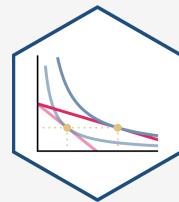


- Economists use conceptual models: fictional constructions to logically examine consequences
- Very different from other sciences
 - No social experiments
 - Purposive, strategic human beings
 - Introspective understanding

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



The Two Major Models of Economics as a “Science”



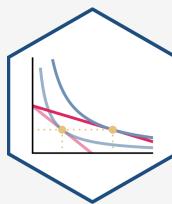
Optimization

- 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!

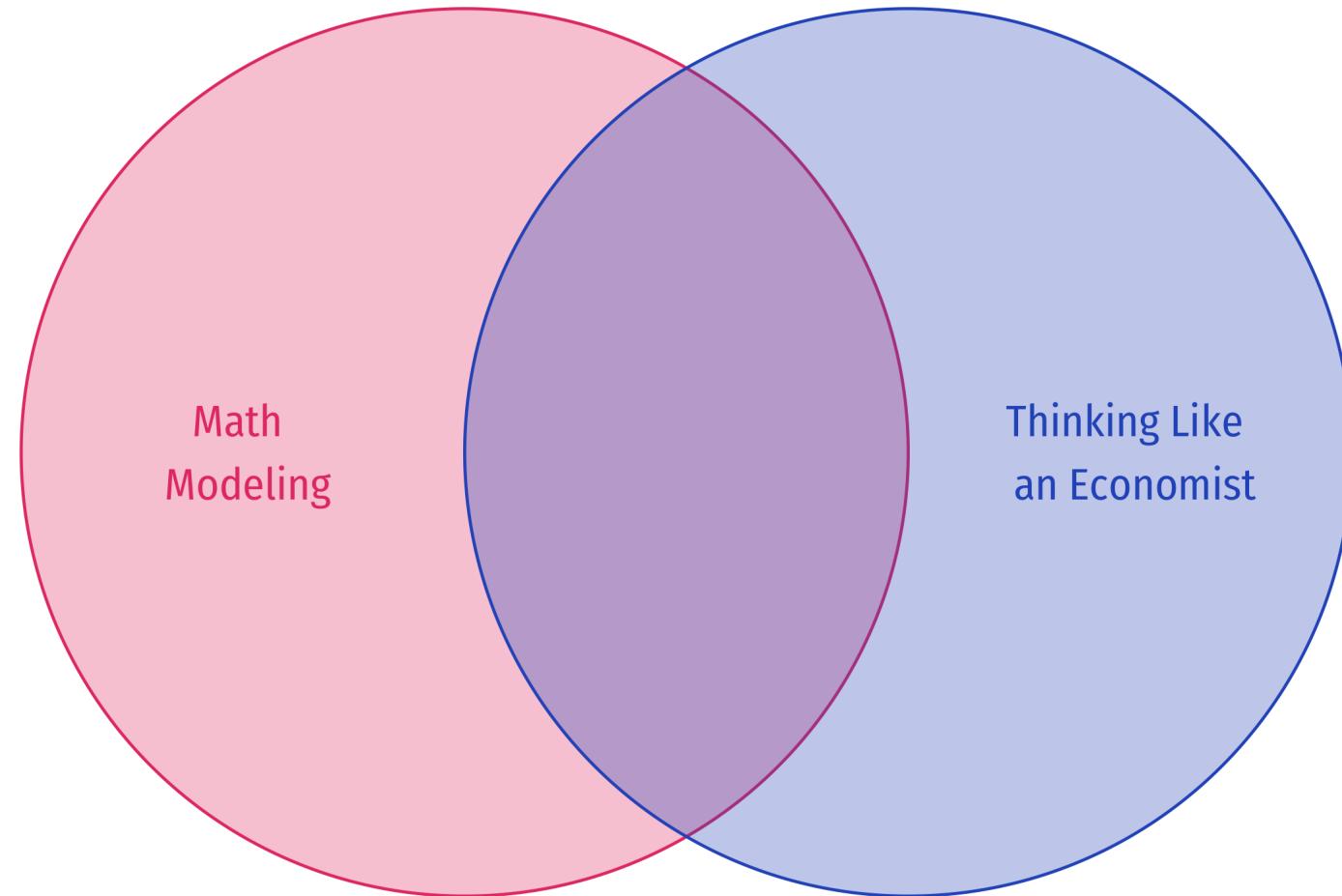
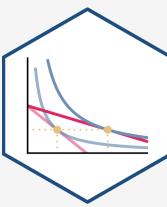


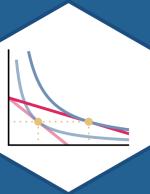
Caution: Don't conflate models with reality!

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



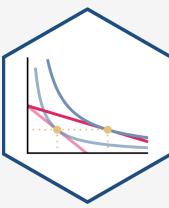
Economics Uses, but Is Not Limited to, Math





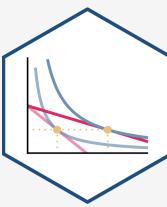
About This Course

Logistics: Hybrid Course



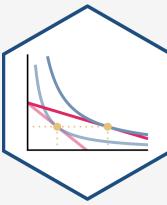
- **hybrid:** more **synchronous** material than **asynchronous** material
- I will always be teaching **remotely**
 - A classroom is available to you
 - I may make occasional visits to campus if you *need* something in person (TBD)
- Office hours: Tu/Th 3:30-5:00 PM on Zoom
 - Zoom link in Blackboard's **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 Mon/Wed 2:00-3:15 PM on **Zoom**
- 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**
 - (Probably) submitted on Blackboard by 11:59 PM Sundays
 - (Probably) timed exams on Blackboard

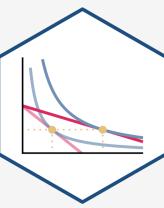
Learning Goals



By the end of this course, you will:

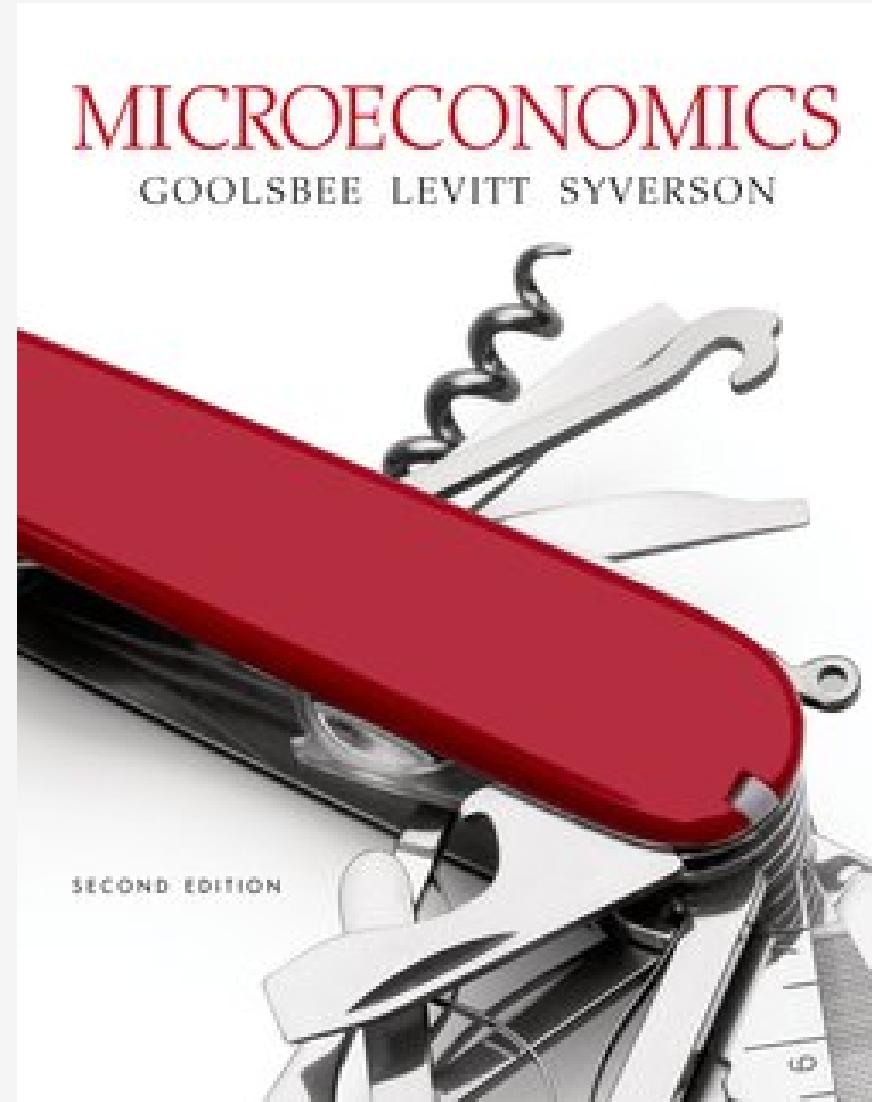
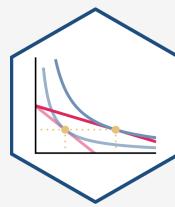
1. apply the models of microeconomics (constrained optimization and equilibrium) towards explaining real world behavior of individuals, firms, and governments
2. explore the effects of economic and political processes on market performance (competition, market prices, profits and losses, property rights,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

Assignments

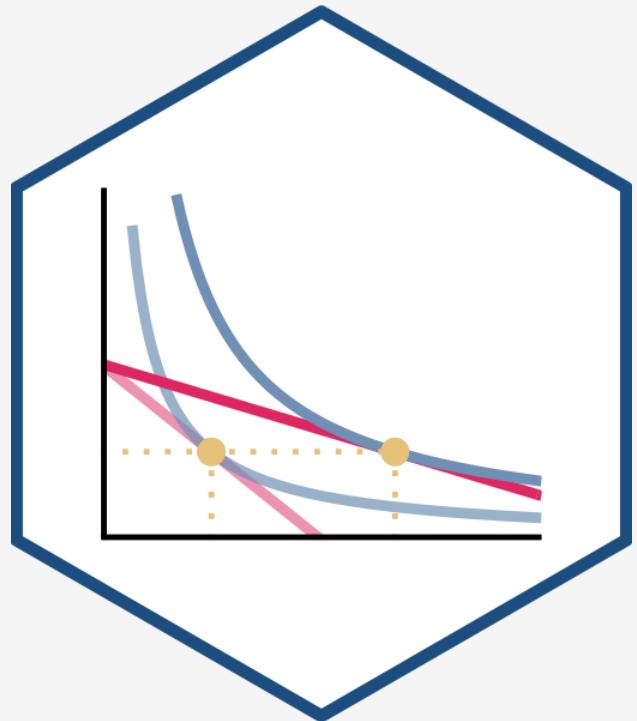
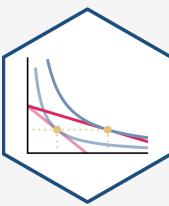


Assignment	Percent
1 Opinion-Editorial	20%
n Homeworks (Average)	20%
3 Exams	20% each

Your “Textbook”



Course Website



micro20.classes.ryansafner.com

ECON 306: MICROECONOMIC ANALYSIS

SYLLABUS SCHEDULE ASSIGNMENTS REFERENCE SLACK

SCHEDULE

This page contains all of the following resources for each class meeting:

- **Readings** include textbook chapters and occasional journal articles
- **Assignments** are due by the beginning of class unless otherwise stated
- **Class** materials contain more details, math appendices, and other helpful resources¹
- **Slides** are “Xaringan” presentations in html that can be opened in any browser²
- **Practice** problems we work on together in class to prepare for homeworks and exams

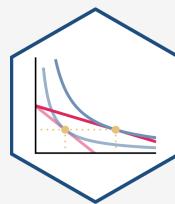
Relevant materials (if applicable, icons will become links) will be posted before class meets.

Last Update: 10:43:46 Mon Aug 17 2020.

1. RATIONAL CHOICE THEORY	READING	CLASS	SLIDES	PRACTICE	ASSIGNMENT
Preliminary Survey				0/0	
1.1 The Tools of Microeconomics				0/0	
1.2 Scarcity, Choice, and Cost				0/0	
1.3 Budget Constraint				0/0	
1.4 Preferences and Utility				0/0	
1.5 Solving the Consumer's Problem				0/0	
■ Problem Set 1				0/0	

micro20.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 [reference page](#) for more



Roadmap for the Semester

