



Microeconomics

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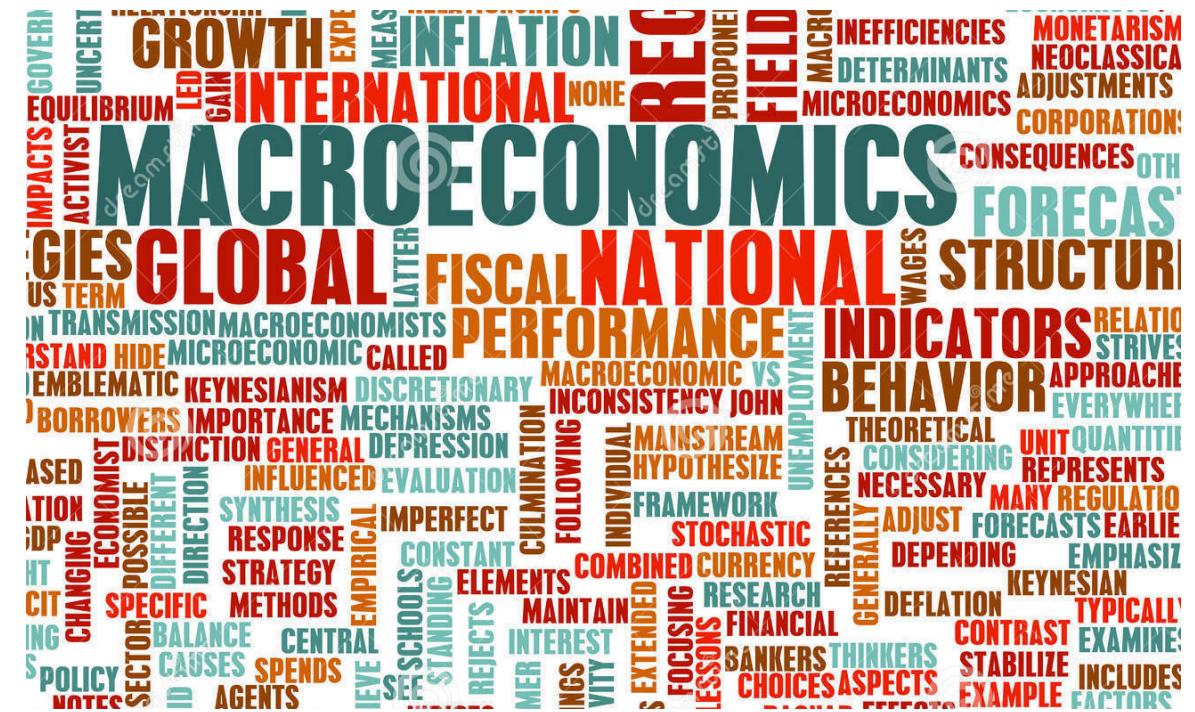
Micro-economics

A dense word cloud centered around the term "MICROECONOMICS". Other prominent words include "SUPPLY", "ELASTICITY", "INFLATION", "GROWTH", "TAXATION", and "DEMAND". The words are rendered in various sizes and colors, such as blue, yellow, green, and red, against a white background.



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





Economics as a Way of Thinking

- Economics is a **way of thinking** based on a few core ideas:
- 1) **People have objective (goals)**
 - Happiness, profit, etc.
- 2) **There are constraints to achieving goals**
 - \$\$\$, time, etc.





Economics as a Way of Thinking

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





Constrained Optimization



Optimizing with Constraints

- The **consumer's constrained optimization problem** is:
- **Choose:** < choice set / options >
- **In order to maximize:** < goal >
- **Subject to:** < constraint >



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Incentives



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.



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Incentives: Even Dolphins Understand

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

Source: [The Guardian](#)



Incentives: Even Dolphins Understand

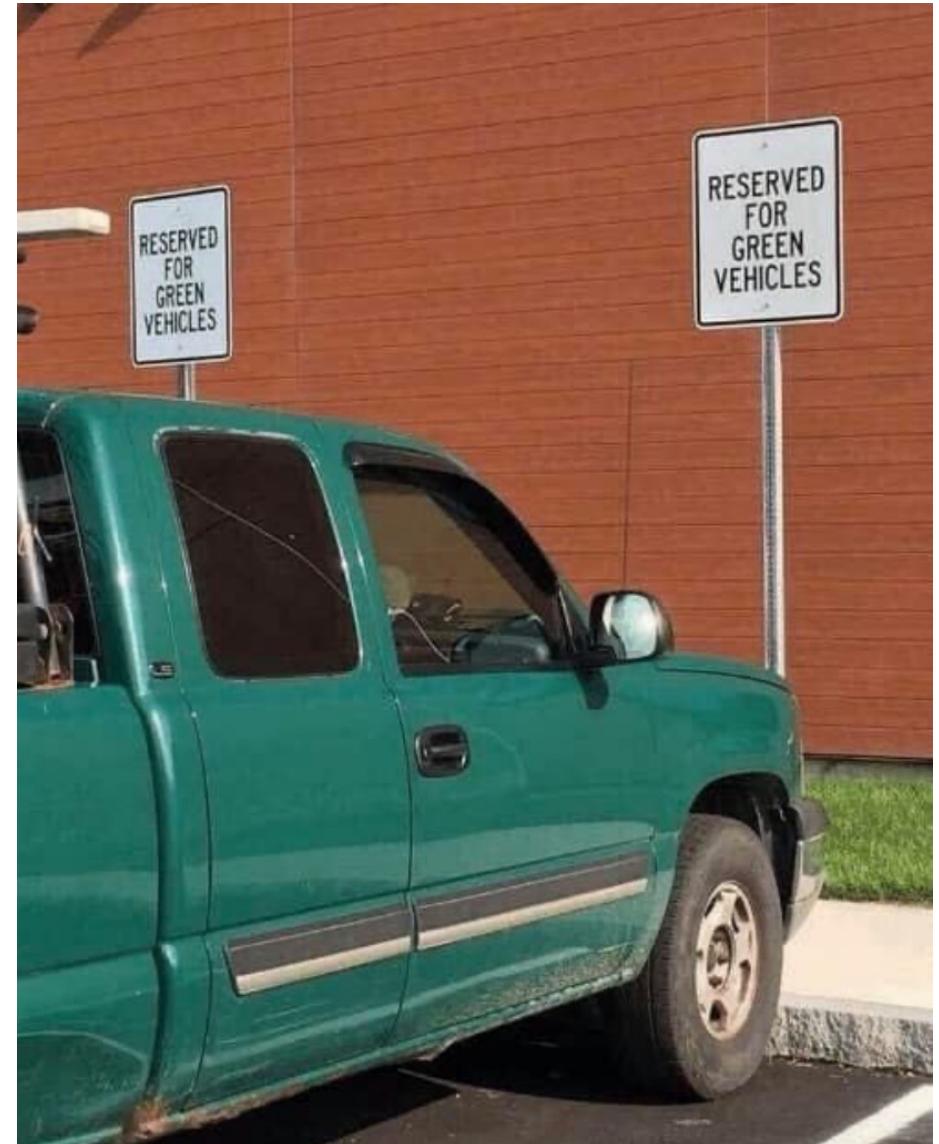
At the Institute for Marine Mammal Studies in Mississippi, Kelly the dolphin has built up quite a reputation. All the dolphins at the institute are trained to hold onto any litter that falls into their pools until they see a trainer, when they can trade the litter for fish. In this way, the dolphins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



Takeaways About Incentives

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





Takeaways About Incentives

 **Peter Fortune AM**  @PeterTFortune · Aug 7, 2019 
Whenever I am working on policy decisions I think of this image... 🚲



179 4.6K 16.5K 

Replies

 **Bridget at Large**  @TRexHen · Aug 8, 2019 
Replying to @PeterTFortune and @PeteNorth303
A street path named Desire.


1 4 164



Equilibrium



Equilibrium Example





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**

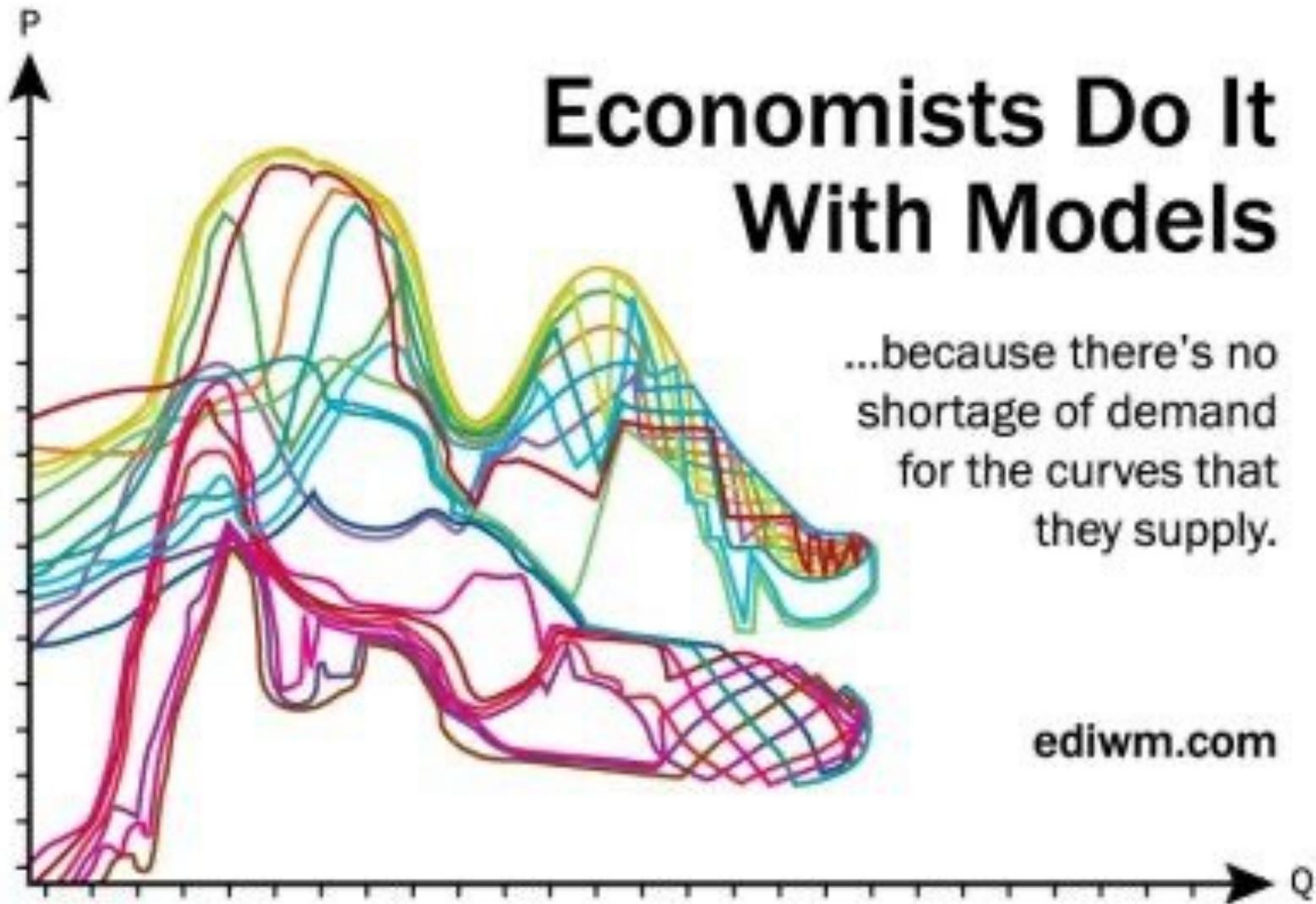




Models



Economic Model





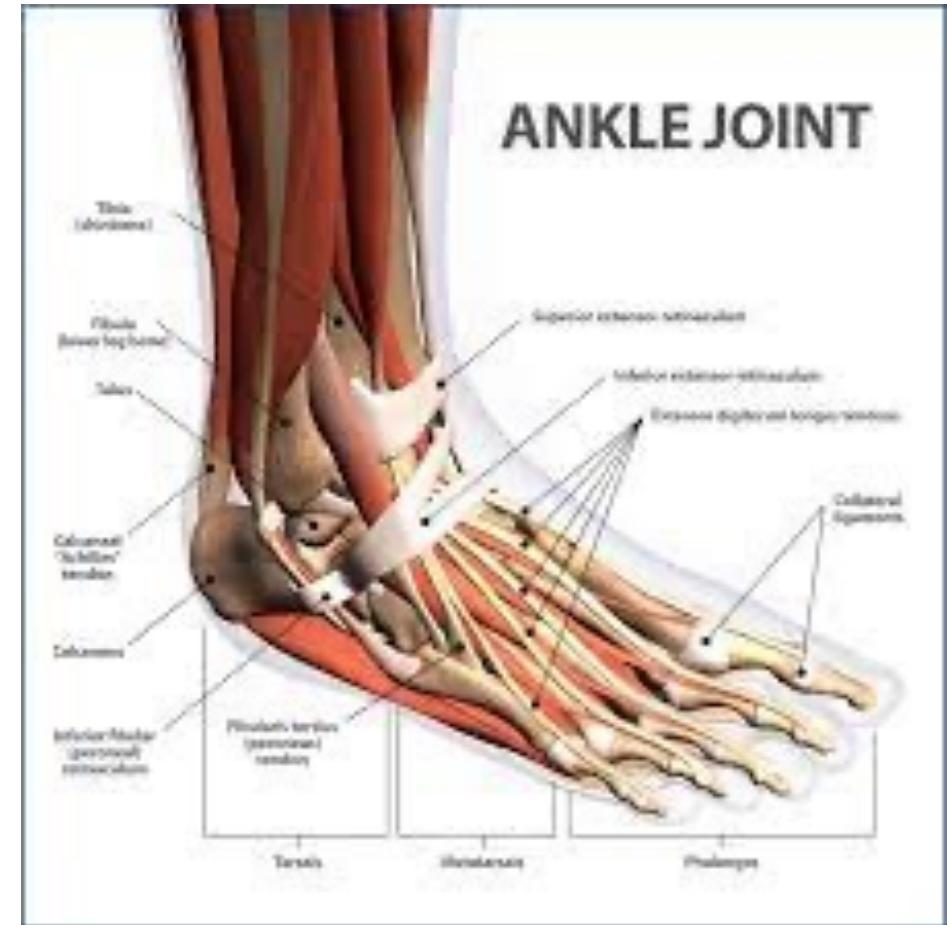
Economic Model

- Simplification of reality
 - Diagrams and equations
- Omit some details to focus on what's really important



Economic Model

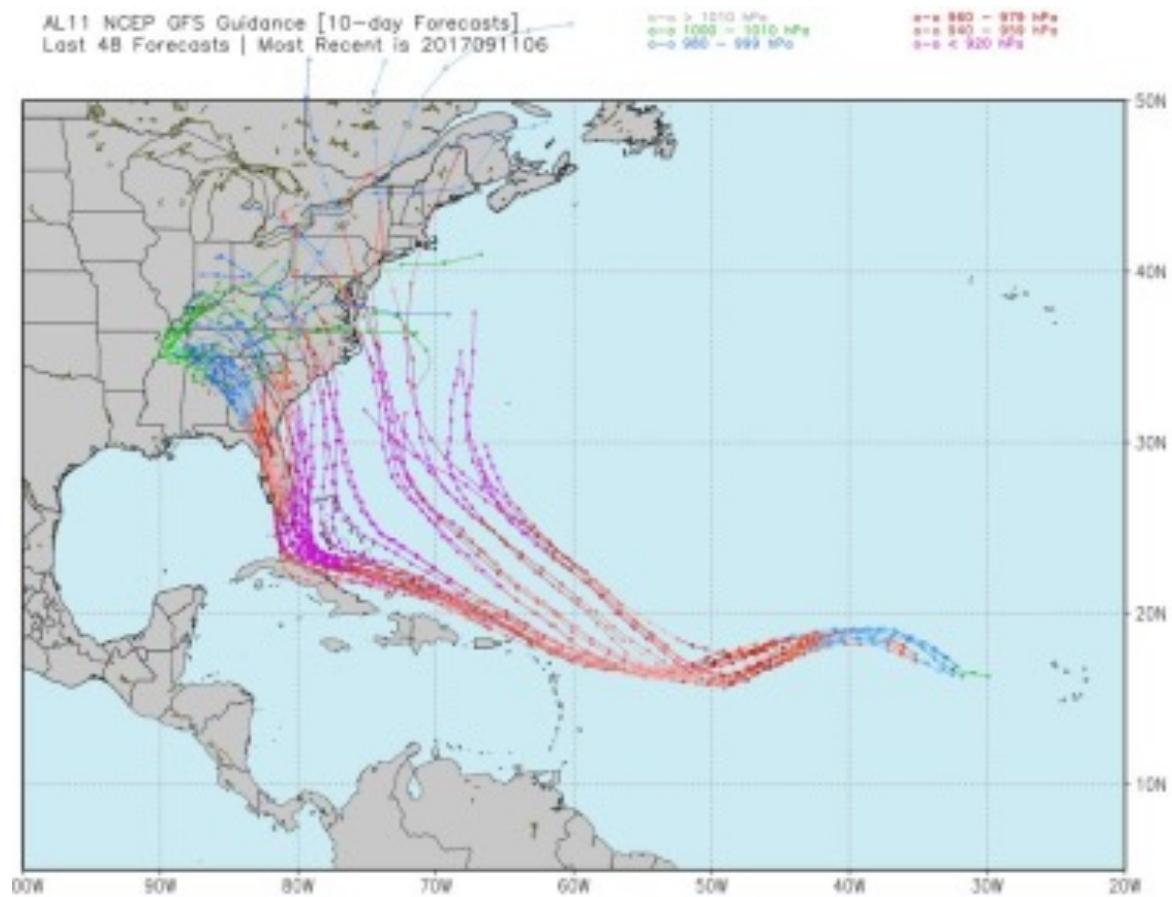
- Simplification of reality
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- Omit some details to focus on what's really important
- Built on assumptions of how the world works





Economic Model

- Simplification of reality
 - Diagrams and equations
- Omit some details to focus on what's really important
- Built on assumptions of how the world works





Economic Model

- 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
 - clear about assumptions
 - often equations and graphs

A blackboard filled with mathematical equations, graphs, and diagrams. The content includes:

- Calculus: $\zeta(s) = \sum_{m=1}^{\infty} (m^{-s})$, $\psi(x) = \frac{d}{dx} \ln(\Gamma(x))$
- Geometry: A triangle with sides labeled a , b , and c . The formula $a \cos(\theta + \alpha) = b/c$ is shown with a diagram.
- Trigonometry: $y = 2 \sin(5x)$, $A = 2$, $P = \frac{2\pi}{3}$; $y = 2 \cos(2t)$, $A = 2$, $P = \pi$; $y = 2 \cos(5x)$.
- Algebra: $x^2 - x - 1 = 0$, $M = \sqrt{1 - \frac{v^2}{c^2}}$, $m+n$.
- Calculus: $U(t) = 1 - \frac{i\lambda}{n} \int_{t_0}^t$.
- Graphs: A graph of a function with vertical asymptotes, and a summation symbol \sum_n .

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



Economic Model

Optimization

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



Equilibrium

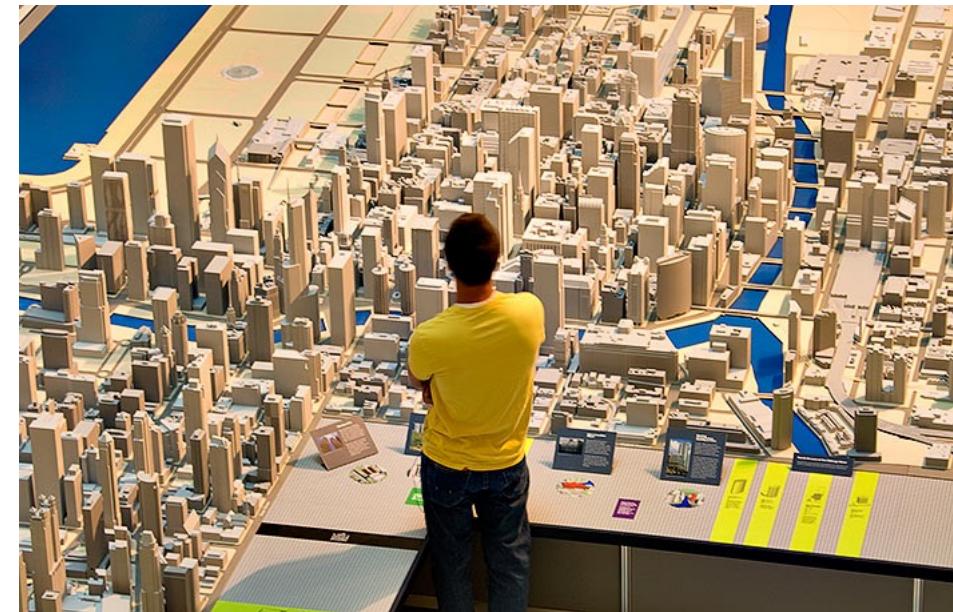
- Agents **compete** with others over **scarce** resources
- Agents **adjust** behaviors based on prices
- **Stable outcomes** when adjustments stop





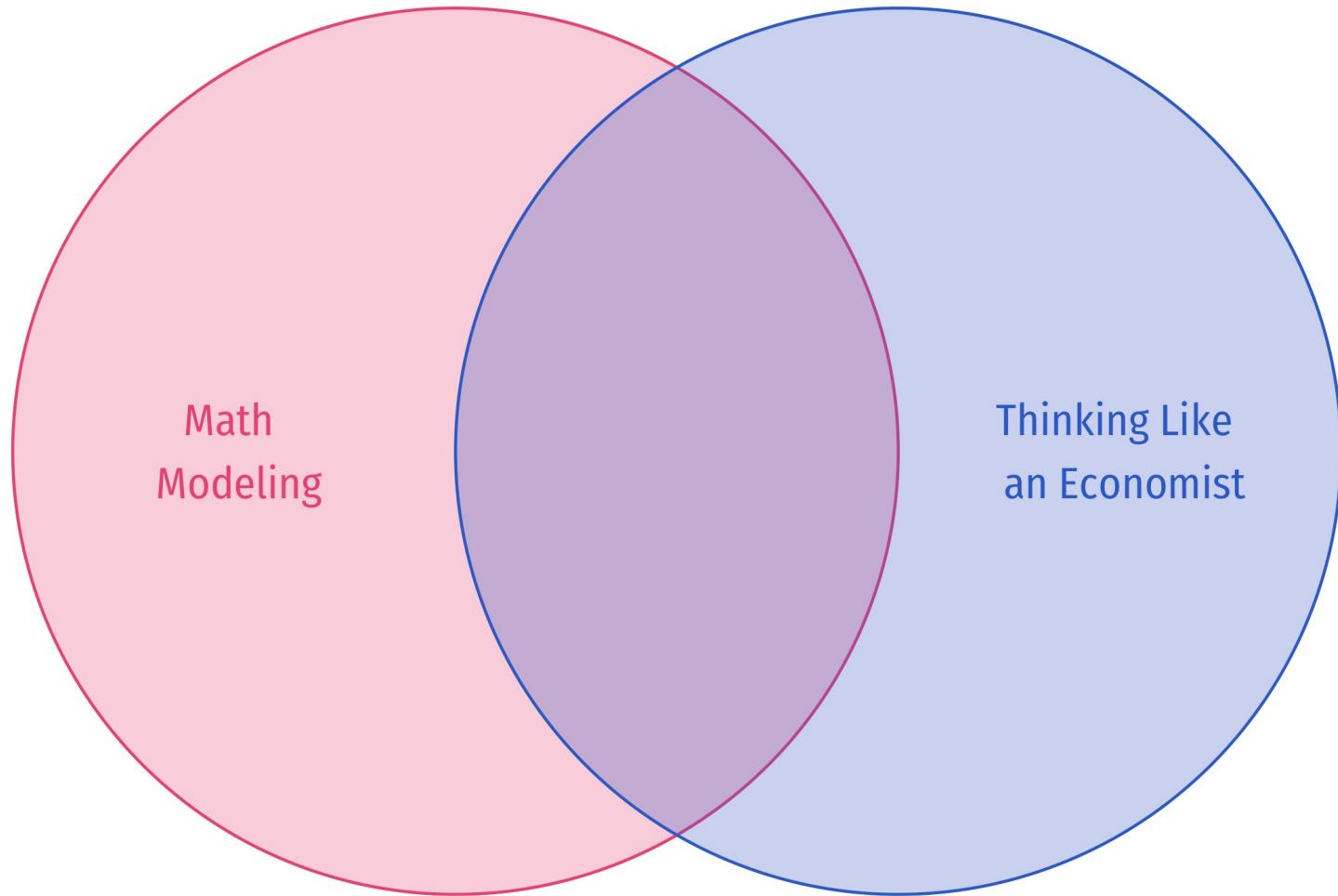
Economic Model

- **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





Let's think about a model

Pricing decision

- Based on work by John List
- Mechanic
- Handicap accessible van
- Service on ding in the bumper
 - What price does the mechanic charge?





Let's think about a model

Question: Why do people receive different treatment in markets?

- Discrimination because of disgust or animosity (Becker 1957)
- Altruism
- Third-degree price discrimination
 - Make \$\$
 - Maybe handicap drivers search less?



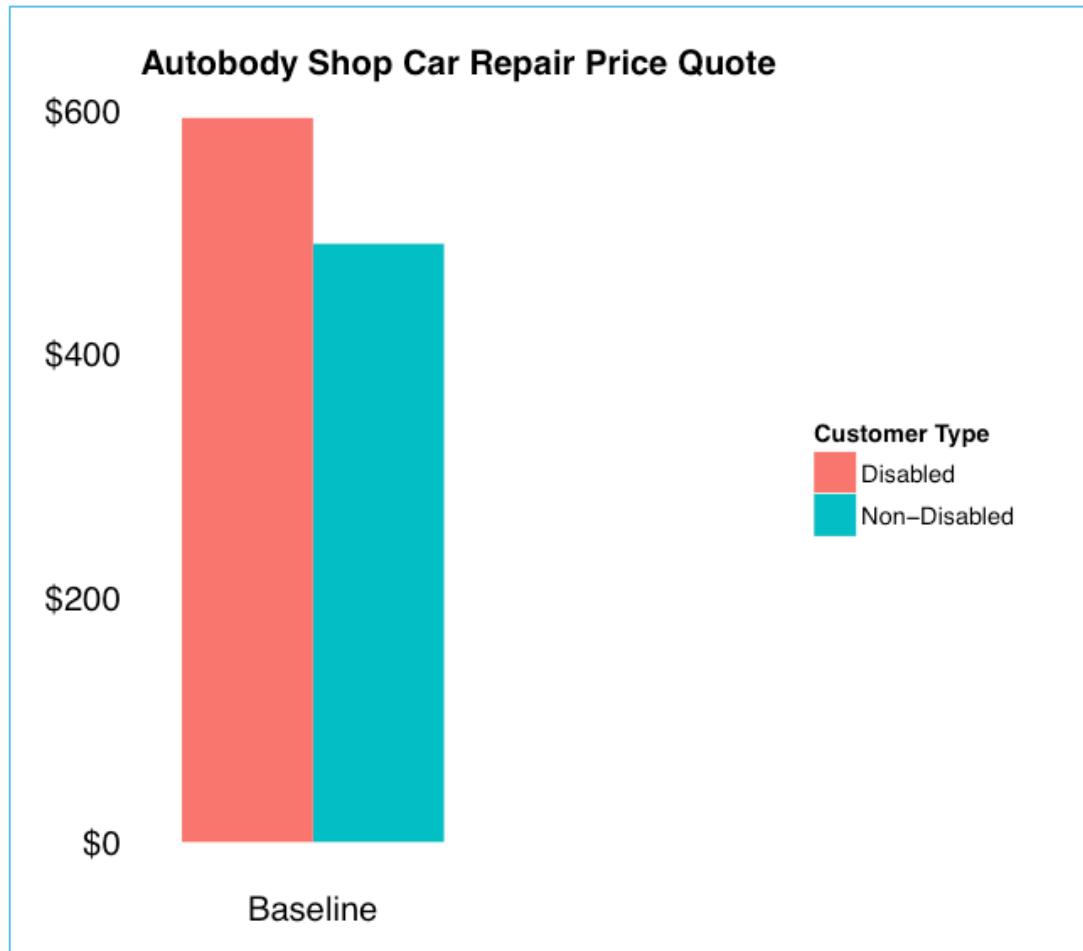
Econometrics

Natural field experiment

- Leveraging the power of randomization
- Took a list of mechanics in Chicago and randomly chose where to get a quote "Flipped a coin" on the driver that goes (handicap or non-handicap)
- The treatment status is **independent** of:
 - The potential outcomes
 - Participant characteristics

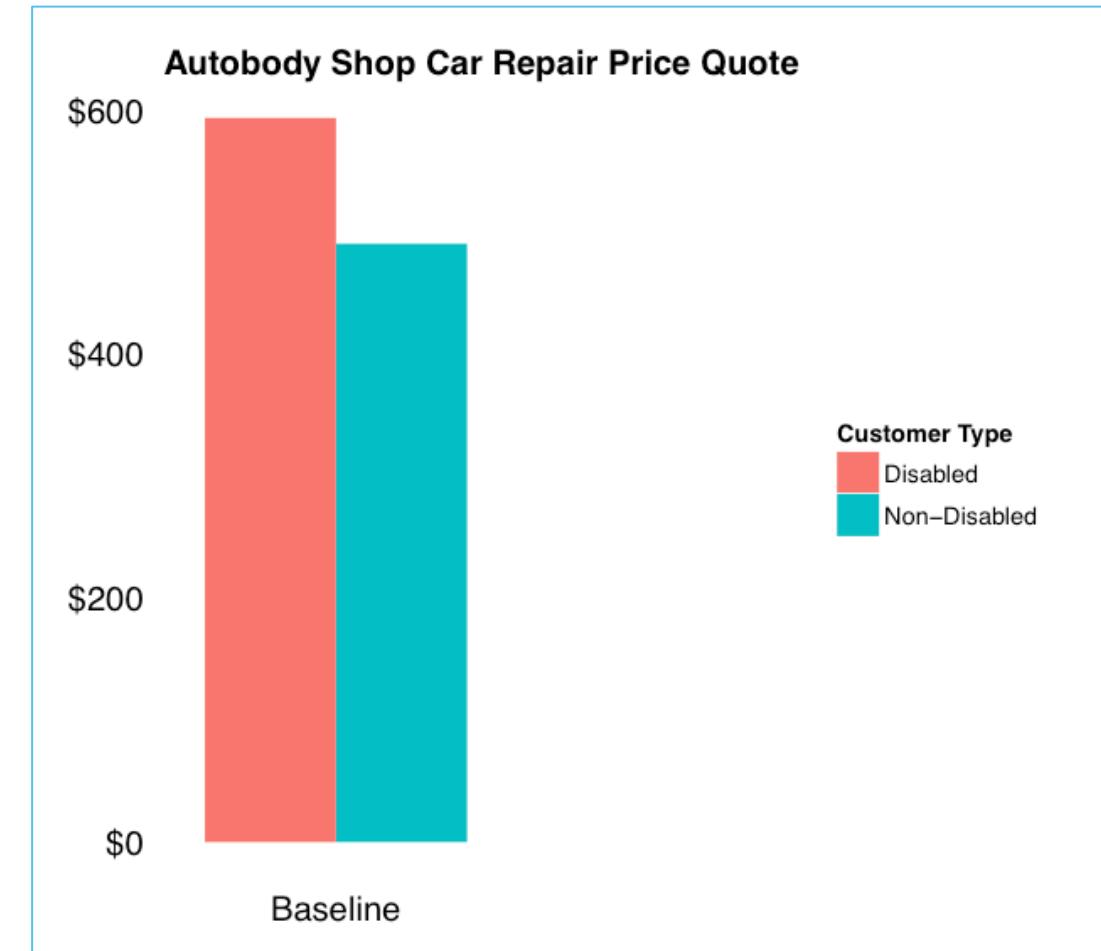
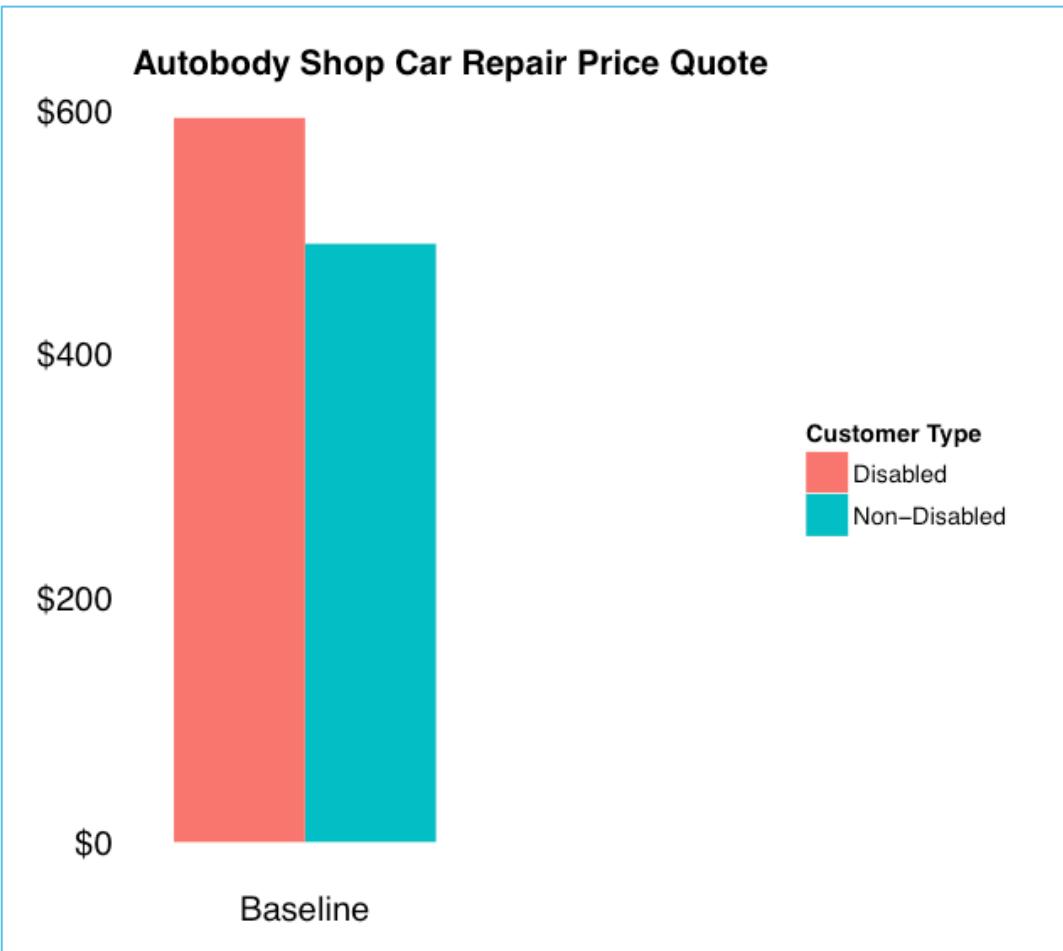


Empirical results





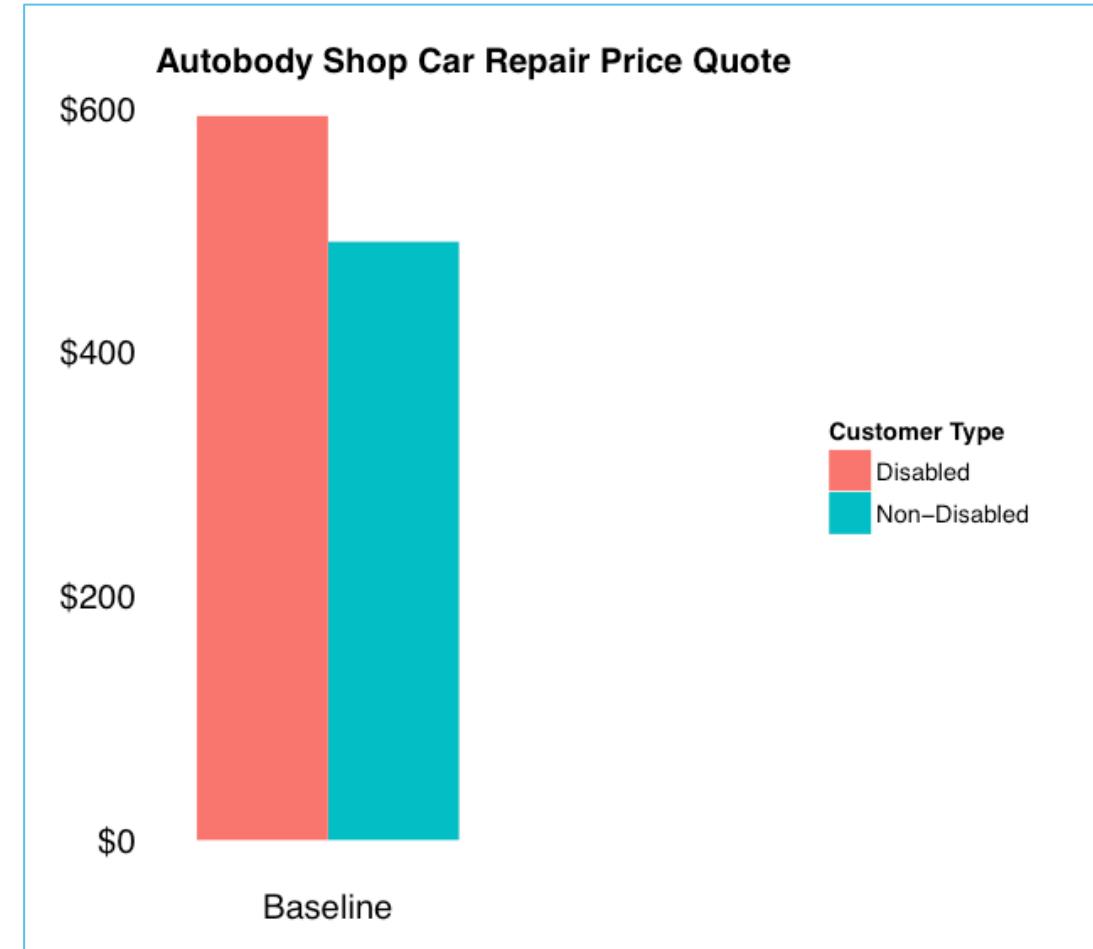
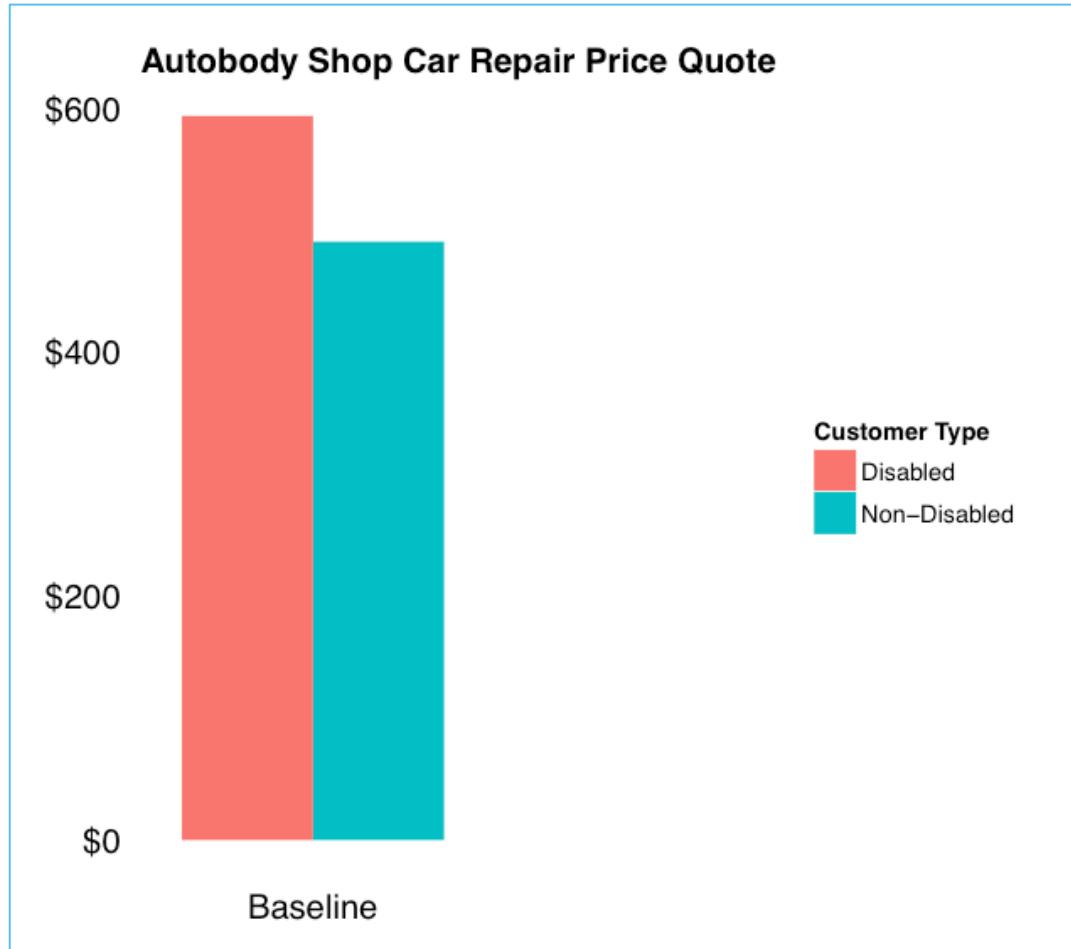
Empirical results





Empirical results

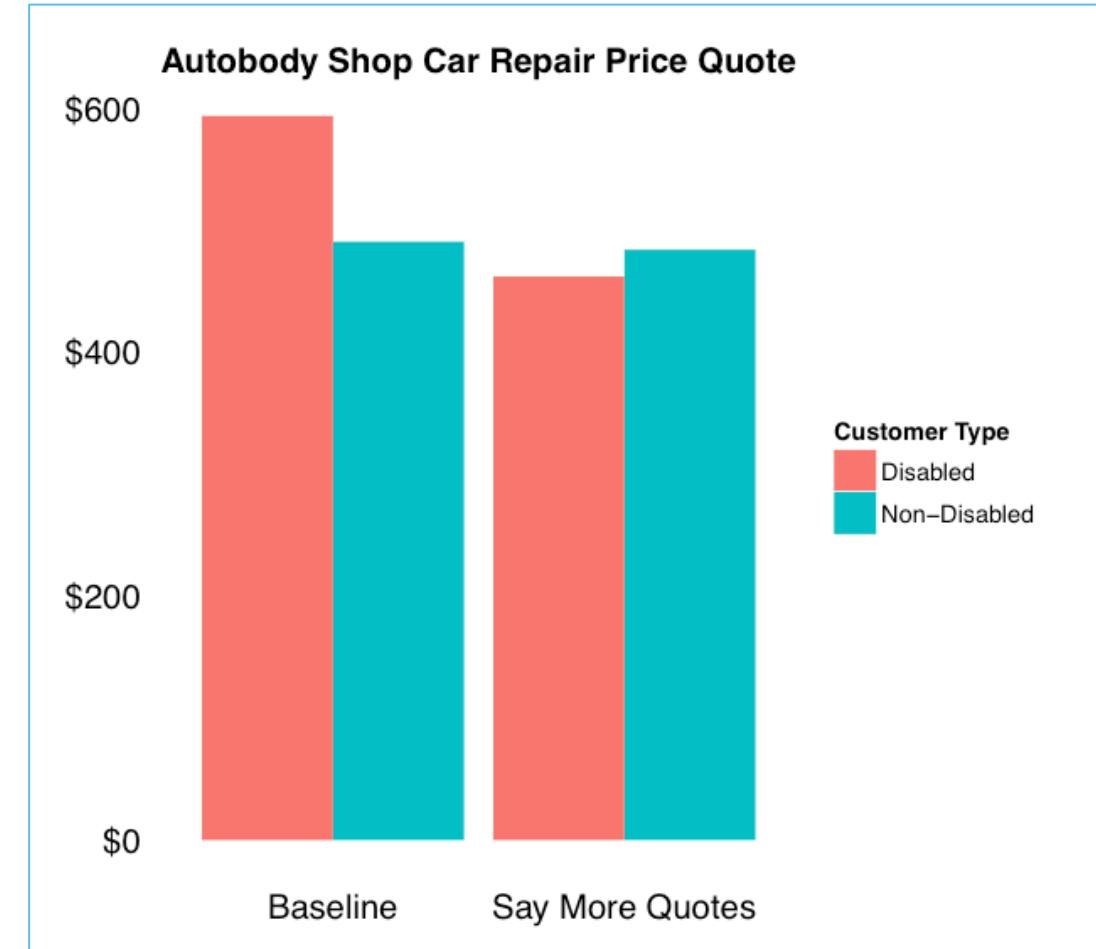
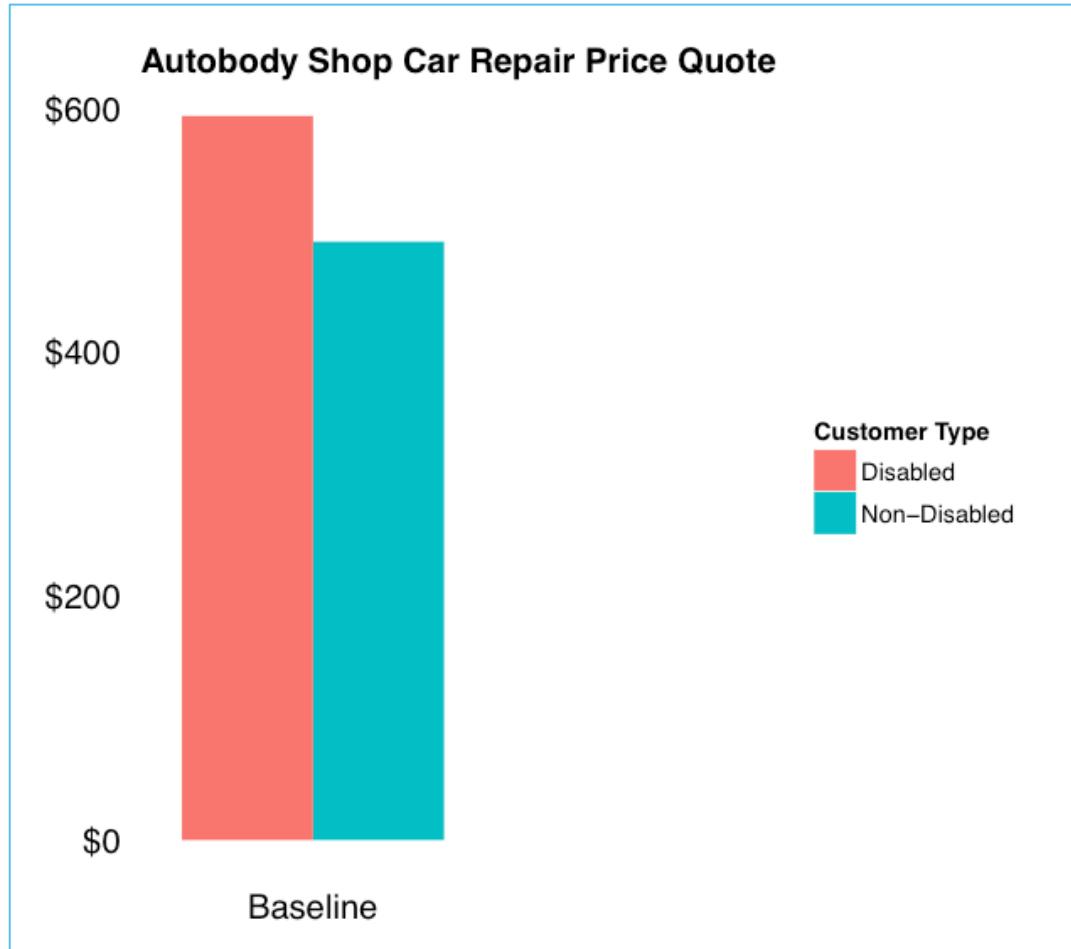
"I'm just out getting a few quotes today"





Empirical results

"I'm just out getting a few quotes today"





Natural Experiments and Quasi-Experimental Methods



III. Niklas Elmehed © Nobel Prize Outreach.
David Card
Prize share: 1/2



III. Niklas Elmehed © Nobel Prize Outreach.
Joshua D. Angrist
Prize share: 1/4



III. Niklas Elmehed © Nobel Prize Outreach.
Guido W. Imbens
Prize share: 1/4

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2021 was divided, one half awarded to David Card "for his empirical contributions to labour economics", the other half jointly to Joshua D. Angrist and Guido W. Imbens "for their methodological contributions to the analysis of causal relationships."