

MONOPOLY PRICING

Motivation 1

The screenshot shows the Amazon Jobs search interface. The search bar contains the word "economist" and is highlighted with a red box. The page displays a list of job filters on the left and three job listings on the right. The "United States" filter is also highlighted with a red box. The job listings are for "Economist" roles in Seattle, Singapore, and Seattle.

Filter by

- JOB TYPE
 - Full Time (500+)
- COUNTRY
 - Country
 - United States (500+)**
 - India (31)
 - Canada (20)
 - United Kingdom (15)
 - Spain (4)
- STATE/PROVINCE
 - State/Province
 - Washington (356)
 - California (69)
 - Virginia (47)
 - Karnataka (26)
 - New York (26)

Sort by: Most relevant

Economist Posted June 24, 2021 (Updated about 1 month ago)
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Economist Posted October 16, 2020 (Updated 8 months ago)
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Economist Posted October 16, 2020 (Updated over 1 year ago)
US, WA, Seattle | Job ID: 1312302
Amazon.com strives to be Earth's most customer-centric company where people can find and discover anything they want to buy online. We hire the world's brightest minds, offering them a fast paced, technologically...[Read more](#)

Motivation 2

Stanford University

Stanford Department of Economics
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Student Placement

Non-Matriculated Students

Student Placement

2021

NAME	FIELDS OF STUDY	PLACEMENT
Nano Barahona	Industrial Organization, Public Economics	UC Berkeley
Alex Bloedel	Microeconomic Theory, Information Economics	Caltech Postdoc, then UC Davis
Jack Blundell	Labor, Public, Causal Inference	Deliveroo
Scarlet Chen	Macroeconomics	Google
Zefeng Chen	International Finance, Macroeconomics, Finance	Peking University, Guanghua School of Management
William Dodds	Public Economics, Development Economics	Tulane University
Sarah Eichmeyer	Public Economics, Health Economics	LMU Munich
Diego Jimenez Hernandez	Industrial Organization, Development Economics	Microsoft Research Postdoc, then Federal Reserve Bank of Chicago
Eduardo Laguna Muggenburg	Econometric Methods for Causal Inference, Public Economics	Facebook
Alejandro Martínez-Marquina	Behavioral and Experimental Economics, Economic History	Klarman Fellow, then USC Marshall
Livio Cuzzi Maya	Macroeconomics, Monetary Economics, Labor Economics	Safra Bank, Sao Paulo
Franklin Qian	Labor Economics, Public Economics, Urban Economics, Industrial Organization	UNC Business School
Karthik Rajkumar	Econometrics, Networks, Econometric Methods for Causal Inference	LinkedIn
Mike Shi	Labor	Cornerstone
Akhil Vohra	Market Design, Microeconomic Theory	Fellow at Cambridge, then UGA
Daniel Walton	Microeconomic Theory, Econometrics	Uber

Why do many firms hire economists???

- (among many other things) an important role for economists at firms is to figure out the right price.
 - Launch a new product, say Alexa. How much to charge?
 - Charge for advertising, e.g. Google/Facebook. How much to charge?
 - How to set prices for rides on trips (e.g. Uber)? How much more to charge when there is congestion?
 - Etc. etc.....
- Normative theory to positive theory

Introduction

- Monopoly is a seller of a product without close substitutes
- Examples of (near) monopoly:
 - Mail services
 - Subways and buses in many cities; local utility companies
 - Retailers can also be a monopolist in isolated markets.
 - New drugs or books with patent or copyright protection
- Key difference from perfect competition: monopoly fully controls price

price taker vs price setter

Goal

- How should a monopoly make its production and pricing decision?

What we do today will apply to other settings as long as a firm can unilaterally set prices (without worrying about competitor response) c.f. oligopoly.

Numerical Example: Ice-Cream Pricing

- Jack rents a truck, buys ice-cream from factory, and keeps all of the profits. Assume monopoly (locally).
- Fixed cost (truck rental): \$15/hour
- Marginal cost (wholesale cost of ice cream): \$3
- Demand function (per hour): $Q=20-2p$
- What price generates the most profit?
 - Basic trade-off: *high price leads to low demand*

Ice-Cream Pricing ...

price	demand	revenue	total cost	incred. revenue	incred. cost	profit
10.0	0.0	0.0	15.0			-15.0
9.5	1.0	9.5	18.0	9.5	3.0	-8.5
9.0	2.0	18.0	21.0	8.5	3.0	-3.0
8.5	3.0	25.5	24.0	7.5	3.0	1.5
8.0	4.0	32.0	27.0	6.5	3.0	5.0
7.5	5.0	37.5	30.0	5.5	3.0	7.5
7.0	6.0	42.0	33.0	4.5	3.0	9.0
6.5	7.0	45.5	36.0	3.5	3.0	9.5
6.0	8.0	48.0	39.0	2.5	3.0	9.0
5.5	9.0	49.5	42.0	1.5	3.0	7.5
5.0	10.0	50.0	45.0	0.5	3.0	5.0
4.5	11.0	49.5	48.0	-0.5	3.0	1.5

$$Q=20-2p$$

$$\text{Cost}=3Q+15$$

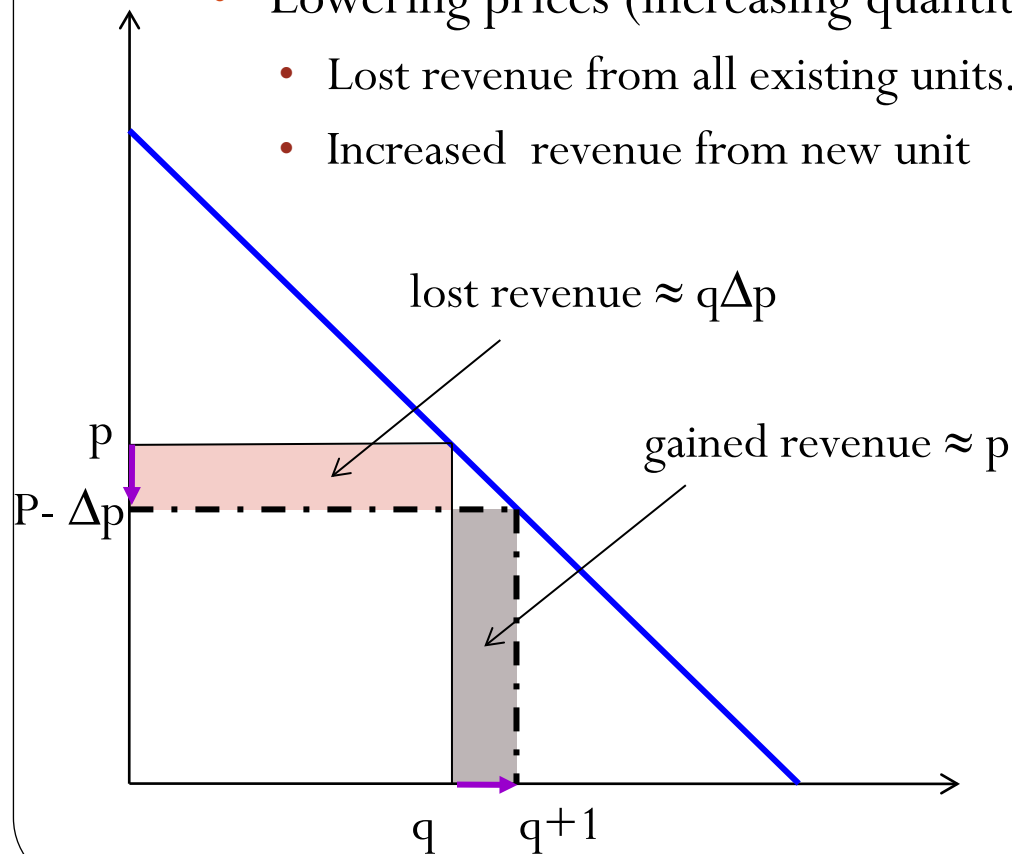
When incremental revenue is greater than incremental cost, profit is rising

When incremental revenue is smaller than incremental cost, profit is declining

→ Keep producing as long as
(incred. revenue) > (incred. cost)

Monopoly's Decision Problem

- Monopoly faces a demand function $Q(p)$ and a cost function $C(Q)$
 - The monopoly can choose either price or output
- Lowering prices (increasing quantity) changes revenue in two ways:
 - Lost revenue from all existing units.
 - Increased revenue from new unit

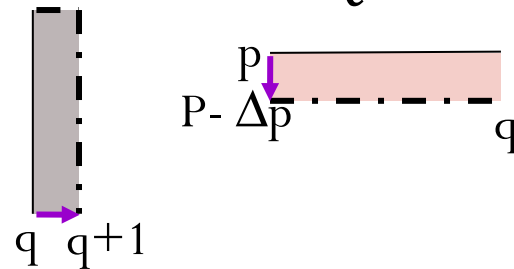


Marginal (Incremental) Revenue

- Firm faces an (inverse) demand function $p(Q)$
- Revenue function: $R(Q) = p(Q)Q$
- **Marginal revenue**: change in revenue from selling an additional unit of product
- Marginal revenue *less* than price [vs $MR=p$ in perfect competition]

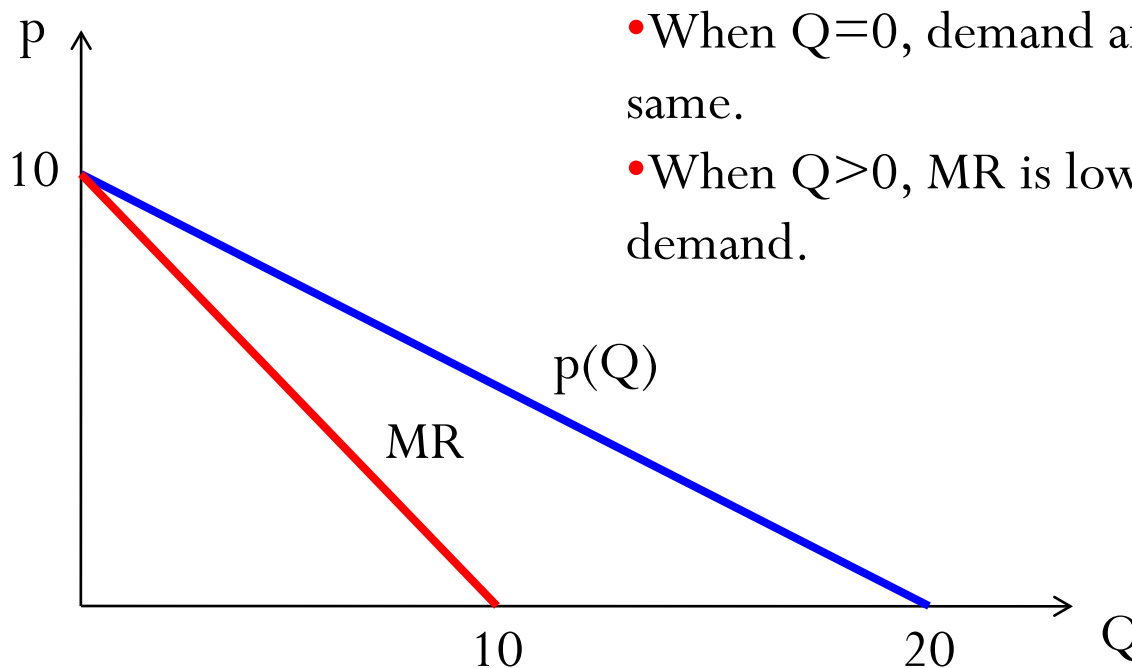
$$MR = \frac{dR(Q)}{dQ}$$

$$MR(Q) = \frac{dR(Q)}{dQ} = p(Q) + Q \frac{dp(Q)}{dQ} \leq p(Q)$$



Marginal Revenue: Example

- Recall the ice-cream example with demand function $Q=20-2p$
 - Inverse demand function: $p(Q)=10-0.5Q$
 - Revenue function: $R(Q)=p(Q)Q=(10-0.5Q)Q=10Q-0.5Q^2$
 - Marginal revenue: $MR(Q)=10-Q < p(Q)$



- When $Q=0$, demand and MR is the same.
- When $Q>0$, MR is lower than demand.

Optimal Monopoly Pricing

- The monopoly chooses Q to maximize profit $\pi(Q)=R(Q)-C(Q)$, where $R(Q)=p(Q)Q$ is the revenue function.
- Use calculus:

$$\frac{d\pi(Q)}{dQ} = \frac{dR(Q)}{dQ} - \frac{dC(Q)}{dQ} = 0$$

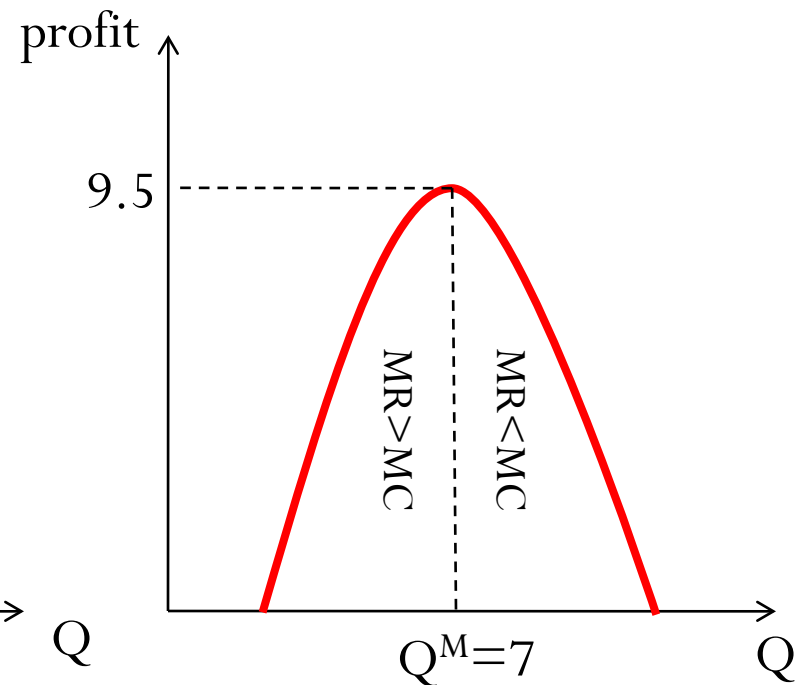
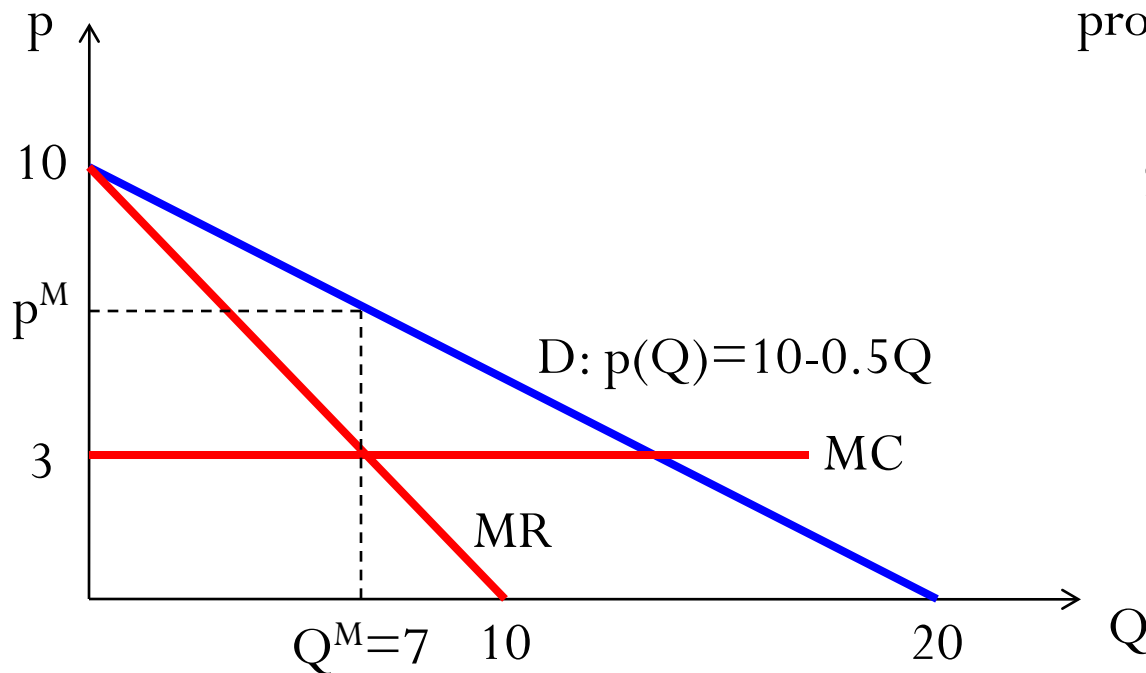


$$MR = MC$$

- If $MR > MC$, selling an extra unit of product generates more revenue than cost, and so can improve profit
- If $MR < MC$, the opposite is true
- Optimal when $MR = MC$
- Cf. Competitive equilibrium, $MR = p \rightarrow p = MC$

Optimal Monopoly Pricing: Example

- Revisit the ice-cream example: $MR=10-Q$, $MC=3$
 - $MR=MC \Rightarrow 10-Q=3 \Rightarrow Q^M=7$
 - $p^M=10-0.5Q^M=6.5$
 - $\pi^M=p^M Q^M - (3Q^M+15)=9.5$
- Profit \uparrow if $MR > MC$ (i.e., if $Q < 7$) and \downarrow if $MR < MC$ (i.e., if $Q > 7$)



Elasticity Rule

- Definition of marginal revenue implies

$$MR = \frac{dR(Q)}{dQ} = p(Q) + Q \frac{dp(Q)}{dQ} = p(Q) \left(1 + \frac{Q}{p(Q)} \frac{dp(Q)}{dQ} \right) = p(Q) \left(1 + \frac{1}{\varepsilon} \right)$$

- Then optimal monopoly pricing implies

$$MR = p(Q) \left(1 + \frac{1}{\varepsilon} \right) = MC$$

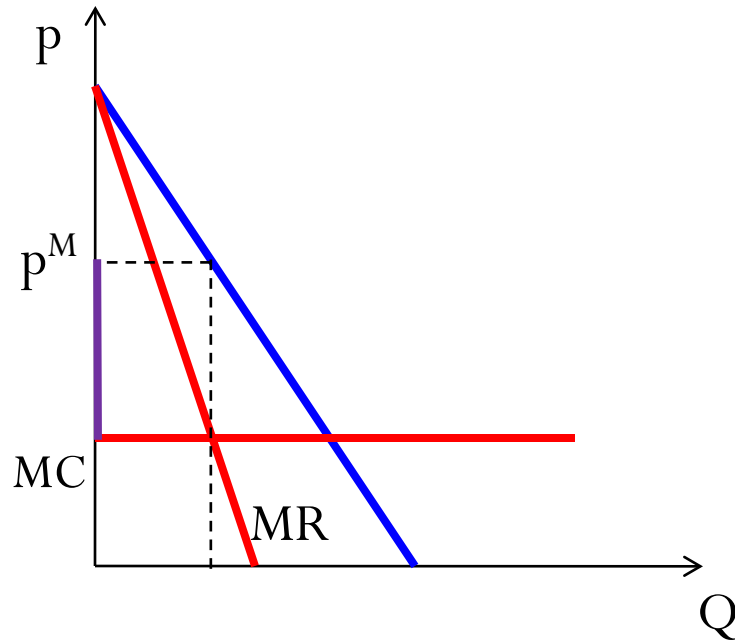


$$\frac{p - MC}{p} = \frac{1}{-\varepsilon}$$

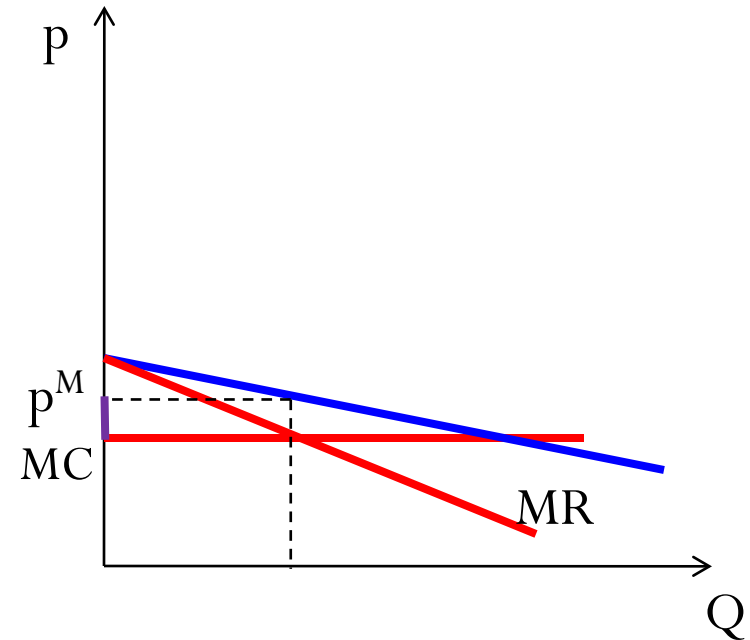
- *More elastic demand (i.e., greater $-\varepsilon$), or more price sensitive consumers, leads to lower profit margin*
 - e.g., Optimal markup when elasticity is -10? When elasticity is -2?
- At the optimal price, demand must be elastic (i.e., $-\varepsilon > 1$)

Elasticity and Margin

Low elasticity
High margin



High elasticity
Low margin



The profit margin is *inversely* related to demand elasticity
Monopoly power is limited by demand elasticity

It's Jaw-Dropping How Little It Costs to Make an EpiPen

Martha C. White | Sept. 7, 2016



This is just mind-boggling

Another day, another infuriating bit of news about Mylan's pricey — and lifesaving — EpiPen: Pharmaceutical industry experts estimate that the medicine and its auto-injector, for which Mylan charges roughly \$300 a pop, cost around \$30 to produce.



Bloomberg—Bloomberg/Getty Images

What do you think the demand elasticity is, assuming Mylan is pricing the drug at its (static) profit maximizing level?



The iPhone 13 Pro costs Apple only \$570 to manufacture

6th October, 2021 at 1:10 am by [Shreyaan](#)

⚡ 88% 📖 3 min read 💬 [Comments](#)

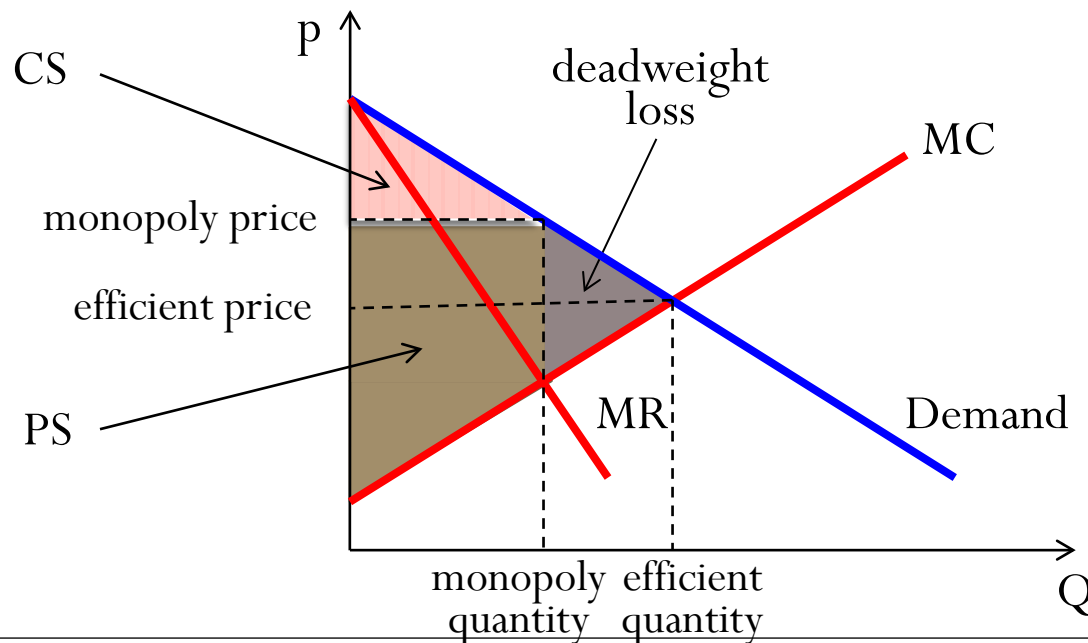
- A brand new 256GB iPhone 13 Pro model costs exactly \$570 to build.
- The bill of material hence accounts for 52 percent of the phone's final cost.

According to TechInsights' teardown analysis, a brand new 256GB storage iPhone 13 Pro costs exactly \$570 to build. This is a 4% increase over the bill of materials for the 256GB iPhone 12 Pro, estimated to be \$548. For comparison, a 256GB iPhone 13 Pro costs \$1,099. This means that the bill of materials accounts for 52 percent of the phone's final cost, even when other costs such as R&D, marketing, and transportation are taken into account, as well as Apple's economies of scale.

Assuming Apple is setting prices to maximize profits, what is the elasticity of demand?

Welfare Costs of Monopoly

- What is the difference in total surplus between monopoly and perfect competition?
- Is PS always (weakly) bigger under monopoly than under perfect competition?



Case Study: ZipRecruiter.com




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- About 40,000 registered paying firms (2015)

Growth and Innovation Since 2010

ZipRecruiter started as a tool to help small businesses distribute job postings affordably. Today we're a thriving marketplace where millions of people across the U.S. and U.K. find a better job for a better life.



Search Result for “Professor” at “Berkeley, CA”

The screenshot shows the ZipRecruiter search interface. At the top, there are navigation links for Suggested Jobs, Alerts, Applied Jobs, Saved Jobs, and Messages. The search bar contains the text "professor" and the location is set to "Berkeley, CA". A "Search Jobs" button is visible. Below the search bar, there are filters for "Posted anytime", "Within 25 miles", "All Salaries", "All Employment Types", "All Titles", and "All Companies". The search results are displayed as a list of job cards. The first card is for "Associate/Full Professor - Macro Practice - Berkeley Social Welfare" at the University of California-Berkeley. The second card is for "Assistant Professor - Accounting - Haas School of Business Apply...". The third card is for "Assistant or Associate Professor of Speech, Language, and Hearing...". The fourth card is for "Assistant/Associate Professor in Financial Accounting".

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Assistant or Associate Professor of Speech, Language, and Hearing... NEW! ☆
California State University, East Bay Hayward, CA
Assistant **Professor** or Associate **Professor** commensurate with experience; salary dependent upon educational preparation and experience; subject to budgetary authorization. DATE OF APPOINTMENT: Fall ...

Assistant/Associate Professor in Financial Accounting NEW! ☆

Experiment 1: Setup

- 2 Economists (Dubé and Misra) at Uni. Chicago partnered with ZipRecruiter.com to conduct two experiments. (today, I only talk about one of them).
- Experiment 1
 - Experimentally vary prices to firms upon reaching paywall
 - August 28-Sept 29, 2015.
 - 7,867 unique firms visited paywall during the period.
 - Randomly assigned firms to one of the price-bins.

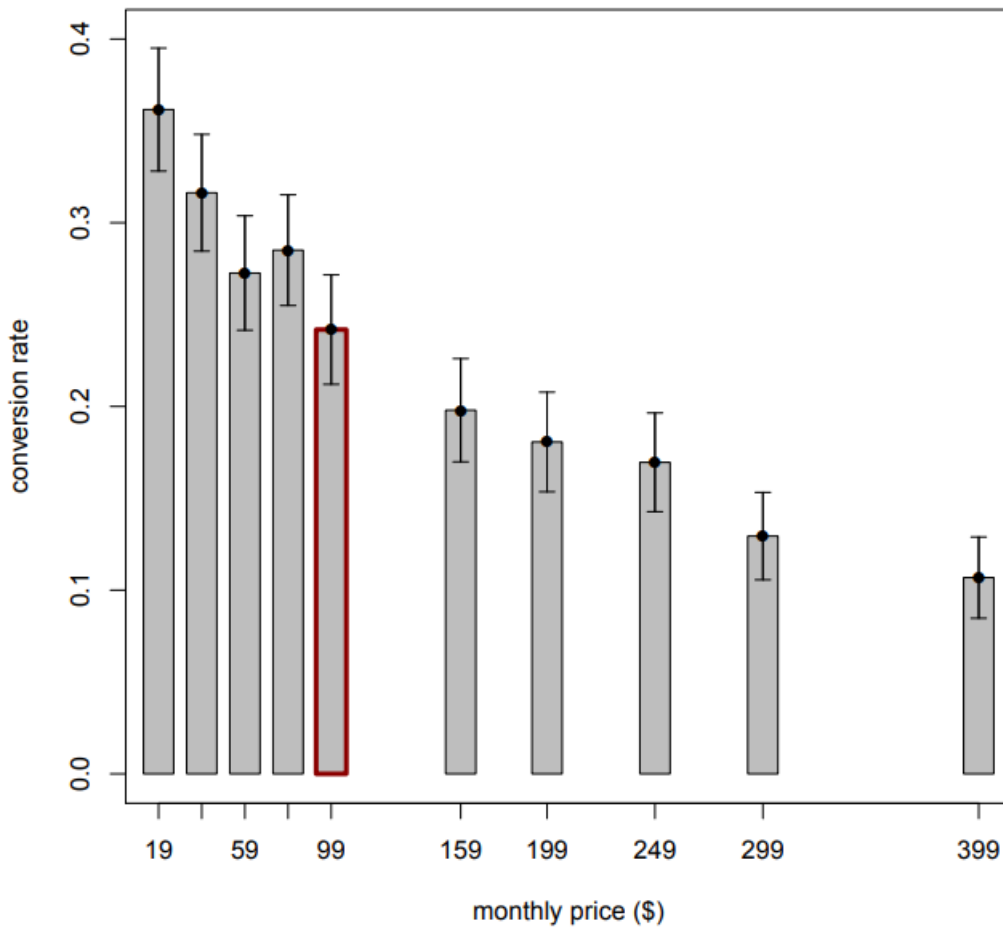
Experiment 1: Price bins

	<i>Monthly</i>	<i>Quarterly</i>	<i>Annual</i>
Control	99	249	590
Test 1	19	49	119
Test 2	39	99	239
Test 3	59	149	359
Test 4	79	199	479
Test 5	159	399	999
Test 6	199	499	1199
Test 7	249	629	1499
Test 8	299	759	1789
Test 9	399	999	2379

Table 1: Experimental Price Cells for Stage One

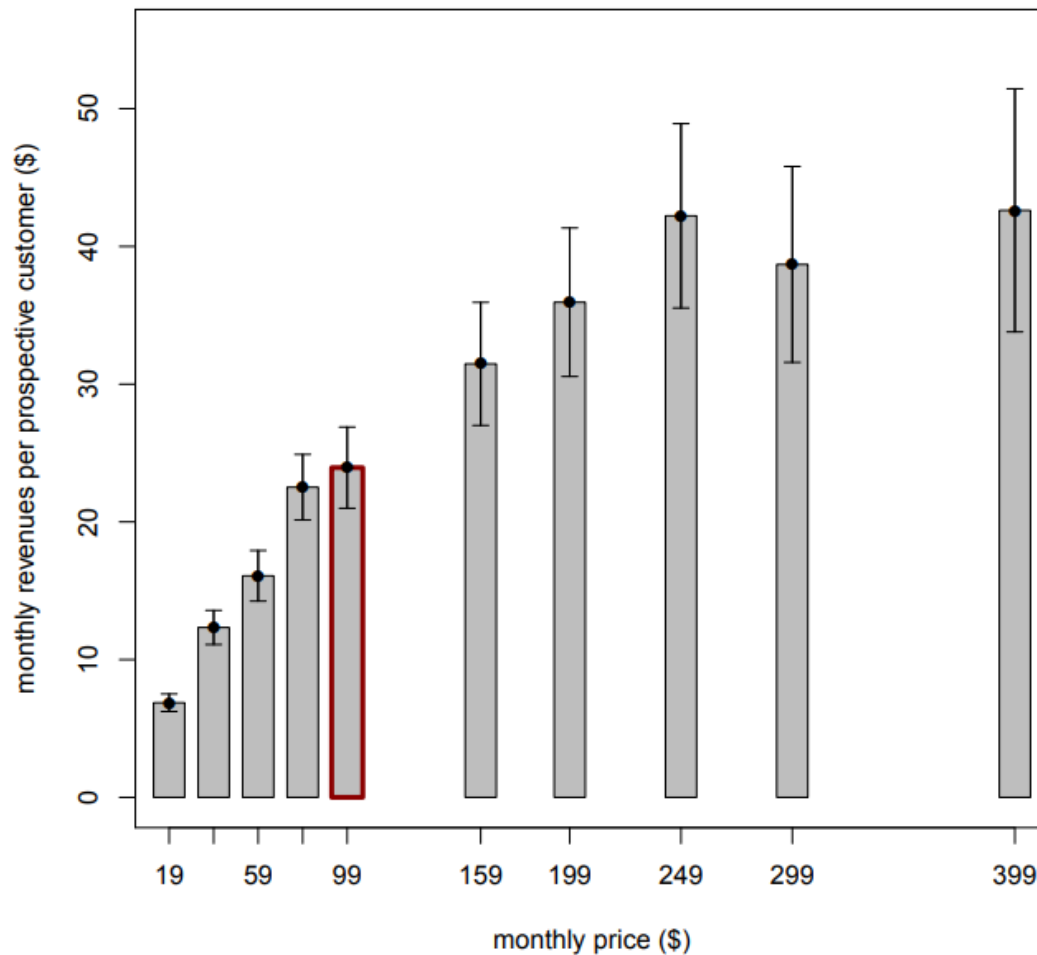
- Baseline of \$99/month before the experiment.
- Randomly assigned firms to 10 treatments
- 10 treatments correspond to some percent change from baseline.
- Anecdote: researchers wanted to do 800% increase, to which the firm balked.

Experiment 1: Conversion Rate



- Graph of conversion rate.
- Ex. At \$20/month, conversion is 35%. At \$399, conversion is about 10%
- Q: How do you turn this into a demand curve?

Experiment 1: Revenue



- Revenue almost doubled at \$249, \$299, and \$399.
- Marginal cost is close to \$0.
- Clear under pricing relative to optimal.
- Firm increased revenue by 14% during experiment.
- Subsequently, firm decides to charge \$249.

Comments: Perfect Competition vs Monopoly

	Competition	Monopoly
# of firms	Many	One
Control price?	No: price taker	Yes: price setter*
Pricing	$MR=MC=p$	$MR=MC < p$
Welfare	Socially efficient	Deadweight loss

*Also applies to other (non-monopoly) firms as long as the firms have sufficient price setting power (do not have to worry about how competitive firms will respond)

Practice: Linear Demand

- Demand function: $Q=12-2p$
- Marginal cost $MC=c$, and no fixed costs
- Optimal price (as a function of c)?
- Optimal price and optimal profit when $c=1$?