

Economics in the News

Final Exam of Fall 2017

Joseph Tao-yi Wang

(A) Free rides boost Kaohsiung
MRT traffic by 10 percent
(Taipei Times, 12/2/2017)

高捷冬季免費傳捷報！
今尖峰運量增21%、比首日加倍
(自由時報2017-12-04)

According to Taipei Times 12/2/2017

- "The number of passengers who took the Kaohsiung Mass Rapid Transit (MRT) during morning peak hours rose more than 10 percent yesterday, the first day the city provided free public transport in an effort to combat air pollution, data released by Kaohsiung Rapid Transit Corp showed.
- The data showed that the number of passengers taking the Kaohsiung Metro from 6:30am to 8:30am totaled 26,970—up 3,072 or about 13 percent from the same period on Friday last week.

Answer the Following Questions

1. What is the number of passengers taking the Kaohsiung MRT from 6:30am to 8:30am on Friday the week before rides were free?
 - $26,970 - 3,072 = 23,898$ people rode last Friday
 - Use the midpoint method to calculate the percentage change in quantity demanded for Kaohsiung MRT. Is it "about 13 percent"?
 - Midpoint = $(23,898 + 26,970)/2 = 25,434$
 - $\Delta Q^d(\%) = 3,072/25,434 \times 100\% = 12.08\%$
(Slightly $<13\%$ due to non-midpoint calculation)

Answer the Following Questions

2. Use the midpoint method to calculate the percentage change in price due to this new policy. Do you need to know what the original price to make such calculations?
 - $\Delta P(\%) = (P - 0) / [(P+0)/2] = 200\%$
3. What is the price elasticity for Kaohsiung MRT? Is the demand elastic or inelastic?
 - $\varepsilon = \Delta Q^d(\%) / \Delta P(\%) = 12.08/200 = 0.0604$
– Almost perfectly inelastic!

According to 自由時報 12/2/2017

- 高捷冬季免費傳捷報！今尖峰運量增21%、比首日加倍（自由時報 12/2/2017）
- 〔記者王榮祥／高雄報導〕今天是高雄市大眾運輸冬季免費措施上路後的第一個星期一，
- 高雄捷運尖峰時段運量共6萬9559人次，比上個星期一增加1萬2109人次，成長21.1%；
- 上週五免費首日尖峰增長幅度為11.4%，今天成長幅度比免費首日幾乎多出一倍。...

Answer the Following Questions

4. What is the number of passengers taking the Kaohsiung MRT during rush hours on Monday the week before rides were free?
- $69,559 - 12,109 = 57,450$ people rode the last Monday before rides were free
 - Use the midpoint method to calculate the percentage change in quantity demanded and the price elasticity for Kaohsiung MRT.

Answer the Following Questions

- $\Delta Q^d(\%) = 12,109 / [(69,559 + 57,450)/2]$
 $= 19.07\%$
- $\Delta P(\%) = (P - 0) / [(P+0)/2] = 200\%$
– True for any P
- $\varepsilon = \Delta Q^d(\%) / \Delta P(\%) = 19.06\% / 200\%$
 $= 0.095$
- Is the demand elastic or inelastic?
- Again Inelastic!!

Answer the Following Questions

5. The news articles deem this policy as a success. Do you agree or disagree?
- **Open question**, but with near-zero elasticity, the cost is much larger than the benefit.
6. How would this policy affect the MPL for delivery workers based in Kaohsiung?
- More MRT use \Rightarrow less street traffic
 - Delivery speeds up, so MPL increases

Answer the Following Questions

- How would this affect their wages?
- Increase MPL \Rightarrow Increase $W = VMPL$
- Would your answer change if this were implemented in the LR instead of the SR?
- LR elasticity larger
 - more people take MRT
 - MPL increases further
 - $W=VMPL$ increases more!

Answer the Following Questions

7. On Dec. 27, 2017, Taiwan News reported:
- Children 6-12 who reside in New Taipei City will be eligible for 50% discounts on the MRT and buses starting early in 2018.
 - What would happen after New Taipei kids receive 50% discounts on MRT fares?
 - **Open question**; little even if children are more price sensitive (w/ near-zero elasticity)
 - Could be worse if they need adult accompany

Answer the Following Questions

8. Why are metropolitan mayors coming up with these policies?
- Hint: What is coming up this year?
 - This is an **open question**, but the metropolitan mayoral elections (六都選舉) are indeed coming up in 2018.
 - Hence, policies catering to voters are very popular now...

(B)無人店vs.科技店 超商雙雄對決

李至和報導 (經濟日報 2017/12/10)

According to Economics Daily (2017/12/10)

- 2018年超商業重頭戲就是7-ELEVEN與全家便利商店將推出科技概念店，7-ELEVEN將領先國內零售/開出首家無人商店，全家計畫推出新型態科技概念店，兩強戰場從商品銷售延伸到科技應用，互別苗頭意味濃厚。
- 統一企業集團董事長羅智先在今年集團耶誕點燈「愛·Sharing」活動上語出驚人表示，「明年7-ELEVEN將會開無人商店，比預期速度還快」，此話一出，震動國內零售業，連羅智先幕僚群都沒做好準備，老闆會將這個秘密武器說出來。

Answer the Following Questions

1. Family Mart and 7-11 are two largest convenient store chains in the market.
 - First assume Family Mart is a perfect substitute of 7-11. Which market structure best describes this market?
 - Duopoly = Two big firms in a market with homogeneous products
 - Oligopoly: more than two chains in the convenient store market, e.g. OK, Hi-Life,...

Answer the Following Questions

2. Consider a game played between 7-11 and Family Mart near National Daiwan Univ.
- Suppose total revenue of convenient stores is about 100 million per year.
 - If they **both don't open** high-tech stores by the end of 2018, revenue is split equally.
 - If **only one opens**, that chain earns 70 million (while the other earns 30 million).
 - If **both opens**, revenue is split equally.

Answer the Following Questions

- Opening a high-tech store by the end of 2018 costs 10 million. Draw the payoff matrix of the game assuming no other operation cost.

- Both Not Open:

– Split 50-50

- Both Open:

– $(50-10)-(50-10)$

- One Open:

– $(70-10)$ vs. 30

| | 7-11 Open | 7-11 Doesn't Open |
|-------------------|--------------|----------------------|
| F-Mart Open | 40, 40 | 60, 30 |
| F-Mart Doesn't | 30, 60 | 50, 50 |

Answer the Following Questions

3. What is the dominant strategy of this game (if there is one)?



- Dominant Strategy: Open (for both)

- What is the Nash equilibrium?

- Nash:

–(Open, Open)



| | |  7-11 Open |  7-11 Doesn't Open |
|-------------------|-----------------------|--|--|
| F-Mart Open | <u>40</u> , <u>40</u> | <u>60</u> , 30 | |
| F-Mart Doesn't | 30, <u>60</u> | 50, 50 | |

According to Economics Daily (2017/12/10)

- 全家董事長葉榮廷早在今年中旬就拋出將開科技概念店的策略，目前進度稍稍落後，將推遲至明年上半年才能亮相。葉榮廷說，適合的店不好找，至少需60坪以上店面，相關細節內部也還在調整中，明年一定會推出。
- 據了解，兩大超商在新型態科技店中，會廣泛應用如人臉辨識或刷掌紋來辨識消費者身分，因此店內必然會有許多攝影相關設備；結帳可使用行動支付工具，或在商品上應用RFID標籤，買完東西即可自動付款、結帳；廣泛利用AI人工智慧技術，收集消費者購買行為大數據，並針對不同消費者發送個別促銷訊息，也可能在科技店中展現。 ...

Answer the Following Questions

4. According to the news article, 7-11 and Family Mart initially planned to open high-tech stores by the end of 2018, but now have another option: **speed up and open the high-tech store by June.**
- Suppose speeding up and opening by June costs 15 million; if one opens earlier (by June), but the other opens late (by the end of 2018),
 - the earlier one earns **65 million** (while the other earns **35 million**).

Answer the Following Questions

- Draw the new payoff matrix of this modified game. Payoff Matrix to be filled is:

Speed-up vs. Not:

$$-(70-15) - 30$$

| | 7-11 Speed-up | 7-11 Open | 7-11 Doesn't |
|--|------------------|--------------|-----------------|
|--|------------------|--------------|-----------------|

Speed-up vs. Open:

$$-(65-15) \text{ vs. } (35-10)$$

| | | | |
|--------------------|--------|--------|--------|
| F-Mart Speed-up | 35, 35 | 50, 25 | 55, 30 |
|--------------------|--------|--------|--------|

Both Speed-up:

$$-(50-15) \text{ vs. } (50-15)$$

| | | | |
|----------------|--------|--------|--------|
| F-Mart Open | 25, 50 | 40, 40 | 60, 30 |
|----------------|--------|--------|--------|

| | | | |
|-------------------|--------|--------|--------|
| F-Mart Doesn't | 30, 55 | 30, 60 | 50, 50 |
|-------------------|--------|--------|--------|

Answer the Following Questions

5. What is the dominant strategy of this game (if there is one)?




• Dominant Strategy:

–None

• What is the Nash Equil.?

• Nash:

– (Speed-up, Speed-up)

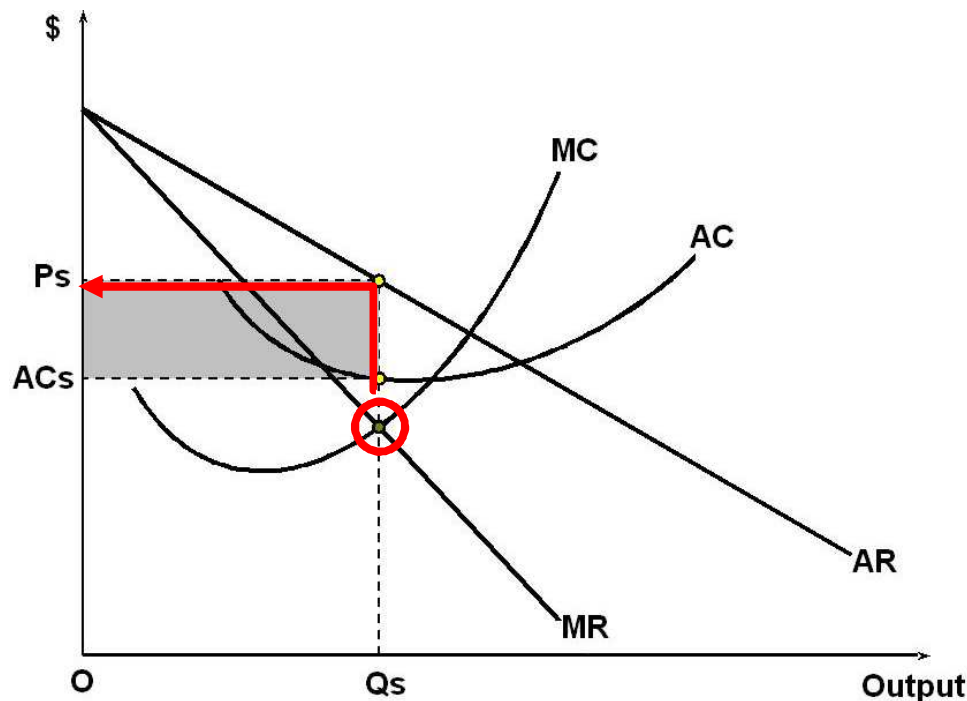
| |  |  |  |
|--------------------|---|---|---|
| | 7-11 Speed-up | 7-11 Open | 7-11 Doesn't |
| F-Mart Speed-up | <u>35</u> , <u>35</u> | <u>50</u> , 25 | 55, 30 |
| F-Mart Open | 25, <u>50</u> | 40, 40 | <u>60</u> , 30 |
| F-Mart Doesn't | 30, 55 | 30, <u>60</u> | 50, 50 |

Answer the Following Questions

6. Now suppose 7-11 and Family Mart are merely partial substitutes of each other. Which market structure best describes this convenience stores market?
- Monopolistic competition
 - How would each store chain determine their quantity and price under this market structure? Draw a diagram and explain.

Answer the Following Questions

- Choose quantity at $MR=MC$
- Go up demand (AR) to determine Price

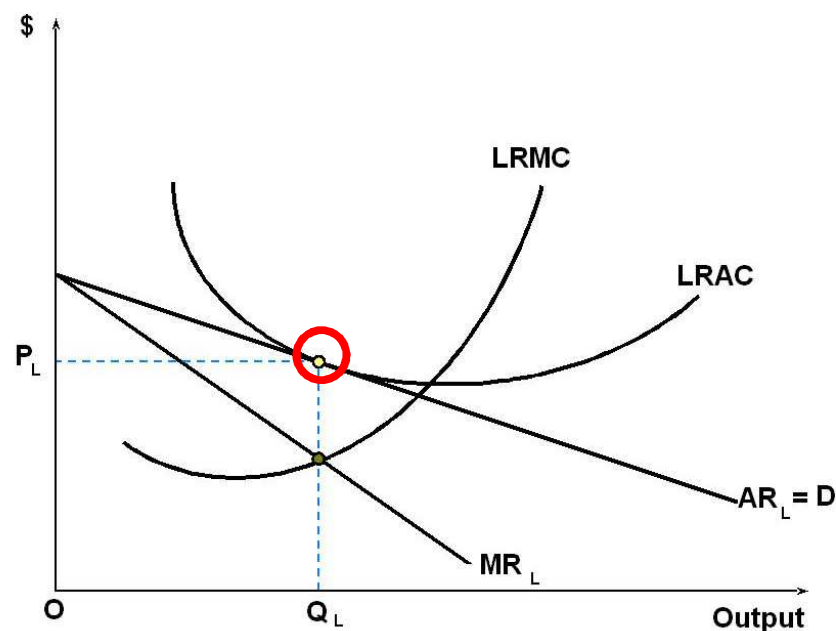


Source: Wikipedia

Answer the Following Questions

7. Assume there is little barrier of entry. Draw a graph and illustrate the long run equilibrium of this market. What is the long-run economic profit for 7-11 and Family Mart?

- Entry/exit occurs until
- ATC tangent to $D=AR$
- Zero economic profit



Answer the Following Questions

8. Suppose each AI server costs NT\$500k + maintenance costs NT\$10k/month, but one AI server can do twice the work of a human staff, whose salary is NT\$25k/month.
- Would you replace the human workers with AI servers? How does your decision depend on timing (SR vs. LR) or economies of scale?
 - Bonus open question

Answer the Following Questions

- Can you use this to explain why only 7-11 and Family Mart want to introduce unmanned stores, but not other convenient store chains in Taiwan?
- Open question, but this is likely because of economies of scale adopting AI technology

(C) Student Collusion in Professor J's Exam Question Contests

Chunghwa Keeps Low-cost 4G Plan
in Blow to Peers

(Lisa Wang, Taipei Times, 2017/3/2)

From Classroom to Telecomm Market...

- Professor Joseph hosts an exam question contest, asking students to form groups to propose questions for the final exam.
- The group who proposed the best question will be rewarded with having their question appear in the exam.
- This gives the winning group an advantage to boost their grades, while other groups struggle to answer proposed tough question

From Classroom to Telecomm Market...

- Before the contest, students call for a meeting to discuss the possibility of all submitting simple questions so everybody gets good grades easily.
1. Consider this game where each group has two strategies:
 - Submit an easy (but crappy) question vs.
 - Submit tough (but brilliant) question.

- Is there a dominant strategy for each group?
- **Selecting a tough question** is dominant:
 - If other groups submit easy questions,
 - Your group will get selected by submitting tough questions (and gain a lot since you know the answer)
 - If other groups submit tough questions,
 - Your group should submit an equally tough question (so you have a shot being selected)

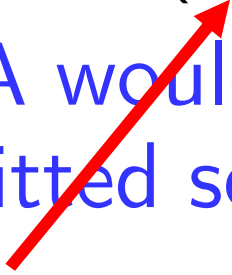
Answer the Following Questions

2. Suppose all groups agree to submit easy questions. Would each group renege from the agreement if they wanted to maximize their grades? Why or why not?
- Since it is dominant to submit tough questions, agreeing not makes no difference:
 - You gain following your dominant strategy
 - What is the Nash equilibrium of the game?
 - Nash = All groups **submit tough questions**

Answer the Following Questions

3. Suppose one group decides to submit their question first and announces that it was a simple question. Assuming a non-verifiable announcement, would other groups follow suit if they wanted to maximize their grades?
- **Submit tough question** is dominant; seeing a leader submit easy question is useless:
 - Can gain following the dominant strategy
 - So others will not follow suit

Answer the Following Questions

4. Now assume the TA receives the first question and confirms that an easy question was just submitted.
- Would other groups follow suit if they wanted to maximize their grades?
 - Confirmed leader action is still insufficient to break dominance! (Even sequentially)
 - What if the TA would confirm whether each question submitted sequentially was also an easy question?
- 

Answer the Following Questions

5. Suppose Professor J decides to host two contests, one for the midterm and another for the final exam. Would this increase the possibility of student collusion? Why or why not?
- The outcome in the final exam (2nd stage) contest is the same as the 1-shot contest
 - Anticipating that, outcome of the midterm exam (1st stage) contest is also the same!

Answer the Following Questions

6. How would your answers to the above questions change if some students care not only about maximizing their own grades?
 - If others have other-regarding preferences, they may not follow their dominant strategy
 - But if **you** don't have other-regarding preferences, you will still follow the dominant strategy regardless of what others are doing!
7. How can your answer to the above questions apply to the following article?

Chunghwa keeps low-cost 4G plan in blow to peers

- Chunghwa Telecom Co (中華電信), the nation's largest telecom, for the second time extended its lowest flat-rate subscription plan for 4G services, dashing its peers' hopes of an end to a price war.
- The telecom yesterday said that its NT\$699 plan for unlimited 4G data usage would still be available until March 15.
- The plan was originally set to expire on Tuesday... (Lisa Wang, Taipei Times, 2017/3/2)

Applying to Taiwan Telecomm Market

- The company's moves came amid persistent calls from local peers to cancel the cut-rate tariffs, with the firms saying that flat rates are cramping profits and the price war has become irrational.
- The nation's top three telecoms launched low-price subscription plans about three years ago in a bid to stimulate the adoption of 4G, but they have struggled to phase them out due to stiff market competition.

Applying to Taiwan Telecomm Market

- To counter pricing competition from Chunghwa Telecom, Far Eastone Telecommunications Co (遠傳電信, FET),
- the nation's No. 3 telecom, yesterday said it would resume its cheapest flat rate plan for unlimited 4G data usage today.
- FET charges subscribers NT\$698 per month for unlimited 4G Internet access.
- FET scrapped the rate as planned on Feb. 22, and unveiled a substitute plan...

Applying to Taiwan Telecomm Market

- "In response to market conditions and to cater to consumers' needs, FET is to relaunch the NT\$698 rate plan," FET said in a statement yesterday.
- Taiwan Mobile Co (台灣大哥大), the nation's No. 2 telecom, said early last month that it was looking at scrapping its lowest NT\$700 per month 4G subscription plan last month, but it has yet to announce its cancelation.

Applying to Taiwan Telecomm Market

7. How can your answer to the above questions apply to the following article?

- This is an open question. But the same prisoner's dilemma occurs in both cases.
 - As evident in the article, no telecomm company wants to **drop** their low-cost 4G plan
 - Just like none wants to **submit easy question**
 - See also: 電信低價吃到飽打死不退 NCC: 要勇敢 (中央社, 2017/12/28)

電信低價吃到飽打死不退 NCC：要勇敢

台灣電信產業今年低價吃到飽持續，5大電信「敵不退、我不退」，NCC今天喊話「要勇敢」；但業者坦言，明年別說吃到飽退場，就連要提高吃到飽門檻都很難。...

...電信業今年4G低價吃到飽趨勢持續，儘管今年2月底有相繼退場的契機出現，最終仍是曇花一現，在競爭壓力驅使下，5大電信呈現「敵不退、我不退」的僵局，導致數據量雖然不斷飆升，電信行動營收卻不增反減，恐造成電信業在建設網路與投資5G時縮手。

對此，NCC發言人翁柏宗今天在會中鼓勵業者「要勇敢」，意即希望業者勇敢跨出第一步，不管是誰率先鳴槍，盼能打破目前僵局，挽救惡性循環的局面。

電信低價吃到飽打死不退 NCC：要勇敢

明年吃到飽能否退場？中華電信總經理謝繼茂今天表示，「去年就有勇敢(退場)過，但大家都不跟我們，結果就很慘」，他說，「大家都說我們是龍頭，要率先開槍，但被咬過後，往後要考慮退場或拉高門檻都會很謹慎。」

至於明年吃到飽是否有退場可能性？謝繼茂坦言不可能，就連將吃到飽拉高門檻的機會也沒有，市場連188終身吃到飽都出來了，但門檻要再往下也很難。

台灣市場小卻有5家電信業者，遠傳電信總經理李彬表示，任何市場有超過胃納量的競爭者，就會有市值往下掉的狀況，主管機關要業者勇敢，但當業者開始勇敢，只能試一下水溫，2個禮拜就只能被迫縮回來，主管機關「講勇敢」也只是空話。...

(D) Uber Externality

"Your Uber Car Creates Congestion.
Should You Pay a Fee to Ride?"

By Winnie Hu (NY Times, 2017/12/26)

According to New York Times (2017/12/26)

- An explosion of ride-hailing app services has transformed the way that people get around the city and is choking the streets. Midtown traffic crawls at an average of 4.7 miles per hour from 6.5 miles per hour five years ago...
- About 103,000 for-hire vehicles operate in the city, more than double the roughly 47,000 in 2013, according to the Taxi and Limousine Commission.

According to New York Times (2017/12/26)

- Of those, 68,000 are affiliated with ride-hailing app companies, including 65,000 with Uber alone, though they may also provide rides for others. In contrast, yellow taxis are capped by city law at just under 13,600.
- Now a new report finds that ride-hailing cars are often driving on the city's busiest streets with no passengers—in effect, creating congestion without any benefits.

According to New York Times (2017/12/26)

- The report by Bruce Schaller, a former city transportation official, found that more than a third of ride-hailing cars and yellow taxis are empty at any given time during weekdays in Manhattan's main business district.
- The ride-hailing cars average 11 minutes of unoccupied time—compared with 8 minutes for yellow taxis—in between dropping off one passenger and picking up another, according to the report...

According to New York Times (2017/12/26)

- New York City is considering a new fee on for-hire vehicles at a time when the state-controlled MTA is in dire need of money to overhaul the city's decrepit subway system.
- Advocates say it would be easier to push through the State Legislature than tolls on the East River bridges and already has a precedent: a 50-cent surcharge on cab rides that goes to the MTA.

According to New York Times (2017/12/26)

- The ride-hailing services are not subject to that surcharge, but collect state and local sales taxes on each ride...
- Alix Anfang, an Uber spokeswoman, said simply adding a fee would not address an already unfair fee system in which Uber riders pay more in sales tax than taxi riders pay with the 50-cent MTA fee.

According to New York Times (2017/12/26)

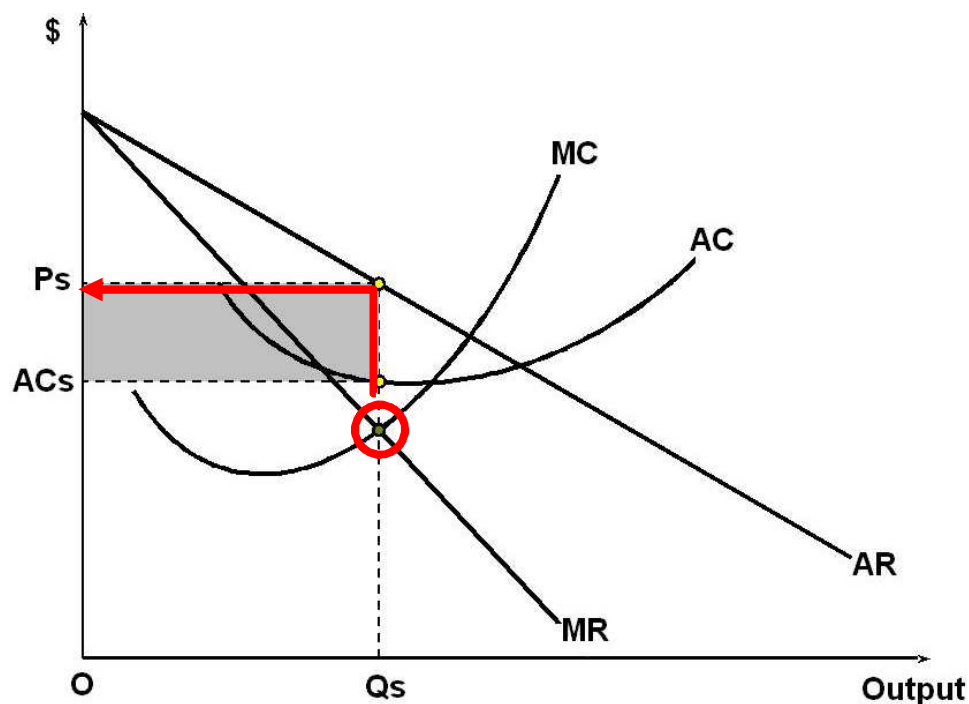
- The minimum fare for an individual Uber ride in NYC is \$8, which amounts to a sales tax of 71 cents...
 - "The existing ride-hailing tax unfairly burdens outer borough New Yorkers who pay far more in taxes per trip than Manhattan taxi riders, which is why Uber believes a new transit tax system should fully fund mass transit by setting fees based on how crowded the roads are, not the type of vehicle people are traveling in..."

Answer the Following Questions

1. Assume riders care only about getting to their destination quickly, but the number of yellow taxis are limited by law.
 - Which market structure best describes the market before ride-hailing apps?
 - Since each taxi could differ in speed, etc., this is closest to monopolistic competition
 - Draw a diagram to discuss the effect for such governmental regulation on the taxi market.

Answer the Following Questions

- Choose quantity at $MR=MC$
- Go up demand (AR) to determine Price



Source: Wikipedia

Answer the Following Questions

2. Now NYC has plenty of drivers who would respond to each ride-hailing app. Which market structure best describes this for-hire vehicle market? (perfect competition!)
- How would drivers behave in this market?
 - They are price-takers and can only accept or reject the price given by Uber, Lyft, etc.
 - What is the individual supply curve for each driver? Their MC curve (above AVC)!

Answer the Following Questions...

3. Assume there is little barrier of driver entry.
- Is the long-run (market) supply curve flat? Why or why not?
 - Even if firms have identical costs, there is still congestion. Hence, their costs would change as other firms enter the market!
 - So, the LR supply curve is upward sloping.

Answer the Following Questions...

4. Suppose all Uber drivers agree to stay off the road for 5 minutes when unoccupied. Would the drivers renege from this agreement? Why or why not?
- If Uber drivers collectively stay off the road, this could create a supply shortage and trigger the surge price mechanism Uber has.
 - But, the same prisoner's dilemma occurs here and some driver would likely renege!

Answer the Following Questions...

5. Are ride-hailing services currently paying the 50-cent MTA fee? What is the % of sales tax they are paying? Explain why they think the current fee system is unfair.
- Instead of 50-cent MTA fees, Uber pays $> \$0.71$ for each ride ($> \$8.00$)
 - The sales tax rate is $\$0.71 / \$8 = 8.875\%$
 - Uber pays higher taxes ($> \$0.71$) than cabs (who pay $\$0.50$ MTA fees but not sales tax)

Answer the Following Questions...

6. What is the effect of imposing a universal surcharge on all rides? Draw a graph and explain.
- The MC (and hence individual supply curves) would shift up parallel to old MC.
 - (Graph omitted)