

Principles of Economics I (Fall 2012)

Homework #5 Answers

(Lecture 11-12, Due on Dec. 12, 2012, submitted in class)

TA will score even numbers.

Note: All textbook problem numbers refer to “Problems and Application” part in corresponding chapter, the 6th Chinese/U.S. edition of the textbook.

For Chapter 13

1. 判断正误：“当一个企业的边际成本高于平均成本时，平均成本上升”，这一论断只在边际成本是递增的时候才成立。

答：错误。

2. Chapter 13, #1

a. opportunity cost; b. average total cost; c. fixed cost; d. variable cost; e. total cost; f. marginal cost.

3. Chapter 13, #4

Here is the table of costs:

Workers	Output	Marginal Product	Total Cost	Average Total Cost	Marginal Cost
0	0	---	\$200	---	---
1	20	20	300	\$15.00	\$5.00
2	50	30	400	8.00	3.33
3	90	40	500	5.56	2.50
4	120	30	600	5.00	3.33
5	140	20	700	5.00	5.00
6	150	10	800	5.33	10.00
7	155	5	900	5.81	20.00

- a. See the table for marginal product. Marginal product rises at first, then declines because of diminishing marginal product.
- b. See the table for total cost.
- c. See the table for average total cost. Average total cost is U-shaped. When quantity is low, average total cost declines as quantity rises; when quantity is high, average total cost rises as quantity rises.
- d. See the table for marginal cost. Marginal cost is also U-shaped, but rises steeply as output increases. This is due to diminishing marginal product.
- e. When marginal product is rising, marginal cost is falling, and vice versa.
- f. When marginal cost is less than average total cost, average total cost is falling; the cost of the last unit produced pulls the average down. When marginal cost is greater than average total cost, average total cost is rising; the cost of the last unit produced pushes the average up.

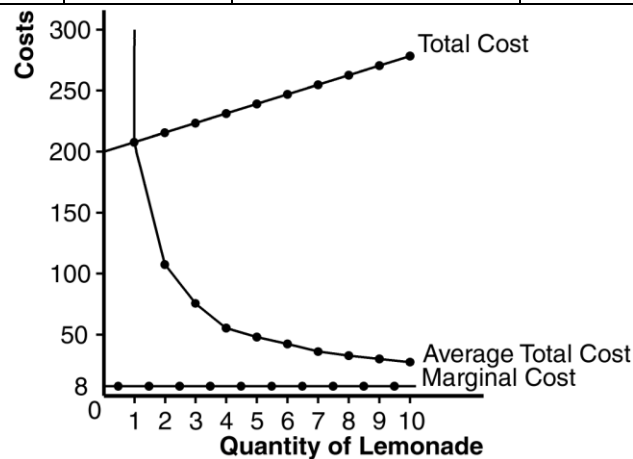
4. Chapter 13, #5

At an output level of 600 players, total cost is \$180,000 ($600 \times \300). The total cost of producing 601 players is \$180,901. Therefore, you should not accept the offer of \$550, because the marginal cost of the 601st player is \$901.

5. Chapter 13, #7

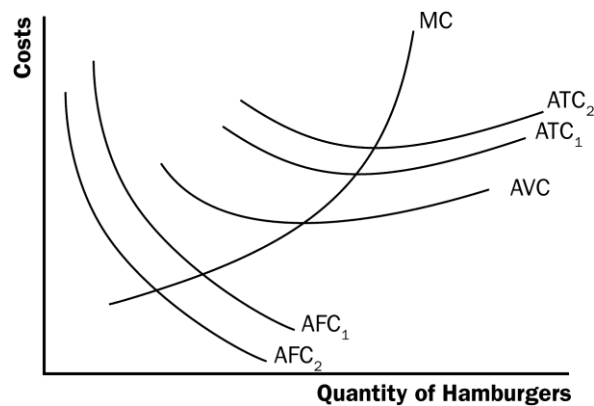
- The fixed cost of setting up the lemonade stand is \$200. The variable cost per cup is \$0.50.
- The following table shows total cost, average total cost, and marginal cost. These are plotted in the figure below.

Quantity (gallons)	Total Cost	Average Total Cost	Marginal Cost
0	\$200	---	---
1	208	\$208	\$8
2	216	108	8
3	224	74.7	8
4	232	58	8
5	240	48	8
6	248	41.3	8
7	256	36.6	8
8	264	33	8
9	272	30.2	8
10	280	28	8

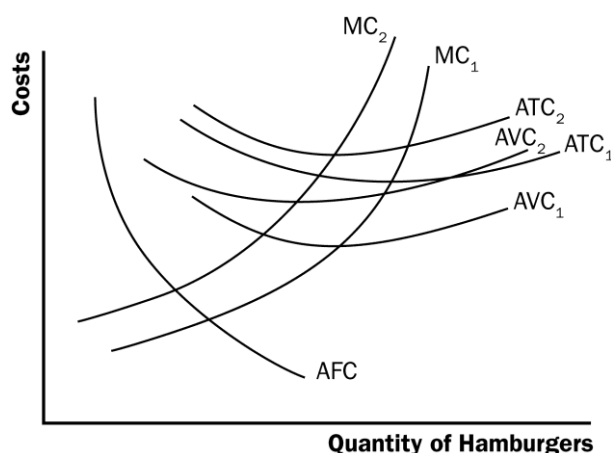


6. Chapter 13, #10

- The lump-sum tax causes an increase in fixed cost. Therefore, as the figure below shows, only average fixed cost and average total cost will be affected.



- Refer to the figure below. Average variable cost, average total cost, and marginal cost will all be greater. Average fixed cost will be unaffected.



For Chapter 14

7. The Wheeler Wheat Farm sells wheat to a grain broker in Seattle, Washington. Since the market for wheat is generally considered to be competitive, the Wheeler Farm
- does not choose the quantity of wheat to produce.
 - does not have any fixed costs of production.
 - is not able to earn an accounting profit.
 - does not choose the price at which it sells its wheat.

8. 在一个完全竞争市场, 武二郎长期以来以 2 个铜板的价格出售一定数量的烧饼。这表明:
- 烧饼的边际成本恰好为 2 个铜板
 - 烧饼的平均总成本不高于 2 个铜板
 - 烧饼的边际成本必然是递增的, 平均总成本一定不是递减的
 - 以上说法均正确

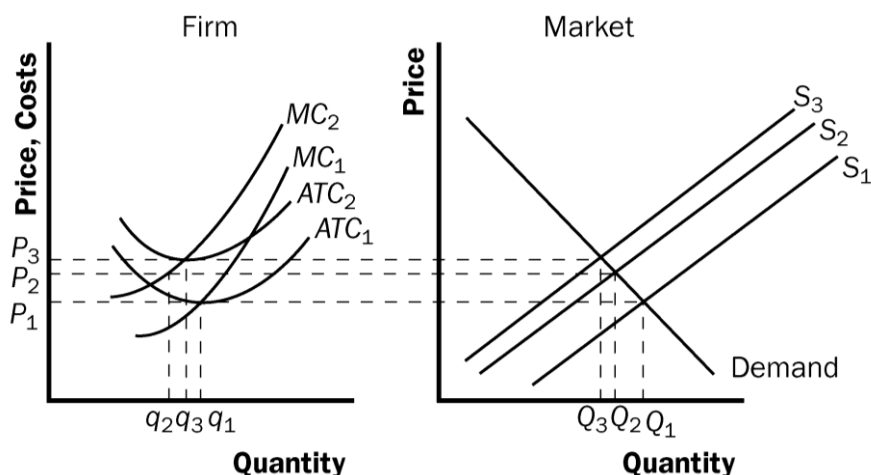
9. 贝莉和丈夫居住在美丽的小镇上, 贝莉是一个大家公认的模范家庭主妇。有一天, 小镇上一个单身女人因为卖淫被警察抓进了监狱, 她愤然公布了与她有染的男人名单, 贝莉的丈夫不幸列于其中。虽然丈夫保证痛改前非, 但贝莉仍决意离婚。她认为, 虽然离婚本身会损害她看重的家庭幸福, 但她更无法容忍丈夫的不忠带给她的声誉损害。贝莉的选择是正确的吗? 运用你学过的相关经济学概念加以评论。

答: 从经济学角度来看, 贝莉的选择并不正确。丈夫的不忠及带来的名誉损失已成为既成事实, 无论如何不能消除它的影响, 应视为沉没成本。而离婚的成本是可以避免的有意义的成本。考虑到这一点, 不离婚才是合理的选择。

10. Chapter 14, #1

(Hint: For simplicity, consider the rise of oil price increased the marginal cost of boat-making *in a same amount* for each additional product.)

- a. As shown in the figure, the typical firm's initial marginal-cost curve is MC_1 and its average-total-cost curve is ATC_1 . In the initial equilibrium, the market supply curve, S_1 , intersects the demand curve at price P_1 , which is equal to the minimum average total cost of the typical firm. Thus, the typical firm earns no economic profit. The rise in the price of crude oil increases production costs for individual firms and thus shifts the market supply curve to the left.

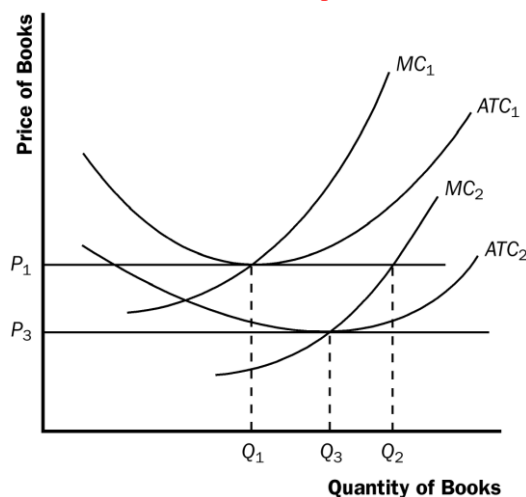


b. The increase in the price of oil shifts the typical firm's cost curves up to MC_2 and ATC_2 , and shifts the market supply curve up to S_2 . The equilibrium price rises from P_1 to P_2 , but the price does not increase by as much as the increase in marginal cost for the firm. As a result, price is less than average total cost for the firm, so profits are negative.

In the long run, the negative profits lead some firms to exit the market. As they do so, the market supply curve shifts to the left. This continues until the price rises to equal the minimum point on the firm's average-total-cost curve. The long-run equilibrium occurs with supply curve S_3 , equilibrium price P_3 , total market output Q_3 , and firm's output q_3 . Thus, in the long run, profits are zero again and there are fewer firms in the market.

11. Chapter 14, #6

- The figure shows the typical firm in the industry, with average total cost ATC_1 , marginal cost MC_1 , and price P_1 .
- The new process reduces Hi-Tech's marginal cost to MC_2 and its average total cost to ATC_2 , but the price remains at P_1 because other firms cannot use the new process. Thus Hi-Tech earns positive profits.
- When the patent expires and other firms are free to use the technology, all firms' average-total-cost curves decline to ATC_2 , so the market price falls to P_3 and firms earn zero profit.



12. Chapter 14, #8

- Profit is equal to $(P - ATC) \times Q$. Therefore, profit is $(\$10 - \$8) \times 100 = \$200$.
- For firms in perfect competition, marginal revenue and average revenue are equal. Since profit maximization also implies that marginal revenue is equal to marginal cost, marginal cost must be \$10.
- Average fixed cost is equal to AFC/Q which is $\$200/100 = \2 . Since average variable cost is equal to average total cost minus average fixed cost, $AVC = \$8 - \$2 = \$6$.
- Since average total cost is less than marginal cost, average total cost must be rising. Therefore, the efficient scale must occur at an output level less than 100.

13. Chapter 14, #10

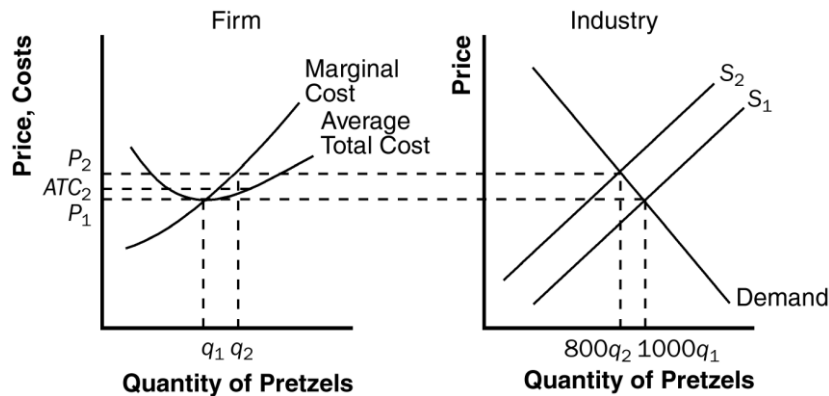
- The table below shows TC and ATC for a typical firm:

Q	TC	ATC
1	11	11
2	15	7.5
3	21	7
4	29	7.25
5	39	7.8
6	51	8.5

- At a price of \$11, quantity demanded is 200. Since marginal revenue is \$11, each firm will choose to produce 5 pies. Therefore, there will be 40 firms ($= 200/5$). Each producer will earn total revenue of \$55 ($\11×5), total cost is \$39, so profit is \$16.
- The market is not in long-run equilibrium because firms are earning positive economic profit. Firms will want to enter the market.
- With free entry and exit, long-run equilibrium will occur when price is equal to minimum average total cost (\$7). At that price, 600 pies are demanded. Each firm will only produce 3 pies, meaning that there will be 200 firms in the market.

14. Chapter 14, #13

- The figure shows the current equilibrium in the market for pretzels. The supply curve, S_1 , intersects the demand curve at price P_1 . Each stand produces quantity q_1 of pretzels, so the total number of pretzels produced is $1,000 \times q_1$. Stands earn zero profit, because price is equal to average total cost.



- If the city government restricts the number of pretzel stands to 800, the industry-supply curve shifts to S_2 . The market price rises to P_2 , and individual firms produce output q_2 . Industry output is now $800 \times q_2$. Now the price exceeds average total cost, so each firm is making a positive profit.

Without restrictions on the market, this would induce other firms to enter the market, but they cannot because the government has limited the number of licenses.

c. If the city charges a license fee for the licenses, it will have no effect on marginal cost, so it will not affect the firm's output. It will, however, reduce the firm's profits. As long as the firm is left with a zero or positive profit, it will continue to operate. Thus, as long as the industry supply curve is unaffected, the price of pretzels will not change.

d. The license fee that brings the most money to the city is equal to $(P_2 - ATC_2) \times q_2$, which is the amount of each firm's profit.

15. 应对垃圾邮件

垃圾邮件指的是那些此前并无商务关系的人未经接收者同意而发送的商业电子邮件。今天,因特网上发送的电子邮件中有超过 2/3 是以令人讨厌的商业广告形式出现的垃圾邮件,其数量已经达到每日数十亿条; 1/3 的电子邮件用户每天收到的邮件中有 80% 是垃圾邮件。

(1) 如果垃圾邮件接收者从邮件中得到了对自己有用的商品信息,他就会回应这一封邮件,并可能最终购买该邮件所宣传的商品。而对于那些毫不关心垃圾邮件的接收者来说,垃圾邮件增加了他们的阅读负担,加剧了邮件服务器的负荷。问:作为商业广告,垃圾邮件给发送者带来的边际收益是什么,给接收者中的回应者带来的边际收益是什么?它给发送者带来的边际成本是什么,给那些不关心邮件的接收者带来的边际成本是什么?

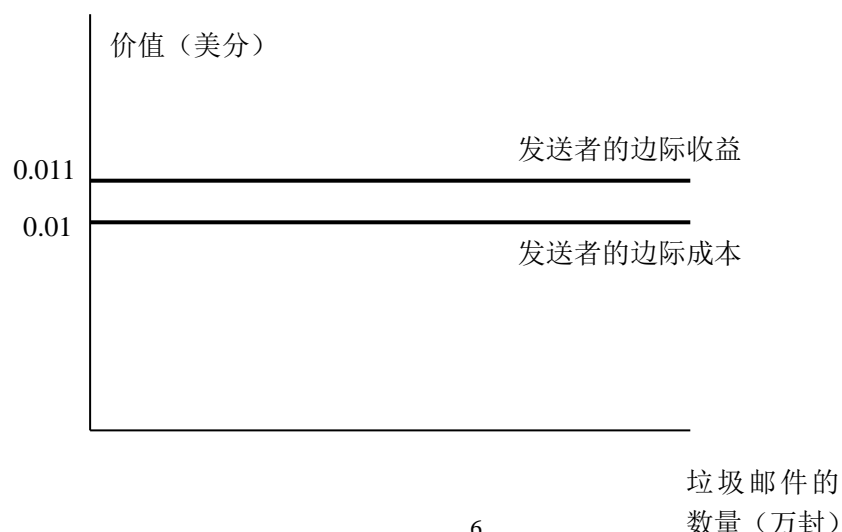
答:垃圾邮件给发送者带来的边际收益是每个接收者可能购买其宣传产品的预期利润;给接收者中回应者带来的边际收益是获得了对自己有用的商品信息。给发送者带来的边际成本是每发送一封邮件花费的时间(非常微小);给那些不关心邮件的接受者带来的边际成本是个人阅读负担与服务器负荷的增加。

(2) 软件工程师估计,每封垃圾邮件的发送成本低至 0.01 美分,而回应者的比例低至十万分之一。给定这一条件,你认为垃圾邮件导致了怎样的外部性?程度如何?这样的外部性导致垃圾邮件相对于社会合意的水平是太多了还是太少了?解释之。

答:这些数据表明发送者的私人成本很小;而社会成本很大(因为绝大部分的接收者都属于受损者)。这足以导致垃圾邮件具有很强的负外部性。因此导致垃圾邮件过多。

(3) 假定垃圾邮件的发送者从每个回应者身上能够赚取 11 美元的收益。根据这些数据,画出对于垃圾邮件发送者而言的边际收益曲线和边际成本曲线。边际收益和成本曲线具有怎样的形状?(提示:假定垃圾邮件的潜在接收者的数量非常之大;同时,注意到垃圾邮件发送者并不清楚接收者中哪些会做出回应——垃圾邮件的目标指向性极差。)

答:边际收益曲线和边际成本曲线都是近乎水平,高度各为 0.011 美分和 0.01 美分。图形如下:



(4) 垃圾邮件发送者从每个接收者身上赚得的平均利润大致是多少？根据你的边际收益与成本曲线的形状，你估计发送者发送的垃圾邮件的数量是大还是小？总的来说，垃圾邮件发送者从所有的接收者身上得到的总利润有没有可能是很大的？

答：平均利润（同时边际利润）大致为 0.001 美分，非常小；但由于边际收益和成本曲线是接近水平的，最优（利润最大）的发送数量是非常大（接近于无穷）。总利润有可能是很大的。

软件工程师们设计了两种反垃圾邮件的方法。第一种是智能软件过滤器，通过分析邮件内容的某些特征（例如，使用某些商业性词语的频率等）来识别出垃圾邮件并加以屏蔽。第二种是发送者身份的认证系统。其中一种要求发送者在发送邮件时附上一张小额电子支票，例如 1 美分。如果该邮件没有问题，接收者不会要求兑现支票。如果该邮件被接收者认为是垃圾邮件，则通过一套标准化的投诉机制，接收者可以获得支票的兑现。

(5) 在第一种方案下，垃圾邮件的发送者可以通过对垃圾邮件的内容进行加工，以规避智能软件的跟踪。例如，加入乱码或天气预报等随机内容，或改变单词的拼写（如用数字“0”代替字母“O”）等。当然，破解越高级的智能软件需要邮件发送者付出更大的成本（如雇佣更高水平的计算机专家）。问：这种反垃圾邮件的方法如何改变了垃圾邮件发送者的成本？给定垃圾邮件发送者继续发送垃圾邮件，这种方法是否影响其发送的数量？

答：这改变了发送者的固定成本但没有改变其边际成本。因而不影响其发送的数量。

(6) 与第一种方案相比，第二种方案如何影响发送者的边际收益和成本曲线？它是否影响发送者发送垃圾邮件的数量？影响是大还是小？

答：这种方案提高了发送者的边际成本，没有改变边际收益。由于发送者的边际收益和成本曲线都接近于水平（弹性非常之大），因此即使非常小的边际成本增加都会极大地减少发送者发送垃圾邮件的数量。

(7) 你认为哪一种方案可能会更加有效？解释之。

答：第二种。因为垃圾邮件的总利润可能很大，这使得第一种方案增加的固定成本必须足够大才能阻止发送者发送任何的垃圾邮件，否则会毫无效果。而第二种方案针对了垃圾邮件极低的边际利润的弱点，改变了发送者的边际决策，很小的惩罚就可以消除垃圾邮件。