

## Principles of Economics (Double Degree) (Fall 2022)

### Homework #1\_Solution

(Chapter 1-6, Due on Oct 4th, 2022)

For Chapter 1

#### 1. Textbook, Chapter 1, #5

The fact that you have already sunk \$5 million is not relevant to your decision anymore, because that money is gone. What matters now is the chance to earn profits at the margin. If you spend another \$1 million and can generate sales of \$3 million, you'll earn \$2 million in marginal profit, so you should do so. You are right to think that the project has lost a total of \$3 million (\$6 million in costs and only \$3 million in revenue) and you should not have started it. However, if you do not spend the additional \$1 million, you will not have any sales and your losses will be \$5 million. What matters now is minimizing your loss. In fact, you would pay up to \$3 million to complete development; any more than that, and you will not be increasing profit at the margin.

2. 1838 年，美国陆军被指派将印第安人从美国东部转移到俄克拉荷马州（位于美国中部）。这一任务的承包人事先得到了每个印第安人 65 美元的付款（相当于今天的 1270 美元），以便在 1000 英里的漫长旅途中为印第安人提供食物和药品。许多承包人提供的粮食分量不足，肉类腐烂变质，药品则根本没有。结果，大约四分之一的印第安人死于途中。

（1）政府向承包人提供每个印第安人 65 美元的付款目的是什么？这一目的是否很好地达到了？

目的是使得印第安人能够得到安全地转移。这一目的没有很好地达到。

（2）经济学家认为，65 美元的付款应该按照达到目的地之后，的印第安人的数量来给付。这一新的政策是否会使情况有所不同？

是。这会减少印第安人的死亡率。

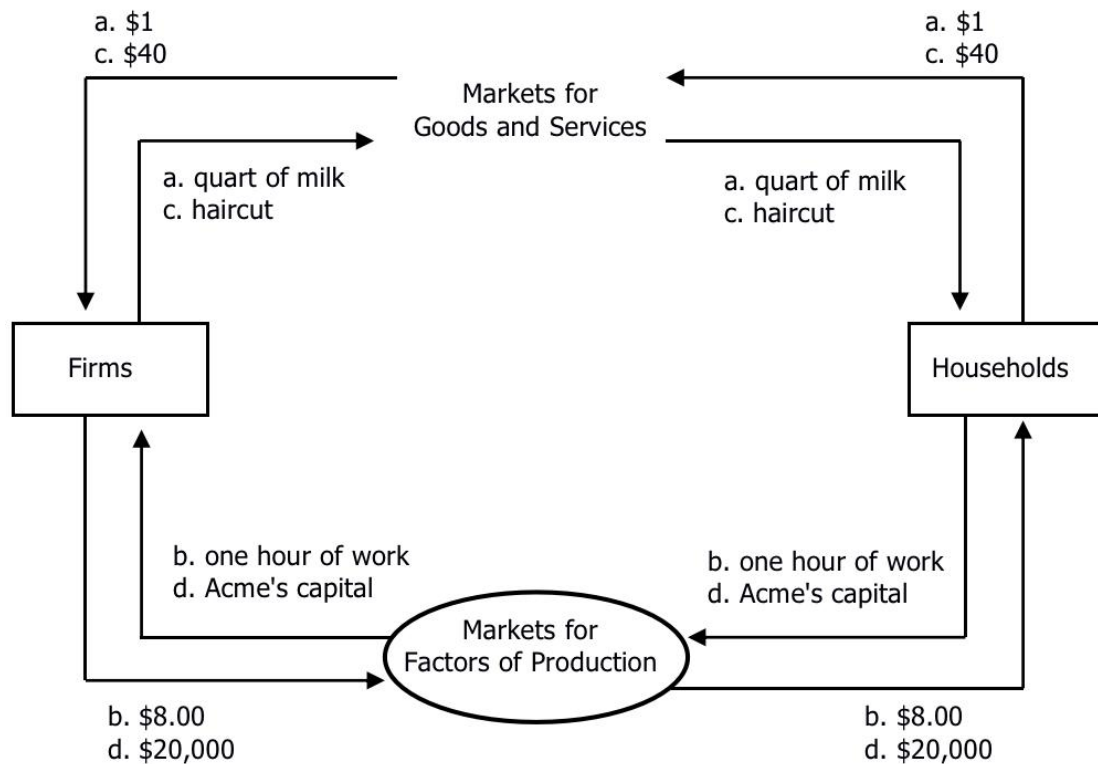
（3）利用人对激励做出反应的基本原理，分析从事先给付到事后给付的激励变化，由此说明（2）的结论。

承包人在决定提供多少食物与药品的决策时，面临节省资金还是减少死亡的权衡取舍（原理 1）。新的政策使得承包人提供食物和药品的边际成本不变，而边际收益提高——减少 1 个死亡人数就能多得 65 美元的付款（原来的边际收益近乎零）。（原理 2、3）因此，承包人在新政策下会提供更多的食物和药品，使得印第安人的死亡率下降。（极端的，如果保持每个印第安人足够健康的成本低于 65 美元，所有的印第安人都能活下来。）（原理 4）

For Chapter 2

#### 3. Textbook, Chapter 2, #1

the four transactions are shown.



4. Textbook, Chapter 2, # 4

(Hint: The PPF may not be smooth curve.)

- a. A: 40 lawns mowed; 0 washed cars  
B: 0 lawns mowed, 40 washed cars  
C: 20 lawns mowed; 20 washed cars  
D: 25 lawns mowed; 25 washed cars

b. The production possibilities frontier is shown in Figure 8. Points A, B, and D are on the frontier, while point C is inside the frontier.

c. Larry is equally productive at both tasks. Moe is more productive at washing cars, while Curly is more productive at mowing lawns.

d. Allocation C is inefficient. More washed cars and mowed lawns can be produced by simply reallocating the time of the three individuals.

5. In the early 19th century, the Russian government sent doctors to southern Russian villages to provide assistance during a cholera epidemic. The villagers noticed that wherever doctors appeared, people died. Therefore, many doctors were chased away from villages, and some were even killed. This reaction to the correlation between doctors and deaths is most likely a problem of

- A. omitted variables.
- B. reverse causality. 2
- C. government propaganda.

D. medical incompetence.

For Chapter 3

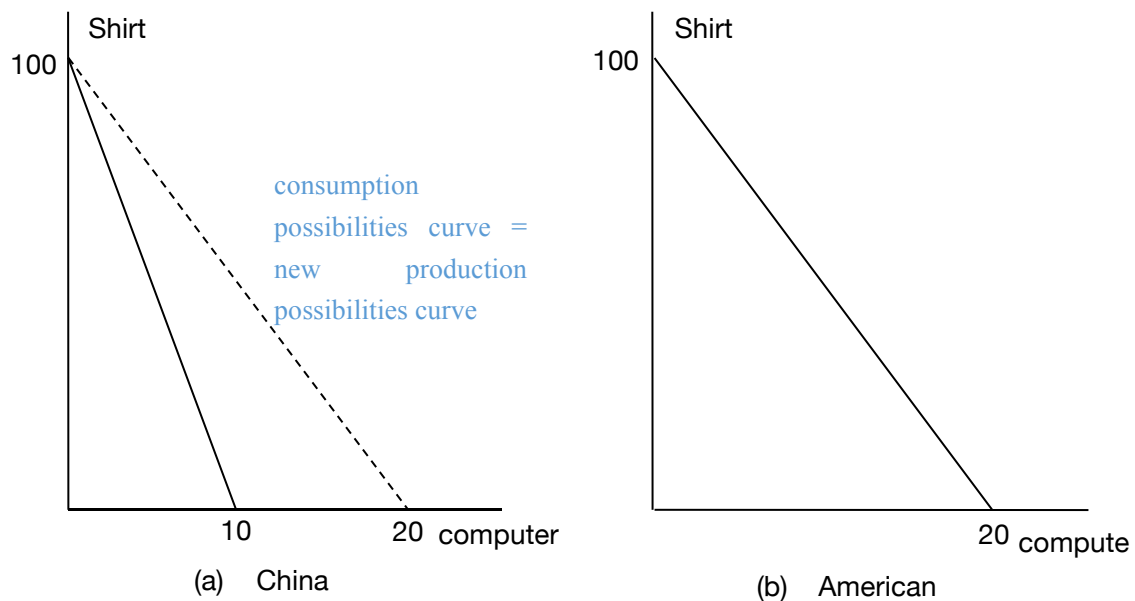
6. Textbook, Chapter 3, # 9

- a. True; two countries can achieve gains from trade even if one of the countries has an absolute advantage in the production of all goods. All that is necessary is that each country has a comparative advantage in some good.
- b. False; no one can have a comparative advantage in everything. Comparative advantage reflects the opportunity cost of one good or activity in terms of another. If you have a comparative advantage in one thing, you must have a comparative disadvantage in the other thing.
- c. False; trades can and do benefit both sides — especially trades based on comparative advantage. If both sides did not benefit, trades would never occur.
- d. False; to be good for both parties, the trade price must lie between the two opportunity costs.
- e. False; trade that makes the country better off can harm certain individuals in the country. For example, suppose a country has a comparative advantage in producing wheat and a comparative disadvantage in producing cars. Exporting wheat and importing cars will benefit the nation as a whole, as it will be able to consume more of both goods. However, the introduction of trade will likely be harmful to domestic auto workers and manufacturers.

7. Trade and Technological Progress

Suppose that in a year an American worker can produce 100 shirts or 20 computers, while a Chinese worker can produce 100 shirts or 10 computers.

- a. Graph the production possibilities curve for the two countries separately.  
See the two graphs below.



b. If these countries were open to trade, which country would export shirts? Explain at what price of shirt (in term of computer) the two countries might trade. What would be the most favorable price for China?

China would export shirts and American would export computers. The shirt price would be between the opportunity cost of producing shirts (in term of computer) of the two countries, that is, between  $1/5$  computers and  $1/10$  computers. The most favorable price for China is  $1/5$  computer per shirt.

c. Graph the consumption possibilities curve for China, given that China receives the most favorable price from trade, and trade can happen at that price in any possible amount.

The consumption possibilities curve for China is graphed as the dashed line in the graph. China would always exchange shirt for computer at the most favorable price, and it can exchange any amount to achieve its highest consumption possibilities.

d. Suppose that China catches up with American productivity so that a Chinese worker can produce 100 shirts or 20 computers. What patterns of trade would you predict now? (2 points)

The trade would disappear since there are no comparative advantage of producing either good in either country.

e. Graph the new consumption possibilities curve for China. How does this advance in Chinese productivity affect the economic well-being of the citizen of China? Explain your answers by using the graph.

Since there is no trade, the consumption possibilities curve for China is its new production possibilities, which is the same as its consumption possibilities curve in part (c).

The technological progress would increase the economic well-being of the citizen of China, because the most favorable consumption possibilities curve before this technological progress is just the same as our new consumption (and production) possibilities curve. Would the price be less favorable for China or American be unwilling to exchange at any amount China would want to, the old consumption possibilities curve with trade would shrink. So the new consumption possibilities curve must lie entirely out of the old one, and Chinese citizens must benefit from the technological progress.

Intuitively, trade can be regarded as a technological progress which lowers the opportunity cost of producing the importing goods. But here the “real” technological progress is better than this “pseudo-“ technological progress because the opportunity cost is even lower (at least reach the lower bound of trade.)

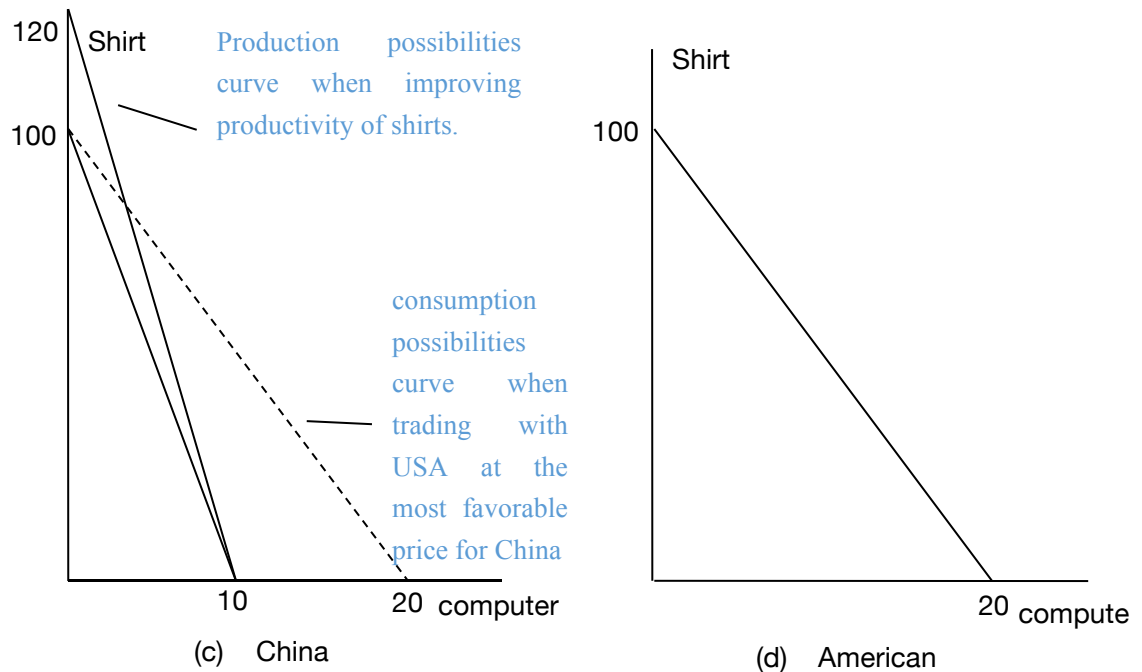
f. How does this advance in Chinese productivity affect the economic well-being of the citizen of American? Explain.

American citizen would hurt from this advance (in general), since they lose the gain from trade.

g. Now suppose instead of improving its productivity of producing computers, China improves its productivity of producing shirts so that a Chinese worker can produce 120 shirts or 10 computers. Explain why Chinese citizens might be hurt by this productivity improvement.

Use graph when necessary.

The following graph show the new production possibilities curve when improving productivity of shirts, together with consumption possibilities curve when improving productivity of computers. Notice that the former does not entirely lie out of the latter. Suppose after the shirt productivity improvement, the price of shirt decreases (because now the opportunity cost of producing shirt decreases) so much that China's new consumption possibilities curve is very close to its new production possibilities curve. But before that, the price of shirt is so favorable that China can have the graphed consumption possibilities curve. If some points on the section of this “old” consumption possibilities curve beyond the new productivity possibilities curve is preferred to any point along the new production possibilities curve, then we will have the conclusion that Chinese citizen are worse off after the productivity improvement of shirt.



For Chapter 4

8. Textbook, Chapter 4, #4.

a. Film streaming services and TV screens are likely to be complements because you cannot watch a film without a television. Film streaming services and movie tickets are likely to be substitutes because a movie can be watched at a theater or at home. TV screens and movie tickets are likely to be substitutes for the same reason.

b. The technological improvement would reduce the cost of producing a TV screen, shifting the supply curve to the right. The demand curve would not be affected. The result is that the equilibrium price will fall, while the equilibrium quantity will rise. This is shown in Figure 16.

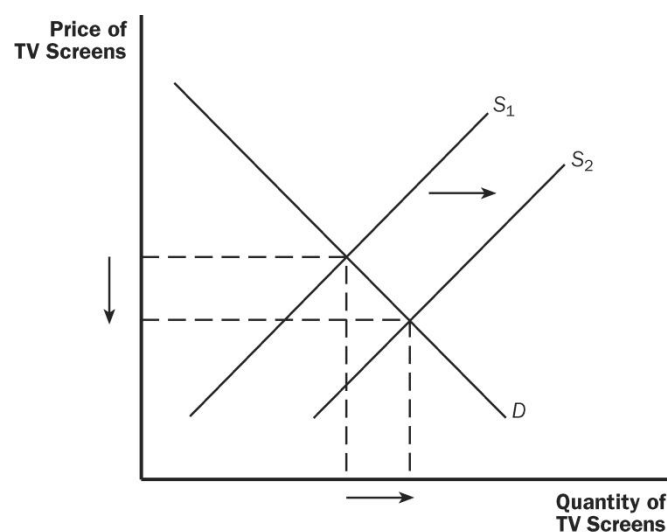


Figure 16

c. The reduction in the price of TV screens would lead to an increase in the demand for film streaming services because TV screens and film streaming are complements. The effect of this increase in the demand for film streaming is an increase in both the equilibrium price and quantity, as shown in Figure 17.

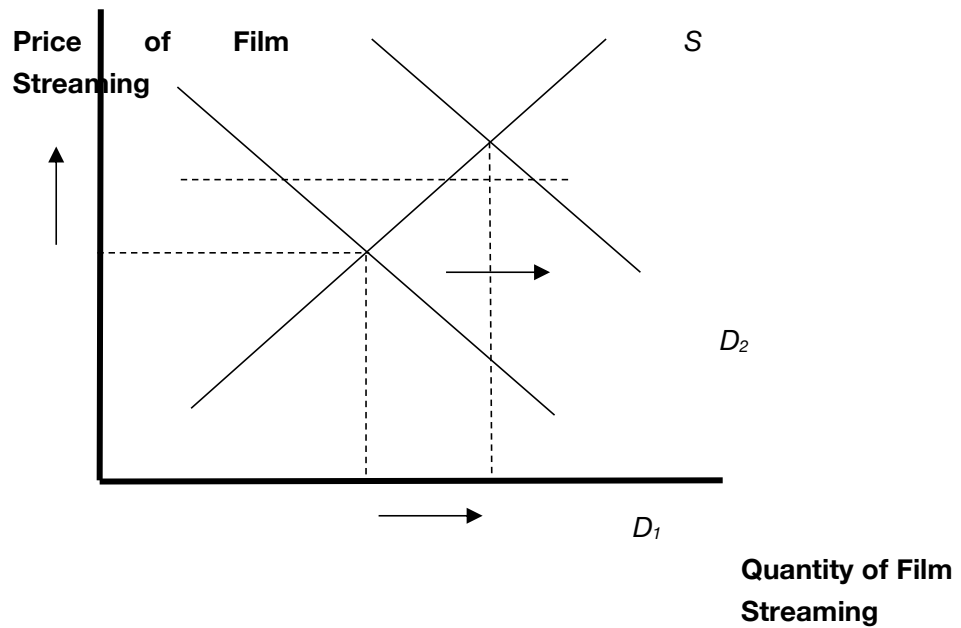


Figure 17

The reduction in the price of TV screens would cause a decline in the demand for movie tickets because TV screens and movie tickets are substitute goods. The decline in the demand for movie tickets would lead to a decline in the equilibrium price and quantity sold. This is shown in Figure 18.

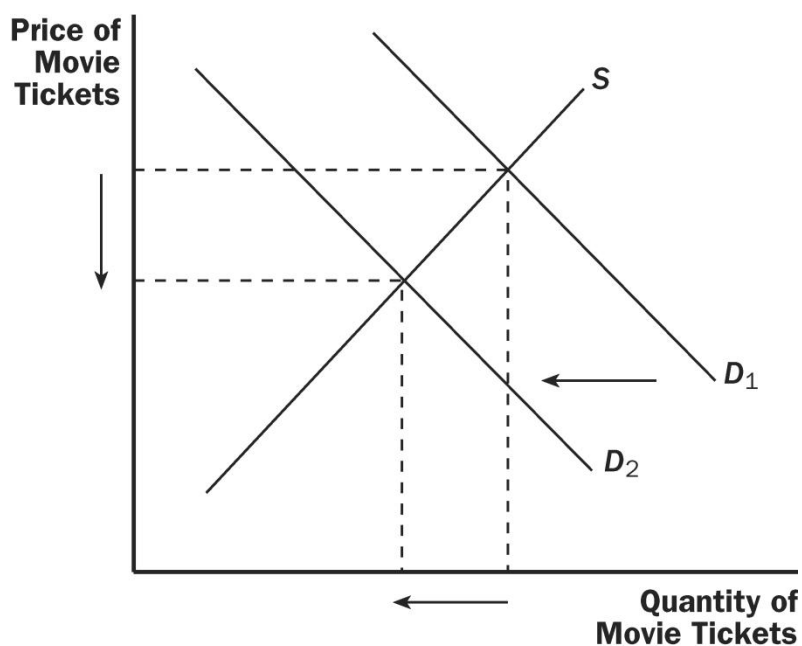


Figure 18

9. 水泊梁山有两条好汉：张顺和李逵。他们每天均从事砍柴和打鱼两工作，每天固定工作 8 小时，产量如下表第 1-2 行所示：

	一天 8 小时产量		打 1 斤鱼的机会成本
	鱼 (斤)	柴 (斤)	
张顺	10	30	3
李逵	5	50	10
张横	7.5	30	4
李忠	3	18	6

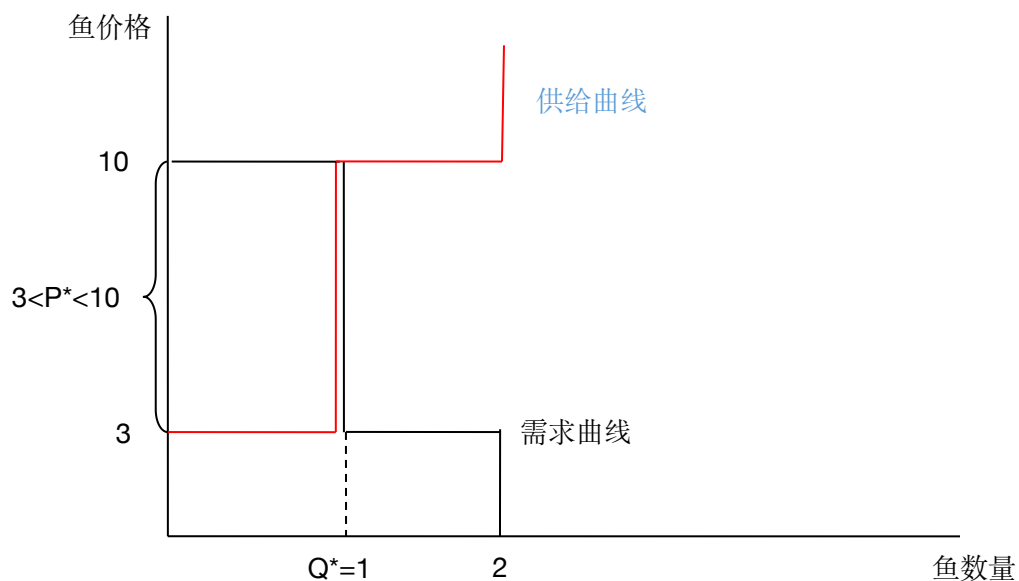
(1) 张顺和李逵每打 1 斤鱼的机会成本是多少？将答案填入表中。

现在，水泊梁山决定建立一个市场。每天开市时，张顺和李逵将鱼或柴带到市场上进行交换。不过，由于对鱼的运输条件有限，每个卖者只能带到市场上 1 斤鱼，每个买者也只能带走 1 斤鱼。

(2) 将鱼作为市场交换的产品，柴作为鱼的价格单位，画出水泊梁山市场的供求图形。市场最终的交易价格是怎样的？交易数量是多少？谁是鱼的卖者？谁是买者？

如图。价格在每斤鱼 3-10 斤柴之间。交易量为 1 斤鱼。张顺是鱼的卖者，李逵是鱼的买者。

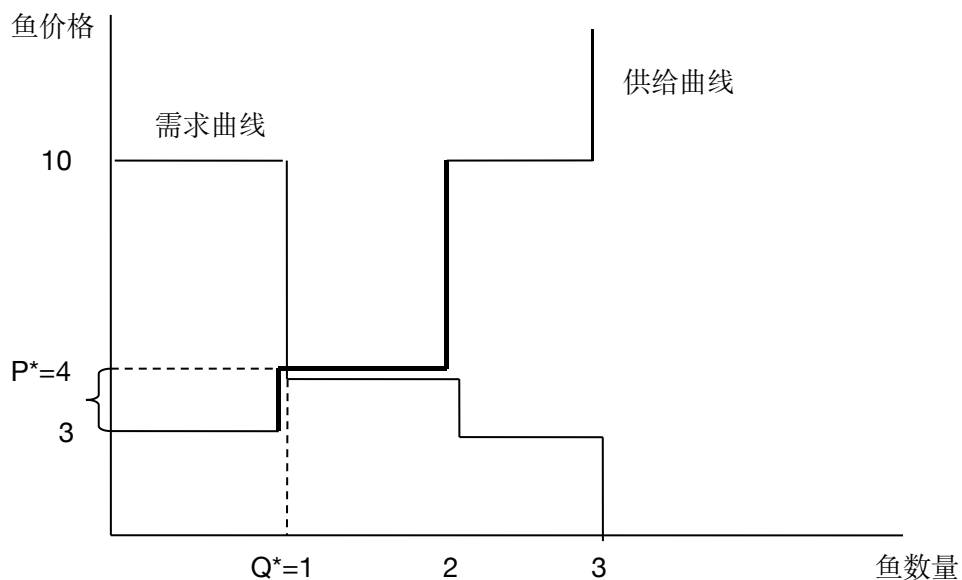




现在水泊梁山又有一位好汉入伙：张横。张横每天 8 小时的产量如上表第 3 行所示。这样，在每天的市场上就出现了三位潜在的参与者，假定每个人买入或卖出的鱼数量仍为 1 斤。

(3) 在表中填入张横生产 1 斤鱼的机会成本。在新的市场上最终的交易价格是怎样的？交易数量是多少？谁是鱼的买者？谁是鱼的卖者？谁无法参与市场交易（如果有的话）？

如图。交易价格为每斤鱼 4 斤柴。交易数量为 1 斤鱼。李逵是买者，张顺是卖者。张横无法参与交易。

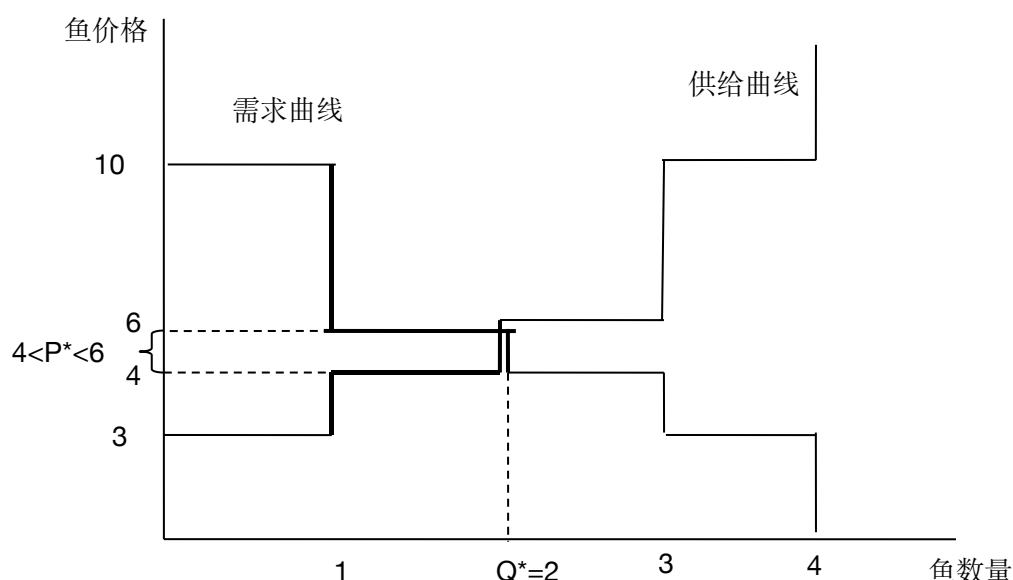


现在水泊梁山的好汉增加到四位：张顺、李逵、张横和李忠。新增的李忠每 8 小时的产量如上表第 4 行所示。仍然假定在所有潜在的市场参与者中，每个买者和卖者交易的鱼数

量限定为 1 斤。

(4) 在表中填入李忠生产 1 斤鱼的机会成本。在这四个人形成的市场中，最终的交易价格是怎样的？交易数量是多少？谁是鱼的买者？谁是鱼的卖者？谁无法参与市场交易（如果有的话）？

如图。交易价格为每斤鱼 4-6 斤柴。交易数量为 2 斤鱼。鱼的买者为李逵、李忠；鱼的卖者为张顺、张横。所有人都参与交易。



现在考虑水泊梁山有 108 条好汉，他们生产鱼的机会成本满足公式： $C=R$ ，单位为柴的数量（斤），其中  $R=1,2,\dots,108$ ，是所有好汉按照生产鱼的机会成本由低到高排的“座次”， $R$  越大则生产鱼的机会成本越高。

(5) 根据上述对于简单情况的分析，你能猜测在所有 108 位好汉参与的市场上，鱼的交易价格（以柴为单位）和数量是多少吗？仍然维持每个好汉只能买入或者卖出 1 斤 4 鱼的假设。

生产鱼机会成本低的前 54 位好汉将卖出鱼，机会成本高的后 54 位将买入鱼。交易数量为 54 斤鱼。交易价格在最后一位卖者（即机会成本最高）的卖者和最后一位买者（即机会成本最低）的买者之间，即在 54-55 斤柴之间。

(6) 竞争市场的一个关键假设是买者和卖者都是价格接受的，这一假设基于如下的判断，即：在一个有众多买者和卖者的市场上，市场价格会被压缩到一个窄小的范围。上述所有的分析是否支持了这一判断？并进行直观的解释。

上述分析表明：随着市场上买者和卖者的增加，总的来说，交易价格的范围的确在缩小。这对竞争市场中行为者价格接受的假定提供了支持。

直观来说，随着买者增加，需求者之间的竞争将使得价格面临上升压力，最终将不低于出价最低者愿意支付的价格。而随着卖者增加，供给者之间的竞争将使得价格面临下降的压力，最终将不高于成本最高的供给者愿意接受的价格。而市场交易又需要使得买者中出价最低者愿意支付的价格高于卖者中成本最高者愿意接受的价格。可以想象，随着买者和卖者增加，这两个价格所形成的价格空间将会越来越小。

For Chapter 5

10. Textbook, Chapter 5, #12.

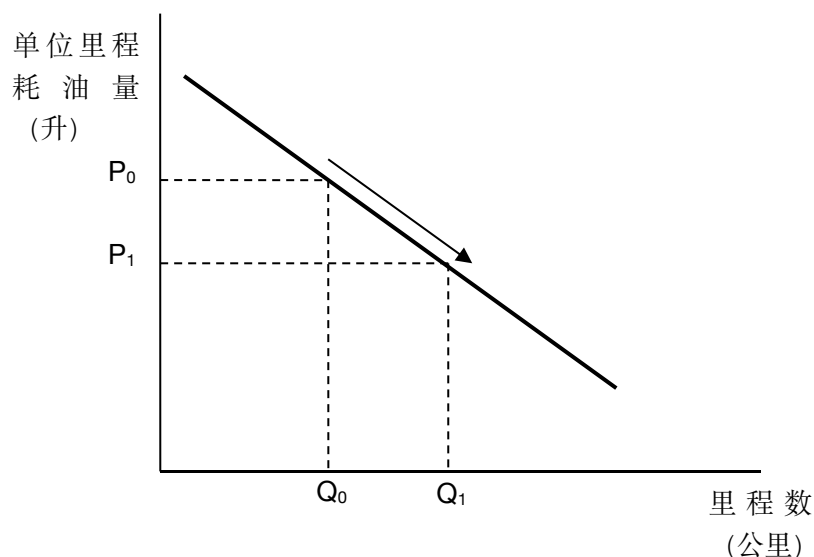
A worldwide drought could increase the total revenue of farmers if the price elasticity of demand for grain is inelastic. The drought reduces the supply of grain, but if demand is inelastic, the reduction of supply causes a large increase in price. Total farm revenue would rise as a result. If there is only a drought in Kansas, Kansas' production is not a large enough proportion of the total farm product to have much impact on the price. As a result, price does not change (or changes by only a slight amount), while the output by Kansas farmers declines, thus reducing their income.

11. 在现代社会，人们无论是上班、购物或者去郊区旅游，通常会选择驾车出行。考虑人们对驾车出行的需求。需求量以驾车出行的里程数（公里）来衡量，价格以单位里程的耗油量（升）来衡量（忽略汽车本身的损耗）。

(1) 画出驾车出行的需求曲线。给定汽油的价格不变，为什么单位里程耗油量的增加会减少人们的出行里程？用人对激励做出反应的基本原理加以解释。

需求曲线如图。

单位里程耗油量的增加提高了人们增加 1 公里出行的边际成本（汽油支出），但没有改变出行的边际收益（便利或享受）。因此，它最终导致了出行里程数的下降。



现在，一位发明家发明了一种节能技术，能够降低耗油量。政府为了提倡节能，免费为每一辆汽车安装了这个节能技术。

(2) 这个事件会对驾车出行的需求造成怎样的影响？用图形解释之。

导致沿着需求曲线移动。如图，从 $(P_0, Q_0)$ 点移到 $(P_1, Q_1)$ 点。

(3) 节能技术的使用一定能够导致汽油需求量的下降吗？仔细解释之。你的答案在短期和长期会有所不同吗？

汽油的需求量等于  $P \cdot Q$ 。如果出行对单位里程耗油量的需求价格弹性小于 1；则耗油量下降导致的出行增加较小，最终导致汽油需求量下降。反过来，如果出行对于耗油量的需求价格弹性较大，汽油需求量最终上升。

在长期，需求价格弹性更大（例如，人们可以买马力更大的汽车，增加出行次数，买更远的住宅等），因此长期来讲石油需求量更容易增加。

(4) 假定网络与通讯技术的发展减少了人们出行的必要性。这会导致出行需求怎样的变动？是否一定会导致汽油需求量的下降？  
需求曲线左移。是。

For Chapter 6

12. Textbook, Chapter 6, #8.

a. Figure 9 shows the effects of the minimum wage. In the absence of the minimum wage, the market wage would be  $w_1$  and  $Q_1$  workers would be employed. With the minimum wage ( $w_m$ ) imposed above  $w_1$ , the market wage is  $w_m$ , the number of employed workers is  $Q_2$ , and the number of workers who are unemployed is  $Q_3 - Q_2$ . Total wage payments to workers are shown as the area of rectangle ABCD, which equals  $w_m$  times  $Q_2$ .

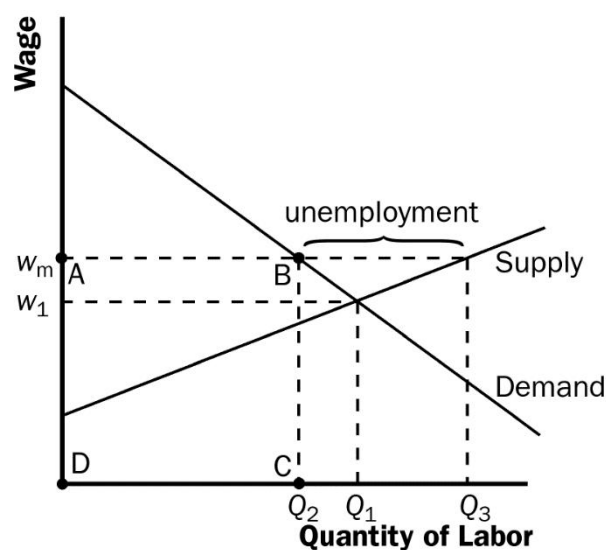


Figure 9

b. An increase in the minimum wage would decrease employment. The size of the effect on employment depends only on the elasticity of demand. The elasticity of supply does not matter, because there is a surplus of labor.

c. The increase in the minimum wage would increase unemployment. The size of the rise in unemployment depends on both the elasticities of supply and demand. The elasticity of demand determines the change in the quantity of labor demanded, the elasticity of supply determines the change in the quantity of labor supplied, and the difference between the quantities supplied and demanded of labor is the amount of unemployment.

d. If the demand for unskilled labor were inelastic, the rise in the minimum wage would increase total wage payments to unskilled labor. With inelastic demand, the percentage decline in employment would be lower than the percentage increase in the wage, so total wage payments increase. However, if the demand for unskilled labor were elastic, total wage payments would

decline, because then the percentage decline in employment would exceed the percentage increase in the wage.

13. 在医疗市场上，当政府决定增加对人们看病的补贴时，政府补贴的金额最终会，人们看病时自我支付的金额最终会，社会总体上花在看病上的金额最终会。

- A. 上升，下降，上升
  - B. 上升，可能上升或下降，可能上升或下降
  - C. 上升，可能上升或下降，上升
  - D. 可能上升或下降，可能上升或下降，可能上升或下降
- (提示：参考教材第 6 章习题 10。)

28. Market research has revealed the following information about the market for chocolate bars:

The demand schedule can be represented by the equation  $QD = 1,600 - 300P$ , where  $QD$  is the quantity demanded and  $P$  is the price. The supply schedule can be represented by the equation  $QS = 1,400 + 700P$ , where  $QS$  is the quantity supplied.

a. Calculate the equilibrium price and quantity in the market for chocolate bars.

Equilibrium occurs where quantity demanded is equal to quantity supplied. Thus:

$$QD = QS, \text{ or } 1,600 - 300P = 1,400 + 700P$$

which results in,

$$P = \$0.20, QD = QS = 1,540$$

The equilibrium price of a chocolate bar is \$0.20 and the equilibrium quantity is 1,540 bars.

b. Chocolate producers persuade the government that chocolate bars are important for people's health. The government decides to impose a price floor \$0.50. How many Chocolates are sold? Do you think this policy indeed help to improve people's health?

The policy will cause a surplus of chocolate bars. The quantity sold will be determined solely by the demand as  $Q = 1,600 - 300 \times 0.5 = 1,450$ . People's health will not be improved as a result.

c. Now suppose the government instead believes that chocolate is harmful to health, and decides to place a \$0.20 tax on it. How many Chocolates are sold now? What is the price paid by chocolate buyers? The price received by producers?

Suppose the tax is placed on buyers. (Result will be the same if assumed being placed on sellers.)

The equilibrium equation becomes,

$$QD(P+t) = QS(P),$$

where  $t$  is the tax size. That is,

$$1,600 - 300(P+0.2) = 1,400 + 700P,$$

Thus,

$$P = 0.14, P+0.2 = 0.34, QD = QS = 1,498.$$

1,498 chocolate bars will be sold, and the price paid by buyers is 0.34 and received by producer is 0.14.

d. Calculate the price elasticity of demand and the price elasticity of supply when the \$0.20 tax is imposed. Do NOT use the mid-point formula. Use the result to explain the relative tax

burden shared by buyers and producers.

The price elasticity of demand is:

$$E_d = [(1498 - 1540) / 1540] / [(0.34 - 0.20) / 0.20] = -0.04$$

The price elasticity of supply is:

$$E_s = [(1498 - 1540) / 1540] / [(0.14 - 0.20) / 0.20] = 0.09$$

The demand is more inelastic than the supply, so buyers will share more tax burden than producers. This is indeed the case: Among all the tax burden of \$0.20, buyers share an amount of \$0.14, or 70%, and producers share an amount of \$0.06, or 30%.

(It can be derived rigorously that buyers' share of tax burden should be  $E_s / (-E_d + E_s) = 0.09 / 0.13 = 70\%$ .)