

## Question 1

### Answers

- (a)(i) Compare the foreign sales relative to the total sales of Indian generic drugs from 2004 to 2014. [1]

Difference: Foreign sales have increased more than the increase in total sales. (as shown by increasing “foreign sales as % of total sales”)

- (ii) Identify and explain 1 factor that could account for the observation noted in (a)(i). [2]

Sales of generic drugs refer to total revenue which is the total receipts or total earnings received by generic drug makers from the sale of generic drugs. Total revenue can be calculated by multiplying the price of the good ( $P$ ) with the quantity sold ( $Q$ ) at that price.

The price control in India may have contributed to the higher increase in foreign sales relative to the total sales. Firms are subjected to a price cap if they were to sell in the domestic market, whereas they are not subjected to price cap if they were to sell it overseas. Price in other countries would be higher than prices in India. [1]

Moreover, Extract 1 says that the price control has caused some producers to “cut back on production of drugs for domestic use”, therefore, the quantity of drugs sold in foreign countries would be higher than the quantity sold within India [1]. As such, the sales from other countries would be higher than the sales within India. Therefore, foreign sales would take up a large proportion of the total sales.

Or

The foreign sales of Indian generic drugs have increased.

This could be due to India’s comparative advantage in making generic drugs as labour is cheaper and cost of running a plant is lower as compared to countries like U.S. and Europe (Extract 1). [1]

According to the Theory of Comparative Advantage, the country with a lower opportunity cost of producing a good relative to its trade partner will specialize and export the good, hence the increase in foreign sales. [1]

- (b) Using a diagram, explain how the expiry of a patent of a drug like Ambien will affect the profitability of a firm. [4]

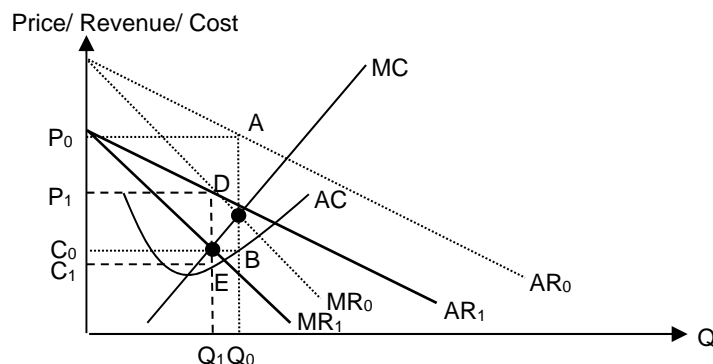


Figure 1: A drug firm's profits after expiry of patents

A firm's profit is determined by its price and average cost curve. With reference to Figure 1, assume that the firm initially charges a price  $P_0$  while producing at  $Q_0$ . The supernormal profit earned by the firm is represented by the area  $C_0P_0AB$ . [1]

With the expiry of drug patents such as Ambien, the legal barriers to entry will be lowered and generic drug firms will enter the industry and produce the drugs as well. This implies that there will now be an increase in the number of competitors in the industry. [1]

As a result, it is likely that the firm will see a fall in its market share and a fall in demand. This is represented by a fall in the firm's AR from  $AR_0$  to  $AR_1$ , and in turn, a fall in its MR from  $MR_0$  to  $MR_1$ . [1]

With the expiry of the patents, the firm produces at a lower output level ( $Q_1$ ) and at a lower price ( $P_1$ ). The supernormal profit earned would then fall from area  $C_0P_0AB$  to  $C_1P_1DE$ , where AC is now equal to  $C_1$ . [1] As even more firms enter the market, the firm's profits may even fall to zero.

- (c) **Extract 2 mentions that Americans are charged higher prices than consumers in the emerging markets for pharmaceutical drugs. Explain how this might be a form of price discrimination.** [5]

Price discrimination occurs when different groups of consumers are charged different prices for the same goods or services that are not due to cost differences. [1] For firms to be able to price discriminate the following 3 conditions must be satisfied.

### **Pharmaceutical firms have the ability to price discriminate**

#### **Market power**

Pharmaceutical drugs are usually covered under patents which are the exclusive rights to sell a drug. With the high barrier to entry, a firm is likely to have few or no substitutes suggesting that demand is relatively price inelastic. Hence pharmaceutical firms can increase price without losing too much sales. [1]

#### **Ability to segment the markets according to different PED**

The US market is charged higher prices as compared to emerging markets like the Indian market because the demand for it is more price inelastic. [0.5]

This might be because US enjoys higher purchasing power as compared to India. As such, the proportion of income spent on drugs in US is lower as compared to India (3<sup>rd</sup> degree price discrimination). [0.5]

Since the demand for drugs is more price inelastic in the US than India, charging higher prices in the US will lead to a less than proportionate decrease in quantity demanded. Therefore, prices in the US are higher than prices in emerging markets. [1]

### Resale is not possible

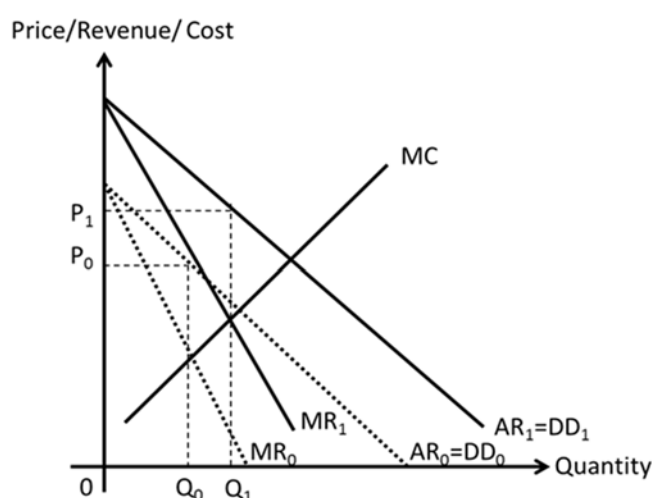
Some drugs might require prescriptions which mean that the access to the drugs would be controlled by the hospital or the physician according to the needs of the patient. It might be difficult for people looking to resell the cheaper-priced drug to have access to the drugs in the first place. [1]

- (d) **With reference to Extract 2 and 3, discuss the factors that can affect the price and output decisions of drug-makers for digoxin.** [8]

Assuming that the drug-makers for digoxin seeks to maximise profits, there are several factors that can affect their price and output decisions.

The type of market structure can affect the price and output decisions of drug-makers of digoxin. Extract 3 mentioned that there are 3 drug-makers of digoxin, thereby suggesting that each drug-maker is an oligopoly. Due to the small number of drug-makers prevalent in the market, the drug-makers are mutually interdependent where each oligopolistic drug-maker makes its decision based on the reactions of other drug makers in the same industry. In this case it was mentioned in Extract 3 that when one of the three companies producing digoxin increased their price, the others soon followed. This could be an example of price leadership model whereby the dominant drug-maker will set its price and the rest of the drug-makers will take this price as given.

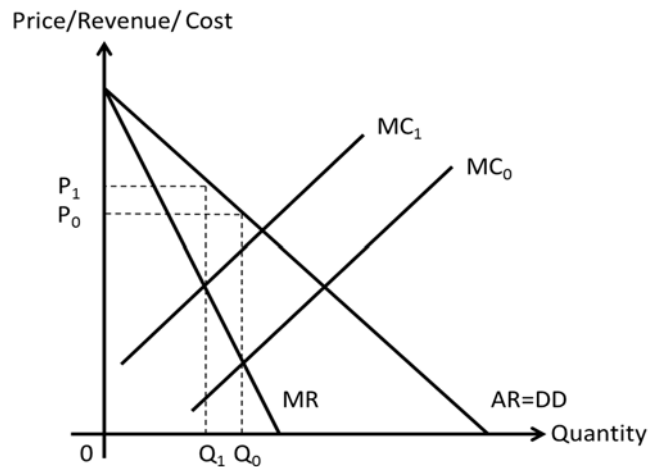
Also, it was mentioned in Extract 2 that when the emerging markets get more prosperous and the elites become richer, this means that in time to come, as income level increases in these countries, their ability to pay for drugs which is a normal good will increase. This meant that income level could also be a factor that can affect price and output decisions of a drug-maker. When income rises, AR & MR of a firm will shift to the right as shown in Figure 2, thereby resulting in a new set of equilibrium price and quantity at  $P_1$  and  $Q_1$ .



**Figure 2**

Another factor that could affect the price and output decisions of drug-makers for Digoxin is cost. In Extract 3, it was mentioned that there are higher costs of acquiring raw material and increase in cost to ensure quality of drugs. Marginal

cost is defined as the additional cost of producing an additional unit of output. Given that the higher costs of acquiring raw materials and increase in cost to ensure quality of drugs will cause the additional cost of producing an additional unit of output to increase, this will shift MC to the left from  $MC_0$  to  $MC_1$  as shown in Figure 3 and this will result in a new equilibrium price and quantity at  $P_1$  and  $Q_1$ .



**Figure 3**

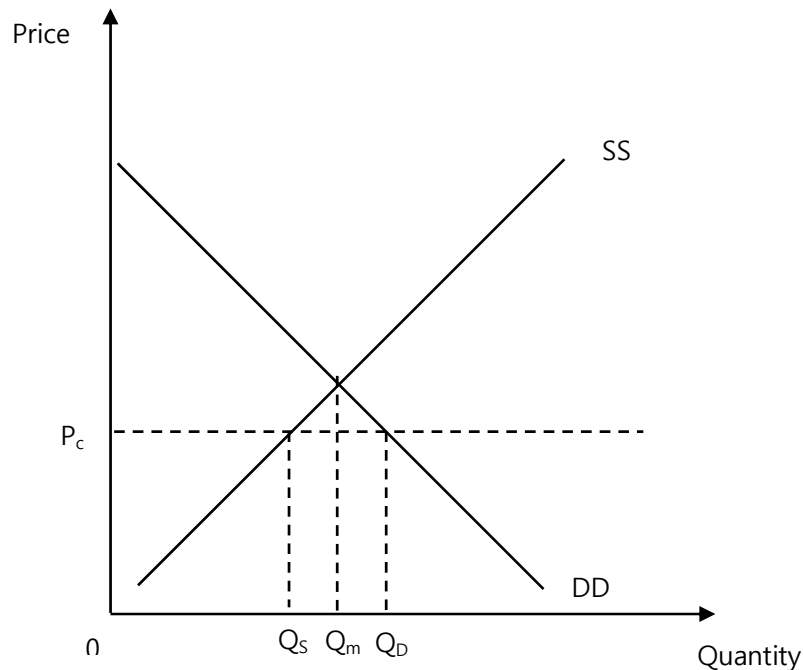
The above analysis assumes that the drug-makers seek to maximise profit. If the drug makers has alternative objective such as revenue maximization in mind, they will produce at a point where  $MR=0$  where quantity will be higher than the profit-maximisation level and at a price lower than the profit-maximisation level.

L2	For a developed discussion on how 2 factors can affect price and output decisions for the drug-makers of digoxin.	4-6
L1	For an undeveloped discussion on how 2 factors can affect price and output decisions for the drug-makers of digoxin.  Or  For a developed explanation on how a factor can affect price and output decisions for the drug-makers of digoxin.	1-3
E1	For an evaluative discussion on the significance of the factors in affecting price and output decisions for the drug-makers for digoxin.	1-2

- (e) **Discuss whether a price control would be the most appropriate way to achieve higher equity in the drug industry.** [10]

**Thesis: Price control is appropriate**

Price controls are government regulations that established either a maximum price or a minimum price to be charged for specific goods and services. In the case of pharmaceutical goods, India used a price ceiling, which is a maximum price, to lower the prices of pharmaceuticals. This is to make drugs more affordable for the poor, increasing the level of equity in society.



**Figure 4: Price ceiling in the market for drugs**

A price ceiling would establish a maximum price, for example, at price  $P_c$  in Figure 4. Drug makers will be legally bound to charge only a maximum price of  $P_c$  and not above it. The price ceiling would only be effective if it is placed below the equilibrium price. This would increase the affordability of pharmaceuticals and increase the level of equity in society as more of the poor have access to drugs.

**Anti-thesis: Price control is not appropriate**

However, the immediate impact of a price ceiling is that quantity demanded will be higher and quantity supplied will be lower, thereby causing a shortage ( $Q_d - Q_s$ ). While some of the poor are able to buy the drug at a lower price, the rest are unable to do so due to the shortage. Moreover, there are some consumers who are able to pay a higher price but are unable to obtain the drug. This may lead to the emergence of a black market where consumers resort to buying drug at higher (than legal) prices. Hence, most of the poor may not be made better off.

Also, due to the shortage, some mechanisms for rationing the good will naturally develop. For example, buyers who are willing to arrive early and wait in line can get the good, while those unwilling are unable to get the good. These long queues are inefficient because they waste buyers' time and this can be troublesome to the elderly, disabled or other groups of people who cannot afford to queue for a long time. As such, in view of the shortage, there needs to be a good administrative system to deal with the shortage in order for price ceiling to be effective.

*In addition, the price control might also cause some consumers to seek alternative avenue to obtain the drugs like "importing older [drugs] from China" (Extract 3). The "older [drugs]" could be less effective as compared to the drugs that is in shortage and might result in drug resistance which would worsen healthcare outcome.*

The artificially low prices of drugs from the implementation of a price ceiling may also have unintended consequences. For example, the price ceiling may send the

wrong signals to drug makers as they will have less incentive to produce given the low prices and will divert fewer resources to produce drugs, resulting in a misallocation of resources. Some drug makers may even choose to move production elsewhere (Extract 1) if the price control is permanent, leading to a fall in SS. The shortage may worsen if demand continues to increase or the supply continues to fall.

## Synthesis

In view of the limitations of the price control, compulsory licensing, a form of relaxation of patent laws (Extract 4) could be a more appropriate measure as it reduces the barrier to entry which leads to an increase in the level of competition in the pharmaceutical drugs industry as competitors will enter and produce drugs as generics (Extract 2). This would lead to a fall in demand for individual firms and a decrease in price, making drugs more affordable for the poor, thereby increasing the level of equity in the society.

## Conclusion

*As such, a free market solution in the form of compulsory incensing would be more appropriate than a price control, which is a form of government intervention that is more overt.*

## Marking scheme

<b>L2</b>	For a developed discussion on how price control is the most appropriate way to make drugs more affordable to consumers in India  <u>Developed discussion</u> <ul style="list-style-type: none"> <li>• Explain how price control can help to make drugs more affordable</li> <li>• Explain limitations of price control</li> <li>• Explain how compulsory licensing can help to make drugs more affordable</li> <li>• Explain limitations of compulsory licensing</li> </ul>	<b>5-7</b>
<b>L1</b>	For an undeveloped discussion on how price control is the most appropriate way to make drugs more affordable to consumers in India  OR  For a developed explanation on how price control is the most appropriate way to make drugs more affordable to consumers in India.	<b>1-4</b>

## Evaluation (1-3 marks):

Evaluative comment could be made about the effectiveness of both a price ceiling and the relaxation of patent laws in the context of India and the pharmaceutical industry.

