## **Question 1**

### The Pharmaceutical Industry

#### Extract 1: AIDS: Branded and Generic anti-HIV drugs

Roche, the pharmaceutical giant, recently announced a price of \$20,424 for a year's supply of its anti-HIV drug Fuzeon in U.S. This was almost three times the price of the most expensive AIDS drug. Roche claimed that Fuzeon is more expensive to produce than other anti-HIV drugs, claiming that it spent \$600 million developing the drug. However, many HIV drugs that cost up to \$15,000 a year in the U.S. can be made for less than \$300 a year by generic manufacturers overseas. These generic firms are allowed to enter the market and sell copies of the original drug when the pharmaceutical patent expires. As generic drugs contain exactly the same active chemical substances, these are considered as strong substitutes to the original branded drugs.



#### Figure 1

Sources: World Street Journal, 1 Dec 00 and ACT up press release 13 Mar 03

#### **Extract 2: Regulation of branded drugs**

In the past year, critics have complained that prescription drugs are contributing to escalating health care costs in the developed countries. Some also assail drug manufacturers, contending that drug prices are too high. They propose price controls as a way to lower drug prices. Price controls have a consistent history: they don't work. Whether they apply to air fares, gasoline, telecommunications or medicines, they discourage innovation, create shortages and fail to keep prices in check. Further, they harm the poor by making whatever is controlled more difficult and more expensive to obtain.

However, according to leading prescription drug price and sales database information company, IMS Health, drug costs are rising primarily because of rising costs of innovation

that contributed to record sales of new products and a changing mix of available products. Price increases have been relatively modest over the past 10 years.

Sources: National Centre for Policy Analysis Policy Report No. 23 Oct 99 and Focus 16 Apr 04



Figure 2: Composition of Drug Costs

#### Extract 3: Under-consumption of drugs in developing countries

The major communicable diseases of poverty, especially AIDS, TB and malaria, cause over six million deaths annually, with devastating social and economic impacts. The global community has recognised the causal links between ill-health, poverty and weak economic growth. Historically, efforts to tackle the major diseases affecting developing countries have been poorly coordinated, resulting in under-consumption of drugs that can cure these diseases.

OECD governments and international bodies such as the World Bank have stepped up investments in these areas. In response, new private sector allies– especially the pharmaceutical companies are forging partnerships with governments to undertake a wide range of activities, such as distributing donated or subsidised products, strengthening health service delivery and access to drugs and educating the public.

Adapted from http://www.eldis.org

Sources: National Centre for Policy Analysis Policy Report No. 23 Oct 99 and Focus 16 Apr 04

## Questions

(a)	(i)	Describe the changes in sales of Glaxo's AIDS drugs from 1997 to 2000 using Figure 1.	[2]
	(ii)	Illustrate, using demand and supply diagrams, how the change in the number of AIDS patients and entry of generic AIDS drug producers affect the market for branded AIDS drugs.	[4]
(b)	(i)	Using an appropriate diagram, explain the type of price control that can be used to regulate the price of branded drugs.	[4]
	(ii)	Discuss the effectiveness of price controls in the regulation of branded drugs prices.	[6]
(c)	(i)	Using relevant economic analysis, explain why the market fails to allocate sufficient resources to the consumption of drugs in developing countries.	[4]
	(ii)	Evaluate, with reference to Extract 3, the policies that governments in developing countries have undertaken to address the under-consumption of drugs.	[10]

#### Answers

- (a) (i) Generally, sales of Glaxo AIDs drugs decreased [1]. However, sales for one of the drugs, Combivir rose in 1999, followed by a fall. [1]
  - (ii) The rise in the number of AIDS patients would lead to an increase in the demand for branded drugs by these patients seeking to increase their life expectancy, causing the demand curve to shift to the right.

The entry of generic drug producers will lead to a fall in the demand for branded drugs as price of substitutes (generic drugs) decrease. The entry of generic drugs would increase the number of suppliers in the generic drug market, causing the price of generic drugs to fall. Since generic drugs are substitutes of branded drugs, the demand for branded drugs fall due to the fall in the price of substitutes i.e. generic drugs.

The net impact on the equilibrium price and output depends on the relative strength of the two events.

**1-2m:** Explanation of factors that affect the market for branded AIDS drugs tend to be scanty

**Max of 3m**: Explanation of the two factors that affect the market for branded AIDS drugs, without comment on how price and output depends on the relative strength of demand

**Max of 4m :** With judgement on relative strength of demand or some acknowledgement that price and output depends on the relative strength of demand.

(b) (i) Price ceiling+diagram+ references to diagram

The type of price control that can be used to regulate the price of branded drugs is the price ceiling. Price ceiling refers to government-imposed price above which firms are not legally allowed to charge. It is the maximum price that the government sets on drug prices, below the market equilibrium price which is deemed too high. The objective of implementing price ceiling is to prevent prices from rising beyond a certain level to ensure the much needed drug remains affordable to the poor patients. This is to achieve equity, i.e. a fairer distribution of goods and services in the country to prevent social instability. With reference to the diagram, the price ceiling is set at Pmax below the market equilibrium price, Pe.

**1m:** Identification of price ceiling

1m: Explanation of price ceiling &/or objective

1m: Graph

1m: Reference to graph



b (ii) Price ceiling is desirable because it increases lowers the price of the costly drug resulting in the increased affordability of the drug to lower-income AIDS patients, thus leading to increased equity. This is especially pertinent for the increasing number of patients residing in developing countries.

In addition, the market for AIDS drugs is inelastic due to few close substitutes available to the AIDS drugs. Since the branded drug producers who have sole owndership of the patents, are able to pass on high costs of production to consumers in the form of higher prices and hence, price regulation would restrict the monopolists from exploiting the consumers. As a result, the price control would ensure affordability of drugs especially for the needy patients.

On the other hand, a maximum price on AIDS drugs may not be desirable as it reduces the incentive of firms to produce and invest in costly innovation. As a result, few new and effective drugs are discovered as a maximum price would reduce the amount of profits earned by the AIDS drug producers and hence, resulting in reduction of profits channeled into research and innovation. Furthermore, according to Figure 2 the percentage increase in drug cost is more than the percentage increase in price of drugs, largely due to rising costs of innovation. This shows that price control may cause the drug producers to make more losses resulting in fewer drugs introduced in the market.

There would also be a shortage of AIDS drugs in the market as quantity demanded (Qdd) exceeds quantity supplied (Qss) at P max in Fig. 1 above. Hence, there would be insufficient drugs for the patients and A black market may ensue, causing the price of AIDS drugs to be even higher and the AIDS drugs would be unaffordable to the poor. Only the wealthier patients, who have the ability and willingness to pay the price, Pb would be able to buy the drug and hence, the price control would result in even higher prices at Pb than the price that clears the market.

Mark scheme					
Level	Marks	Descriptor			
L1	1-2	Largely irrelevant points that are not clearly explained. Major conceptual errors.			
L2	3-4	One-sided answer that is fairly developed or two sided answer that is underveloped and lacks rigour			
L3	5-6	Two sided answer that is well-developed with good rigour of analysis. Some recognition of context or reference of analysis. (at least three points of arguments in total, covering thesis and anti thesis.			

(c) (i) The market fails to allocate sufficient resources to the consumption of drugs due to the presence of positive externalities.

The positive externality will cause a divergence between private benefit and social benefit or private cost and social cost.

There are external benefits from consumption of drugs. For example, drugs will not only benefit the individual who pays for them due to increased life expectancy and better health but may increase the productivity of the economy, resulting in higher economic growth and so raise other people's incomes. From the standpoint of society as a whole, MSB > MPB because of the external benefit.



In the diagram above, S=MPC=MSC because there are no negative externalites. The individual's market demand curve also reflects his MPB, therefore D = MPB. Due to the

positive externality in consumption, MSB is higher than MPB because of the External Benefit.

The market equilibrium is at E where MPB = MPC. This will give a market equilibrium quantity 0Qe where there is underconsumption of drugs if left to the free market. The private individual does not consider the external benefit in his action.

At market equilibrium output 0Qe, MSB is greater than MSC; that is society values an extra unit of the good more than what it would cost society to produce it. The socially efficient level should be where MSC = MSB, ie. at output 0Qs. Therefore, the price mechanism under-allocates resources to the production of the good since 0Qe < 0Qs. Area EAB represents the welfare/deadweight loss to society as a result of this under-allocation of resources.

Therefore, the market fails to allocate resources efficiently because it does not take into about the external benefit in consumption.

- Identification and explanations of type of externaity + examples of third party effects (2m)
- graph (1m)

-graphical references to divergence of MSB and MPB and MSB>MSC: interpretation resulting in allocation of resources below socially efficient level (for a maximum of 4 m)

(ii)



Policies that governments in developing countries have undertaken include forging partnerships (extract 3) with pharmaceutical companies to subsidise drugs to encourage the consumption of drugs. This would effectively shift the supply curve of drugs to PMC', by the

amount of the subsidy (equivalent to EMB at Qs as shown in Diagram 1). The cost of consuming education is now lower. Equilibrium quantity of drugs is increased to Qs, and the deadweight loss is eliminated.

However, there is again the difficulty in assessing the extent of marginal benefit and determining the right amount of subsidy to be given, especially for citizens of differing income levels, which may lead to equity issues. Despite the inherent problems in measuring the external marginal benefit, subsidizing drugs would definitely help in reducing the deadweight loss and in bringing the consumption of health enhancing drugs closer to Qs. As such, the government can only consider re-evaluating the amount of subsidies given, to judge whether it is reflective of the true external marginal benefit.



Public provision of drugs at zero cost also poses another problem: that of over-provision and over-consumption. As seen in the diagram above, provision of drugs at zero price i.e. for free, would lead to consumption over and above the socially optimal amount, at Qz. This would result in a misallocation of resources and an efficiency loss. An alternative would be to provide a subsidized rate of education at P, as mentioned above. However, this would lead to issues of equity, as the lowest-income patients would not be able to afford paying price P.

As mentioned in Extract 3, educating the public and raising awareness is also a possible solution to the problem. For instance, the government may set up regulatory bodies in raising awareness of the access to health enhancing drugs to resolve the problem of imperfect information. However, there may be problems in changing the mindset of some ill patients who are not convinced of the efficacy of the drugs in alleviating their illness and hence, may think that the drugs are not necessary.

However, these policies may not be the most appropriate over time as the needs of the seriously ill patients would change over time. Hence, the government has to constantly review its policies over time to ensure appropriateness and equity. Otherwise, government failure would occur alongside market failure. It is important to complement the policies of

subsidizing drugs with raising awareness through education as increasing affordability would need to be paired with increased receptiveness and mindsets towards the consumption of drugs to increase consumption towards the socially efficient level.

Level	Marks	Descriptor				
L3	7-8	<ul> <li>For a well-developed analytical explanation of measures with good assessment and application to extract</li> <li>Use of well illustrated and explained diagrams</li> </ul>				
L2	5-6	<ul> <li>For an explanation of measures without limitations and</li> <li>Underdeveloped explanation of measures</li> </ul>				
L1	1-4	<ul> <li>For a general and superficial description of measures used by government to increase consumption of drugs</li> <li>Basic errors of theory or inadequate development of economic analysis</li> </ul>				
E2	2	<ul> <li>Proposing alternative policies</li> <li>Most appropriate/ effective measure</li> </ul>				
E1	1	Largely unexplained judgment				

# Marking Scheme