Term 4 Intensive Revision

**Case Study Practice – Market Failure**

**The Price of Water**

**Table 1: Singapore Water Prices**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Domestic Potable Water Prices (Households)** | | | | | **Non- Domestic Potable Water Prices (Firms)** | |
| **0-40 cubic metres** | | | **> 40 cubic metres** | |  | |
|  | **Current** | **From 1 July 2018** | **Current** | **From 1 July 2018** | **Current** | **From 1 July 2018** |
| **Water Tariff** | $1.17 | $1.21 | $1.40 | $1.52 | $1.17 | $1.21 |
| **Water Conservation Tax** | $0.35 | $0.61 | $0.63 | S0.99 | $0.35 | $0.61 |
| **Total Price** | **$1.52** | **$1.82** | **$2.03** | **$2.51** | **$1.52** | **$1.82** |

Source: www.pub.gov.sg

**Extract 1: Singapore Budget 2017**

Water tariffs (price of water) will be going up for the first time since 2000. But Housing & Development Board (HDB) households will be getting help to offset the increases. The increase will fund the higher costs of desalination and Newater\* production, as well as that of maintaining Singapore's current water infrastructure.

The total increase, including taxes, will be about 30 per cent. The Water Conservation Tax reinforces the message that water is precious. This will be raised to between 50 and 65 per cent of the tariff by 2018.

The 30 per cent increase in the total price of water is "absolutely necessary", as it is a "scarce" resource and "not cheap to produce", said Prime Minister Lee Hsien Loong. "If the water tariffs are not enough to pay for these, PUB (Public Utilities Board) would still have to build all this, and we would still have to pay for this. But instead of paying for it through the water tariff, we would have to pay for it through our taxes and I think it's fairer to pay for it through the water tariff. Those who use the water pay for the water, rather than from general taxes.”

As the economy grows, the country will need more water, said Mr Lee, adding that climate change will also cause the supply of water to be less predictable. And as the population in the Malaysian state of Johor continues to grow, this means that the resource will come under pressure due to a corresponding growth in demand, he said. Singapore draws more than half of its water supply from Linggiu Reservoir in Johor.

Singapore now uses 430 million gallons of water a day, with the domestic sector (households) accounting for 45 per cent, and the non-domestic sector (firms), the rest. Water demand is expected to more than double by 2060, and every additional drop of water will have to come from more expensive water sources. In addition, the cost of water transmission has increased as Singapore lays deeper pipes in an urbanised environment.

The four National Taps are imported water, water from local catchment areas, desalination and Newater. More than half our current water consumption relies on imported and local catchment water, which rely on weather conditions. Newater is projected to meet 55 per cent of water needs and desalination up to 30 per cent by 2060.

*Various Sources: Straits Times, Feb 20, 2017; CNA, Feb 21, 2017*

**Extract 2: Water Privatisation**

Water privatisation – when private corporations buy or operate public water utilities – is often suggested as a solution to municipal budget problems and aging water systems. With privatisation, profitability dictates that a system be as efficient as possible so that it can be as profitable as possible. In the world of water distribution, this would mean that more people would receive their water in a more efficient manner and that would limit the ability of the water to be contaminated within the system.

Unfortunately, water privatisation more often backfires, leaving communities with higher rates, worse service, job losses, and more. Empirical evidence indicates that there is no significant difference in efficiency between public and private water provision.

By privatising water and sewer systems, local government officials abdicate control over a vital public resource. Private water companies are primarily accountable to their stockholders, not to the people they serve. They are unlikely to adopt the same criteria as municipalities when deciding where to extend services. They are prone to cherry-picking service areas to avoid serving low-income communities where low water use and frequent bill collection problems could hurt corporate profits. As a result of price hikes, service disconnections and inadequate investment, water privatisation often interferes with the human right to water.

In theory, competition would lead to cheaper contracts, but in practice, researchers have found that the water market is “rarely competitive.” A lack of competition can lead to excess profits and corruption in private operations.

Investor-owned utilities typically charge 59 percent more for water service than local government utilities. Food & Water Watch [compiled the water rates of the 500 largest community water systems in the country](https://www.foodandwaterwatch.org/insight/state-public-water-united-states) and found that private, for-profit companies charged households an average of $501 a year for 60,000 gallons of water — $185 more than what local governments charged for the same amount of water. After privatisation, water rates increase at about three times the rate of inflation, with an average increase of 18 percent every other year.

In fact, public operation often saves money. A review of 18 municipalities that ended their contracts with private companies found that public operation averaged 21 percent cheaper than private operation of water and sewer services.

*Source: Food and Water Watch, Aug 30, 2015*

**Extract 3: Trade based on Virtual Content of Water**

Producing agricultural and industrial goods require lots of water – often much more water than we realize. The water that is necessary to produce a good is often referred to as its water footprint or its virtual water content. For instance, one kilogram of apples has a [water footprint](http://www.worldwater.org/data20082009/Table19.pdf) of 700 liters because of the water needed to grow an apple tree, as well as harvest and transport the apples.

In [Peter Debaere](http://www.darden.virginia.edu/web/Faculty-Research/Directory/Full-time/Peter-Debaere/)’s most recent [discussion paper](http://www.cepr.org/pubs/dps/DP9030.asp) for the Centre for Economic Policy Research (CEPR), he suggests that countries should take advantage of the global economy to fight water scarcity, i.e. they should specialise more in producing goods depending on water availability in their regions.  Water-scarce countries should buy water-intensive goods from water-abundant countries instead of producing and exporting those types of goods themselves.  Import of ‘virtual water’ i.e. in the form of agricultural and industrial commodities can be an effective means for water-scarce countries to preserve their domestic water resources.

But his findings also indicate that water contributes significantly less to the pattern of exports than the traditional production factors such as labour and physical capital. The reason is that water is generally grossly underpriced. Water scarcity appears to affect trade patterns only in cases where absolute water shortage forces water-scarce countries to import water-intensive products, because they simply cannot be produced domestically.

The fact that water inputs are often heavily subsidised by national governments is hereby ignored. Most governments subsidise water supply on a huge scale by investing in infrastructure like dams, canals, water purification, distribution systems, desalination plants and wastewater treatment. These costs are often not charged to the water users. Besides, water scarcity is generally not translated into an additional component in the price of goods and services that are produced with the water, as happens naturally in the case of private goods. As a result, water inputs do not form a substantial component of the total price of even the most water-intensive products. Consequently, the production of and trade in goods – even though various sorts of goods require a lot of scarce water inputs – is not or hardly governed by water scarcity.

Many water problems are closely linked to international trade. Subsidised water in Uzbekistan is overused to produce cotton for export; Thailand experiences water problems due to irrigation of rice for export; Kenya depletes its water resources around Lake Naivasha to produce flowers for export to the UK and the Netherlands; Chinese rivers get heavily polluted through waste flows from factories that produce cheap commodities for the European market.

*Source: Economic Research and Statistics Division,*

*World Trade Organization* [*3 January 2013*](https://blogs.darden.virginia.edu/ibis/2013/01/03/water-as-a-comparative-advantage-in-international-trade/)

**Questions**

|  |  |  |  |
| --- | --- | --- | --- |
| **a)** | **i)** | With reference to Table 1, identify the type of user that will face the highest water conservation tax rate from July 2018. | **[1]** |
|  | **ii)** | Explain a possible reason for the above. | **[2]** |
| **b)** |  | Using a diagram, explain one demand factor and one supply factor that may have caused the water tariff to rise. | **[3]** |
| **c)** |  | With reference to Extract 2, to what extent do you agree with the view that privately-owned utilities make the provision of water efficient and equitable? | **[8]** |
| **d)** |  | Extract 3 states that water is generally grossly underpriced.  Explain the effects on stakeholders if water were priced to reflect its true value. | **[6]** |
| **e)** |  | **Discuss the solutions whether other solutions are better than the use of subsidies in solving the problems of market failures in the water industry** |  |
|  |  | **[Total 30 marks]** | |

**Suggested Answers**

**(a) (i) With reference to Table 1, identify the type of user that will face the highest water conservation tax rate from July 2018. [1]**

Households (h/hs) that consume more than 40 m

**(a) (ii) Explain a possible reason for the above. [2]**

* Demand for h/hs that consume > 40 m3 may be price-inelastic.
  + It is possible that these h/hs have higher incomes and can afford to consume more. Thus it can be inferred that water consumption takes a smaller % of their income. In this regard, a higher tax is needed to reduce consumption to the desired level
* Issue of equity: A lower tax for h/h consumption <40 m3

as it is likely a larger % of the poorer household’s income i.e. demand is less price-inelastic

* Reduce need to raise income taxes that may result in more progressive income taxes as water tax charges user based on consumption
* Use of 2-tiered taxation: a lower tax for a certain basic level of consumption which is essential for survival and a higher tax for less essential consumption (beyond 40 m)
* To pre-empt inflationary pressures due to greater rise in production cost if water tax for firms were higher: need to raise taxes on water, but need to avoid raising production cost; therefore rise in taxes mostly subjected on households with high usage

**(b) Using a diagram, explain one demand factor and one supply factor that may have caused the water tariff to rise. [3]**

* Rise in water tariff is due to both a rise in demand and fall in supply, leading to an overall shortage, which results in consumers bidding up the price.
* Demand factor
  + Economic growth (from case: ‘As the economy grows’)
  + Higher industrial production increases demand for water as an input
  + Higher incomes lead to more leisure activities that are water-intensive in nature; or people feel less of a need to conserve water as they can afford
* Growth of population in Singapore (Not in case but acceptable)
* As population increases, both household consumption and industrial consumption (due to more goods and services produced) increases
* Supply factor
  + Rise in (variable) cost associated with water treatment (desalination and Newater): increases production cost and firms less willing to supply at given price; rise in cost of water transmission
  + Fall in supply of water to Singapore from Johor due to population growth in Johor (this is a supply, and not a demand factor)
  + Fall in supply due to climate change

**Illustration with diagram**

A rise in demand leads to a rightward shift of the demand curve and a fall in supply leads to a leftward shift of the supply curve respectively. The shortage results in water tariffs rising.

**(c) With reference to Extract 2, to what extent do you agree with the view that privately-owned utilities make the provision of water efficient and equitable? [8]**

**Introduction**

* Resources are scarce and there is a need to apportion them amongst competing uses so as to attain an efficient allocation of resources with the resultant impact of maximising society’s welfare.
* Allocative efficiency is attained when MSB= MSC or P=MC; equity is achieved if water is equitably distributed regardless of ability to afford.
* It is implicit that for allocative efficiency to be attained, productive efficiency must be attained.

**Main Body**

**Thesis: Efficient and Equitable**

X-inefficiency

Transferring ownership to the private sector resolves the problem of X-inefficiency. Private firms aim to maximise profits. One way to do so is to be as cost-effective as possible i.e. to be X-efficient and operate at a point on the LRAC curve.

Governments have less need to be cost-effective and may operate at a point above the LRAC curve. If left to government, the lack of profit-incentive and bureaucracy results in X-inefficiency. In addition, the possible erosion of profits may be covered with government subsidies.

Dynamic efficiency

Transferring ownership to the private sector may result in more investment and innovation, since innovation has the potential to increase profits for private firms. Conversely, governments lack spontaneity without incentives to increase profits.

* Process innovation: Innovating the process of producing water can result in greater productivity, which can reduce cost and increase profits for firms. It also allows firms to lower prices to consumers will reaping higher profits.
* Product innovation: Firms may improve the quality of water, such as reducing water contamination, in order to increase demand for its water. This benefits consumers.

Allocative efficiency (with increase in competition)

Competition may arise if there a few private companies in the country providing water to different localities in the country. In a bid to remain in business, firms are forced to price nearer MC (nearer allocative efficiency). There is thus a certain level of bench-marking in terms of pricing. In a bid to remain in business, firms are forced to price nearer MC (nearer allocative efficiency)

Further benefits in terms of X-efficiency and Dynamic efficiency (with increase in competition)

There is further reduction of X-inefficiency and dynamic inefficiency should there be an increase in competition when water provision is left to private hands. Because of the fear that contracts may not be renewed or may be awarded to rivals, firms will engage in price and non-price competition that can result in lower prices and better quality (less contaminated) water.

**Anti-thesis: Neither Efficient nor Equitable**

Allocatively inefficient (due to natural monopoly)

It is likely that a natural monopoly arises. It is common for the contract for a particular locality to be awarded to a single firm. This is to prevent duplication of resources and also allow the firm to reap benefits of internal economies of scale. The latter arises from the huge sunk cost e.g. laying of pipes and other water treatment plants which leads to very low LRAC. While this allows firms to lower the price of water, the monopoly power gives firms full autonomy to charge exorbitant prices.

Without government intervention, the monopoly is likely to be allocatively inefficient, charging a price much > MC at its profit-maximising output. The under-production leads to a DWL for society, where society values the last unit of the good more than what it costs to produce it. This analysis corroborates with Extract 3 which shows private utilities ‘charging 59 percent more for water service; $185 more than what local governments charged for the same amount of water; water rates increasing at about three times the rate of inflation’. Given monopoly power, the demand by households for the essential service is price-inelastic. And with huge entry barriers

due to government licensing, the market dominance allows the firms to restrict output by charging a high price.

X-efficiency and dynamic efficiency

The monopoly also has no incentive to be X-efficient (show from the same diagram) and thus operates at a point above the LRAC curve, as it can still make supernormal profits.

Neither does it need to be dynamic efficient, given its monopoly power.

Effect on Equity

Extract 2 mentions that private utilities ‘are prone to cherry-picking service areas to avoid serving low-income communities’. This results in a case where demand with income gap is lower than what would be socially optimal - a situation of demand without income gap. The underproduction leads to a dwl where MSB>MSC for every unit under-produced. From the earlier illustration on allocative inefficiency, CS also falls when one compares the price of a monopoly to

price in a PC market.

Conclusion/Evaluation: (any of these ideas)

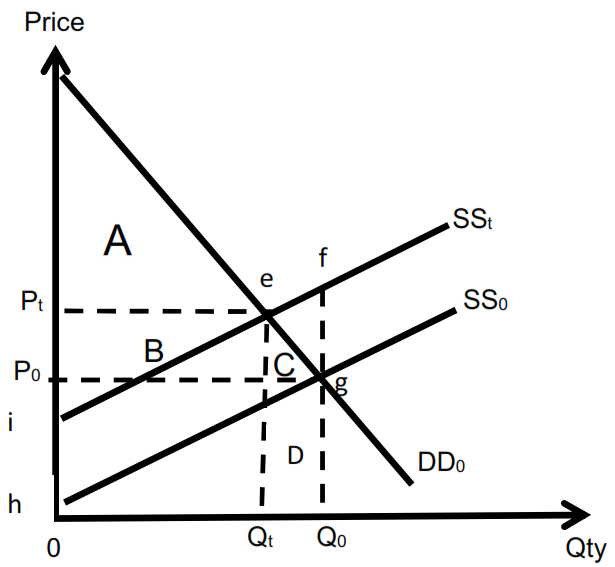
* The privately-owned utilities is, by and large, allocatively inefficient and inequitable, as shown by the empirical evidence. Unlike a government-owned utilities which has P=MC and equity as its objective, the private firms are more concerned about maximising profits and being ‘accountable to their stockholders’.
* This is further worsened by the fact that there is ‘rarely competition’.
* But fear of the market being contestable may force the private firm to be efficient

especially when the government can ensure that contracts are not renewed. After-all, in the case, ‘18 municipalities did end their contracts with private companies’.

(Conclusion can also be couched in terms of how the government can make the market contestable or how there can be regulatory bodies to ensure move towards efficiency.)

**(d) Extract 3 states that water is generally grossly underpriced. Explain the effects on stakeholders if water were priced to reflect its true value. [6]**

* Price not reflecting true value is due to the fact that ‘water is often heavily subsidised by governments’. For the price to reflect its true value, the subsidy has to be removed.



As shown in the diagram, OPt is the true price/value of water when there is no subsidy. So, the removal of subsidy shifts the supply curve from SS0 to SSt. This creates a shortage, with the final equilibrium price rising to Pt and quantity falling to Qt.

* On Consumers (households that use water as an input) and Producers of Water
  + With a reduced quantity, consumer surplus falls by area B+C
  + Since demand is price-inelastic, a rise in price leads to a less than proportionate fall in quantity demanded to Qt, causing total expenditure by consumers to rise
  + This is likely to worsen inequity as it takes a larger % of the poor household’s income.
  + Higher water prices also affect the macroeconomy because water is an important factor of production in the production of most goods and services. Water price hikes will increase production cost, which decreases AS and causes cost-push inflation. The resultant impact is that households end up with more expensive goods and services.
  + For producers of water, the producer surplus falls from P0gh to Ptei
* On Firms (businesses that use water as an input)
  + The rise in price of water and the subsequent increase in total expenditure on water will increase the variable costs of businesses. Since water is an important input, the rise in production cost will reduce the supply of final goods and services produced by producers, reducing the quantity sold. The higher costs and lower sales quantity reduces producer surplus and profits.
  + In Extract 3, it is stated that’ water scarcity is generally not translated into an additional component in the price of goods & services that are produced with the water, as happens naturally in the case of private goods.’ If water is factored into the cost of producing goods, the country may lose its comparative advantage in certain industries that are water-intensive especially since ‘governments subsidise water supply on a huge scale’. They may re-allocate resources to industries that are less water-intensive.
  + 2 issues arise here:
    - The competitiveness of the goods is affected with removal of subsidies. This affects the profits of firms.
    - Moreover, in the re-allocation of resources to restructure and develop comparative advantage in new areas, workers or households may be adversely affected due to structural unemployment since they may lack skills for these new industries.
* On Government
  + With the removal of subsidies of area fg X 0Q0), it may alleviate problems of financing and budget deficit as well as reduce the opportunity cost of not being able to spend the money on areas of education, healthcare and infrastructure.
* On Future Generations
  + The over-consumption due to the subsidy has also led to water scarcity – a situation of limited resource and unlimited wants. This leads, over the long-term, to a depletion of the water resource. With the removal of subsidy, more water can be conserved to meet the needs of future generations.