

## Question 1

### The market for coal in China and US

**Table 1: Total Coal Exports and Imports** (thousand tons)

		2008	2009	2010	2011	2012
<b>China</b>	Exports	63,384	25,235	27,181	27,546	15,184
	Imports	44,467	138,890	179,870	200,722	318,466
<b>United States</b>	Exports	83,478	60,404	83,179	108,229	126,720
	Imports	37,811	22,985	20,567	14,505	10,294

Source: US Energy Information Administration

**Table 2: GDP Growth Rates** (annual % change at constant prices in local currency)

	2008	2009	2010	2011	2012
<b>China</b>	9.6	9.2	10.4	9.3	7.7
<b>United States</b>	0.0	-2.8	2.5	1.8	2.8

Source: World Bank

#### Extract 1: China overtakes Japan as world's top coal importer

China overtook Japan as the world's top coal importer for the first time in decades last year, partly driven by robust Chinese demand. China, also the world's biggest coal producer and consumer, imported 200.7 million tonnes of the fuel in 2011.

China is likely to keep its top position in 2012 as rising costs and competition from foreign coal have created pressure for imports. China's coal consumption is expected to remain robust as new coal-fired power generation comes on-stream and demand from the cement industry, the second-largest driver of thermal coal consumption, is also seen rising as the government makes a strong push to urbanise.

A Reuters poll last month, however, showed that the country's coal imports are expected to grow at a slower pace in 2012, as domestic appetite moderates and home production rises.

Source: Reuters, 26 January 2012

#### Extract 2: US coal industry losing steam

This year's outlook is grim for the US coal industry, which after two years of rising profits has begun closing mines, signalling a new wave of production cutbacks and, possibly, another round of industry consolidation.

The two biggest threats facing US coal companies are the low price of domestic natural gas, which is making thermal coal a less-attractive fuel for their utility-customers, and the shaky economic picture in Europe, which is dampening exports of metallurgical coal.

Demand among European steelmakers has fallen, pushing down the benchmark price for the highest grades of coal by nearly 30% over the past year. Also dampening prices is tougher federal emissions rules for US utilities, resulting in more planned closures of coal-fired energy generating plants.

In a recent report, BP PLC, known previously as British Petroleum, forecasts that coal usage globally will grow through 2020, mostly driven by China, before levelling off. By 2030, coal will account for 27.7% of world energy consumption, ahead of oil at 27.2% and natural gas at 25.9%, and far outpacing renewables at 6.3%.

Source: Wall Street Journal, 24 January 2012

### **Extract 3: US switches to clean energy alternatives**

America is shovelling coal to the side-lines. Utilities are aggressively ditching coal in favour of natural gas which has become cheaper. Natural gas has other advantages over coal. It produces far fewer emissions of toxic chemicals and gases that contribute to climate change, key attributes as tougher environmental rules go into effect.

Patriot Coal, a mining company, closed a mine in Kentucky, idled several others, and has cut 1,000 jobs. Coal has also enjoyed strong political support because of the jobs it provides in mining and transportation. That helped coal thrive even as environmental concerns over mining practices and air quality grew.

A revolution has been under way in the natural gas industry. Drillers figured how to tap enormous deposits of previously inaccessible reserves. As the price of natural gas plummeted, coal became a less-favoured source of energy.

A pair of clean air rules enacted by the Environmental Protection Agency (EPA) over the past year tighten limits on power-plant emissions of sulfur dioxide and nitrogen dioxide, and place new limits on mercury, a poison found in coal. This will force between 32 and 68 of the dirtiest and oldest coal plants in the country to close over the next three years as the rules go into effect, according to a survey of power plant operators conducted late last year.

Source: The Huffington Post, 6 December 2012

### **Extract 4: Green protectionism vs. growth**

Some rich countries are imposing carbon limitations and threatening to curb imports from poor countries. This will cripple their own economies and harm the poor without doing much about emissions. Various governments want such green protectionism, including taxes on carbon-intensive imports, or on all imports from countries that do not cut emissions, especially the main targets, China and India.

The European Union wants to cut emissions by 20 percent by 2020, while proposed US legislation aims for 80 percent by 2050. But large emitters of greenhouse gases such as India and China are more worried about growth and tackling poverty.

Carbon restrictions on trade, however, will do little to reduce emissions. Taxing carbon-intensive imports from China, for example, will have a negligible impact because the vast majority of its emissions-laden exports go to other developing countries.

Carbon barriers on trade make even less sense when one considers the nature of global production today. Rich countries "import" around one-third of their carbon dioxide (CO<sub>2</sub>) emissions (the amount of CO<sub>2</sub> released in making imported goods), often from developing countries. The production of a single item often involves trading components between many different countries. Complex supply chains have brought cheaper and better goods and high-paying jobs to rich countries, and infrastructure, new jobs and higher incomes to developing countries. Over a quarter of all global trade in manufacturing is now in intermediate components, not final products. Rich countries cannot restrict imports without damaging their own production and growth.

Source: The Korea Times, 16 April 2010

## Questions

(a) Compare the trends in imports of coal into the US and China from 2008 to 2012. [2]

*Imports of coal into US were generally decreasing while imports of coal into China were generally rising. [1m]*

*The extent of changes in China's imports was larger than that in the US, i.e. 700% rise in the case of China as opposed to 70% fall in the case of the US. [1m]*

*(Note: As there are no similarities, students are to give 2 differences to be awarded 2 marks.)*

*Other answers accepted:*

*Imports of coal into China are consistently higher than the imports of coal into the US. [1m]*

*Note: Comparison should be made across the time period 2008-2012. Answers that compare a sharp spike in imports of coal into China from 2008-2009 are not accepted.*

(b) Explain the relationship between GDP and imports of coal in China. [2]

*Higher GDP → greater purchasing power → higher C → higher production of local goods and services → higher demand for imports of coal for use in production [2m]*

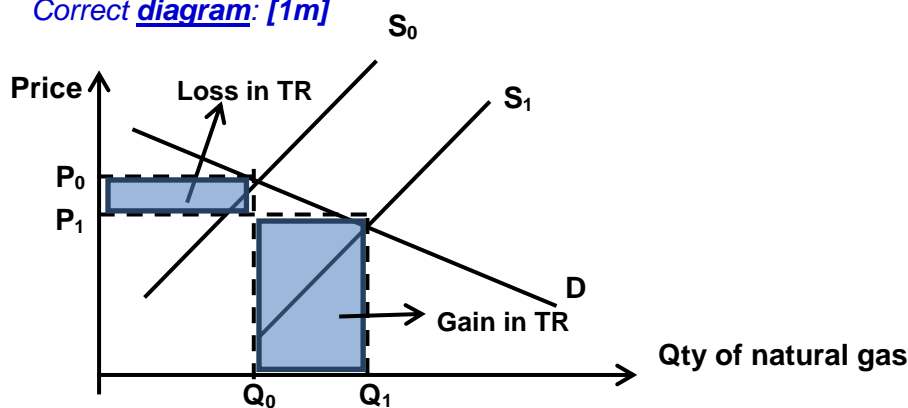
OR: *Higher GDP → greater purchasing power → higher energy consumption (heating, cooling, etc) → higher demand for coal imports [2m]*

OR: *Higher imports of coal → more energy/resources to fuel local production of goods and services → higher output → higher GDP [2m]*

(c) Using a supply and demand diagram, explain the likely effect of the changes stated in Extract 3 on the total revenue of natural gas producers. [4]

*This question requires the student to identify the supply-side effect, and explain the effect on revenue using the concept of PED.*

*Correct diagram: [1m]*



Explanation:

- *Increase in supply due to technological advancements allows drillers to tap previously inaccessible reserves (Extract 3) [1m]*
- *Demand is relatively price elastic, due to other substitutes (coal) available [1m]*
- *When supply increases, price falls and quantity demanded increases more than proportionately. This results in an increase in total revenue for natural gas producers. [1m]*

Other possible answers:

- *Student can argue that demand is price inelastic because there are no good substitutes for clean energy. In this case TR would fall instead.*

- Student can also explain that demand for cleaner energy increased due to clean air rules enacted by EPA. However to get the full mark, the student must also account for the increase in supply, and weigh the relative shifts/effects on TR.

**(d) China is both the top producer and importer of coal in the world.**

- (i) Explain whether the case of a country exporting and importing within the same commodity group contradicts the Theory of Comparative Advantage. [4]**

*The Theory of Comparative Advantage states that a country should specialise in the production of a good if it can produce it at a lower opportunity cost than its trading partner. Difference in opportunity costs arises from the different factor endowments each country has. Hence if China has a comparative advantage in the production of coal, it should specialise in producing coal for domestic consumption and export, while importing another good that her trading partner can produce at a lower opportunity cost. [2m]*

*However, a country may choose to export and import within the same commodity group for various reasons. [2m for any acceptable reason]*

- to increase the level of competition in the domestic market. With competition, there will be lower prices and greater variety, which will benefit consumers.
- to obtain different varieties of a product but of a similar quality/grade
- to obtain different varieties and of different quality/grade (Extract 2: different types of coal, i.e. thermal coal, metallurgical coal)

*Other acceptable answers:*

- The country is experiencing increasing opportunity costs as level of production rises.
- The country is in the process of losing its comparative advantage as shown by falling exports and rising imports of the good. However, such structural changes take time resulting in the good being both imported and exported.

- (ii) Using the information available, what conclusion can be drawn about the price elasticity of demand for coal in China compared to that in the US? [4]**

*The demand for coal is generally price inelastic, as coal is an input for generation of energy, which is a necessity. The demand for coal in China is likely to be more price inelastic as compared to the demand for coal in the US.*

*According to Extract 1, China is the world's largest consumer and producer of coal. With a growing economy, the demand for energy in China is increasing at a faster rate than that in the US. As coal is the main source of energy in China, the demand for coal in China is relatively more price inelastic.*

*According to Extract 3, natural gas is a substitute for coal in the US. As the supply of natural gas in the US has increased, the availability of natural gas in US is greater than that in China. Hence the demand for coal in the US is relatively less price inelastic than that in China, with the availability of close substitutes.*

*1 mark – stating PED for coal in China compared to that in the US (only if reasoning is given)*

*3 marks – providing 2 reasons to support*

*2 marks – providing 1 reason to support*

**(e) Discuss the effects of the US government's regulations on coal production on the standard of living in the country. [6]**

**Introduction:**

- Define standard of living – both material and non-material well-being

**Positive effects of government regulations on coal production on SOL:**

- There are significant negative externalities arising from coal production and consumption in the form of pollution and environmental damage (Extract 3)
- As a result,  $MSC > MPC$  and there is over consumption of coal when left to the market
- The government intervened using legislation in the form of clean air rules (Extract 3)
- This would limit the production of coal to the socially optimal level, as firms are forced to reduce usage of coal or switch to cleaner forms of energy
- Thus there is a positive effect on the non-material SOL due to fall in level of emissions

**Negative effects of government regulations on coal production on SOL:**

- The government's regulation has resulted in the closure of many coal mining companies. This has resulted in significant loss of jobs (Extract 3)
- This could result in structural unemployment as coal miners/other workers in the coal industry lack the skills to take up jobs in other industries
- With a loss of jobs, household income would fall, and consumers would suffer from a loss of earnings. On average, this leads to a loss in earnings.
- This would result in a fall in material SOL as individuals who work in the coal industries have lower income and can now consume less than before.

**Conclusion/synthesis:**

- Overall effect on SOL depends on the government's ability to mitigate the negative effects of such regulations on coal production. The government should help with structural shifts in the economy, for example through supporting alternative gas industries and sending workers for retraining/skills upgrading.

Level	Descriptors	Marks
L3	<ul style="list-style-type: none"> <li>• Well developed and balanced answer with good use of economic analysis and reference to data</li> <li>• Reasoned conclusion made</li> </ul>	5-6
L2	<ul style="list-style-type: none"> <li>• Undeveloped answer with some economic analysis used in explanation, with limited reference to data.</li> <li>• One-sided answer</li> </ul>	3-4
L1	<ul style="list-style-type: none"> <li>• Descriptive answer with no economic analysis and framework to support.</li> </ul>	1-2

- (f) Discuss the effectiveness of the policy of carbon limitations by developed countries for reducing emissions by developing countries. [8]

**Introduction:**

- Briefly explain the need for carbon limitations to reduce emissions globally
- Explain "carbon limitations" and its effect on imports
  - Can be in the form of taxes on carbon intensive imports, or all imports from countries that do not cut emissions (Extract 4)

**Thesis: Carbon limitations may be effective in reducing emissions by developing countries**

- Taxes on carbon intensive imports would raise the price of these goods and lower the quantity demanded for them
- The negative externalities from the production of these goods would be internalised and

*production of carbon intensive goods would be brought down to the socially optimal level*

- *It is especially effective because it targets developing countries such as China and India which are significant emitters of carbon given that many of them are going through industrialisation. (Extract 4)*
- *Such countries are able to produce at very low costs partly due to their lack of environmental regulation. This is because their priority is for economic growth rather than environmental protection.*
- *This makes them heavy polluters, thus the carbon limitations would be targeting the largest sources of negative externalities.*

**Anti-Thesis (1): Carbon limitations may not be effective because they have a negligible impact on carbon emissions**

- *However, the carbon limitations only apply to imports into the countries that impose them such as the EU and the US*
- *Most of the “emissions-laden exports” go to other developing countries that do not impose such carbon limitations (Extract 4)*
- *As such, carbon limitations by US and EU would have a negligible effect in reducing negative externalities on a global scale. The policy would not be effective in reducing carbon emissions at the global level*

**Anti-thesis (2): Carbon limitations may not be effective due to other limitations of using such taxes**

- *As a result of globalisation, complex supply chains are formed in which production of a single item takes place in multiple countries. As such, developed countries import many raw materials and intermediate goods from developing countries for production of final goods.*
- *Demand for these raw materials and intermediate goods would be relatively price inelastic as they are essential in the production of many goods.*
- *Thus taxes on imports resulting in higher prices would cause a less than proportionate fall in quantity demanded. Imports of carbon intensive goods would remain high even with the carbon limitations*
- *The governments in developed countries may also have difficulty in estimating how much to tax as it is difficult to value the external cost, especially because the carbon emissions are emitted in other countries. Tax rates that are too high or too low would not be effective in reducing carbon emissions to the optimum level.*

**Conclusion/synthesis:**

- *Criteria: Depends on cooperation by other countries as well*
- *Carbon emissions and its impact on climate change are global issues that require a joint effort by all the large economies in the world in order to be solved*
- *Both developed and developing countries have to work together to reduce carbon emissions. With only developed countries targeting the problem, the impact would be negligible because developing countries would continue to produce large amounts of carbon emissions.*
- *Alternative measure: developed countries could help support the use of clean technology in developing countries instead. For e.g. by sharing of technological advancements in the area, or helping them subsidise the use of green technology.*

L3	<ul style="list-style-type: none"> <li>• <i>Well developed and balanced answer considering the implications of targeting developing economies to reduce carbon emissions</i></li> <li>• <i>Good use of economic analysis and reference to data</i></li> </ul>	5-6
L2	<ul style="list-style-type: none"> <li>• <i>Undeveloped answer with some economic analysis used in explanation, with limited reference to data.</i></li> </ul>	3-4

	<ul style="list-style-type: none"> <li>• <i>One-sided answer</i></li> <li>• <i>Theoretical answer listing strengths and limitations of taxes</i></li> </ul>	
<i>L1</i>	• <i>Descriptive answer with no economic analysis and framework to support.</i>	<i>1-2</i>
<i>E2</i>	• <i>Well-reasoned judgement recognising that reducing carbon emissions on a global scale requires cooperation between all countries</i>	<i>2</i>
<i>E1</i>	• <i>Some attempt to make judgement but is not well supported</i>	<i>1</i>