

Section A

Answer **all** questions in this section.

Question 1

The Shale Revolution

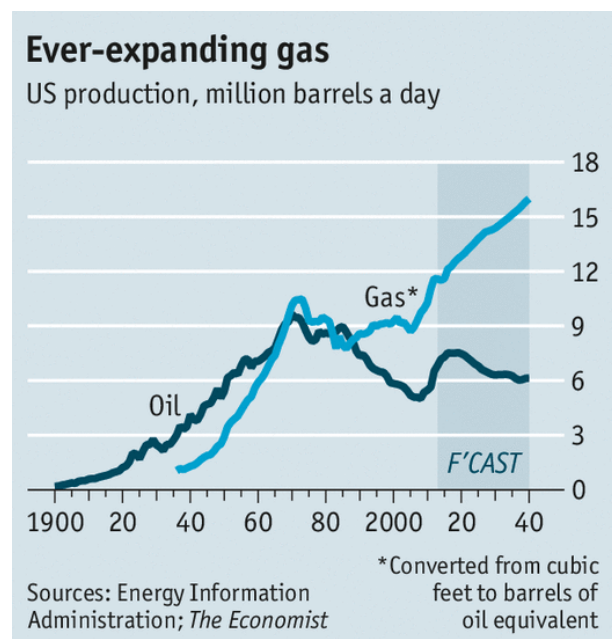
Extract 1: Shale Energy Revolution in US

Extracting gas from shale rock through hydraulic fracturing has transformed the US energy landscape as natural gas can be extracted. The shale energy revolution is likely to shift the tectonic plates of global power in ways that are largely beneficial to the West and reinforce U.S. power. Shale gas offers the means to vastly increase the supply of fossil fuels for transportation, which will ease the rising demand for oil, fueled by China's economic growth.

The shale extraction technology of hydraulic fracturing can be employed in producing natural gas as a form of energy sources. America will be more energy self-sufficient and more importantly in the consequent displacement of world oil markets by a sharp reduction in U.S. imports and will put additional downward pressure on global oil prices. The second factor is the potential to use natural gas for transportation. They are overlooking the immense advantage that natural gas has as a transportation fuel in America and Europe, which have both developed a natural gas infrastructure in urban areas that takes piped natural gas into homes, offices and supermarkets. The incentives to develop natural gas are very great. But so far, the United States has only experienced the first stage of low natural-gas prices and the revival of energy intensive industries such as chemicals and steel because of low gas prices.

Source: *The New York Times*, 25 December 2012

Figure 1: US Production of Oil and Gas



Source: Energy Information Administration (EIA)

Extract 2: Environmental Benefits of the Shale- Natural Gas Industry

According to the Environmental Protection Agency, natural gas-fired electricity generates half the carbon dioxide of coal-fired production. The EIA projects that carbon dioxide emissions will remain below their 2005 level (just under 6 billion metric tons) through 2040 - in some part because of increased reliance on renewables but in large part because of substitution of coal by natural gas.

Source: American Enterprise Institute, 4 April 2013

Extract 3: Tightening regulation in the Shale Gas Industry

Though some US states have updated historic oil and gas regulations to encompass hydraulic fracturing and shale gas work more generally, many lag behind and lack enough qualified people to enforce regulations properly, the researchers said. Scientists found "little or no evidence" to support claims that hydraulic fracturing had contaminated aquifers, but recommended that states do more to prevent accidents, such as spillages, underground leaks and gas explosions.

More stringent rules and better surveillance of well construction could prevent cases of houses exploding after methane from fracked wells seeped along underground fractures and collected beneath homes. A handful of high-profile blasts have been traced to shale gas wells in Ohio, Colorado and other states. Hydraulic fracturing uses high pressure water mixed with particles and chemicals to break gas-rich shale rocks apart more than a kilometer underground. Critics have blamed the technique for a range of undesirable effects, from air pollution and contaminated water to minor earthquakes.

Source: The Guardian, 16 Feb 2012

Extract 4: Economic Benefits of the Shale- Natural Gas Industry

This year America is expected to overtake Russia and Saudi Arabia to become the world's largest producer of oil and gas combined. In the next few years the benefits of hydraulic fracturing will become more visible in other industries, especially those, such as chemicals firms, that consume a lot of energy or use raw materials derived from hydrocarbons. European industry pays around three times as much for its gas as its American counterpart, and Japanese firms pay more than four times as much.

A report this week by the International Energy Agency, predicts that by 2015 America's energy-intensive firms will have a cost advantage of 5-25% over rivals in other developed countries. The aluminium, iron and steel industries are also taking advantage of cheap gas supplies. Recently 19 new or expanded plants have been announced by firms including US Steel, Alcoa and Arcelor Mittal. Nucor is rebuilding on a site in Louisiana, whose original plant was dismantled and shipped to Trinidad nearly a decade ago, when gas prices were rising in America. Makers of such things as cement and tyres are heavy consumers of energy, too, and thus stand to benefit from cheap gas.

Source: The Economist, 16 November 2013

Extract 5: Rising Foreign Direct Investment

In early 2013, Sinochem, a Chinese company, entered into a \$1.7 billion joint venture with Pioneer Natural Resources to acquire a stake in the shale industry in West Texas. This investment highlights a renewed trend toward foreign joint ventures in the shale industry. Since 2008, foreign companies have entered into 21 joint ventures with United States, investing more than \$26 billion in tight oil and shale gas market.

Investment in shale industry in the United States totaled \$133.7 billion between 2008 and 2012, as part of 73 deals. Joint ventures by foreign companies accounted for 20% of these investments. The rest of the investments were either part of outright acquisitions—such as the Australian BHP Billiton oil company's acquisition of Petrohawk Energy Corp.—or were joint ventures among American companies (such as Hess and Noble Energy with Consol Energy) and financial institutions.

Source: *Energy Information Administration*, 8 April 2013

Questions

(a)	(i)	Using Figure 1, compare the changes in the production of oil and natural gas in US from 1940 to 2010. Similarities: Both Increase Differences: Rate of increase of natural gas was higher than oil	[2]
	(ii)	With the help of a demand and supply diagram, explain the likely impact of the shale revolution on the price of oil. 1m: Increase Supply (Shale Revolution) 1m: Decrease in demand for oil (Substitute) 1m: Diagram with graphical analysis	[3]
(b)		Using AD/AS analysis, explain how the shale energy revolution in Extract 1 might have affected the US economy in the short run. SRAS: Decrease in Unit COP Extract 3: Addition shale energy as a substitute for factor input will put additional downward pressure on global oil prices. The potential to use natural gas for transportation in America and Europe will be able to reduce transportation cost and decrease the unit cost of production. AD: Increase Investment/ Increase in net export Extract 3: United States has only experienced the first stage of low natural-gas prices and the revival of energy intensive industries such as chemicals and steel because of low gas prices. Attract more Investments into US, in turn increasing AD.	[6]

		<p>America will be more energy self-sufficient and more importantly in the consequent displacement of world oil markets by a sharp reduction in U.S. imports The decrease in import expenditure would increase net export and increase AD.</p> <p>L1 (1-3m) Only one sided Analysis L2 (4-6m) Considers both AD and AS analysis, relates to the extract with extract information, GRAPHICAL ANALYSIS is required</p>	
(c)	(i)	<p>Using Extract 2, explain the case for government encouraging the development of shale gas industry despite it generating negative externality.</p> <p>1m: Compare the diff extent of MEC (Lesser DWL) 2m: Graphical Illustration 2m: Graphical Analysis and how it is a decrease in the (DWL)</p>	[5]
	(ii)	<p>Extract 3 mentions about the tightening of regulation in the shale gas industry. Comment on the effectiveness of regulations in reducing the market failure in the shale gas industry.</p> <p>L1 (1-3m): One sided analysis of how the regulation works. L2 (4-6m): Regulation should reduce the MEC or increase the MPC in the production of energy from Shale (Both analysis accepted)</p> <p>Extract 3: States do more to prevent accidents, such as spillages, underground leaks and gas explosions. Critics have blamed the technique for a range of undesirable effects, from air <u>pollution</u> and contaminated water to minor earthquakes. (Insufficient regulation will worsen the MEC to third party) Reduction in MEC: With more regulation, it reduces the probability of accidents, reducing the possibility of third part cost. Increase in MPC:</p> <p>Relate to the difficulties in the regulation of the industry</p> <ul style="list-style-type: none"> - Imperfect Information - Lack of skilled manpower in the regulating - Time Lag - Corruption - Cost of regulations (Restriction of free market development environmental benefit vs economical cost) <p>Extract 3: Though some US states have updated historic oil and gas regulations to encompass hydraulic fracturing and shale gas work more generally, many lag behind and lack enough qualified people to enforce regulations properly</p>	[6]

(d)	<p>Discuss how the development of the shale gas industry in Extract 1 and 3 would affect the US Balance of Payment. [8]</p> <p>BENEFITS <u>Capital and Financial Account</u> Greater FDI (Capital inflow) Extract 5: Investment in shale industry in the United States totaled \$133.7 billion between 2008 and 2012, as part of 73 deals. <u>Current Account</u> Trade balance improve due to decreasing dependence on oil imports Extract 1: America will be more energy self-sufficient and more importantly in the consequent displacement of world oil markets by a sharp reduction in U.S. imports and will put additional downward pressure on global oil prices.</p> <p>EVALUATION Despite the improvement in BOP, US has been in a recession since the WFC, the increase in FDI from the shale industry might be insufficient on improving the entire account in BOP. US had been dependent on imports for basic consumption and necessities. Despite the reduction in the reliance on oil imports, it could only be just an improvement of the deficit in the trade balance of the current account in the BOP, it might be insignificant.</p> <p>COSTS <u>Long Run</u> Worsens Income balance of the current account in the BOP Profits earned from the FDI will be transferred to the own domestic economy. Worsens Trade Balance of the current account in the BOP Increase in employment and income level will increase purchasing power in the long run. Increase in consumption of imports, Worsens Trade Balance</p> <p>EVALUATION Dependent on firm's decision to re-invest. Dependent on the types of goods imported, if they are mostly inferior, luxury or necessities. The extent of change in the demand of the imports would be different.</p> <table border="1" data-bbox="343 1624 1324 1955"> <thead> <tr> <th>Level</th><th>Description</th><th>Marks</th></tr> </thead> <tbody> <tr> <td>1</td><td>1 sided analysis. Mere Listing of BOP accounts.</td><td>1-3</td></tr> <tr> <td>2</td><td>2 sided clear economic analysis with evidence from extract that links to different components of the BOP.</td><td>4-6</td></tr> <tr> <td>3</td><td>Balanced View with reasoned judgement demonstrated in the analysis of the development on the different accounts of BOP.</td><td>7-8</td></tr> </tbody> </table>	Level	Description	Marks	1	1 sided analysis. Mere Listing of BOP accounts.	1-3	2	2 sided clear economic analysis with evidence from extract that links to different components of the BOP.	4-6	3	Balanced View with reasoned judgement demonstrated in the analysis of the development on the different accounts of BOP.	7-8	
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[Total: 30 marks]

