H1 Qn 1 CASE STUDY QUESTION

Figure 1: Global rare earth metals price index

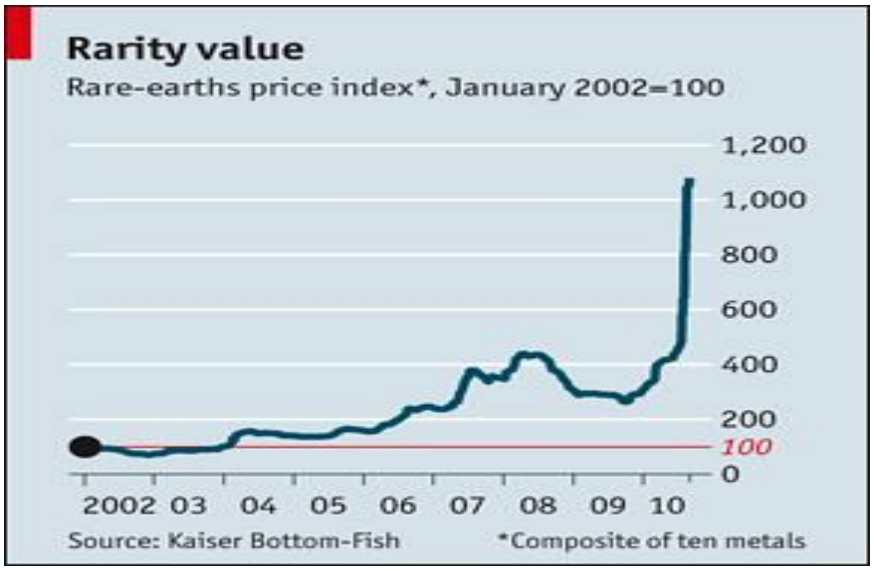
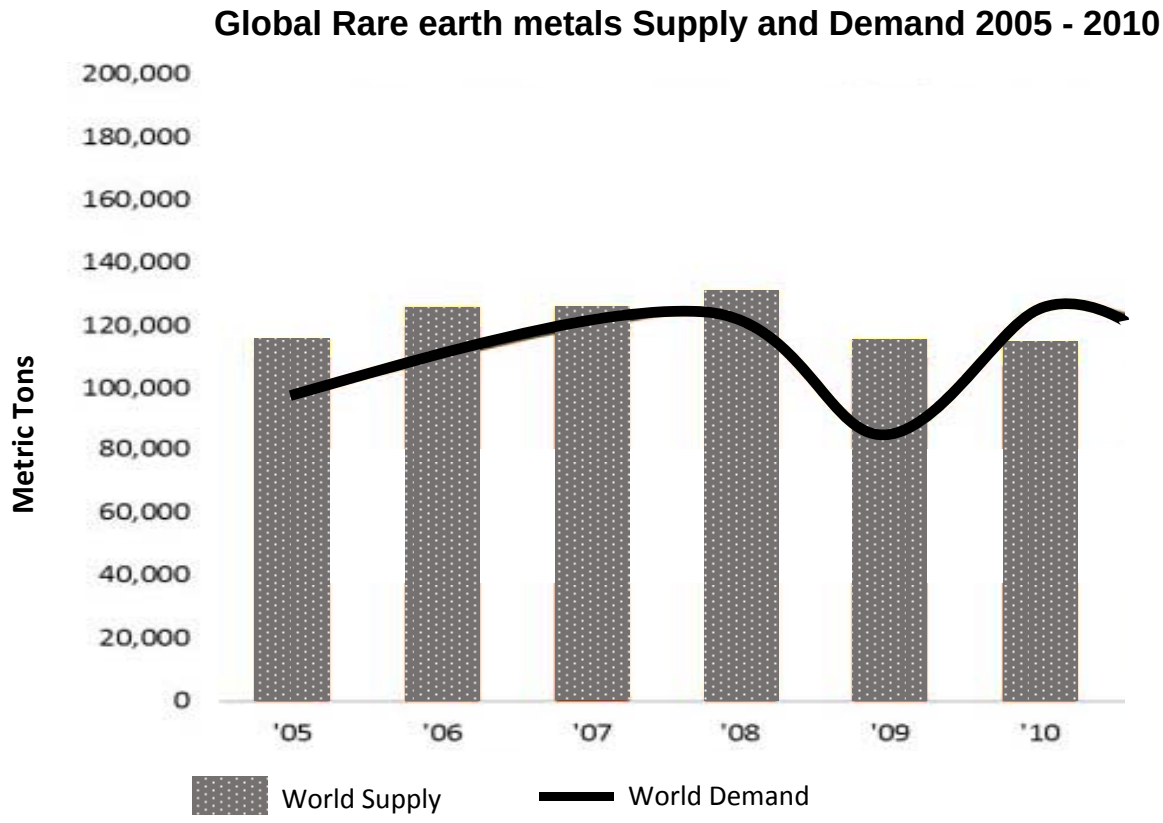


Figure 2



Extract 1: China's grip on the world's rare earth market may be slipping

For the past two years, the world has had a rare earth problem.

Rare earth metals are crucial for a wide range of electronics, from solar panels, fluorescent bulbs to iPod headphones to hybrid vehicles. And China produces 95 percent of the world's supply. So when China began sharply restricting exports in 2010 — allegedly to give its own industries an advantage — the global prices for rare earths skyrocketed. Bad news.

Except now, it is looking like the rare earth crisis is receding.

Despite their colorful name, rare earth metals aren't actually all that rare. At one point or another during the twentieth century, Brazil, India, the United States and South Africa were all major producers. In the 1980s, China decided to ramp up production massively, driving out competitors and cornering the market. China managed to do this, in part, through preferential policies by the Chinese government and lax environmental standards. This quickly enabled China to become a dominant, low-cost producer of rare earths by the late 1990s.

In 2010, China decided to restrict its export quota by 40 percent. That helped drive prices up and suddenly made it economical for other countries to start boosting their own production again. Out in Mountain Pass, California, for instance, Molycorp is now reopening and expanding its massive rare earth metals mine. Many countries are also doing the same.

Meanwhile, Japan has rushed to reduce its dependence on rare earths over the past few years—especially since China has a habit of restricting exports every time the two nations get into a territorial spat. Panasonic has developed a technique to recycle neodymium from old electronic appliances. Honda is extracting rare earths from used car batteries. TDK Corp., which creates magnets for motors, now sprays dysprosium on its motors rather than mixing it in, in order to conserve.

Source: The Washington Post, October 19, 2012

Extract 2: The Case Against Lynas in Malaysia

If everything goes as planned, by September this year, the largest rare earth refinery in the world will start operating in Gebeng Industrial Zone, some 25 km away from Kuantan town, home to almost half a million people. This plant will cast a shadow over Kuantan town. Real estate price will plunge, residents who are able to relocate will flee and those who are not will be in constant fear of radiation exposure.

The authorities have learnt nothing from the Asian Rare Earth (ARE) debacle in Bukit Merah, Perak. The ARE plant was operated by Mitsubishi Chemical and it extracted rare earth from old tin mine slag. Unfortunately the waste contains high level of thorium, which is a perpetually radioactive substance because its half life is 14.05 billion years! The residents there blamed the plant for birth defects and eight leukemia cases, 7 of whom have since

died. As a result of strong public opposition, the ARE was finally closed in 1992 and is currently undergoing a massive RM303 million cleanup.

Similarly, for the new rare earth refinery, the point of contention is the waste management. Lynas will import rare earth ores from Mount Weld in Australia to be processed in Gebeng. The finished products will be exported overseas while the radioactive waste dumped in Gebeng. From the press statements, one can surmise that the waste management is not even finalized yet.

Environmentalists contends that the much larger volume causes thorium levels to build up over time, to which Lynas has yet to provide any reply. Lynas also conveniently skipped the issue of radon gas, another potent carcinogen, which is discharged when the ores are cracked. Finally, Lynas refuses to disclose whether they will process uranium bearing ores in Gebeng from their newly acquired Malawian mine in Gebeng.

Source: Malaysia Today, 05 May 2011

Extract 3: China's Rare Earth Industry and Export Regime

Over the past few years, the Chinese government has implemented a number of policies to tighten its control over the production and export of rare earths, which are important to a number of high technology industries, including renewable energy and various defense systems.

Moreover, many analysts contend that China's recent actions to consolidate its rare earth production and restrict exports are intended to promote the development of domestic downstream industries, especially those engaged in high technology and green technology industries, by ensuring their access to adequate and low-cost supplies of rare earths.

It is further argued that China's rare earth export policies are intended to induce foreign rare earth users to move their operations to China, and subsequently, to transfer technology to Chinese firms. This would aid to increase the productive capacity of China.

China denies that its rare earth policies are political, discriminatory, or protectionist, but rather, are intended to address environmental concerns in China and to better manage and conserve limited resources. However, there could be adverse effect on the Chinese economy.

Source: adapted from Congressional Research Service www.crs.gov

Questions

(a) With reference to the data

i. Summarise the trends in global rare earth metals price from 2007 to 2010 [2]

General Trend: rare earth metals price has been generally increasing from 2007 to 2010	1m (Compulsory)
Refinements: except for the period between 2008 and 2009 where the price fell Or there was a sharp increase in rare earth metals price between 2009 to 2010	1m (for any one refinement)

ii. Prices of rare earth metals have changed differently for the period 2008-2009, and 2009-2010. Using demand and supply analysis, account for this difference. [4]

Account for price fall from 2008-2009: From Figure 2, world supply decrease. World demand also decreased. However, world supply decrease by less than world demand. This would create a surplus in the market. Draw diagram to show the different magnitudes of the shift. Show price fall diagram.	1m for explanation of the shift in the curve, 1 m for linking to price fall
Account for price increase from 2009-2010: From Figure 2, world supply remained the same. World demand increased. This would create a shortage in the market. Draw diagram to show the different magnitudes of the shift. Show price rise diagram.	1m for explanation of the shift in the curve, 1 m for linking to price increase

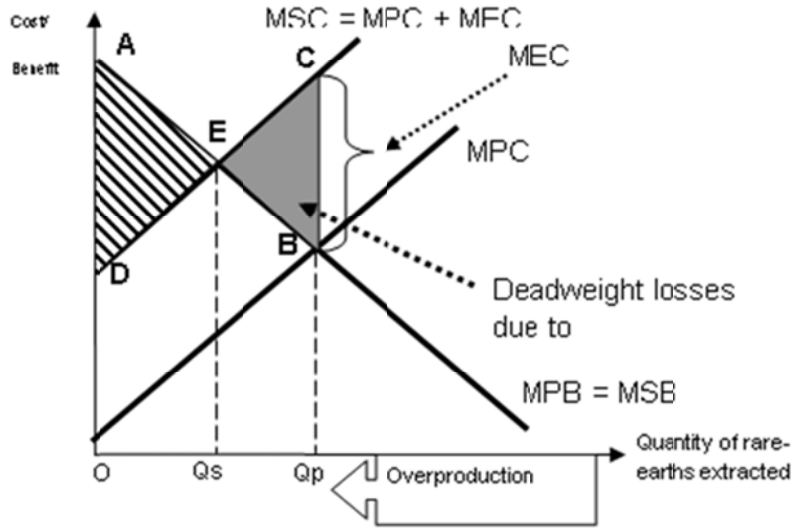
iii. What can be inferred from extract 1 about the rare earth metals prices in 2011? [2]

From extract 1: Demand for rare earth metals is expected to fall due to the recycling efforts to reuse the resource. Supply of rare earth metals is increasing with many countries also starting to produce them. Demand fall, supply increase, therefore price is predicted to fall in 2011.	1m for predicting price fall, 1 m for any reason.

(b) Explain why China adopted preferential policies for the producers of rare earth metals. [2]

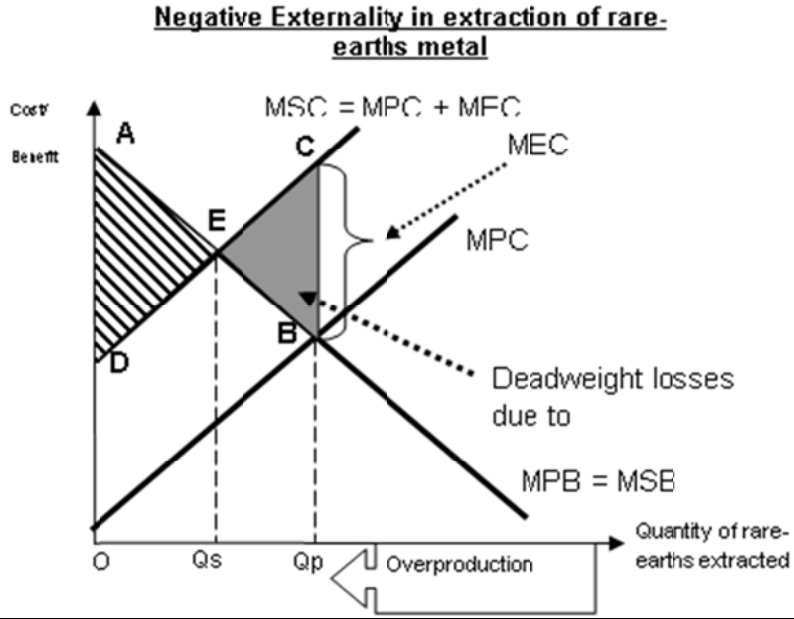
With preferential policies, the producers will be able to produce the good with a lower opportunity cost, i.e. more productively efficient, and thus gain comparative advantage. This is beneficial to China as it will boost their trade, and attract FDI into the country to make use of these cheap resources.	2m
Or China wants to control the rare earth metals industry by being the world's largest producer of rare earth metals.	

(c) i. With reference to the data, define and explain how negative externalities can arise in rare earth metals extraction. [4]

Negative externalities gives rise to external cost which arises when individual actions inflict costs upon a third party without the latter being compensated for. These are additional costs borne by people other than the producers or consumers directly involved in an economic activity.	1m for the definition of negative externalities
When producers extract rare earth metals, this process will impose an external cost on other people. For example, the waste from this extraction process contains high level of thorium which is radioactive(extract 2 para 2). This will lead to health problems like birth defects and leukemia, and lead to extra medical bills and costs on a third party. These external costs are not taken into account by the producers as they are only concerned with their own private costs and benefits from the extraction process. There is overallocation of resources to the extraction of rare earths metal with MSC > MPC. Diagram is optional but it is easier to show the negative externalities with the diagram. **Negative Externality in extraction of rare-earths metal**  	2m for explaining clearly what the external costs are using examples from the extract. 1m for describing MSC > MPC

ii. As a consultant economist, what options would you present to the Malaysian government for responding to the alleged negative externalities of rare earth metals extraction, and what would you recommend? Justify your answer. [8]

Show the diagram that reflects the negative externality in rare earth metals production.	



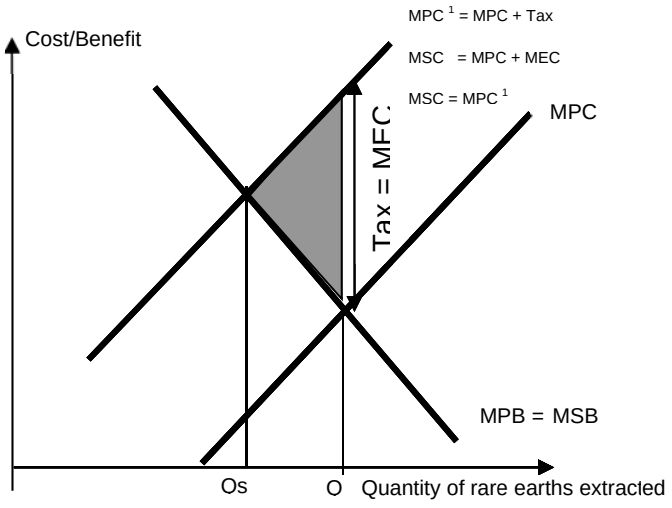
Goods that emit negative externalities in production would always be produced beyond the socially optimal level because of the presence of a deadweight loss (shaded area). As such any intervention devised to ensure that production occurs at the socially optimal level would internalise this externality. Several strategies that can do this are discussed below: -

At least 2 options.
1 compulsory tax option.

Each policy should be explained in detail with evaluative comments.

Conclusion and judgment (2m)

<u>Option1: Tax on production</u>



Imposition of Indirect Tax

The government may adopt the fiscal policy tool such as indirect tax to correct negative externalities. It might force firms to pay a fee or indirect tax on each unit of quantity produced corresponding to the MEC they exert on society (vertical MPC-MSC distance at Q).

An indirect tax charge on each unit of production has the same effect as an increase in the costs of production to the firms causing the externality. If this tax accurately reflects the MEC, firms in effect now have to pay for the use of (and harm caused to) the environment and their MPC will now coincide with the MSC.

Thus, the production cost of the firm now rises to MPC^1. The externality has then been 'internalised' i.e. taken into account by the firms in decision-making. As a result (of the decision-making adjustment), at output Q, MPC^1>MPB (and MSC>MSB), the firm would maximise its net private benefit if adjustments were made to re-establish private equilibrium (MPC^1=MPB) – until the point where the deadweight loss to society ceases to exist and net social benefit is also maximised (ie. output where MPC^1=MPB=MSC=MSB). With reference to Figure 3, the quantity being produced after the imposition (and internalisation) of the indirect tax now corresponds to the socially optimal level, Qs

Evaluation: Using taxation as an incentive to reduce or internalise the externality could be rather cumbersome, tedious and administratively costly. Furthermore the external costs incurred, is sometimes difficult to measure accurately. Under-taxation will not completely eliminate the deadweight loss to society and over taxation will lead to deadweight loss being created.

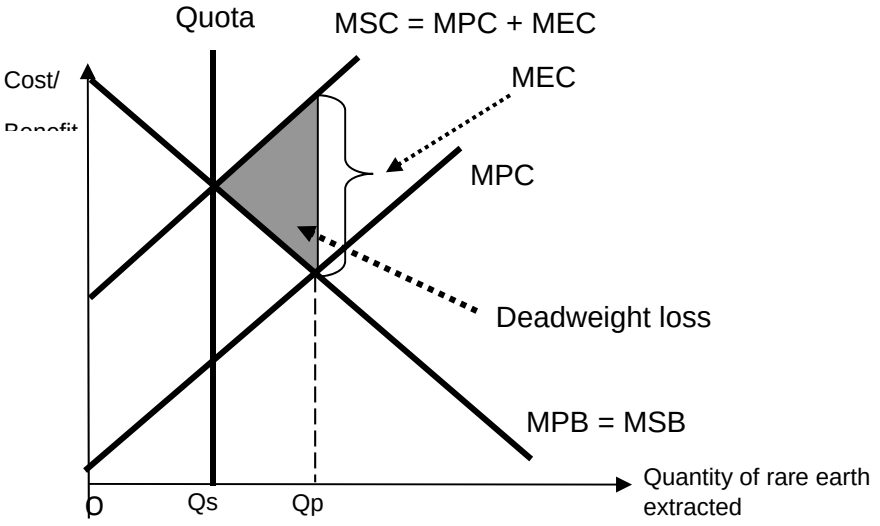
Option 2: Legislation/Regulation

These can take on various forms:

- minimum emission standards,
- maximum quantity extracted/sold,
- regulations governing production: Having more restrictions and rules on the production of rare earth metals.

All these are forms of command or control policies that have an effect on the market.

Imposition of a production Quota (Legal Limit)



Quantity Restrictions

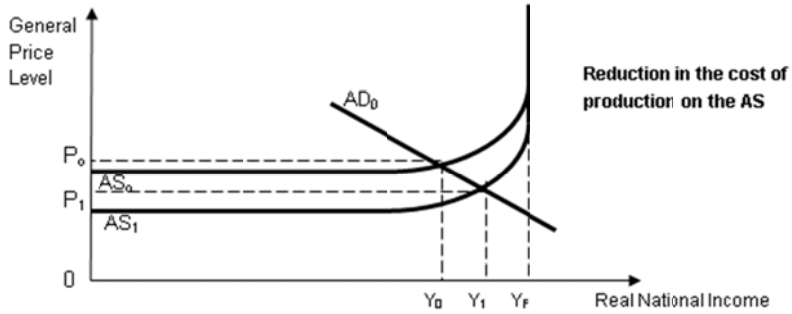
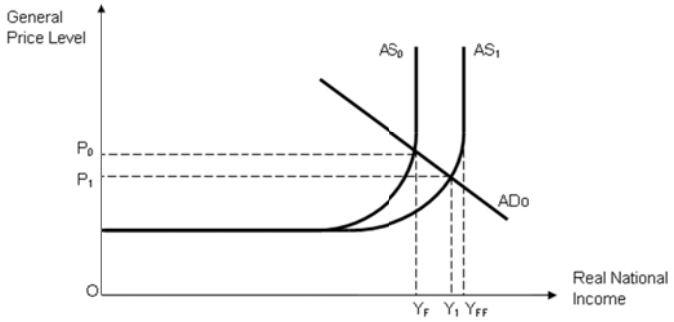
One way the Malaysian government chose to reduce production is to impose a production quota equal to Qs on the quantity extracted

(assuming Qs is also the socially optimal level). With reference to the figure, if a quota is imposed, firms would have no choice but to limit the supply to Qs instead of Qp and the deadweight loss (shaded area) is eliminated. Evaluation: It incurs a compliance cost. The penalties for non-compliance must be sufficiently harsh and inspections must be sufficiently frequent and rigorous for the regulation to be an efficient means to reduce external costs. This however, implies the use of additional scarce resources which may pose a strain on the efficient resource allocation in other markets. Option 3: Permits to extract. Option 4 Total ban on production The Malaysian government can also ban extraction of rare earth metals and this will totally remove the externalities that arise. Evaluation: Due to a total ban, the loss in net social benefit could be bigger than the removal of the dead weight loss due to the externality. Option 5: Relocation to a place not near populated areas / not near residences.	
Recommended Policy: Malaysian government can consider tax on production together with regulations on location as they are relatively easier to administer and less costly to maintain, compared to quotas. In addition, tax will generate revenue for the Malaysian government and these could be used to cover any extra expenses used to regulate this industry. The total ban is not recommended as the loss in foreign direct investments is a greater loss than the dead weight loss from the externality.	

L1	Well explained one option, or 2 vaguely explained options. No diagrammatic illustrations	1-3
L2	At least 2 options. 1 must be a tax option. Each policy should be explained in detail. Must have at least one diagrammatic illustration.	4-6
E1	Clear judgement and justification of judgement made with proper conclusion	1-2

(d) China can only benefit from the implementation of export restrictions on rare earth metals. Discuss. [8]

This question requires a 2 sided approach to discuss the benefits and costs on China. Briefly describe how export restrictions work	
Thesis statement: China will benefit from the implementation of export restrictions on rare earth metals. Body 1: "intended to promote the development of domestic	3m for thesis

downstream industries, especially those engaged in high technology and green technology industries, by ensuring their access to adequate and low-cost supplies of rare earths." Extract 3 Elaborate and explain further This will generally reduce the cost of production and increase the Aggregate supply. This can be show on the diagram where the SRAS shifts downward.  Impact on Income: Rise in real national Income Employment: As Y0 increase to Y1, there is more employment of resources on the economy, this adds on a positive effect on the economy. Prices: Due to the increase in Aggregate Supply, the general price level decreased from P0 to P1. This cools down the economy and ensures prices remains fairly stable. Body 2: "China's rare earth export policies are intended to induce foreign rare earth users to move their operations to China, and subsequently, to transfer technology to Chinese firms. This would aid to increase the productive capacity of China." Extract 3 Elaborate and explain further This will cause the productive capacity to increase, thereby an increase in the Aggregate Supply. The LRAS will shift to the right.  **Figure 3: Increase in LRAS and Its Effects on Price and Income and Full Employment Level ofNational Income** Explain effects on Y, E, P	
Anti-Thesis: China will not benefit from the implementation of	3m for anti-

export restrictions on rare earth metals. Body 3: In the short run, export restrictions have adverse effects on the Aggregate Demand. AD will rise slower, as exports of rare earth metals is regulated, thereby affecting the overall exports revenue of China. Diagram to show. In the long run, Japan, and other countries decrease demand due to methods to recycle rare earth metals from old electronic appliances, and used car batteries etc. Extract 1. Also, Supply will rise as there are other countries extracting rare earth metals too. Extract 1. This will hurt the China economy in the long run as exports will fall significantly. Body 4: Strain bilateral relationship with other countries. Volume of world trade, employment and incomes may fall. Export restrictions brings about retaliation from countries who are affected. Prices of rare earth metals would also rise. This leads to a reduction in the volume of world trade, employment and incomes. This may even result in worldwide depression.	thesis
Evaluation and Conclusion: As China wants to adopt a fast and strong economic growth, their policies would be aligned to achieving that. Moreover, with the huge benefits that can arise on the aggregate supply of China, the benefits arising from this export restrictions will greatly outweigh the costs incurred. However, in the longer run, there could be adverse effects due to decrease in demand, and increase in world (ex China) supply of rare earth metals.	Students need to form their own judgment and conclude accordingly, with justification (2m)

L1	One sided argument with little or no discussion on the possible disadvantages of export restrictions.	1-3
L2	Balanced argument with a clear development of the possible benefits and disadvantages of the export restrictions.	4-6
E1	Clear judgement and justification of judgement made with proper conclusion	1-2