Question 1: Government intervention in the market for rare earths Suggested answers

(a)	With evidence from Extract 1,			
	(i)	What can you conclude about the price elasticity of supply of rare		
		earth elements (REEs)?	[2]	

- Extract 1 mentions that "extracting, processing and refining REEs are tricky for a myriad of technical and environmental reasons". This suggests that the production of REEs is highly complex with a lengthy production process. [1]
- The supply of REEs would hence be price inelastic [1] with quantity supplied increasing less than proportionately when price increases.
 - (ii) Using a demand and supply diagram, explain the likely change in the REEs market in the future. [4]
- The demand for REEs like dysprosium and terbium are derived from the demand for electric vehicles because these elements are factor inputs in the production of electric vehicles. [1]
- Amid the ongoing race to create a large electric vehicle market (Extract 1), the derived demand for REEs will continue to increase, shown by the rightward shift of the demand curve from D0 to D1. [1]

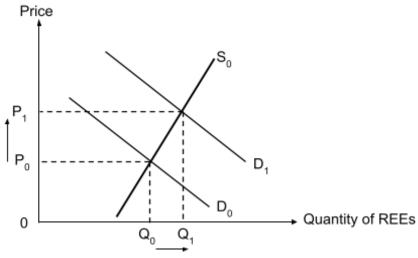


Figure 1: REEs market

- [1] for a fully labelled and accurately drawn diagram
- Given a price inelastic supply of REEs as concluded in (a)(i), an increase in the demand for REEs in the future will lead to a significant increase in price from P0 to P1, and a slight increase in equilibrium quantity from Q0 to Q1. [1]

(b) With reference to Figure 1, summarise the trend of the price of dysprosium oxide during the period 2009 – 2024.

[2]

General trend:

o The price of dysprosium oxide is <u>forecasted</u> to increase generally during the period 2009-2024. **[1]**

Refinement:

o except for the years 2016-18 where the price decreased. [1]

OR

o There was a spike in 2011. [1]

(c) Explain the meaning of a positive statement and a normative statement and identify an example of each type from Extract 2.

- A positive statement is an <u>objective statement</u> whose accuracy can be tested by looking at evidence. [1]
- One example is "the removal of these elements from the earth's crust, using a mix of water and chemicals, caused extensive water and soil pollution." [1]

OR

- "Other pollutants, such as cadmium and lead, also are released during the mining process; long-term exposure to these metals poses health risks."
- A normative statement involves <u>value judgement</u> and is <u>subjective</u>; cannot be proven or disproved by looking at facts. [1]
- An example is "There is talk that similar mining could be started in Africa and other regions, so we should not repeat the same mistakes." [1] OR
- "Ma's fear is that other regions around the world could suffer a similar fate if they become, like China, the supplier of cheap rare earth elements, with little or no environmental price attached."

(d) To what extent would rare earth mining improve the standard of living of people in China? Discuss. [8]

Question interpretation

Command phrase	To what extentimprove	Balanced discussion on both sides (SOL improved and worsened) before an evaluative conclusion on the overall extent
Content	Standard of living (SOL)	Material (supported with AD/AS analysis) and non-material SOL
Context	Rare earth mining and people in China	Evidence from case material on the effects of rare earth mining on the people in China.

This question requires a balanced discussion on the effects of rare earth mining to the standard of living (improve and worsen) of the people in China. The discussion should be undergirded by AD/AS analysis where relevant and supported with evidence from case material before coming to a reasoned conclusion on the overall extent mining REEs improves SOL in China.

Introduction

- With the intensification of rare earth mining in China (Extract 2), it remains to be seen whether the standard of living would improve or decrease.
- Standard of living comprises two components, material standard of living and non-material standard of living.

Thesis: Rare earth mining would improve the standard of living of people in China

- The mining of rare earth could have increased the material standard of living of people in China as it increases the national income of her people through its net export revenue.
- As China dominates the global REE supply chain (Extract 3), an increase in the extraction of rare earths to meet the explosion of demand for REEs (Extract 1) will increase the export revenue of China, increasing its (X-M), and thus increasing the AD.
 - o Assuming spare capacity, the increase in (X-M) will trigger successive rounds of income-induced consumption due to the multiplier effect.
 - o AD increases from AD_0 to AD_1 because of the initial injection, and eventually to AD_2 because of the multiplier effect. This would result in an increase in real GDP from Y_0 to Y_2 , where there is *higher actual economic growth*.

General Price Level (GPL)

AS

P₂
P₁
AD₀
AD₁
Real GDP

Figure 2: Higher actual economic growth from REEs mining

- o If the rate of real GDP growth rate exceeds the population growth, there will be an increase in *real GDP per capita*. This translates to consumers having greater purchasing power and hence higher ability to purchase more goods and services. This increases their material standards of living.
- With higher actual growth from increased REE mining, the increase in output also increases the derived demand for labour, reducing demand deficient unemployment from $Y_f Y_0$ to $Y_f Y_2$.
 - o With more people having jobs and incomes, this will increase the opportunity costs of committing crime. The crime rates in China would be expected to reduce, leading to an improvement in non-material standard of living as well.

OR

o The increase in incomes from the higher employment rates would mean higher tax revenue for the government, increasing the government's budget and ability to spend more on education and healthcare to improve literacy rates and life expectancy rate, increasing China's non-material SOL.

Anti-thesis: Rare earth mining may decrease the standard of living of people in China

- However, the mining of rare earths generates negative externalities which would decrease the non-material standard of living of people in China.
 - o The extraction of REEs generate spillover costs in terms of "extensive soil and water pollution" (Extract 2) to third parties who are not involved in the rare earth mining process. These people are the residents staying nearby the rare earth mines.
 - The pollution would worsen air and water quality and lower sanitary levels, leading to people developing illnesses, reducing life expectancy rates and lower non-material standard of living.
- If a significant number of people fell ill due to the pollution, and lose the ability to work, the fall in incomes may also worsen the material stand of living.

Evaluative Conclusion

- [Stand + Alternative] As rare earth mining could raise the material living standards of
 residents in China due to an increase in net export revenue and hence income, the overall
 impact on resident's living standards depends on the government's ability to mitigate the
 negative externalities in production.
 - o With tougher regulation to stem the damage done by rare earth mining, together with more sustainable mining practices (Extract 4), these negative effects are likely to be minimised. Thus, rare earth mining would improve the living standards of people in China.

OR

• [Time Frame + Stand] In the short run, the production of rare earths suffers from negative externalities in production, hurting residents' non-material living standards. However, in the long run, as China take steps to fix the issues and enacting tougher regulations to mitigate the negative effects (Extract 4), rare earth mining will likely raise the living standards of people in China in the future.

Mark Scheme

Level	Knowledge, Application/Understanding, and Analysis	Marks
L2	 For a well-developed answer that has: good scope – explains the impact of rare earth mining on the material and non-material SOL of people in China; and good balance – explains the positive and negative impacts of rare earth mining on SOL; and good rigour – explains using AD/AS analysis; and good application to context – applies analysis to the context of China 	4 – 6
L1	 For an under-developed answer that: lacks scope – did not explain the impact of rare earth mining on the material SOL or non-material SOL; and/or lacks balance – did not explain the positive or negative impact of rare earth mining on SOL; and/or lacks rigour – descriptive explanation of how SOL of the Chinese is affected by rare earth mining lacks application to context – did not explain change in SOL using case material. 	1 – 3

Е	For a well-reasoned judgement on the extent to which rare earth	1 – 2
	mining will improve or worsen the material and non-material SOL of	
	people in China.	

(e) Discuss the view that tougher government regulations for mining companies to 'upgrade their equipment to more modern, efficient technology in rare earth mining' (Extract 4) is the best policy to alleviate the negative effects in the extraction of rare earth metals.

[10

Question interpretation

Command word/phrase	Discuss the viewbest policy	Present a balanced perspective of the workings and limitations/unintended consequences of two policies, one of which is the policy stated in the question followed by a well-substantiated judgement on which policy would be better.
Content	Regulations for upgrade equipment Alleviate the negative effects	The use of more efficient technology can help reduce the MEC associated with the extraction of REEs. Address the negative externalities in (f)(i) and improve allocative efficiency
Context	Extraction of rare earth metals	The case material should be used, where applicable.

A relevant response requires a balanced analysis of the appropriateness of two policies, including the tougher regulations for firms to upgrade their mining equipment through technology, in terms of their workings and limitations/unintended consequences in addressing negative externalities before making a well-reasoned judgment on overall appropriateness of the policies in addressing the market failure.

Introduction

- [Set context and outline approach] The extraction of rare earth metals generate negative externalities, causing residents living near mining sites, the third parties, to suffer health issues and incur higher health costs due to pollutants such as cadmium and lead (Extract 2). The presence of MEC would lead to overproduction of REEs, and result in deadweight loss (DWL).
 - o Alleviating the negative effects in the extraction of rare earth metals would hence require a reduction of the DWL.
- **[Outline approach]** Besides tougher government regulations for mining companies to upgrade their equipment, a government can also impose an indirect tax on REE mining.

Policy 1: Explain how tougher regulations for firms to upgrade to more efficient technology can reduce the extent of negative externalities to alleviate the negative effects, alongside its limitations

 Tougher regulations for firms to upgrade to more efficient technology will reduce the extent of negative externalities, and hence reduce the deadweight loss to improve allocative efficiency.

- **o** As companies upgrade their equipment to more modern and efficient technology, the extraction process will release lesser pollutants into the atmosphere.
- **o** This represents a decrease in the spillover costs to third parties, leading to a decrease in the MEC in rare earth mining.
- **o** As MEC decreases, MSC moves to MSC', which is nearer to MPC. The new socially optimal level of rare earth mining is at Qs', where MSC' = MSN, which is closer to Qp.
- o The DWL falls, hence alleviating the negative effects of rare earth mining.

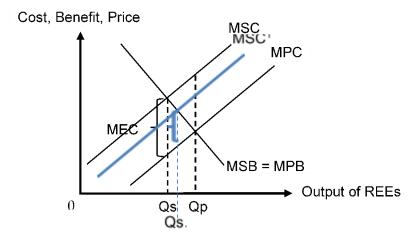


Figure 3: Effects of tougher regulations

 This policy could incur high administrative costs on governments to monitor and enforce the regulation as inspections would need to be carried out periodically. This incurs an opportunity cost as the budget could have otherwise been spent on other areas such as improving the healthcare industry.

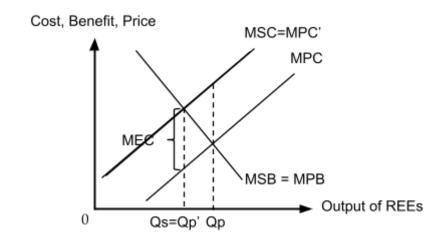
OR

This policy is likely to be limited in its effectiveness as the mandate to upgrade to more
modern, efficient technology would require governments to have a good understanding of
the REE mining industry and the available technologies. However, imperfect information
could reduce the extent to which MEC can be reduced and hence the reduction in the
DWL.

Policy 2: Explain how an indirect tax can reduce the extent of negative externalities to alleviate the negative effects, alongside its limitations

- Another policy that a government can implement is an indirect tax on REE mining so that the "external [pollution costs] could be internalised in the cost" of products (Extract 2).
- By implementing a per-unit tax equal to the MEC at Qs, this forces producers to internalise the external costs to third parties by raising their unit costs of production, increasing the MPC.
- This is shown as a shift of the MPC curve to the MPC', which coincides with the MSC curve.
 - o The new private optimal production level, Qp', where MPC' = MPB, falls to coincide with Qs, achieving allocative efficiency.
 - o The DWL is eliminated, alleviating the negative effects of mining.





- However, the government is likely to have imperfect information regarding the monetary value of the MEC generated at Qs. Estimates would have to made, and errors in terms of under-estimation or over-estimation would mean that allocative inefficiency would still persist in the REEs market.
 - o Moreover, an overestimation could result in a tax that is too high, possibly leading to government failure where the DWL generated could be greater than before non-intervention.

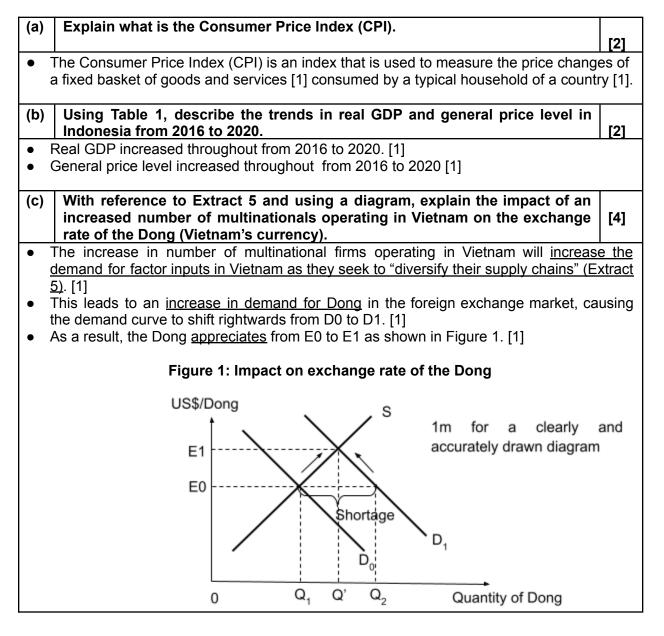
Evaluative conclusion

- **[Stand]** Tougher regulations alone may not be the best policy to alleviate the negative effects of rare earth extraction. A combination of both tougher regulations and indirect taxes may be more suitable instead.
- [Alternative] The taxation is a short run policy which can yield immediate effects and raise tax revenue. Given China's domination in the global market for rare earth elements and the rising global demand, it is likely to generate substantial tax revenue for China which can be directed towards enforcement of regulation and be used to finance the research and development into cleaner technology, whose effects can only be reaped in the long run.

Mark Scheme

Level	Knowledge, Application/Understanding, and Analysis	Marks
L2	 For a well-developed answer that has: good scope – explains the tougher regulations for firms to upgrade to more efficient technology in rare earth mining and one alternative policy to alleviate the negative externalities in rare earth metals extraction. and balance – explains both the workings and limitations/unintended consequences of both policies; and good rigour – explains using benefit-cost market failure analysis; and good application to context 	5 – 7
L2	 For an under-developed answer that: lacks scope – did not explain an alternative policy to alleviate the negative externalities in rare earth metals extraction lacks balance – did not explain the limitations/unintended consequences of both policies; and/or lacks rigour – descriptive explanation of the workings and limitations/unintended consequences of both policies in addressing the negative externalities of rare earth metals extraction; and/or lacks application to context – limited use of case material to support analysis 	1 – 4
E	A well-reasoned judgement on the extent to which the tougher regulations for firms to upgrade to more efficient technology in rare earth mining is the best policy to alleviate the negative effects in the extraction of rare earth metals.	1 – 3

Question 2: Opportunities and Challenges in Southeast Asian economies Suggested answers



(d) With reference to Extract 5 and the use of a diagram, explain one reason why a firm like "Apple now has plans to manufacture its high-end Airpods studio earphone in Vietnam".

- As mentioned in Extract 5, China is now a less attractive a place to manufacture due to the number of tariffs in place. Apple will thus be inclined to manufacture in Vietnam instead as it allows them to get around the tariffs. [1]
- Due to an absence of tariffs, there is a lower cost of production as compared to manufacturing in China, leading to a fall in MC and AC from MC1 and AC1 to MC2 and AC2 respectively when they manufacture in Vietnam. [1]
- Profits increase from P1abC1 to P2deC2 [1]

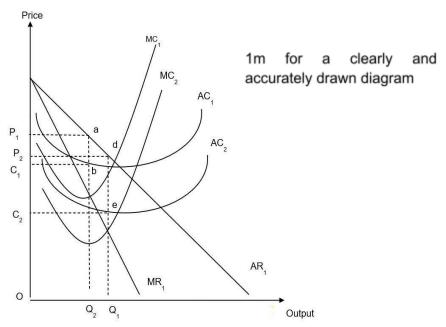


Figure 2: Increase in profits of Apple

(e) Using economic analysis and based on the evidence provided, assess whether open economies such as Vietnam and Singapore would gain or lose from the US-China trade war.

Question interpretation

Command word/ phrase	Assess	To provide a balanced analysis of gains and losses for the two economies from the US-China trade war, before coming to a well-reasoned judgement.
Content	US-China trade war leading to loss or gains for the two open economies	Students are expected to use AD/AS analysis to examine how the US-China

		trade war will affect the macroeconomic performance of Vietnam and Singapore.
Context	Vietnam and Singapore	Extract 5 & 6

Candidates should explain how the US-China trade war will affect the AD and AS of the two open economies Vietnam and Singapore. Gains and losses should be explained in terms of actual or potential growth and/or unemployment. They can also explain the impact in terms of material and non-material standard of living (SOL). A well-substantiated evaluative judgement on the overall impact (gains and loss) is required.

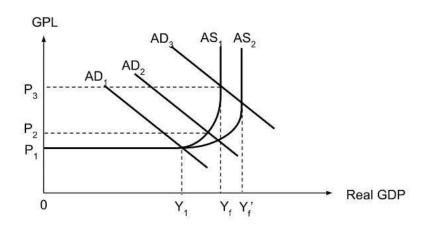
Introduction

 [Set the context] Open economies such as Vietnam and Singapore experience relatively free flows of trade, capital and labour. The US-China trade war has differing impacts on the two open economies, in terms of their macroeconomic performance, with opportunities and threats.

Body 1: Vietnam gains from US-China trade war

- Due to its openness to capital flows, Vietnam has benefitted from the US-China trade war.
- Due to the tariffs imposed on China, Vietnam has become a more attractive place for US companies to manufacture goods since there are no tariffs in place on exports from Vietnam to US. This is evident from Extract 5, where "Many multinationals have started operating in Vietnam, including global technology leaders like Apple and Samsung."
- Multinationals relocating to Vietnam increases the Foreign Direct Investment (FDI) into Vietnam. This increases investment expenditure (I), which increases AD.
- Below the full employment level, there will be a <u>multiplier effect</u> due to the multiplied increase in income-induced consumption. AD increases from AD₁ to AD₂ because of the initial injection, and eventually to AD₃ because of the multiplier effect. As shown in Figure 3, this would result in an increase in real GDP from Y₁ to Yf, where there is *higher actual economic growth*.
- The increase in real GDP will also increase the derived demand for labour as more workers are hired to produce more goods and services, decreasing demand-deficient unemployment.

Figure 3: Impact of US-China Trade War



- The increase in FDI also leads to an increase in productive capacity, leading to an increase in the AS, shown in the above figure as a rightward shift of the AS curve. As real GDP increases from Yf to Yf', Vietnam enjoys *higher potential growth*.
- In addition, the increase in AD and AS in tandem will lead to *higher sustained economic growth*, where real GDP increases from Y1 to Yf', with lower inflationary pressures.
 - o This is supported by the IMF's prediction of a strong economic recovery in 2021, with growth projected to strengthen 6.5% "as normalization of domestic and foreign economic activity continues." (Extract 5).

Body 2: Singapore loses from US-China trade war

- On the other hand, the US-China trade war has brought about losses to Singapore.
- Due to the openness of the Singapore economy, it has a role in the global supply chain which has been disrupted by the US-China trade war. As stated in Extract, even though tariffs aren't imposed on Singapore exports, Singapore companies that produce intermediate goods used as inputs in the production of China's exports to the US may see a lower demand. With demand for exports falling, (X-M) falls, leading to AD and real GDP falling.
- The decrease real GDP will also decrease the derived demand for labour as fewer workers are hired to produce more goods and services, *increasing demand-deficient* unemployment. (can also link to SOL)

Evaluative Conclusion (stand + 1 well-substantiated A-T-M-S angle)

- **[Stand]** Overall, it would seem that Singapore loses while Vietnam gains from the US-China trade war.
- **[Time frame]** However, if the US-China trade war intensifies further, the resulting decline in global economic growth and incomes is likely to lead to a fall in demand for exports worldwide, and Vietnam could experience a fall in exports and actual growth as well.
- [Situation] Depending on how similar Singapore exports are to Chinese exports, Singapore's exports could increase if US switches from more expensive tariff-imposed Chinese goods to Singapore goods. Moreover, Singapore could also attract US companies to relocate there and this could lead to more gains than losses for the economy.

Mark Scheme

Level	Knowledge, Application/Understanding, and Analysis	Marks
L2	 For a well-developed answer that has: good scope – explains the impact of US-China trade war on the macroeconomic performance in terms of the macroeconomic goals (e.g. economic growth, unemployment) good balance – explains both the benefits and costs of US-China trade war on Vietnam and Singapore; and good rigour – explains using AD/AS analysis, supported by relevant diagram(s); and good application to context – explains using the context of the two economies mentioned in Extracts 5 and 6. 	4 – 6
L1	 For an under-developed answer that: lacks scope – explains the impact of US-China trade war on only 1 macroeconomic goal of the two economies; and/or lacks balance – only explains the benefits OR costs of US-China trade war; and/or lacks rigour – descriptive explanation without use of AD/AS analysis or diagram(s) lacks application to context – answer is purely theoretical and did not explain using case material. 	1 – 3
E	For a well-reasoned judgement on the overall impact of US-China trade war on the two economies.	1 – 2

(f)	Assess whether tackling falling growth rate is more important than raising	[10
	productivity.]

Question interpretation

Command word/phrase	Assess whether	Give a balanced and comparative analysis of the the benefits of tackling falling growth rate over raising productivity and vice versa, before providing a judgement on which which aim takes precedence.
Content	Falling growth ratesraising productivity	Analyse the impact (consequences) of actual growth vs productivity growth More important in terms of benefits
	More important	'
Context	Not stated	Answer should make reference to case material and bring in relevant examples of economies - Singapore or any economy is acceptable.

Introduction

 Falling growth rates could refer to a slower rate of positive actual growth or even negative actual growth.

- Raising productivity involves an increase in the quality of factors of production, resulting in an increase in output produced per unit input.
- Both tackling falling economic growth and raising productivity are important goals and this essay assesses whether the former should take precedence over the latter.

Body

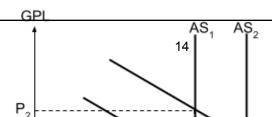
Thesis: Explain how tackling falling economic growth may be more important than raising productivity.

- If the adverse consequences from falling economic growth rate are significant, tackling falling economic growth rates may be more important than raising productivity.
- Slower actual growth can occur from a slower than expected growth or a decline in any of
 the components of the AD. This can lead to pessimism in the outlook of the economy. As
 consumer and business confidence falls, C and I will also fall because consumers are
 pessimistic about their future expected incomes, and firms are pessimistic about their
 future expected profits. This will then give rise to negative growth, lower incomes and
 lower material SOL.
- Furthermore, continued weak economic growth could limit the amount of resources available to sustain growth, since there is less investment in capital, resulting in lower productive capacity and slower or even lower potential growth in the long run. Lower sustained growth limits both current and future material SOL as households have lower current and future incomes.
- With slower growth, the government collects less tax revenue, which can in turn limit its
 ability to enact redistributive policies to reduce income inequality to promote more
 inclusive growth. Non-material SOL could also be lowered if the lower tax revenue
 impacts the government's ability to spend on healthcare and education.
- Hence, in such a situation where there is a drastic fall in growth rates resulting in significant negative growth and a full-blown recession, governments should focus on boosting the growth rates to mitigate the negative consequences of a recession.

Anti-Thesis: Raising productivity growth is more important than tackling falling growth rates.

- Governments may decide to focus on raising productivity growth due to the positive consequences on its long-term growth.
- The potential growth is especially important for economies that are operating near full employment. Without an increase in productive capacity, further actual growth is not possible. This is because at full employment level, an increase in AD causes factor prices to be bidded up as firms compete for factors of production that are in shortage, leading to demand-pull inflation as firms. This is the case in Indonesia where much higher growth is a challenge due to "stagnant productivity" which is the "main factor constraining potential growth" (Extract 7).
- By raising productivity, the increase in LRAS together with an increase in AD can lead to sustained growth as shown in Figure 4, where there is an increase in real GDP from Y1 to Y3 with no significant upward pressure on GPL (slight increase in GPL from P1 to P3). This increases both current and future material SOL.

Figure 4: Sustained growth arising from raising productivity





Evaluative conclusion (stand + 1 well-reasoned ATMS evaluative angle)

- **[Stand]**: Whether tackling falling economic growth is more important than raising productivity depends on the current economic state of the economy.
- [Situation]: While productivity growth is important, it takes a lower priority when there is an economic fallout as severe as the one during Covid-19. The economic fallout from Covid-19 was the most severe, surpassing even the SARS outbreak of 2002 and September 2001 attacks where the impact was more short-lived. Weaker economic growth during Covid could dampen already weak business and consumer confidence, and this could tip the economy into a full-blown recession, where growth rates become negative. Moreover, efforts at raising productivity have unpredictable outcomes, unlike efforts to boost economic growth by increasing government expenditure and through transfer payments to households. Ultimately boosting growth to preserve jobs takes precedence during times of recessions.

OR

- **[Stand]:** Whether tackling falling economic growth is more important than raising productivity depends on the severity of falling growth rates and types of challenges faced by the economy.
- [Situation]: If growth rates are still positive despite weaker growth, governments may choose to focus on raising productivity to address other challenges instead. For instance, while Singapore has been facing lower growth over the years, its growth rate was still forecasted to be "within the range of 0.5 to 2.5 per cent in 2020" (Extract 5). On the other hand, there are greater threats to its long-term growth, in the form of an "ageing population and weakening productivity". Without an increase in productivity through greater investment in automation for instance, Singapore is likely to face limited potential growth which will greatly limit its ability to achieve sustained growth in the long run. Hence, for such economies facing long-term demographic challenges which threatens its long-term growth, boosting productivity is more important than tackling falling growth rates.

Student's Evaluation (Wang Yiqin, CG 06/21)

- [Stand]: In conclusion, tackling falling growth rate and raising productivity are both important as focussing on one objective alone would inevitably lead to creation of other unintended economic problems.
- [Alternative]: If the focus is on tackling falling growth rate and productivity growth is ignored, there may be significant inflation. If the focus is on productivity and not falling growth rate, unemployment could keep rising. Hence, both objectives must be taken care of.

• [Situation]: However, in real world situations, which objective to place more importance on depends on the situation of the economy as it is costly and incurs great opportunity cost to focus on both. Developing countries should focus on falling growth rates more as they are likely to have spare capacity in the economy for AD to rise further, while developed countries should focus on productivity more for future growth.

Mark Scheme

Level	Knowledge, Application/Understanding, and Analysis	Marks
L2	 A well-developed answer that has: Good balance and scope – analyses the benefits of tackling falling economic growth and raising productivity; and Good rigour – analyses the benefits of tackling falling economic growth and raising productivity using AD/AS analysis; and Good application – arguments are supported with case evidence and examples of Southeast Asian economies where relevant. 	5 – 7
L2	 For an answer that: Lacks balance and scope - analyses only the benefits of tackling falling economic growth or raising productivity; and/or Lacks rigour - there are gaps in explaining the benefits of tackling falling economic growth or raising productivity; and/or Lacks application - there is little or no support with case evidence and examples of Southeast Asian economies. 	1 – 4
E	For a well substantiated conclusion on whether tackling falling economic growth is more important than raising productivity.	1 – 3