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ECONOMICS Higher 2 Syllabus 9570

Examiner's Report

Year 5 Common Test 2023



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ECONOMICS

Y5 H2 Common Test 2023

Paper	9570/01
Paper	1

Case Study

(a) With reference to extract 1, explain one fixed and one variable cost that a hawker food vendor faces. [4m]

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- <u>Fixed cost is cost that does not vary with output</u>, where output can be defined as the number of meals produced. For instance, Rental cost, the hawker food stall vendor would still have to incur rental payment even though no meals are produced as the stall may close and shut down operations. [2m]

- <u>Variable cost is cost that varies with output</u> (being the number of meals produced). For instance, the cost of ingredients used in cooking. As more meals are produced, more of such ingredient costs will be incurred to prepare them. [2m]

Examiners' Comments

 Most candidates were able to correctly explain fixed and variable costs in relation to output and give relevant examples.

AFIs (Area for Improvements)

- However, some did not link fixed and variable costs explicitly to output.
- Several candidates wrongly cited staff salaries as a variable cost. In the given context, staff salaries were clearly stated as an overhead cost which is a fixed cost.
- A few candidates were confused about the difference between output and demand. The demand for a good can increase or decrease, but reference must be made to the effect on output that is produced eventually.

(b) Explain which market structure a hawker food stall is likely to operate in. [2m]

State the likely market structure: MPC [1m]

Explain: Extract 1 suggests that with the "highly fragmented" nature of the hawker food industries with "many small...hawker food vendors", the industry is characterised by many small-scale producers suggesting a lack of market dominance and sell slightly differentiated products in terms of the different cuisines or different cooking style of the dishes. [1m]

Examiners' Comments

AFI: Candidates need to realise that for this question, the mere justification that there are many small firms is not sufficient to distinguish Monopolistically Competitive (MPC) market structure from a Perfectly Competitive market structure. Candidates are required to further substantiate with another distinctive characteristic like slightly differentiated products or low barriers to entry.

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[Turn Over

Commented [ETH1]: PIs move away from explaining why a particular cost is a variable cost because it is not incurred if there is no production or if the firm choose to shutdown. Look at the definition, you should be justifying it with "whether it varies with o/p!"

Commented [ETH2]: Top-tier answers contectualises the o.p to the context of the qns

Commented [ETH3]: Students are expected to spell out fully and correctly

Commented [ETH4]: The students must use the case extract to support their answer and not listing out all the theoretical knowledge on the characteristics of an MPC

(c) With reference to Figure 1, describe the trend of the prices of hawker food in Singapore. [2m]

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General trend: Prices generally increased [1m]

Refinement: Between 2021-2022, prices increased sharply. [1m]

Examiners' comments:

AFI: A small number of responses confused prices with price index. Candidates are expected to explain how prices changed based on an inference from the price index.

(d) With the aid of a diagram, explain the effect of supply disruptions on producer surplus in the market for hawker food. [4m]

- Explain the SS-side disruptions:
- From Extract 1 para 2:" Supply disruptions caused by the war in Ukraine have caused prices of energy and fertiliser to soar", this results in the rise in cost of ingredients as the production of food ingredients would likely cost more, increase COP \rightarrow fall in SS for hawker food, shifting supply curve leftwards from S₀ to S₁. At prevailing price P₀, a shortage is generated which results in an upward pressure on prices, cet par, increase in hawker food prices from P₀ to P₁ causes a more than proportionate fall in qty traded from Q₀ to Q₁ [2m]
- <u>Link to effect on producer surplus</u>: Hence there will be a fall producer surplus from area P₀bd to area P₁ac as the rise in the minimum price that producers are willing to receive has increased more than the increase in the market price received [1m]
- Diagram to illustrate effect on producer surplus [1m]



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Examiners' comments:

AFIs:

• A significant number of responses simply stated that SS-side disruptions cause a fall in SS but did not explain what specifically these SS-side disruptions were and how they resulted in a rise in COP and a fall in SS.

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- Weaker responses did not explain the market adjustment process.
- The explanation of the effect on producer surplus was in general poorly done. Most answers simply stated that given the reduction in the area representing the producer surplus in the diagram, the producer surplus has fallen. This approach does not explain the reasoning behind the fall in the producer surplus. Instead, what is expected is that the producer surplus has fallen due to (i) the minimum price the producer must receive has risen resulting in a reduction in the difference between what the producer is actually receiving versus the minimum of what the producer is willing to receive (ii) the quantity traded has also fallen.
- Some candidates did not understand the concept of producer surplus and were not able to correctly identify the area of producer surplus on the diagram.
- Some candidates were hampered also by poorly drawn demand and supply curves that did not extend fully to the y-axis or supply curves that extended below the x-axis.

(e) Discuss whether a large restaurant will always enjoy more cost advantages as compared to a hawker food vendor. [8m]

Introduction:

Clarify meaning of cost advantages: lower average cost of production – due to larger scale of production and thus the ability to enjoy IEOS.

Analysis

Thesis: Explain why a large restaurant can enjoy more cost advantages relative to a smaller hawker food vendor

(Only 1 well-explained source of IEOS is required)

- Consider the various types of IEOS that a large restaurant can enjoy e.g. Marketing and Technical IEOS
- Explain how these cost advantages arise for a large restaurant by being able to operate at a large scale of production and substantiate with case evidence.

Marketing EOS:

E.g, a large restaurant is better able to purchase food ingredients in bulk with a larger scale of production, hence they are better able to negotiate better pricing for the food ingredients and enjoy substantially lower long-run average cost of production as compared to a smaller scale hawker food vendor which purchases smaller quantities of these ingredients. Extract 1 para 1 mentions purchasing food ingredients in bulk which a large restaurant is in a better position to do so.

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E.g. A large restaurant is better able to spread their advertising cost over a large range of output due to their larger scale of production, so that the long-run average cost of production is lower as compared to a smaller scale hawker food vendor. Extract 1 para 1 suggests that large restaurants: "with multiple locations may be better able to spread their advertising costs across a wider customer base, making it more cost-effective to reach potential customers."

Technical EOS:

A large restaurant is better able to enjoy technical economies of scale by acquiring and using large food storage and refrigeration facilities. Applying the Law of Increased Dimensions or the container principle. The container principle asserts that when the surface area of a container increases, the volume increases at a more than proportional rate. By doubling the surface area, the volume increases fourfold. Larger containers have a higher volume-to-surface area ratio, allowing firms using such containers to enjoy lower container costs per unit of output. Consequently, this results in a reduction in average costs for larger firms. Hence a large restaurant that can use larger refrigeration facilities tend to incur less cost per unit of output (unlike a small-scale hawker vendor), hence the long-run average cost is lower.

- Support analysis with a LRAC diagram

Large restaurant operating on a larger scale, expands output from Q_0 to Q_2 , lowers LRAC from C_0 to C_2 , as compared to a small-scale hawker vendor, expands output from Q_0 to Q_1 , LRAC falls only from C_0 to C_1 .



Suggested evaluation points applied to Thesis: [Consider the strength/weakness of the argument]

 In the context of a large restaurant operating within a chain of restaurants, like Swenson's, the scope for reaping substantial IEOS is enhanced due to the ability to enjoy IEOS

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such as marketing economies of scale. The advertising campaigns, promotional materials and resources poured into developing them are spread across a much larger customer base compared to a smaller, individual restaurant, who would have to bear the full cost of marketing efforts on their own.

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 Large restaurant chains often develop standardized operational systems and processes that can be replicated across multiple locations. For example, standardised menu items, recipes, and preparation methods, while centralized supply chain management can optimize inventory and logistics. This streamlines operations and improves efficiency in the production process, leading to cost savings.

Anti-thesis: Explain why a small hawker food vendor may also enjoy cost advantages

(Only 1 well-explained point required)

- Consider ways in which the hawker food vendor may attempt to lower costs Eg. In the extract, it was suggested that small hawker food vendors can adopt banding so as to purchase food ingredients in bulk. This will allow them to negotiate better pricing on the ingredients and enjoy similar cost savings that large restaurants enjoy from marketing economies of scale.
- Other perspective besides scale advantages: Government provision of Productivity Grants

 small hawker vendors may receive subsidies for purchase of kitchen automation equipment – this leads to increase productive efficiency and lowers their COP for small scale hawker food vendors

Anti-thesis may also consider the reason that a large restaurant may not enjoy more cost advantages due to disEOS as the firm expanded production beyond the MES.

<u>Suggested evaluation point</u> applied to Anti-thesis: [Consider the strength/weakness of the argument]

Difficulty in coordination between hawker vendors to enjoy bulk purchase discount: To
purchase in bulk, hawker vendors need to come together and coordinate on the type of
ingredients, the quantity of ingredients, the timings in which they are required. All these
complexities may mean that hawkers vendors will find the benefits limited from bulk
purchasing. Hawker vendors may find it simpler to order ingredients on their own rather
than attempt to find similar minded vendors and order in bulk.

Suggested Reasoned Conclusion:

Approach: Weigh-up the strengths/weaknesses of the arguments based on the content in the analysis, make a decision on the relative weight of the strengths and weakness of the arguments and come to a final recommendation.

Make a judgement: It is **more likely** that a large restaurant may enjoy more cost advantages as compared to a hawker food vendor.

Explain how the judgement is arrived: In the context of the rising food costs in Singapore and given that raw materials such as ingredient costs still form the bulk of the COP for hawkers as seen in Fig 2, the impact of such costs on hawker food vendors would be larger compared to a large restaurant. In contrast for a large restaurant, rental fees and staff salaries may be a relatively © RI 2023 Y5/9570/CT/2023 [Turn Over] larger proportion of costs. On top of that, complexity of coordination among hawker vendors for banding will limit their ability to lower their COP - thus large restaurants may have greater cost advantages compared to a hawker food vendor.

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Marks Scheme

Knowledge, Application, Understanding, Analysis		
L1	 Unclear or no use of economic framework Mere listing of points that lack depth of economic analysis. Glaring conceptual errors No use of case evidence Explained why the small or large restaurants enjoy cost advantages (One-sided analysis) 	1-3
L2	 Explain why the large restaurant may enjoy more cost advantages and how a hawker food vendor may also enjoy cost advantages. (Two-sided analysis) Well-applied to context supported by case evidence. Elaboration demonstrates good rigour using economic framework and relevant diagram. 	4-6
Evaluation		
E1	One evaluative point explained	1
E2	One evaluation point and a recommendation/insight explained	2

Examiners' comments:

AFIs:

1. Analysis

- Weaker answers were confused between the different sources of IEOS such as financial and marketing EOS, explaining both wrongly. For answers that did explain the respective IEOS correctly, many failed to link the scale of production to lower long run **unit** cost of production in their explanation consistently.
- Weaker responses often gave a cursory explanation of how the different sources of IEOS leads to lower unit cost of production.
- Responses that chose to explain financial EOS were weaker as there was no case evidence that explicitly supported such a reason for cost advantage.
- Some candidates drew diagram(s) showing IEOS but made no reference to the diagram in their analysis. Candidates need to understand that diagrams that are unexplained in the analysis does not value-add to the quality of the answer at all and will earn no credit. Diagrams that are drawn need to be integrated into the analysis and used to support the analysis.
- A few candidates confused a movement along vs a shift of the LRAC curve. Internal EOS is represented by a downward movement along the LRAC curve, while external EOS is represented by a downward shift of the LRAC curve.

2. Evaluation

- Evaluative responses were considerably weaker or non-existent. Evaluation must be drawn from and substantiated based on the underpinning content in the analysis. Looking at the © RI 2023 Y5/9570/CT/2023 [Turn Over

strengths and weaknesses of the arguments, while necessary, it is, however, insufficient to gain full evaluation marks. The evaluative response needs to make a decision on the relative weight of the strengths and weakness of the arguments and come to a final recommendation. Many candidates thus failed to provide a recommendation that formed the basis of the overall judgement.

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(f) Discuss the effectiveness of the government policies to keep hawker food affordable. [10]

Introduction

Clarify the meaning of "effectiveness":

- effective in keeping hawker food affordable, lowering food prices and/or increasing purchasing power.

To answer this question with sufficient scope, the candidate should always consider the view that both demand and supply-side policies work to keep hawker food affordable.

Analysis for DD-Side Policy

Thesis 1: Explain how direct government subsidies such as using CDC vouchers work to keep hawker food affordable.

1) CDC vouchers

One of the government policies to help to ensure that hawker food prices are kept affordable is the use of **CDC vouchers as a demand-side policy.** According to Extract 2: every Singapore household can now claim \$300 worth of Community Development Council (CDC) vouchers, which can be used at many hawker stalls. Hence, the CDC voucher is a form of direct subsidy that increases the <u>purchasing power and disposable income of consumers</u>. This increases the demand for hawker food, assuming that hawker food is a normal good. Hence demand curve shifts rightwards from D₀ to D₁. This leads to a shortage that will cause hawker food prices to rise from P₀ to P₁. Despite the rise in price, the increase in purchasing power from the CDC vouchers should help to improve the affordability of food.



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Anti-thesis: Explain the limitations of using direct subsidies (CDC vouchers)

As mentioned, the rightward shift of the demand curve from D_0 to D_1 , leads to a rise in equilibrium prices from P_0 to P_1 . The increase in price may limit the effectiveness of the CDC vouchers as now the higher price reduces the amount of hawker food that the household can purchase with the \$300 CDC vouchers.

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The use of CDC vouchers may also be limited in effectiveness as it does not address the root cause of the rise in hawker food prices. The cause is mainly attributed to the rising cost of ingredients caused by the soar in energy and fertilizer cost (Extract 1). Thus, once the CDC vouchers are used up, households will still face the problem of the inability to afford the high hawker food prices.

Analysis for SS-side policy

Thesis 2: Explain how a supply-side policy to reduce ingredient costs works to keep food hawker food affordable.

Note: Any 1 well-explained supply-side policy from case material is sufficient

2) Hawkers' Productivity Grant

From the supply-side policy approach, the government aims to lower the cost of production for hawkers via the implementation of the Hawker's Productivity Grant. In extract 3, the grant allows the stallholders to claim 80 per cent of the unit cost of equipment on a reimbursement basis. It seeks to **encourage adoption of automation equipment to increase the hawkers' productivity.** With this grant, hawkers are able to purchase automated equipment such as the commercial grade vegetable cutter which can help to slice up to 300kg of vegetables in an hour. This can speed up the ingredient prepping process for the hawkers and increase their productivity, being able to produce more plates of food per unit labour, ceteris paribus, the unit cost of production will fall leading to an increase in the supply of hawker food.

The supply curve for hawker food will shift to the right from S_0 to S_1 . The surplus that is created will result in a fall in price, thus increasing the affordability of hawker food.



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Anti-thesis: Explain the limited effectiveness of using such a supply-side policy

The Productivity Grant may be limited in effectiveness as not all but only selected automated equipment qualifies for the subsidies. Thus, not all the hawkers are able to claim the grant and benefit from it. Hawker food vendors who are not given the grant may choose not to use the expensive automation equipment in their preparation process, and the adoption rate of using automation equipment will not be high, thus limiting the increase in productivity and the extent of lowering COP such that the rise in SS of hawker food to keep hawker food prices affordable may be insignificant.

The effectiveness of the Productivity Grant depends largely on the receptivity of the hawkers towards the scheme as the adoption of automated equipment may require the hawkers to learn how to operate them and to use them in their food prepping process. It may be that the more traditional and older generation of hawkers may be less keen in taking it up as they may not see the need for it after many decades of using the traditional methods of production. Also, they may want to keep with traditional ways of production methods to preserve the taste of their dishes. This will similarly limit the increase in productivity and the extent of reduction in COP, hence the rise in SS of hawker food to keep hawker food prices affordable may be insignificant.

<u>Or</u>

3) Subsidies to encourage adoption of advanced technologies and innovation.

From the supply-side policy approach, the government has diversified food sources to lower food and ingredient costs by increasing domestic production. This is done **by providing subsidies to encourage adoption of advanced technologies and innovation.**

With reference to Extract 2, the government has plans to "[increasing] domestic production by ramping up urban and vertical farming through adopting and leveraging on advanced technologies and innovative solutions". Using technology and innovation such as high-tech systems to maximise available physical space and create suitable conditions to grow more food with fewer resources or high-tech farms that uses the AI to monitor the growth of its leafy greens, along with an advanced environmental control system to ensure optimum yield all year round. This helps to increase the yield of the food crop and increase supply of food ingredients and decrease in food ingredient prices. With food ingredient, being an important factor of production for hawkers, the fall in the price of food ingredient will help significantly to lower the cost of production for hawkers and increase SS of hawker food, shifting SS curve rightwards from S₀ to S₁, ceteris paribus. The hawker food prices also fall from P₀ to P₁, thus increasing the affordability of hawker food. (Reference to same DDSS diagram as above)

Anti-thesis: Explain the limited effectiveness of using such a supply-side policy

The cost of setting up the urban and vertical farms domestically, and the technology that is required to boost domestic production may be very costly. Thus, if the grant provided by the government is insufficient, the local farmers may not be able to afford this technology, especially in the case of smaller scale farmers. Thus, the supply of food may not increase significantly, limiting the ability to lower the ingredient cost for hawkers and unable to lower hawker food prices substantially.

Furthermore, the effect of adoption of advanced technology on the farms also takes some time to be realised as there is a need to train the farmers on how to incorporate and use the technology © RI 2023 Y5/9570/CT/2023 [Turn Over

in their production process. This is supported by Extract 2 where it states that "you need to spend time, effort, and money training everyone from scratch literally. We don't have a ready pool of skilled indoor farmers." Hence, this policy may be limited in its ability to supplement food production in Singapore in the short run. With that, the supply of food may not increase significantly, similarly limiting the ability to lower the ingredient cost for hawkers and unable to lower hawker food prices substantially.

Reasoned Conclusion (Suggested approach)

An evaluation needs to be provided for each of the policies discussed, weighing up the strengths and weaknesses of the arguments. This can take into account the considerations such as the desirability and feasibility besides effectiveness issues. E.g. Considerations of SR vs LR, different perspectives of stakeholders (consumers, producers, government), unintended consequences can also be used.

After weighing up the strengths/weaknesses of the arguments, arrive at the best course of action for the government by providing the recommended policy approach.

Evaluating direct subsidy policy: While the provision of CDC vouchers has its limitations, it is overall still an essential short-term measure to help consumers, especially the lower-income households, to deal with the rising hawker food prices and increasing affordability.

Although it may not be fiscally sustainable for the government to provide such subsidies in the long run. This problem may be mitigated by providing more targeted assistance. E.g. Instead of providing a fixed sum (\$300) of CDC vouchers to <u>all</u> households, the vouchers can be targeted at the poor as this is the group that requires more financial assistance. The lower income group will receive a greater amount of subsidy while the higher income group will receive less.

Evaluating supply-side policy: Although the effects of the diversification of food sources via the adoption of technology and innovation will take some time to occur, the government should still encourage the diversification of food sources and more domestic production through the adoption of technology and innovation. From the sustainability perspective, it is a more effective solution in the long run as it can more effectively lower food prices and increase affordability without putting a significant strain on government expenditure in the long run.

Possible Recommendation/Summative judgement:

Suggested approach to arrive at policy recommendation

- Consider the strengths and weaknesses of the direct subsidy policy against that of the supply side
- Come to a recommended course of action for the government to pursue for the best policy
 approach

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Make the judgement: All things considered, the direct subsidy policy is a recommended approach in the context of hawker food prices increasing sharply and becoming protracted.

Explain how the judgement is arrived: The direct subsidy can be tweaked to be more targeted to ensure fiscal sustainability. Recognising that the effects of innovation will only come through in the long run, the CDC vouchers can help to more immediately alleviate the effects of rising hawker food prices and improve affordability. It can be removed once domestic production increases and food prices falls.

However, from a timeframe perspective, a combination of policies can be argued to be a more effective approach to deal with the rising cost of hawker food, since direct subsidies work better in the short-run, while supply-side policies are better suited in the long-run. Especially in the case of Singapore, due to our high reliance on foreign imported food ingredients, Singapore is highly susceptible to supply-side disruptions which often put immense pressure on food prices in Singapore. Thus, by diversifying the food sources and growing locally, it will help to reduce our reliance on foreign imported food ingredients and lower our susceptibility to imported food price inflation in the future. Hence, helping to reduce the fluctuation in food prices because of external shocks.

Marks Scheme

Knowledge, Application, Understanding, Analysis			
L1	•	Smattering of points not directly linked to the question. Mere listing of points that lack depth of economic analysis and justification. No reference to the economic framework One-sided answer Only explained how one policy works.	1-3
L2	•	Balanced Thesis-Anti-thesis approach in the discussion of both demand and supply-side policies. Analysis displays rigour in terms of use of DD/SS framework to show how policies help to keep hawker food affordable.	4-7
Evaluation			
E1	•	One evaluative point explained	1
E2	•	Two evaluative points and a recommendation/insight explained	2-3

Examiners' Comments

AFIs:

- 1. Analysis
- Some responses showed poor time management, these were often incomplete and/or lacked elaboration.
- Weaker responses lacked detailed analysis by giving only brief cursory explanation on how the government polices worked to lower hawker food prices. Y5/9570/CT/2023

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- Some candidates who explained the use of subsidies did not specify clearly the type of subsidies (direct or indirect) or shifted the wrong curve (DD vs. SS).
- A significant number of responses failed to address the key point of the question, which was to improve the affordability of hawker food. Discussion of producer surplus, total revenue effects were either unnecessary or failed to provide any link to affordability. Similarly, while Productivity Grants as a policy was explained in terms of increasing productivity, the final link to affordability was not made.
- In the weaker responses, there was a misunderstanding of how the productivity grant worked to improve the affordability of hawker food. Many such responses explained how the grants helped to lower the unit COP of the cooking equipment which is a factor of production for hawker food thus increasing the supply of hawker food. However, this analysis is inaccurate as the intent of the productivity grant was to encourage the hawker food vendor to adopt the use of automated equipment to <u>raise productivity</u>. This is represented by the increase in output <u>per unit of input</u> leading ultimately to a fall in the COP, which increases the supply of hawker food and hence lowering the price of hawker food to improve affordability.
- Many candidates also failed to understand what is meant by "effectiveness" of government policies to keep hawker food affordable. Many responses explained the issue of desirability and sustainability instead, particularly when assessing the limitations of the policies.
- Some responses suggested policies such as price ceiling instead of discussing policies that were already implemented by the Singapore government in the extracts as required by the question.
- Stronger responses consistently contextualised their responses and evaluation to the context
 of Singapore and the rising hawker food prices well and linked back to the issue of
 effectiveness of the policies implemented.

2. Evaluation

- The quality of evaluation and summative judgement were generally poor. Perhaps due to poor time management, many candidates did not provide evaluation of the policies discussed and/or a summative judgement/policy recommendation.
- Some candidates repeated the limitations explained earlier in their analysis. Others provided a mere summary of their analysis points. These attempts earned no credit for evaluation.
- Again, candidates are reminded that evaluation must be drawn from and substantiated based on the underpinning content in the analysis provided.
- Examining the strengths and weaknesses of the policy arguments, while necessary, it is, however, insufficient to gain full evaluation marks. The evaluative response needs to make a decision on the <u>relative weight</u> of the strengths and weakness of the policy arguments and come to a <u>final policy recommendation</u> approach. The intent of evaluation here is to demonstrate the ability of the candidate to systematically weigh-up the policy options available to the government before finally arriving at a recommendation for the best course of action the government should take to address affordability of hawker food for the given context.

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Paper 9570/02 Paper 2

Essay

Falling sales of Electric Vehicles (EVs) and discovery of new mines have caused the price of Lithium, a key ingredient in the production of Lithium-ion batteries to fall by 20%. This led to a dip in the prices of Lithium-ion batteries which are used to power gadgets ranging from smart phones to EVs. Meanwhile new technologies in the form of Sodium-ion batteries have emerged in the battery market, seeking to rival Lithium-ion batteries.

Adapted from New York Times and BBC, 2023

(a) Using demand and supply analysis, account for the sharp fall in price of Lithium.	[10]
(b) Discuss the impact of falling prices of Lithium-ion batteries on its related	
markets.	[15]

Suggested answer for part (a)

R1: Explanation of 1 X Dd and 1 X Ss factor to account for the <u>fall in price of Lithium</u>

R2: Application of 1 X PED OR 1 X PES concept to account for the sharp fall in price of Lithium

Introduction:

- Equilibrium price of Lithium is determined by the interaction of market demand and market supply in the free market.
- The sharp fall in the price of Lithium can be explained using changes in demand and supply, coupled with relevant elasticity concepts like price elasticity of demand (PED) OR price elasticity of supply (PES).

Body:

R1: Explanation of 1 X Dd and 1 X Ss factor to account for the fall in price of Lithium

- Demand factor falling sales of Electric Vehicles (EVs) in EU and China s demand for EVs has been decreasing.
- Since Lithium is a factor input in producing Lithium-ion batteries that power EVs, its demand is derived from the demand for EVs → fall in derived demand for Lithium, illustrated by a leftwards shift from D0 to D1 in Figure 1.
- Supply factor discovery of new Lithium mines increases the number of Lithium ores that can be mined and processed to become Lithium → more Lithium mining firms are encouraged to enter the industry → increasing the supply of Lithium, illustrated by a rightwards shift from S0 to S1 in Figure 1.
- Explain the market adjustment process: Referencing Figure 1, a rise in supply and fall in demand lead to a surplus of Q2Q3 at the prevailing market price P0, resulting in a downward pressure on price of Lithium, which incentivises consumers of Lithium to increase quantity demanded (due to income and substitution effect) while Lithium producers reduce quantity supplied (due to a fall in profitability). This process continues until a new equilibrium price P1, which is lower than P0 and equilibrium quantity Q1, which is greater than Q0 is reached. Hence, both the fall in DD and the rise in SS of Lithium have reinforced each other to create a fall in the price of Lithium as shown in Figure 1.

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- R2: Application of 1 X PED OR 1 X PES concept to account for the sharp fall in price of Lithium
 - Application of PED: The demand for Lithium is relatively price inelastic, |PED| <1, because Lithium is a key factor input in the production of Lithium-ion batteries as well as EVs. Additionally, there is a lack of availability of close substitutes to Lithium in producing batteries for various gadgets such as smartphones and EVs as mentioned in the preamble. Thus, when supply of Lithium increases from S0 to S1, creating a surplus as seen in Figure 1, a large and significant fall in price of Lithium is needed to clear the surplus given the price-insensitivity of consumers. This results in a more than proportionate fall in price of Lithium compared to the increase in quantity.
 - Application of PES: The supply of Lithium is also relatively price inelastic, PES <1. Despite the discovery of new mines, the extraction and refining process to obtain Lithium is time-consuming. Thus, when demand falls from D0 to D1, creating a surplus seen in Figure 1, a large and significant fall in price of Lithium is necessary to clear the surplus given the price insensitivity of producers. This results in a more than proportionate fall in price of Lithium compared to the fall in quantity.

Conclusion

The sharp fall in price of Lithium is explained by the combined rise in supply and fall in demand for Lithium, compounded by the nature of Lithium, being a metal possessing |PED| <1 and PES<1 values.

Mark Scheme:

Knowledge, Application, Understanding, Analysis		
Level	Description	Marks
L3	 Well-developed answer addressing both DD and SS factors given in the preamble Depth and clarity of analysis: Both DD and SS changes mentioned are explained in detail with a step-by-step analysis showing how the changes in the preamble affects demand and supply of Lithium. 	8-10

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	 Price adjustment process is well explained with reference made to the diagram drawn Link to a sharp fall in the price of Lithium is clear (either through the application of PED < 1 OR PES < 1) 	
L2	 Underdeveloped explanation of demand OR supply factors with some gaps/lapses in analysis: some factors are stated rather than explained. Did not consider both the DD (falling sales of EVs) and SS (discovery of new mines) factors mentioned in the preamble Answer lacks step by step linkages, referencing to the fall in price of Lithium Incomplete price adjustment process Gaps present in linkages made to account for the sharp fall in price of Lithium i.e. Lapses in analysis and application of either PED or PES 	5-7
L1	 Answer is mostly irrelevant or inaccurate Lacks economic framework and/or terminology Several glaring conceptual errors in analysis Did not use information provided in the preamble for Dd and SS factors that led to the fall in price of Lithium Did not address the fall in price of Lithium at all 	1-4

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Examiners comments

Part (a)

- Many students inaccurately stated that EVs and Lithium were complements in consumption and there was an inability to establish clear relationship between EVs and Lithium i.e., derived demand relationship was not explicitly stated.
- Students are reminded to be sensitive towards the key word which is sharp that implies the importance of addressing the extent of fall in price.
- Lack of application of relevant elasticity concept, i.e., PED and/or PES to account for the sharp fall in price of Lithium.
- Some students compared the extent of shifts, such as fall in DD outweighs rise in SS or vice versa to account for sharp fall in price of Lithium. This approach indicated that students did not realise that a rise in SS and fall in DD are reinforcing shifts that lower prices.
- Some students analysed only a fall in DD OR a rise in supply. This was an incomplete
 answer given that there was both a fall in DD and a rise in supply which contributed to the
 sharp fall in price
- Generally poor application/grasp of PED/PES concepts.
 - Inappropriate/incorrect identification and application of PED/PES
 - Claimed that PED>1. However, a price elastic demand will result in a relatively small decrease in price when SS increased. .
 - Claimed that PES>1. However, a price elastic supply will result in a relatively small decrease in price when DD decreased.
- Weak analysis or plenty of gaps in the analysis of the market adjustment process. Failure to explain:

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- o explicitly the surplus that led to the downward pressure on price of Lithium
- the effects on producers to decrease price to clear surplus which led to response by some producers to decrease quantity supplied due to fall in profitability and response by consumers to increase quantity demanded due to income and substitution effects.
- the process continues until surplus clears at lowered price and quantity.
- Organisational problem whereby there were separate analyses of DD and SS factors plus two market adjustment process. This resulted in time penalisation as time could have been spent on writing a better answer for part (b).

(b) Discuss the impact of falling prices of Lithium-ion batteries on its related markets. [15]

R1: Discussion on the impact of fall in price of Lithium-ion batteries on its substitute market

R2: Discussion on the impact of fall in price of Lithium-ion batteries on a final product market

Suggested answer for part (b)

Introduction

- The falling prices of Lithium-ion batteries is likely to **impact** its related markets differently in terms of changes in **price**, **quantity and total revenue** of producers in these markets.
- The first related market is a substitute in consumption to Lithium-ion batteries, Sodiumion batteries.
- The second related market is a final product market that utilises Lithium as a factor input, examples are smartphones or EVs or other electronic gadgets that run on Lithium-ion batteries.

Body:

R1: <u>Discussion</u> on the impact of fall in price of Lithium-ion batteries on its substitute market i.e. Sodium-ion batteries market

Thesis: Explain the impact of fall in price of Lithium-ion batteries on Sodium-ion batteries

- Identification of substitute relationship & Application of CED: Lithium-ion batteries and Sodium-ion batteries are substitutes whereby producers of gadgets can use them interchangeably as factor inputs to produce gadgets → cross elasticity of demand (CED) of Sodium-ion batteries with respect to the price of Lithium-ion batteries is positive i.e. CED > 0.
- Additionally, the magnitude of CED may be small, meaning they are weak substitutes because Sodium may have inferior attributes compared to Lithium in producing batteries. For example, Lithium-ion batteries have higher energy density than Sodium-ion batteries.
- Hence, the fall in price of Lithium-ion batteries leads to an increase in quantity demanded of it → less than proportionate fall in Demand for Sodium-ion batteries, illustrated by a small leftwards shift of demand curve from D0 to D1 in Figure 2.
- Brief analysis of the adjustment process: At the prevailing market price, P0, a surplus is created, exerting a downward pressure on price of sodium-ion batteries until a new equilibrium is attained at a lower equilibrium price P1 and a lower equilibrium quantity Q1. Since total revenue is calculated by multiplying price and quantity, this results in a

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Anti-thesis: Critical extension of analysis/contrasting perspective on the impact of fall in price of Lithium-ion batteries on sodium-ion batteries (any one of these points)

- Extent of change in Dd is different due to different CED value: The negative impact on price, quantity and total revenue of Sodium-ion batteries producers may be significant if the value of CED is large instead. In the case of production of low energy density gadgets such as smartphones, Lithium-ion batteries and sodium-ion batteries are seen as close substitutes as they can be used in production of smartphones almost interchangeably. Hence, a fall in price of Lithium-ion batteries → more than proportionate fall in demand for Sodium-ion batteries → larger fall in price, quantity and total revenue, magnifying the negative impact on sodium-ion batteries market.
- Time period in consideration: The negative impact created on sodium-ion batteries is likely to be even smaller, especially in the short run (SR). This is because Sodium-ion batteries are in the emerging phase and final products that utilises these, such as EVs may have to be modified to fit them. Moreover, time is needed to test run how Sodium-ion batteries affect the operation of EVs extensively → CED value between the 2 batteries may be even smaller → the fall in Dd for sodium-ion batteries in the SR is much smaller → smaller fall in TR for sodium-ion battery producers. Hence, negative impact on sodium-ion batteries in the SR is much less than in the LR assuming that price of Lithium-ion batteries continues to fall over time.

Evaluation (R1) (either one of these approaches/points):

There are other factors impacting the sodium-ion battery market or

Possible responses from sodium-ion battery producer to mitigate the negative impact on the market.

• On the whole, the fall in price of Lithium-ion batteries tends to **negatively** affect its **substitute market** i.e. Sodium-ion battery market. What is debatable would only be the **extent to** which the sodium-ion battery market would be negatively affected. However, given the novelty of sodium-ion batteries due to its recent emergence in the market, there may be a potential for its usage in multiple gadgets over time → **potential rise in demand** for sodium-ion batteries due to a **change in taste and preferences** (of producers of

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gadgets) towards sodium-ion batteries despite the fall in price of Lithium-ion batteries → may offset the initial negative impact on demand for sodium-ion batteries. Ultimately, the negative impact on equilibrium price, qty and TR of sodium-ion battery producers may be muted.

Given that the fall in price of Lithium-ion batteries would create a negative impact on the price, qty and TR for producers in the sodium-ion battery market, producers of sodium-ion batteries could actively respond by engaging in aggressive product differentiation strategies e.g. R&D to enhance the unique/superior qualities of sodium-ion batteries over that of Lithium-ion batteries → reduce the substitutability between the 2 batteries → reduce the CED value such that a continuous fall in price of Lithium-ion battery would not affect the demand and hence price, qty and TR of sodium-ion batteries as negatively. Additionally, successful R&D efforts would raise Dd for sodium-ion batteries in producers of gadgets → positively affecting price, qty and TR in the sodium-ion battery would not affect.

R2: Discussion on the impact of fall in price of Lithium-ion batteries on a final product market

<u>Thesis: Explain the impact of fall in price of Lithium-ion batteries on a final product market</u> such as EVs

- Given that Lithium-ion batteries are a key factor input in producing EVs currently, the fall in its price leads to a fall in the cost of production for EVs producers → ceteris paribus the increase in profitability of producing EVs causes an increase in supply → illustrated as a rightward shift of SS for EVs from S0 to S1 in Figure 3.
- Brief analysis of market adjustment process: The market adjustment process occurs leading to a fall in price from P0 to P1 and rise in quantity from Q0 to Q1.
- Application of PED: Given that price fell but qty has increased, the effect on total revenue of EVs producers depends on the PED value of EVs. EVs have many close substitutes in the form of petrol and diesel vehicles and the price of EVs constitutes a large proportion of an average consumer's income, the demand for EVs is price elastic, |PED| >1. When supply increases, the fall in price causes a more than proportionate increase in quantity demanded → gain in total revenue (area Q0AE1Q1) from increase in quantity demanded outweighs the fall in total revenue (area P0E0AP1) from the fall in price → overall, total revenue increases for EVs producers → positive impact on EV mkt.



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Anti-thesis: Extension of analysis/contrasting perspective on the impact of fall in price of Lithium-ion batteries on the final product mkt

• While the fall in price of Lithium-ion batteries creates a positive effect on the market for EVs due to the nature of EVs being price elastic in demand. The same fall in price of Lithium-ion batteries will create a negative effect on the market for a different final product whose demand may be price inelastic i.e. |PED| < 1. An example of this would be smartphones. Demand for smartphones tend to be price inelastic in today's world since they are habitually purchased by consumers due to the many important functions these portable devices possess such as making payments or surfing the web and there are no or not many close substitutes to smartphones in general. Hence, since |PED| < 1, a fall in Lithium-ion battery price → fall in COP of smartphones → cet par, rise in SS of smartphones → more than proportionate fall in price compared to the increase in quantity demanded → total revenue decreases for smartphones producers → negative impact instead.</p>

Evaluation (R2): Judging/comparing the extent of the impact of falling Li-lon batteries on the EVs and smartphones markets

Following the above analysis, the impact of a fall in price of Lithium-ion batteries on final product markets can either be positive or negative depending on the PED value of the final product. However, the extent/magnitude of the impact on the final product also depends on the proportion of the total cost of production that Lithium-ion batteries take up. For example, Lithium-ion batteries is the singular source of power for EVs and takes up a relatively large percentage of the total cost (30-57%) whereas Lithium-ion batteries used in producing smartphones constitute a relatively small percentage of the total cost (less than 5%) → the increase in supply of EVs (from a fall in price of Lithium-ion batteries) is much greater than the increase in supply of smartphones → extent of changes in price and quantity of EVs is greater than that seen in smartphones, ceteris paribus → magnifying the impact of fall in price of Lithium-ion batteries on EVs compared to smartphones.

Overall evaluative conclusion: Judging/Comparing the extent of the impact of falling Liion prices on each of the related markets

The extent of impact on total revenue in the Sodium-ion batteries market is likely to be smaller than that for EVs market when the price of Lithium-ion batteries falls. This is because Lithium-ion batteries used in EVs have a substantial cost and a fall in its price helps to increase supply of EVs greatly. Combined with PED>1 for EVs, there is a larger positive impact on total revenue of EVs producers. However, a fall in price of Lithium-ion batteries causes only a small fall in demand for Sodium-ion batteries given that sodium-ion batteries generally cost less than Lithium-ion batteries to begin with. Additionally, they are seen to be weak substitutes at the current moment. Thus, there is a smaller negative impact on total revenue of Sodium-ion batteries producers.

Mark Scheme: Knowledge, Application, Understanding, Analysis Level Descriptors Marks L3 • Sound analysis with good use of economics framework that includes DD/SS & price mechanism 8-10 • Concepts of CED/PED are used to aid explanation 8-10

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	 Good scope of discussion i.e. 2 well explained related markets (2 requirements) discussed (with appropriate examples given) Both demand <u>and</u> supply relationships are explored in the 2 requirements i.e. Answer includes goods that have been positively (final products such as EVs, laptops, Smartphones etc) and negatively (Sodium-ion batteries) impacted by the falling prices of Lithium-ion batteries Good depth of analysis provided with linkages made between each point 	
L2	 Use of economics framework in analysis Answer lacked depth of elaboration i.e. Did not provide step-by- step analysis, impact on related markets were stated rather than explained Examples provided are not fully relevant/contextualised Only covered related markets that have a demand (Sodium-ion batteries) <u>OR</u> supply side (final product markets such as EVs, laptops, smartphones etc) relationship i.e. Lacks scope. Answer lacks scope: Only 1 related market explained 	5-7
L1	 Irrelevant answer Glaring conceptual errors made Incorrect economic framework used 	1-4
Evaluati	on	
E3	 Judgements provided for 2 requirements based on 2 related markets with explanation and contextualisation PLUS a summative judgement in the concluding paragraph 	5
E2	 Judgements provided for 2 requirements based on 2 related markets with explanation and contextualisation 	3-4
E1	 Judgements lack explanation and/or contextualisation OR judgement provided for only 1 requirement with explanation and contextualisation 	1-2

Examiners Comments:

Part (b)

- Lacked recognition of the need for scope/breadth in the answer, i.e. analysed impact of a fall in price of Lithium-ion batteries on both substitutes and complements markets, thus confining answers to the usage of CED only.
- One-sided answers were written without antithesis, i.e. opposing point of view or extension ٠ of analysis.
- Incomplete analysis of what market meant. Students chose to focus on just effect on price ٠ or consumer surplus or producer surplus within each related market. Impact on market requires analysis on price, quantity and TR/TE instead. This indicated a poor grasp of key words in the questions.
- Poor understanding/loose usage/application of "complements". Many students claimed ٠ that Lithium-ion batteries are complementary to EVs/smartphones/gadgets, hence shifted DD curve for these products. This implies that both Lithium-ion batteries and the EVs/smartphones/gadgets have to be consumed/purchased together. But in the case of these products, Lithium-ion batteries are built into these products and NOT consumed or Y5/9570/CT/2023

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purchased for consumption/usage separately. Thus, they cannot be classified as complements since Lithium-ion batteries is part of the production process of the final product i.e. EVs/smartphones/gadgets. Since Lithium-ion batteries are a factor input of production, this results in change in SS and NOT change in DD.

- Many failed to use either CED (for substitutes market) or PED (for final product market), thus the extension/depth of their analysis is weaker.
- Poor grasp of basic concepts of DD, i.e. did not differentiate between price and non-price factors of DD. This inability to distinguish between what causes a change in quantity demanded versus what causes a change in DD is seen by how many students wrote that the fall in price of Lithium-ion batteries resulted in an increase in DD when it should be increase in quantity demanded.
- No evaluation seen for each related market.
- Diagram drawn but not referenced in the answer or not labelled accordingly. Students are reminded that precisely drawn diagrams have to be referenced to add more depth to their answers.
- Weak time management, i.e. incomplete essays that only considered one related market, usually without antithesis as well.

******END******

"Skill is only developed by hours and hours of work" ~ Usain Bolt