YISHUN INNOVA JUNIOR COLLEGE
JC 2 PRELIMINARY EXAMINATION
Higher 2

CANDIDATE NAME	
CG	INDEX NO

ECONOMICS **9570/01**

Paper 1 **23 August 2024**

Case Study Questions **2 hour 30 minutes**

Additional Materials: Writing Papers
Cover Pages

READ THESE INSTRUCTIONS FIRST

Write your name, CG and index number on the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid/tape.

There are **two** questions in this paper. Answer **all** questions.
Start **each question** (not each part) on a **fresh piece of writing paper**.

At the end of the examination, fasten your work for each question **separately**.

The number of marks is given in brackets [ ] at the end of each question or part question.

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Answer **all** questions.

Question 1: The Not-So-Certain Economics of Electric Vehicles

Extract 1: Electric Vehicle Market

Electric vehicles (EVs) are essential to decarbonising transportation, with their numbers increasing due to rising global demand. While electric cars are significantly cheaper to run — potentially costing up to half as much per mile as similar-sized petrol or diesel vehicles — they are generally more expensive to purchase. To mitigate this cost barrier, many governments offer tax credits and other incentives, making EVs more accessible to a broader range of consumers.

Goldman Sachs Research now expects battery prices to fall to $99 per kilowatt hour (kWh) of storage capacity by 2025 — a 40% decrease from 2022. Analysts estimate that nearly half of this reduction will be driven by falling prices of EV raw materials, including lithium, nickel, and cobalt.

Expanding charging infrastructure and advancing battery technology are crucial to accelerating the adoption of EVs. In response to growing demand, cities are increasingly installing more charging stations in public spaces like grocery stores and airports, making EVs a more practical option for everyday use. Furthermore, advancements in battery technology are extending the range of EVs, making them more viable for longer commutes. The combination of improved battery performance and faster charging technology is also minimizing downtime for EV drivers, further enhancing the appeal of electric vehicles.

Adapted from: *World Economic Forum, 26 Oct 2022 & Goldman Sachs, 1 Nov 2023*

Extract 2: The True Cost of Electrifying Transportation

The transportation sector accounts for 29 percent of U.S. carbon emissions (and 24 percent worldwide), it's only natural that electrification of the vehicle fleet, paired with the rapid greening of electricity production, is widely viewed as key to containing climate risk.

Emissions from internal combustion engine [1] (ICE) vehicles are easy to understand. Combustion of fossil fuels creates global greenhouse gases (GHGs) and local pollution. In contrast, the emissions associated with electric vehicles (EVs) are more complex to measure. The electricity used to charge EVs is generated through a mix of technologies, including wind, solar, hydro, nuclear, and various fossil fuels. Therefore, the pollution associated with EVs depends on the marginal source of electricity - the power plant that adjusts its output in response to increased demand.

Local pollution from traditional vehicles primarily affects respiratory health but is also linked to reduced labour productivity and cognitive performance. EVs can reduce GHGs compared to ICEs in areas where natural gas is the dominant energy source for the electricity grid. However, in regions dependent on coal, particularly in colder climates, EVs can sometimes be more greenhouse gas-intensive. While ICE vehicles emit pollutants directly where they are driven, EVs generate local pollution at the power plants that supply electricity during charging. Thus, the environmental benefits of EVs are most pronounced in urban areas with clean grids (e.g., Los Angeles), but can be diminished or even negative in coal-dependent regions.

[1] An internal combustion engine is a machine that converts internal energy into mechanical energy through the combustion of fossil fuels.

It is also important to consider that congestion externalities and accidents represent the largest market failures associated with driving, surpassing the impact of GHGs and local pollutants. Furthermore, policies intended to promote EV adoption, such as single-occupancy access to carpool lanes and EV purchase subsidies, may inadvertently exacerbate congestion by increasing the number of vehicles on the road or reducing the effectiveness of carpool lanes.

Adapted from: *Milken Institute, 24 Jan 2022*

Extract 3: China's EV Industry Speeds Up

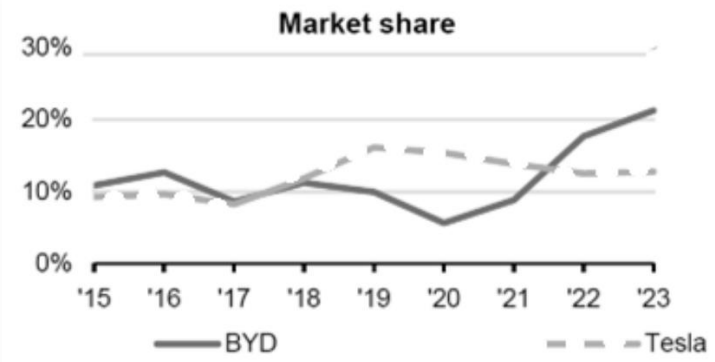
In the final quarter of 2023, BYD, a Chinese firm, surpassed Tesla as the world's biggest manufacturer of purely battery-powered vehicles, selling 526,000 of them to the American firm's 484,000. As the shift away from the ICE gathers pace, established carmakers are beginning to worry that Chinese upstarts might run them off the road.

China dominates the manufacture of electric vehicles' most critical component, batteries. And China's vast domestic market allows local firms to benefit from economies of scale. However, Chinese firms face significant obstacles. Despite generous government subsidies, many new EV startups in China are not yet profitable.

Since late 2022, heightened competition among front-runners has led electric car prices to fall quickly. The price of compact electric cars and SUVs dropped by up to 10% in 2023 relative to 2022. In the first quarter of 2024, Tesla once again slashed prices, by up to 6%, forcing competitors to follow suit, despite shrinking gross margins, which are calculated as the difference between revenue and the cost of goods sold, divided by revenue. Subsequently, BYD implemented a 10-20% price reduction across its models.

In 2023, BYD significantly increased its R&D investment to 39.57 billion Yuan, a 4.7-fold rise from the previous year, surpassing Tesla's expenditure by 11.18 billion Yuan. This substantial investment highlights BYD's commitment to innovation, particularly in the New Energy Vehicle sector. Meanwhile, Tesla, continues to focus its R&D efforts on developing advanced eco-friendly technologies, expanding production of solar energy panels and batteries and investing in charging stations to support the broader adoption of EVs.

Figure 1: Share of global electric car markets by selected carmakers



Source: *Global EV Outlook 2024 & The Economist, 11 Jan 2024*

Extract 4: Rising Protectionism

The Biden administration's plan to slap heavy new tariffs on Chinese EVs and batteries would provide temporary protection for U.S. automobile industry jobs. Few Chinese-made EVs are currently sold in the U.S., so the immediate impact of higher tariffs on consumers would be minimal, according to analysts. However, the White House also plans to more than triple tariffs on Chinese EV batteries and parts to 25%. U.S automakers warn that without access to lower-cost batteries and materials from China, EVs could become prohibitively expensive for mainstream U.S. consumers.

Experts are divided over whether stronger tariff protection will help U.S. automakers in the long run, or work to the benefit of consumers. "The tariffs buy important time," said Michael Dunne, a consultant who has watched the Chinese automobile industry for years. "The U.S. is five to seven years behind China when it comes to electric vehicles and battery supply chains." China protected its automakers in the 1990s and 2000s, Dunne said. "U.S. political leaders could rightly say we are just borrowing a page from China's playbook."

Meanwhile, Washington is investing hundreds of billions of dollars to develop U.S. EV, solar, and other new industries. These provisions include grants, subsidies, tax credits, and direct purchases, with $2 billion allocated for domestic manufacturing and conversion grants to retrofit existing assembly facilities for low-carbon vehicle production. Additionally, $7 billion has been set aside to ensure domestic manufacturers have access to critical minerals and components necessary for battery production. The Inflation Reduction Act also provides $3 billion in credit subsidies for advanced technology vehicle manufacturing through the Department of Energy's Loan Programs Office. The U.S. government has expressed concerns that China's state-driven excess production capacity in these sectors threatens the viability of American companies, and the tariffs are intended to protect American jobs from a potential flood of cheap Chinese imports.

Adapted: *Reuters, 15 May 2024 & 23 May 2024 and Automotive Logistics, 1 Nov 2022*

Questions

(a) Explain **one** demand factor and **one** supply factor that influence the adoption of electric vehicles. [4]

(b) **(i)** Compare the market share of BYD and Tesla from 2015 to 2023. [2]

Extract 3 states that in the first quarter of 2024, Tesla once again slashed prices, by up to 6%, forcing competitors to follow suit, despite shrinking gross margins.

(ii) Explain the likely market structure of the EV industry. [2]

(iii) Discuss whether this pricing strategy is the best for Tesla to maintain profitability in view of rising competition from Chinese EV car manufacturers. [8]

(c) The transportation sector accounts for 29 percent of U.S. carbon emissions (and 24 percent worldwide).
With the use of a diagram, explain why the transport market fails. [4]

(d) Discuss whether imposition of tariff is the best strategy to protect employment in the American automobile industry. [10]

[Total: 30]

Question 2 Sustainability Efforts in Singapore and China

Table 1: Singapore, selected indicators

	2019	2020	2021	2022	2023
Real GDP Growth rate	1.35%	-3.87%	9.69%	3.84%	1.08%
Inflation Rate	0.57%	-0.18%	0.92%	1.98%	0.23%
Carbon emissions per capita (tons)	5.8	9.3	9.4	8.9	9.46

Table 2: China, selected indicators

	2019	2020	2021	2022	2023
Real GDP Growth rate	5.95%	2.24%	8.45%	2.99%	5.24%
Inflation Rate	2.9%	2.49%	0.92%	1.98%	0.23%
Carbon emissions per capita (tons)	7.5	7.7	8.0	8.0	8.9

Source: *https://www.statista.com, accessed 5 August 2024*
https://ourworldindata.org, accessed 5 August 2024

Extract 5: Towards a sustainable and resilient Singapore

Since our founding, we have designed policies with longterm sustainability in mind. We integrated nature into our Garden City and prudently managed scarce resources such as water and energy. Today, all Singaporeans, rich or poor, young or old, enjoy clean air, water and sanitation, quality healthcare and education, as well as lush greenery and safe common spaces because of these policies. As a tropical small island developing state, we are vulnerable to extreme weather patterns and rising sea levels. We have designated 2018 as the Year of Climate Action and taken concrete steps to tackle climate change. We will implement an economy-wide carbon tax from 2019, one of the first Asian countries to do so.

Singapore's carbon tax regime was first implemented from 2019, with an initial tax rate of $5 per tonne of greenhouse gas emissions. This tax rate was in place until 2023. Climate advocates had long said that a carbon tax of $5 per tonne was too low to prompt large emitters to do more to cut their planet-warming emissions. In February 2022, Finance Minister Lawrence Wong said in his Budget speech that Singapore's carbon tax rate would be adjusted upwards, to $25 per tonne of greenhouse gas emissions in 2024 and 2025. This will be raised further to $45 per tonne from 2026 to 2027, with a view of reaching between $50 and $80 per tonne by 2030.

Source: *The Straits* Times, 3 April 2024
Singapore Voluntary Review Report, accessed 5 August 2024

Extract 6: Firms tapping Budget 2024 green initiatives can gain from lower costs, business boost

Local firms that tap the initiatives announced in Budget 2024 to support them in adopting green solutions can stand to gain from lower set-up costs as well as a boost to competitiveness as suppliers to multinational companies. Industry observers said that enhancements to the Enterprise Financing Scheme and the Energy Efficiency Grant, announced by Deputy Prime Minister Lawrence Wong during his Budget speech on Feb 16, can also bolster Singapore's sustainability goals.

Mr Samuel Han, director of energy and sustainability management at Savills Singapore, said that, "By enhancing the existing schemes, these grants serve as a powerful incentive for businesses to embrace green solutions and prioritise energy efficiency initiatives. This not only promotes environmental stewardship, but also offers tangible benefits for businesses, including cost savings and improved competitiveness." He added: "By incentivising the adoption of sustainable practices, the grants empower commercial organisations to play a more active role in reducing their carbon footprint and contributing to Singapore's broader sustainability goals." First announced in 2022, the Energy Efficiency Grant provides local companies in the food services, food manufacturing and retail sectors with up to 70 per cent of financial support to invest in energy-efficient appliances such as LED lighting, air-conditioners, refrigerators, cooking hobs and water heaters. As part of Budget 2024, the scheme will be expanded to include companies in more sectors, including manufacturing, construction and maritime, as well as data centres and their users.

DBS Bank chief sustainability officer Helge Muenkel said: "Additional financial levers such as the tax credit scheme and loans for SMEs to adopt green solutions will also progress the move towards sustainable practices and contribute to fostering a more resilient and sustainable business landscape in Singapore."

Source: *The Straits Times, 22 Feb 2024*

Extract 7: Advancing China's Sustainable Economic Growth

For the world, the year ahead will require careful calibration of monetary and fiscal policies to secure a soft landing — bringing inflation down while maintaining growth firmly in positive territory. Many central banks have the difficult task of deciding when to cut interest rates and by how much, based on data. They can no longer take cues from others as both the pace of disinflation and growth are diverging across countries. It will be also a challenging year for fiscal authorities in most countries — they need to embrace consolidation to reduce debt and rebuild buffers, and at the same time finance the digital and green transformations of their economies. The good news is that the digital and green transformations present opportunities to boost productivity growth and improve living standards. Deep structural reforms can enhance the conditions for entrepreneurship, innovation and economic performance.

Zooming in on China, we saw a strong post-Covid rebound in 2023, with growth exceeding five percent. A key feature of high-quality growth will need to be higher reliance on domestic consumption. Doing so depends on boosting the spending power of individuals and families that is driven by the strong social security system in China that covers pension and insurance for medical, unemployment, work- related and maternity.

Domestic consumption also depends on income growth, which in turn relies on the productivity of capital and labor. Policies that drive reforms such as deregulating the business environment and ensuring a level playing field between private and state-owned enterprises will improve the allocation of capital. Investments in human capital — in education, by subsidizing life-long training and reskilling and quality health care will deliver higher labor productivity and higher incomes.

This is particularly important as China seeks to seize the opportunities of the AI "big bang." Countries' preparedness for the world of artificial intelligence is no longer a goal for the future — it is already an issue for today. The IMF has identified four areas that are critical for countries' AI preparedness — digital infrastructure, human capital and labor markets, innovation, and regulation and ethics. Our analysis finds that China is at the forefront of emerging economies in terms of AI preparedness, with well-developed digital infrastructure providing a head start. Establishing a robust AI regulatory framework and strengthening economic ties with other innovative countries will help China power ahead. Similarly, China has enormous potential in advancing the green economy. It is already the global leader in deploying renewable energy and is making rapid progress in green mobility. Its continued leadership is vital to addressing the global climate crisis.

Source: *International Monetary* Fund, 23 March 2024

Questions

a) **(i)** Compare the changes in real GDP for Singapore and China between 2019 and 2023. **[2]**

(ii) Explain how real GDP growth rate can illustrate an improvement in standards of living in an economy. **[4]**

b) With reference to Extract 5 and using an aggregate demand and aggregate supply diagram, explain **one** likely impact of the carbon tax on the economic growth of Singapore. **[3]**

c) Extract 7 mentions how other economies uses interest rates to manage inflation, explain how interest rates can help to manage inflation. **[3]**

d) In the light of the sustainability issues raised in the case study, assess whether economies should prioritise sustainable economic growth as the main macroeconomic goal. **[8]**

e) Both Singapore and China targets to achieve sustainable growth. **[10]**

Using economic analysis and based on the evidence provided, discuss the extent to which policies implemented by China to achieve sustainable growth can be applied to the Singapore economy.

[Total: 30]

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