## MACROECONOMICS FREE-RESPONSE QUESTION INSTRUCTIONS

- This section consists of short answers and problem-solving questions. Each question set is worth 20 points.
- Read each question carefully before you begin your response. Ensure that you fully understand what is being asked before starting your answer.
- For questions that involve calculations, show every step of your work. Correct methodology is rewarded. So, if one early calculation error carries into later answers, you can still earn credit for correctly applying the required formulas and procedures using your own prior result. Round only as instructed and clearly label your calculations
- Use graphs and diagrams where applicable to illustrate your answers. Label all axes and curves clearly and explain the significance of any shifts or changes depicted.
- Provide clear explanations and justifications for your answers. When asked to discuss or analyze, support your arguments with relevant economic theories, models, or data.
- Allocate your time wisely. Some questions may require more time to answer fully, so plan accordingly to ensure you can attempt all questions in this section.
- Write legibly and ensure your answers are concise and to the point. Focus on the key aspects of the question and avoid unnecessary information.
- If time permits, review your answers before moving on to the next section. This will give you an opportunity to correct any errors or add any additional points.
- If you wish to appeal any part of the test, you can do so by completing the appropriate form located at our website: https://economicsolympiad.org/appeals after the test has concluded.
- The last 5 pages of this test booklet have been provided for your calculations, practice, or any other notes you may need to make during the exam. We suggest labeling these pages as “Work Pages” or “Scratch Pages”. Please note that any work or answers written on these pages will not be graded unless specifically directed to do so.

## Macroeconomics FRQ Scenario 1. Econoland's Green Growth Dilemma

## Macroeconomics FRQ Scenario 1. Answer Key

### Part A (5 points)

Using a single, correctly labeled AD–AS diagram that includes the short-run aggregate supply (SRAS), long-run aggregate supply (LRAS), and aggregate demand (AD) curves, analyze the combined short-run effects of the two policies on the price level and real output.

Identify the new short-run equilibrium and explain how the two policies interact.

### Part A Answer (5 points)

- 1 pt: Initial equilibrium RGDP and price level are shown to the left of LRAS.
- 1 pt: SRAS shifts left because the carbon tax raises production costs.
- 1 pt: AD shifts right because government spending increases.
- 1 pt: New short-run equilibrium is correctly shown and labeled.
- 1 pt: Price level rises; real-output change is indeterminate.
- - 1 pt: if *all* labels are not provided – each axis, each graph, and initial and new equilibrium output and price level. The label for the title of the graph is optional.

### Part B (4 points)

Assume for this part only, place Econoland at its long-run equilibrium before the two policies are implemented and that the carbon tax affects only short-run production costs. The policies do not affect the economy's long-run productive capacity.

If the contractionary effect of the carbon tax is greater than the expansionary effect of the increase in government spending, illustrate and describe the long-run adjustment process using a correctly labeled AD–AS diagram\.

Show the final long-run equilibrium and explain the effects on the price level and real output.

### Part B Answer (4 points)

- 1 pt: After the net policy impact, short-run equilibrium is below full-employment output with inflation. That is, the SRAS shifts leftward from $SRAS_{FE}$ to $SRAS_1$ by more than the net impact of the AD curve's rightward shift.
- 1 pt: Correctly identify a recessionary gap $Y_1 - Y_{FE}$ is negative (i.e., actual output $Y_1$ is below potential $Y_{FE}$), explaining that unemployment puts downward pressure on nominal wages or other input prices.
- 1 pt: Depict the SRAS shifting rightward (downward in price terms), as falling nominal wages reduce production costs, restoring the economy to LRAS.
- 1 pt: Real output returns to potential; the price level falls from the short-run level but will generally remain above the original level because AD increased.

**Part C Answer (11 points)** Loanable Funds and Foreign Exchange Market Framework

Assume that the increase in government spending exceeds the revenue collected from the carbon tax, causing the government budget deficit to increase.

Assuming private saving remains unchanged, (i) describe what happens to national saving. Then, using the loanable funds and foreign exchange market framework for a small open economy, explain the resulting effects on the (ii) domestic real interest rate, (iii) net capital outflow, (iv) the foreign exchange market, (v) the exchange rate, and (vi) net exports.

i. 2 pts: National saving - The larger budget deficit (G – T ↑) reduces public saving; since private saving is unchanged, national saving falls (S↓).

ii. 2 pts: Domestic real interest rate - Econoland is a small open economy with perfect capital mobility. So, the domestic real interest rate stays fixed at the world real interest rate (r = r*). The domestic rate does <u>not</u> rise despite the drop in loanable funds supply.

iii. 2 pts: Net capital outflow - With S falling and investment unchanged (r* is unchanged), net capital outflow declines (NCO = S – I ↓).

iv. 2 pts: Foreign exchange market - Lower NCO means residents supply less domestic currency to buy foreign assets, so the supply of Econoland's currency in the foreign-exchange market decreases.

v. 1 pt: Exchange rate - The reduced currency supply causes the domestic currency to appreciate.

vi. 2 pts: Net exports - The appreciation makes exports relatively more expensive and imports relatively cheaper, so net exports fall unambiguously

## Macroeconomics FRQ Scenario 2. Effects of a Fuel-Price Increase on Inflation and a Transport Business

Total: 20 points

Introduction: Alexandra operates Alexandra Offroad as a sole proprietor. So, her business income is treated as personal income for tax purposes, and she directly bears all business risks. She charges clients a per-kilometer rate that includes a fuel surcharge — an added fee, separate from her base rate, to help offset rising diesel costs. Value-added tax (VAT) is excluded from all calculations.

The closure of the Strait of Hormuz causes gasoline and diesel prices to increase by 25%. Fuel accounts for 3% of the Consumer Price Index (CPI); prices of all other goods and services rise by 1%

**Part A. Inflation (2 points)**

Assume the CPI initially equals 100 and calculate the new CPI and the resulting inflation rate.

**Part B. Profit (14 points)**

Before the fuel-price increase:

- Alexandra charged $1.70 per kilometer and drove 27,000 paid kilometers per month.
- Monthly fixed costs were $20,000.
- Variable cost was $0.64 per kilometer, of which 52% was fuel and 48% was non-fuel cost. (Assume non-fuel variable costs remain unchanged throughout this problem.)
- Diesel cost $1.80 per liter, and Alexandra applied a 3% fuel surcharge on her base rate to help cover fuel expenses .

After the 25% increase:

- Diesel costs $2.25 per liter, and Alexandra raises her fuel surcharge to 8% on her base rate.
- The number of paid kilometers falls to 25,820.
- Fixed costs increase strictly by the inflation rate calculated in Part A — this is the sole source of the fixed-cost increase, since no other cost driver is introduced

Calculate:

1. Alexandra's monthly profit before the fuel price increase.
2. Alexandra's monthly profit after the fuel-price increase.
3. The dollar change in monthly profit.

Show all work, rounding answers to nearest hundredth (two decimal places).

**Part C. Risky Business (2 points)**

Explain how higher fuel prices increase Alexandra's business risk. Refer to both fixed and variable costs.

**Part D. Purchasing Power (2 points)**

Alexandra pays 20% income tax. Using your answers from Parts A and B, determine whether Alexandra's purchasing power increased or decreased and by what percentage, showing your work and rounding answers to nearest hundredth (two decimal places).

## Macroeconomics FRQ Scenario 2. Answer Key

| Part / Requirement | Calculation | Answer | Points |
|---|---|---|---|
| **Part A. Inflation (2 pts)** | | | |
| Fuel component | (3 x 1.25) | **3.75** | 1 |
| Other goods component | (97 x 1.01 = 97.97)<br>New CPI: (3.75+97.97=101.72)<br>Inflation: (101.72-100=1.72%) | **CPI = 101.72**<br>**Inflation rate = 1.72%** | 1 |
| **Part B. Profit (14 points)** | | | |
| Total revenue before increase | (27,000 x 1.70 x 1.03) | **$47,277.00** | 2 |
| Fixed costs before | Given | **$20,000.00** | |
| Variable costs before | (27,000 x 0.64) | **$17,280.00** | 2 |
| Profit before increase | (47,277-20,000-17,280) | **$9,997.00** | 2 |
| New variable cost per km | (0.64(0.48)+0.64(0.52)(1.25))<br>New VC/km=(Non-fuel cost)+(New fuel cost) | **$0.7232** | 2 |
| Revenue after increase | (25,820 x 1.70 x 1.08) | **$47,405.52** | 2 |
| Fixed costs after | (20,000(1.0172)) | **$20,344.00** | |

| Part / Requirement | Calculation | Answer | Points |
|---|---|---|---|
| Variable costs after | (25,820 x 0.7232) | **$18,673.02** | |
| Profit after increase | (47,405.52-20,344.00-18,673.02) | **$8,388.50** | 2 |
| Change in monthly profit | (8,388.50-9,997.00) | **−$1,608.50** (decrease) | 2 |
| **Part C. Risky Business (2 points)** | | | |
| Variable costs | Explains that fuel prices increase variable costs, reducing the contribution margin (profit earned per kilometer). | Accept any equivalent explanation. | 1 |
| Fixed costs | Explains that higher fixed costs combined with fewer kilometers driven make it harder to break even, increasing business risk. | Accept any equivalent explanation. | 1 |
| **Part D. Purchasing Power (2 points)** | | | |
| Purchasing power | After-tax income before: (9,997 x 0.80 = $7,997.60)<br>After-tax income after: (8,388.50 x 0.80 = $6,710.80)<br>Nominal income index: 6,710.80/7,997.60 x 100 = 83.91<br>Real purchasing-power index: (83.9/101.72) x 100=82.49 (See Part A for 101.72)<br>Purchasing-power change: 82.49-100=-17.51% | **Purchasing power decreased by 17.51%** | 2 |