Midterm
Microeconomics for Public Policy I
Fall 2022
October 18, 2022

GWID: _____

Instructions

1. **Write your name on page 16.**
2. Write your GWID on each page. If you don't know your GWID, write your birthdate (or some other made-up number) on **each page**. I request this so that when we scan we don't lose any pages.
3. Answer all questions.
4. The exam is graded out of 100 points; points are indicated on sections and questions.
5. Write legibly. Illegible exams cannot be graded.
6. The final page is intentionally left blank for extra work. If you do extra work on this page (or any other non-standard location) that you would like to be counted, note it clearly near the question you are answering.
7. Label all figures as needed.
8. We give liberal partial credit. If a question has multiple parts and you can't answer one, it is in your best interest to answer all the remaining parts to the best of your ability.
9. Make sure you **explain** your answers as needed. When appropriate, you should also explain any assumptions that you make to arrive at your answer. Explanations may yield partia l credit.
10. Be concise.

For marking purposes only

Part A _____

Part B _____

Part C _____

total _____

A. Ripped From the Headlines (9 points total, 3 points each question)

Read the article from the *Wall Street Journal* at the end of the exam.

1 (3). Does weather impact the supply of or demand for heating fuels? Explain why.

2 (3). Explain why the June fire in Texas lowered prices in the US, and discuss for whom they may have increased prices.

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3 (3). Do higher inventories of fuels make the supply of heating fuels more or less elastic? Explain why, and whether higher inventories are likely to increase or decrease prices, all else equal.

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B. Short Answer Questions (40 points, 5 points each question)

1. Give two specific examples that could shift the supply of apples. For each example, explain which way the supply curve shifts and why.

2. You are a person who really likes chocolate and somewhat likes bananas. Draw indifference curves for these preferences, putting chocolate on the horizontal axis and bananas on the vertical axis, and explain why your curves look the way you've drawn them.

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3. If your utility function is $U = 5XY^8$ are X and Y at all complementary? Explain why.

4. Suppose that the equilibrium price of iron ore falls and the equilibrium quantity of iron ore increases. Assume that only supply or demand changed. Which changed? Explain your answer.

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5. The elasticity of supply of chocolate is 0.2. If price increases by 5%, by what percent will chocolate suppliers change production?

6. Suppose that you observe that one of your favorite lunch spots recently decreased the quantity of fresh vegetables in favor of rice in its lunch bowls (true story!). Given what we know about optimal input choices and prices, what can you deduce changed in the relative price of rice and fresh vegetables? Explain why.

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7. If your demand curve is $Q = 600 - 100P$, how many peaches do you want when the price is \$6?

8. Define marginal utility. Give a specific example, for you, that shows how your marginal utility decreases for a given level of consumption.

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C. Medium Answer Questions (51 points, points as noted on questions)

1 (19 points). Supply, Demand, Quotas and Cookies

The market for cookies is represented by the following supply and demand conditions: $Q_D = 1,000 - 200P$ and $Q_S = 400P - 200$. The variable P is price per box of cookies and Q measures boxes per day.

Throughout this question, you need to make a graphic. You are welcome to make one graphic, making sure you clearly label all parts as requested.

(a, 4) Solve for the equilibrium price and quantity and illustrate your answer with supply and demand curves. Label your graph axes and intercepts.

(b, 3) Suppose the government places a quota on cookies of 400 boxes per day. Solve for the new equilibrium price and quantity. Illustrate the new supply curve and new equilibrium price and quantity on the graph.

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(c, 3) Calculate consumer surplus before and after the quota.

(d, 3) Calculate producer surplus before and after the quota.

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(e, 3) Calculate the deadweight loss from the quota.

(f, 3) Define deadweight loss and explain why a policymaker should care about it.

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2 (16 points). Consumer Optimization

Suppose that Seema's budget constraint is $75 = 10X + 4Y$.

(a, 4) Draw the budget constraint, labeling the axes and intercepts. Put X on the horizonal axis and Y on the vertical axis.

(b, 4) What is the slope of this budget constraint?

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(c, 4) Can Seema afford 4 units of good X and 10 units of good Y?

(d, 4) Draw an indifference curve on your picture from (a) (or repeat the picture) such that Seema is consuming optimally. What is the MRS at this point?

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3 (16). Taxation and Unhappiness

Suppose that the market for solar panels is characterized by demand, $Q = 400 - 10P$ and supply $Q = P + 26$.

(a, 3) What is initial equilibrium price and quantity? Draw a graph, showing this point, and clearly labeling axes and the equilibrium.

(b, 3) Suppose that the government levies a tax of \$22 per unit on solar panels, where the statutory incidence falls on producers. Find the new relevant equation, and add the new curve to your picture.

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(c, 3) What are the new equilibrium price and quantity?

(d, 3) What is the consumer burden? and the producer burden?

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(e, 4) Explain why the party that pays more of the tax does so. Put differently, what feature determines who bears the tax – and which party is that in this problem?

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https://www.wsj.com/articles/higher-heating-bills-poised-to-hit-u-s-households-this-winter-11665805210

MARKETSCOMMODITIES

Higher Heating Bills Poised to Hit U.S. Households This Winter

More expensive natural gas, heating oil, propane and electricity are colliding with forecasts for slightly colder temperatures

The Energy Information Administration's seasonal outlook has a base case for a 27% increase in home heating oil expenses this winter.

PHOTO: ROBERT F. BUKATY/ASSOCIATED PRESS

By Ryan Dezember Follow

Oct. 16, 2022 5:30 am ET

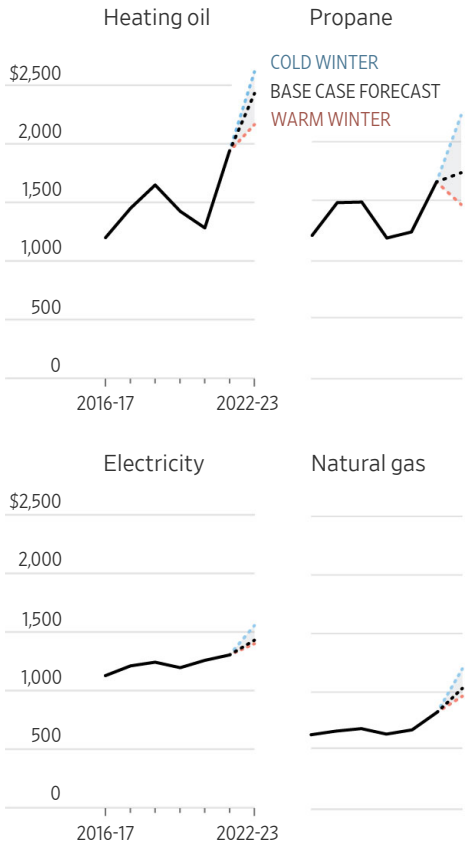
High fuel prices have been a big driver of inflation, pumping up the cost of summer travel and air conditioning, and federal energy forecasters say that staying warm this winter will be more expensive as well.

Americans should expect bigger home-heating bills compared with last winter, thanks to higher prices for natural gas, heating oil, propane and electricity as well as slightly colder weather, the U.S. Energy Information Administration said in its seasonal outlook.

Government energy specialists predict that it will cost $931 to warm the typical home that is heated with natural gas between this month and March. That is up 28% from a year earlier in nominal terms. If it gets colder than federal weather forecasters expect, heating bills could be

51% more than last year for homes with gas-fueled furnaces and boilers, which is nearly half of U.S. households. A 19% year-over-year jump is anticipated if it is a warm winter.

Historical and forecast average household winter heating expenditures by energy type



Note: Years refer to October through March
Source: U.S. Energy Information Administration
Aziz Sunderji/THE WALL STREET JOURNAL

The base case for those who burn heating oil—mainly in the Northeast, where low imports and closed refineries have reduced supply—is for 27% greater expense. Those with propane, popular in rural areas, and electric heat are expected to pay 5% and 10% more, respectively, if temperature forecasts hold.

"Winter energy expenditures for most households are likely to be higher than last winter," said Joseph DeCarolis, EIA administrator. "Much higher if the weather is very cold."

A really chilly winter could throw energy markets back into overdrive and turn up the pressure on central bankers, who are fighting what has been the highest inflation in four decades with the steepest interest-rate increases since the early 1980s.

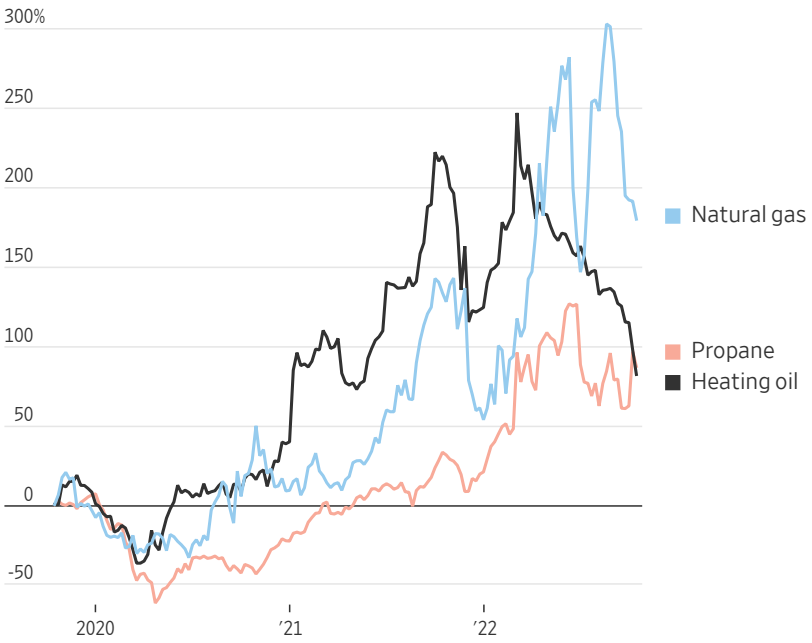
Fuel prices have come down from summer highs as inventories built up from critically low levels.

The declines were reflected in September inflation data, which registered a 19.8% rise in energy costs from a year earlier. That is less than half the year-over-year increase in June and is the slowest gain since March 2021. It is a big reason for the decline in overall inflation from August.

Federal weather officials believe that, on balance, this winter will be colder than last and require more energy to heat homes. Though milder temperatures are expected in the Southwest and along the Atlantic Coast, the National Oceanic and Atmospheric Administration forecasts colder weather in the frigid parts of the country, where the most heating fuel is consumed.

As recently as August, the outlook for winter-fuel prices looked a lot worse for consumers. Natural-gas futures hit shale-era highs above $10 per million British thermal units, and the amount of gas in storage was more than 12% below normal levels. Sky-high coal prices kept gas consumption among U.S. power plants at all-time highs, while Russia's invasion of Ukraine created insatiable demand in Europe for overseas shipments of liquefied natural gas, or LNG.

Futures price performance, weekly



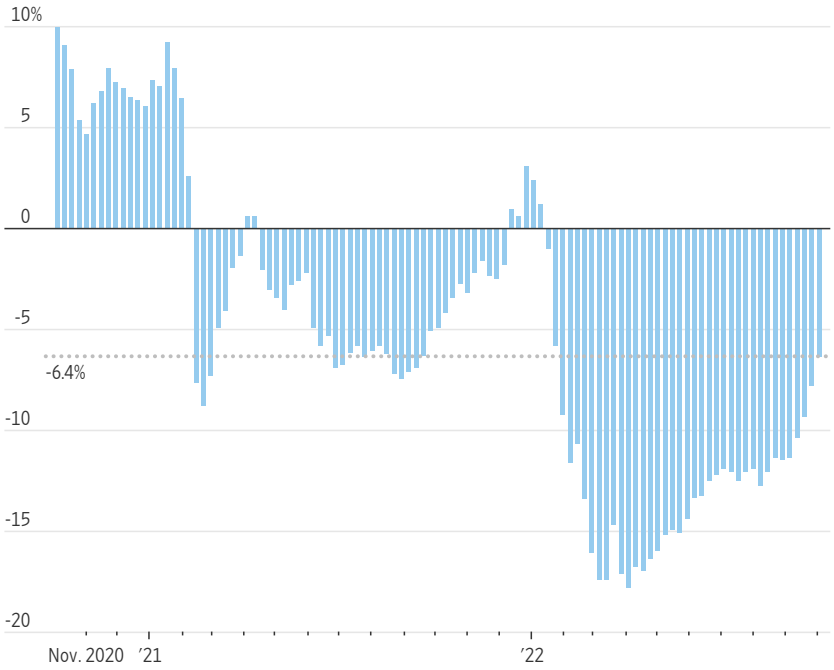
Source: FactSet

Natural-gas prices have declined by about a third since then. They would have likely lingered in double digits had a big LNG shipping terminal in Texas not shut down following a June fire, said Rusty Braziel, chief executive of the consulting firm RBN Energy LLC.

Freeport LNG's outage has reduced U.S. export capacity by nearly one-sixth.

"Instead of going on a ship, these volumes went into inventories, effectively giving the market a reprieve," Mr. Braziel said. "As painful an event as it has been for the folks at Freeport and its customers, it actually helped the U.S. dodge a bullet this summer."

Weekly U.S. natural-gas inventories versus rolling five-year average



Source: Energy Information Administration

Between the gas that otherwise would have been shipped abroad and domestic production that has lately notched daily records, the volumes pumped into U.S. storage facilities over the past month have been the biggest four-week build of the shale era, EIA data show.

Injections of gas into underground caves by traders hoping to sell the fuel for higher prices this winter have halved the deficit to normal inventories that pushed up prices in August.

Analysts and traders say inventories are still low enough that there could be price surges during very cold weather, especially once Freeport resumes operations. The company has said it is aiming to restart next month.

Natural-gas futures ended Friday at $6.453 per million British thermal units, declining for the eighth consecutive week but still 19% higher than a year earlier.

"While we think gas prices are close to fair value, do not write off volatility this winter," said RBC Capital Markets analyst Christopher Louney.

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