NET 2021 Power Round

Milgrom Division: Macroeconomics

April 2021

Instructions

This is the **macroeconomics portion** of the Milgrom division of the 2021 Northwestern Economics Tournament Power Round. There are three questions of *unequal* weight, accounting for a weighted *half* your score for the Power Round. You are encouraged to work together on these questions. Answer each question as clearly and succinctly as possible. You may write on a blank sheet of paper where you *clearly indicate* where your answer to each part is. If you are unsure of your answer, take your best guess: there is no penalty for incorrect answers. It is recommended you spend approximately an hour on this portion. Remember, we do *not* share your answers or scores with Northwestern admissions, nor do we keep them for ourselves. You are not expected to know how to answer each question on the exam; rather, this test is designed to assess your economic and formal reasoning skills. Have fun, and good luck!

Problem 1: The Curse of the Tropics (19 points)

The following question is adapted from [STUDY NAME REDACTED] and [STUDY NAME REDACTED]. You may ignore issues of statistical significance.

One often-discussed phenomenon in the macroeconomics of developing countries is the *Curse of the Tropics*. This refers to the fact that measures of economic well being (GDP, HDI, life expectancy, etc.) are systematically worse in countries between the Tropics of Cancer and Capricorn than those above and below. Economists have speculated many causes of this phenomenon, and many of the most commonly cited related to *geography* and *institutions*.

The Very-Bad-Not-Good-Ruin-Your-Day fly (or V-fly, for short) is a genus of insects unique to the African continent. These flies carry parasites that are harmful for humans and potentially deadly for livestock. Using experimental and observational data, researchers have created a V-Fly Suitability Index (VSI) which measures the extent to which V-flies could feasibly live in a geographic region. V-flies are best suited to areas with very high humidity and temperatures around 25°C (77°F) (not too hot, not too cold).

Part A (2) Do you think there is a positive, negative, or insignificant correlation between the VSI and the aforementioned measures of economic development? Give a 1-2 sentence explanation.

As any statistician would tell you, correlation does not equal causation! One of the main reasons why this statement is true is *omitted variable bias*. This is when we see a correlation between two variables, but in reality there is a third variable which is correlated with both other variables, making causality unclear. For example, we may see a positive correlation in sales of ice cream and the number of recorded sunburns. However, we would not conclude that this correlation perfectly tracks the link between these two variables in a vacuum. In reality, we might expect hot, sunny weather to cause parallel changes in both of these variables - without accounting for this confounding factor, we cannot get an accurate causal estimate of the effect of sunburns on ice cream sales or vice versa.

Part B (3) Give an example of a possible omitted variable causing bias in the correlation you just speculated about in part B. Is this omission causing the observed correlation to be too strong or too weak? (Hint: The VSI is designed to measure a region's susceptibility to V-flies - based on the inputs described before part A, what else might do well in environments with high VSI?)

Notice that we have been using the VSI instead of the actual levels of V-flies. One reason for this is that we can use this get a better estimate of the effect of V-flies.

Part C (3) How could we use the VSI in conjuction with the actual presence of V-flies to get to make conclusions about the true effect of V-flies on economic outcomes? HINT: Are there areas which may have high VSI but where V-flies do not actually live?

Part D (3) In his 1990 book "Institutions, Institutional Change and Economic Performance", economic historian Douglass North defined institutions as "the rules of the game in a society or, more formally, the humanly-devised constraints that shape human interaction". Commonly cited examples of good institutions include fair judicial systems, available public schools, and reliable health services. Give one example of either a well or poorly functioning institution in your life and explain how it helps or hurts your local economy.

Many social scientists have examined the effect of the history of colonialism on modern day political institutions. "Extractive states" are defined as colonies which were set up for the sole purpose of extracting natural resources from colonized areas. Examples include the Belgian Congo, Spanish Mesoamerica, and the French Caribbean. These are contrasted with what the historian Alfred Crosby called "Neo-Europes", where permanent settlements were built in the image of the European societies that the colonizers came from. Examples include colonies that were established in what we now call Canada, Australia, and the USA.

Part E (2) Which of these two models of colonialism do you think will lead to more stable political institutions in the future? Give a 1-2 sentence explanation.

This dichotomy and the relative frequency of these colonial models in different parts of the world is often cited as evidence for the importance of political institutions in explaining the Curse of the Tropics. This is often called the *natural experiment of colonialism*.

Part F (3) Give an example of possible omitted variable bias in the natural experiment of colonialism. That is, explain a relevant way in which these two colonial models may have differed that is tied to modern

economic outcomes but is not precisely tied to sociopolitical institutions. Is this example causing the observed correlation to be too strong or too weak? (Hint: Labor and Capital are necessary for a functioning economy, but may not necessarily be directly linked to institutions)

Part G (3) Give another example of a potential cause of the Curse of the Tropics. Is is geographic, institutional, or neither?

Problem 2: Money Printers and Inflation (12 Points)

We can relate money supply to the aggregate economy with the equation: $MV = PY$, where:

(1) M is the amount of money in the economy

(2) V is the velocity of money

(3) P is the aggregate price level

(4) Y is the real value of goods and services traded

Suppose that in Duckville, we have a money supply M of \$160 and a velocity V of 3. Assume that lemonade production is the only economic activity.

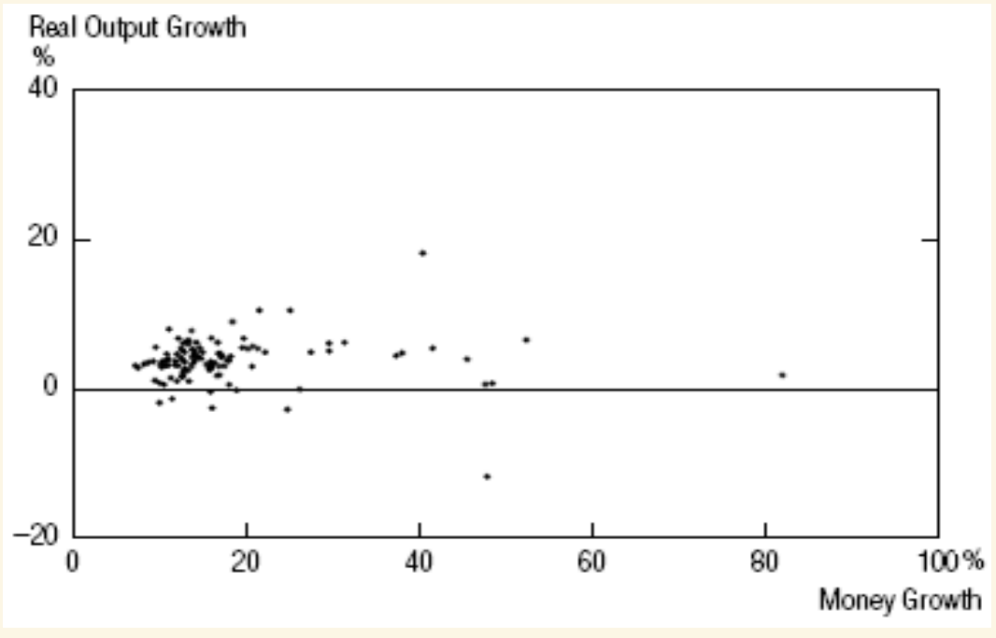
Part A (1) What is the total nominal output in the economy?

Part B (1) Because the only good or service produced is lemonade, we can measure real GDP as the number of lemonades produced. If the price of a lemonade is \$2.50, what is the real GDP?

Part C (2) Now suppose that ducks (the sole lemonade consumer) double their purchases of lemonade. Over the period, the money supply has been spent twice. What is the new velocity of money and total nominal output in the economy?

Part D (1) If the lemonade stand charges \$4.50 instead of \$2.50, what is the real GDP?

We can rewrite the equation of exchange, $MV = PY$, in terms of percentage rates of change. When two products, such as MV and PY, are equal, and the variables themselves are changing, then the sums of the percentage rates of change are approximately equal; that is, $\%\Delta M + \%\Delta V = \%\Delta P + \%\Delta Y$. For simplicity, we can write the above equation as $\mu + \%\Delta V = \pi + g$, where: $\%\Delta M = \mu$, $\%\Delta P = \pi$, and $\%\Delta Y = g$.
The below figure plots the average μ and g between 1960 and 1990 for 100 countries



Part E (4) What can you conclude about the relationship between μ and g? Write down a new expression for μ that reflects this relationship.

Part F (3) Assume that velocity is constant in the long run(growth rate is 0), and suppose that we are in the Duckville economy in Parts (A) and (B), with $M = 160$ and $V = 3$, and $P = 2.5$. If the relationship in E) holds, what happens to the economy when M rises to 250?

Problem 3: Better Everywhere but still Worse Somewhere (11 Points)

The table below shows labor supply of two countries, Maputo and Lesotho, and their unit labor requirements for producing two goods, Warp and Garp. Table 1 shows the quantities of these two goods that each produces in autarky (economic independence), and Table 2 records what they might consume with free trade.

Table 1

	Maputo	Lesotho
Labor Endowments	300	600
Unit Requirement: Warp	1.5	4
Unit Requirement: Garp	1	5

Table 2

Autarky Consumption	Maputo	Lesotho
Warp	90	40
Garp	120	88

Part A (2) Which country has the absolute advantage in producing Warp? Which has the absolute advantage in producing Garp?

Part B (2) Which country has the comparative advantage in producing Warp? Which has the comparative advantage in producing Garp?

Part C (4) Fill in these empty cells in the table below, assuming that each country specializes completely in the good in which it has a comparative advantage. That is, it uses all of its labor to produce only that good. Assume that with trade Maputo consumes exactly two-thirds of the two countries' combined output of each good.

Free Trade Consumption	Maputo	Lesotho
Warp		
Garp		

Part D (3) How much does each country export and import each good in the free trade situation? Is there evidence here that the countries have gained from trade?