Final Exam. Econ520. Fall 2023

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UNC

Instructions:

- Answer all questions.
- Write legibly.
- Write your answers on the question sheets. Use additional pages, if needed.
- *Explain* your answers – do not just state them.
- *Show* your derivations – do not just state the final result.
- Do not refer to any notes or books. You may use a calculator.
- The total time is **180** minutes. The total number of points is **120**.

Name:	PID:

1 Short Questions: Closed Economy

Be sure to explain your answers. No models are required.

1. [8 points] Across all of our AS/AD models (closed and open economy) we found that increasing government spending does change not medium run output. What is the intuition for this general result? Be specific about how a shock to G gets offset by lower demand for other purposes in equilibrium.

   Answer

   MR output is entirely determined by supply factors: productivity (real wages), work incentives (such as UI benefits), and preferences for leisure. Those are the ingredients of the MR supply curve $F\left(\frac{1}{1+m}, z\right)$. Unless a change in AD changes one of these ingredients, only the composition of output changes, but not the level.

   The mechanism: Higher AD causes higher prices which crowd out demand through various channels (e.g., higher interest rates). Prices continue to rise as long as $Y > Y_n$.

2. [8 points] Would you expect the marginal propensity to consume out of a one-time stimulus payment to be large or small? How about a recurring payment that is paid out every year indefinitely? Explain.

   Answer

   Think permanent income hypothesis. Consumers want smooth consumption. For consumers that are not credit constrained, the stimulus payment raises consumption about equally in all future periods.

   A one-time payment has little effect on lifetime income and therefore on consumption in each period. The MPC is $1/T$ where T is the remaining lifetime.

   For a recurring payment, the MPC will be about 1. Lifetime income rises by Tx and so does consumption. Consumption per period rises by x (where x is the annual stimulus amount).

3. [5 points] Suppose the Fed manages to convince the economy that inflation will be higher in the future. How does this change in expectations affect today's aggregate demand?

   Answer

   What matters for consumption and investment demand is the real interest rate: $r = i - \pi$. If the Fed can convince people to expect higher inflation in the future, the real interest rate declines. This stimulates aggregate demand.

4. [8 points] The Phillips Curve postulates $\pi = \pi^e + (m + z) - \alpha u$. Can monetary policy **permanently** lower unemployment? How? What is the intuition?

   Consider two cases:

   (a) Inflation expectations are fixed.

   (b) Inflation expectations are backward looking: $\pi_t^e = \pi_{t-1}$.

Answer

(a) If inflation expectations are fixed, a constant rate of inflation (or money growth) permanently lowers unemployment. In each period, wage setters are surprised by inflation and set a wage that is "too low."

(b) If inflation expectations are backward looking, an accelerating rate of inflation permanently lowers unemployment. In each period, wage setters are surprised that the inflation rate accelerated, even though it did the same in the past, and set a wage that is "too low." Of course, ever accelerating inflation is not feasible. So in the end a period of rising inflation buys temporarily lower unemployment.

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5. [9 points] Explain why "r versus g" is important for how much debt a government can afford to take on. Here, r is the real interest rate and g is the growth rate of the economy.

Answer

The main constraint on the government's ability to take on debt is the path of the ratio of interest payments to output (the tax base). If interest payments grow faster than the tax base, the government will eventually not be able to pay.

The key insight is now: if the government never pays any interest (rolls over all of its debts and interest into new bonds), debt grows at rate r.

Therefore, if $r > g$, a government that rolls over all of its debts eventually runs out of funds. Some part of the interest has to be paid out of tax revenues. I.e., the government has to run primary surpluses. The larger the debt, the higher the surpluses it must run (the less funds are available for government consumption and transfers).

However, if $r < g$, the government can roll over all of its debts. In principle, the government can take on unlimited amounts of debt because it never makes any payments (that are not financed by issuing more debt). In practice, the interest burden is no longer a limiting factor for how much the government can borrow.

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2 Short Questions: Open Economy

Be sure to explain your answers. No models are required.

1. [8 points] Comment on the following quote by Robert Scott: "While growing exports tend to support domestic employment, growing imports costs jobs and reduces domestic output." Do you agree with this quote? Why or why not?

   Answer

   The fundamental logical problem with the quote is that it claims that one endogenous variable (NX) causes changes in another (employment). Whether NX and employment move together or not depends on the underlying shock.

   For example: An increase in government spending will generally raise output (in the short run!) and cause trade deficits (part of the demand goes towards imports). But an increase in foreign government spending will improve NX and raise domestic output.

   One could also mention that MR employment is supply determined. It has nothing to do with NX at all.

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2. [10 points] Certain policies in China increase the Chinese saving rate. How do these policies affect the U.S. trade balance? Explain. What would have to happen for the U.S. trade balance to deteriorate? Distinguish between the bilateral and the overall trade balance.

   Answer

   Start from $Y - C - T + (T - G) + (IM - EX) = I$. If private saving $(Y - C - T)$ rises in China without a corresponding increase in investment, the Chinese trade balance goes into surplus (which is exactly what we have observed between 2000 and 2010).

   The "global savings glut" shows up as demand for U.S. assets (especially treasuries), which pushes up the dollar exchange rate, drives down U.S. interest rates, stimulates U.S. investment, and contributes to the U.S. trade deficit (with China). That last part is key. The overall U.S. trade deficit only rises if something alters U.S. saving or investment (here: lower interest rates).

   Another way of telling really the same story: Higher saving must mean that some Chinese output is not purchased domestically. This shows up as supply in world markets, driving down the price of Chinese goods. Everything else equal, the bilateral trade balance deteriorates. However, for the overall U.S. trade balance to change, you need to argue that either domestic I falls or domestic saving rises.

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3. [6 points] If Uncovered Interest Parity holds, would you expect a currency with a high interest rate to be strong (appreciate in the future) or weak? Explain the intuition.

Answer

UIP requires that the dollar returns of investing at home and abroad are the same. A high interest rate means that investors either expect capital losses (depreciation) or apply a risk premium to the currency. Therefore, high interest rate currencies are generally weak currencies.

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4. [8 points] In a closed economy, real wages equal the marginal product of labor, which is mainly determined by production technologies. What determines real wages in an open economy? And how does foreign productivity affect domestic real wages?

Answer

In an open economy, real wages are still determined by marginal products. But now it is the marginal products of good with comparative advantage that matter (the other goods are imported). Hence, real wages in terms of home produced goods (with comparative advantage) stay the same. But since import prices are lower than autarky prices, real wages in terms of all goods rise.

Foreign productivity growth for imported goods tends to lower the prices of those goods. This raises real wages. Foreign productivity growth for exported goods can be detrimental (but let's ignore that case here).

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3 Open Economy AS/AD [50 points]

Consider an open economy with a floating exchange rate. The model equations are:

IS:

$$Y = C\left(Y - T\right) + I\left(Y, i\right) + G + NX\left(Y, Y^*, \frac{P}{EP^*}\right) \tag{1}$$

LM:

$$M/P = Y \times L\left(i\right) \tag{2}$$

AS:

$$Y = F\left(\frac{P}{P^e}\frac{1}{1+m}, z\right) \tag{3}$$

UIP:

$$E = E^e\frac{1+i^*}{1+i} \tag{4}$$

Where, in the medium run, $P = P^e$. Recall that aggregate demand may be written as

$$Y = C(Y - T) + I\left(Y, \hat{L}\left(\frac{M}{PY}\right)\right) + G + NX\left(Y, Y^*, \frac{P}{E^eP^*}\frac{1+\hat{L}\left(\frac{M}{PY}\right)}{1+i^*}\right)$$

In light of this model, evaluate the common claim that low domestic productivity causes trade deficits. In the model, low productivity may be represented as a high m.

Questions

1. [12 points] Graph how a higher m affects the short-run and medium-run equilibrium. This sub-question just asks for the graph. What happens "under the hood" is the subject of the next few sub-questions. Be sure to explain how the curves that you draw shift and why.

   Answer

   This is a standard AS/AD diagram. A higher m shifts the SR-AS curve up (because the argument of F is $P/(1+m)$). This is a negative productivity shock (of course). Full employment output declines b/c the real wage is lower. The SR equilibrium has lower Y (but above the new Y_n) and higher P. The MR equilibrium moves even further left along AD.

   Keep in mind that SR-AS always goes through $P = P^e$ and $Y = Y_n$.

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2. [18 points] Explain what happens in the **medium run** to output, prices, consumption, investment, and the exchange rate. Be sure to follow the model's logic and support your conclusions with the model equations. Assume that the interest rate rises (this will appear mathematically ambiguous, but is required for the model to "work"). Also explain in words the sequence of events that lead to these outcomes.

   Answer

   MR: $Y = Y_n$ is determines by MR-AS (and falls). $P \uparrow$ as we move along AD.

   From LM, i may rise or fall: $M/P \downarrow = Y \downarrow \times L(i)$. There is a subtle point here that you need not deal with. For the model to make sense, we need i to rise as we move along AD. So we are assuming that here.

   Lower Y and higher i reduce C and I.

   $E \downarrow$ from UIP (the dollar appreciates as interest rates rise).

   The sequence of events: Higher m reduces real wages, so that AS falls. Firms have to raise prices to cover costs.

   Higher prices reduce AD through various channels:

   (a) The interest rate rises as people demand more liquidity, crowding out investment.

   (b) The higher interest rate attracts capital inflows, which appreciates the dollar. $NX \downarrow$.

   (c) Higher prices directly reduce NX via the real exchange rate.

   In addition, price expectations rise over time, further shifting AS up until output is back at full employment.

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3. [10 points] Does the productivity shock reduce the trade balance in the medium run? Derive your answer (you will explain it in the next sub-question). Don't be surprised if your answer turns out to be ambiguous.

Answer

Lower output improves NX. Higher prices and a stronger dollar do the converse.

Another way of looking at the trade balance: $NX = (Y - C - T) + (T - G) - I$. Since the MPC is less than 1, $Y - C$ falls. But I also falls. The effect on NX is ambiguous.

Perhaps more interesting is to look at $NX/Y = S^p/Y + S^G/Y - I/Y$. This is still ambiguous with the first two terms likely about unchanged, but I/Y likely lower because of higher i.

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4. [10 points] Explain in words why lower productivity does not (necessarily) worsen the trade balance. What adjustments take place to keep domestic goods competitive?

Answer

Domestic prices rise as productivity falls. That, by itself, does indeed lower NX. The higher interest rate (which is a bit of a model artifact; in reality the Fed would likely keep i about constant) also worsens NX by appreciating the dollar.

However, all of these forces plus the drop in income also decrease domestic demand. On net, the change in NX depends on whether domestic demand falls by more than domestic supply. This is where the answer links back to $NX = S - I$. That outcome is ambiguous; it depends on how strongly demand responds to higher interest rates and lower income. Basically, it depends on whether income effects or substitution effects dominate.

End of exam.