Review Questions: Open Economy AS/AD Model

Econ520. Prof. Lutz Hendricks

---

1. Getting to Full Employment

Consider a fixed exchange rate open economy that is currently in recession ($Y < Y_n$). Discuss the benefits and drawbacks of three approaches for getting back to full employment: (1) Do nothing; (2) Increase government spending; (3) Currency devaluation.

Also discuss the implications for the trade balance. Show your reasoning in a graph. Recall the model equations:

$$
\begin{aligned}
UIP &: i = i^* \\
LM &: M/P = YL(i) \\
AD &: Y = C(Y-T) + I(Y,i) + G + NX\left(Y, Y^*, \bar{E}P/P^*\right) \\
AS &: Y = F\left(\frac{1}{1+m}\frac{P}{P^e}, z\right)
\end{aligned}
$$

Questions:

1. (10 points) Do nothing.

   Answer: The graph looks like a closed economy AS/AD model.
   Over time, AS shifts down because prices are lower than expectations. We get a prolonged period of falling prices, rising (but below full employment) output. In the background, AD rises because falling prices improve NX. The main drawback: it can take a long time to get to full employment.

2. (10 points) Increase government spending.

   Answer: AD shifts right. In principle, the economy can get to full employment right away. Higher prices and output imply a lower trade balance.

   Benefits: fast; benefits the other country.

   Drawbacks: fiscal deficits; inflation; in practice: takes time to implement.

3. (10 points) Currency devaluation.

   Answer: AD shifts right, but this time because the lower exchange rate improves the trade balance.
   Benefits: fast and quick to implement; trade balance improves (if that is a benefit)
   Drawbacks: inflation; damages credibility of the peg.

2. Changing Risk Premium

Recall the model equations:

$$UIP : i = i^* + RP$$

$$LM : M/P = YL(i)$$

$$AD : Y = C(Y - T) + I(Y, i) + G + NX\left(Y, Y^*, \bar{E}P/P^*\right)$$

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

The exchange rate is fixed. I modified the model by adding a risk premium (RP) to UIP. Assume that the economy starts in a medium run equilibrium. Suppose the risk premium increases.

Questions:

1. (16 points) Show the short-run effects on output, prices, money supply, and net exports. Explain.

   Answer: Short run: AS unchanged. AD shifts left as $i \uparrow$ and $I \downarrow$. Y and P fall. NX improves because $Y \downarrow$ and $P \downarrow$.

   The money supply must have decreased (see money market clearing with lower money demand and lower prices). This happens because the Fed must lean against the capital outflows that happen as long as the interest rate is below $i^* + RP$.

2. (15 points) Show the medium-run effects on output, prices, and net exports. Explain.

   Answer: Medium run: $Y = Y_n$ from AS. P must fall more as AS shifts toward that point. NX must rise, so that AD stays at Y_n even as $I \downarrow$.

3. (8 points) Briefly explain what happens during the transition from short to medium run.

   Answer: Transition: Wage setters adjust price expectations downward. Wages fall, which allows prices to fall. That improves the trade balance and increases Y until $Y = Y_n$. Along the way, the Fed keeps buying foreign exchange (so that M declines).

2.1. Productivity shock

3. Productivity Shock

Consider the consequences of an adverse supply shock in an open economy with fixed exchange rates.

Specifically, assume that the economy starts in the full employment, medium-run equilibrium. Then $m \uparrow$ permanently. Recall the model equations:

$$UIP : i = i^* + RP$$

$$LM : M/P = YL(i)$$

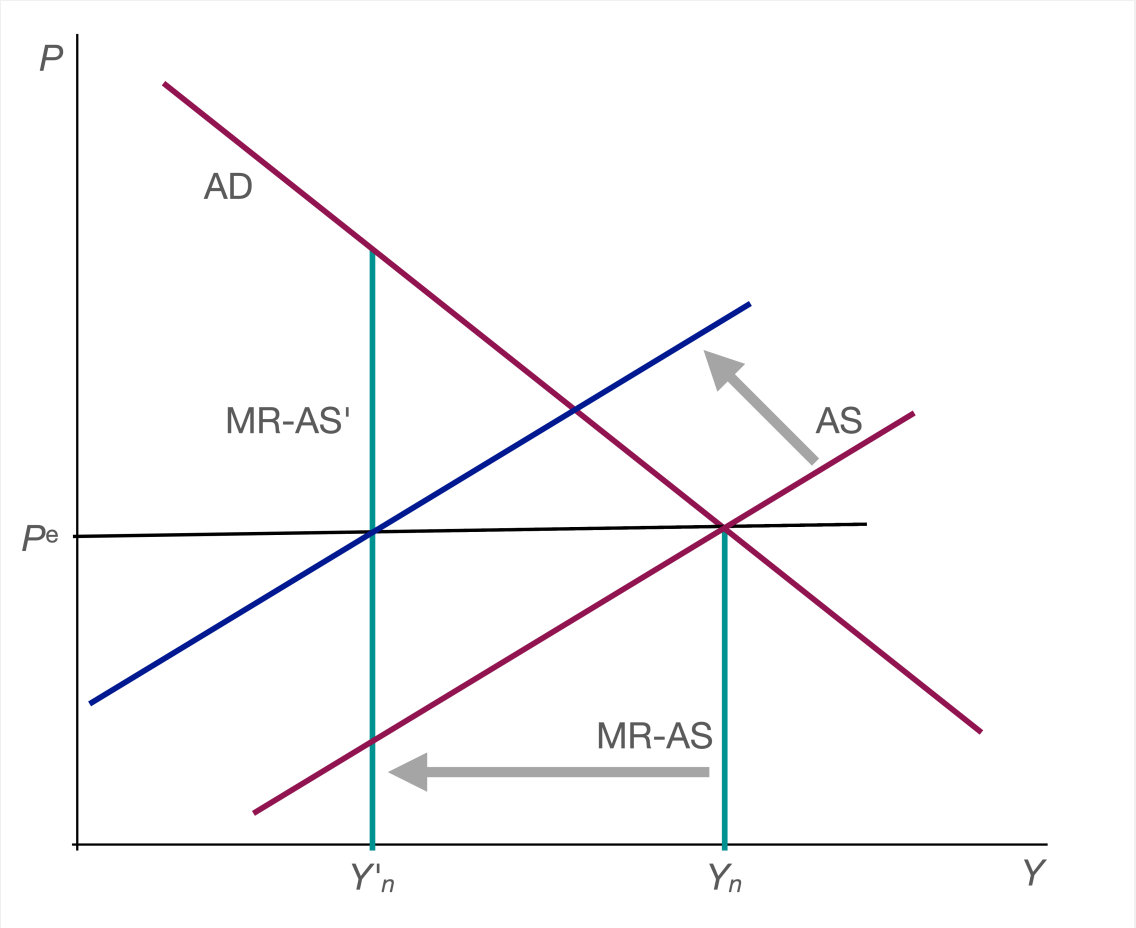
$$AD : Y = C(Y - T) + I(Y, i) + G + NX\left(Y, Y^*, \bar{E}P/P^*\right)$$

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

Questions:

1. (16 points) Graph the medium run equilibrium. Explain what curves you graph (and which ones you do not graph) and how they relate to the model equations. Clearly explain which curves shift and why.

Answer: The graph ends up looking like a closed economy supply shock.



We graph AS and AD with fixed $i = i^{\{*\}}$. We don't worry about LM b/c that just determines M. MR-AS shifts left b/c the m shock is permanent. AS shifts left b/c m rises. As always, AS intersects MR-AS where $P = P^{\{e\}}$. AD does not shift (it's a supply shock).

2. (16 points) Explain how consumption, investment, net exports, and the money supply change in the medium run.

Answer: $C(Y-T) \downarrow, I(Y, i^{\{*\}}) \downarrow$. NX seems ambiguous at first, but it actually falls (b/c prices rise). This is how higher prices reduce AD in this model (movement along AD). $\frac{M}{P} \downarrow$ from LM (but we cannot tell whether M rises or falls).

3. (16 points) Graph the short run equilibrium in the same figure. Clearly explain which curves shift and why. Pay attention to the location of the short run AS curve.

Answer: For which curves shift, see above.

4. (16 points) Explain how the same variables change in short run.

Answer: The changes in the variables are the same as in the MR, but smaller (b/c the shift in AS is smaller).

5. (16 points) Explain what happens along the transition from short run to medium run.

Answer: $P^{\{e\}} \uparrow$ shifts AS up. Prices rise. Output falls b/c the real exchange rate appreciates ($NX \downarrow$). That causes declines in C and I. Higher prices and falling output change the interest rate (direction not clear). The Fed adjusts M to keep $i = i^{\{*\}}$.

4. Floating: Dumping

Consider the consequences of foreign dumping in an open economy with floating exchange rates.

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

$$LM: M/P = Y \times L(i)$$

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

$$UIP: E = E^e\frac{1+i^*}{1+i}$$

Recall that we combine IS + LM + UIP into AD:

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

Questions:

1. (16 points) Graph how foreign dumping affects the short-run and long-run equilibrium. Dumping may be modeled as a drop in foreign prices P^*. 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. Clearly mark the short and medium run equilibrium.

Answer: This is a standard AS/AD diagram. Dumping shifts the AD curve left or down. Ceteris paribus, lower foreign prices reduce NX. The SR equilibrium has lower Y and P. The MR equilibrium has even lower P but unchanged $Y = Y_n$.

2. (16 points) Derive what happens in the **medium run** to output, prices, consumption, investment, the exchange rate, and net exports. Be sure to follow the model's logic and support your conclusions with the model equations.
   Explain in words why foreign dumping worsens our trade balance. How do you reconcile this finding with the notion that policies only affect the trade balance if they change domestic saving or investment?

Answer: MR: $Y = Y_n$ and $P \downarrow$ from the graph.
Interest rate: $\frac{M}{PY} \uparrow = L(i \downarrow)$.
Therefore C unchanged, $I \uparrow$ and $E \uparrow$ (dollar depreciates).
Trade balance: $NX \downarrow$ to satisfy $Y = C + I + G + NX$.

In words: the trade balance improves b/c foreign goods get cheaper in world markets. Some of the direct effects of the dumping are offset by changing prices ($P \downarrow$ and $E \uparrow$ counteract $P^* \downarrow$). But those equilibrium effects are not enough to fully undo the shock.

The finding is consistent with the idea that shocks only affect the trade balance if they change saving or investment. Here, the shock hits investment by lowering i. This is probably not a realistic feature of the model, but it depends on how the Fed reacts.

3. (16 points) Derive what happens in the **short run** to the same variables.

Answer: SR: $Y \downarrow$ and $P \downarrow$ from the graph.
Interest rate: $\frac{M}{PY} \uparrow = L(i \downarrow)$.
Therefore I ambiguous, C unchanged, and $E \uparrow$ (dollar depreciates).
Trade balance: $NX \downarrow$ to satisfy $Y = C + I + G + NX$.

4. (16 points) Explain how full employment gets restored during the transition from the SR to the MR. Where does the additional demand come from?

Answer: Since SR $Y < Y_n$, price expectations start to fall. That reduces wages and allows firms to reduce prices.

Lower prices directly improve the trade balance. This is the first source of additional demand.

Lower prices also raise M/P. To clear the money market, i must fall. (Note: strictly speaking, the change in i during the transition is ambiguous, but let's not get into that complication…). Lower i causes dollar depreciation, which further improves NX. Lower i also crowds in investment.

5. Floating: Low Productivity

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

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

$$LM : M/P = Y \times L(i)$$

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

$$UIP : E = E^e\frac{1+i^*}{1+i}$$

Where, in the medium run, $P = P^e$.

We introduce a simplification relative to the model studied in class: The Fed always adjusts M to hold $i = \bar{i}$ fixed. Then aggregate demand may be written as

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

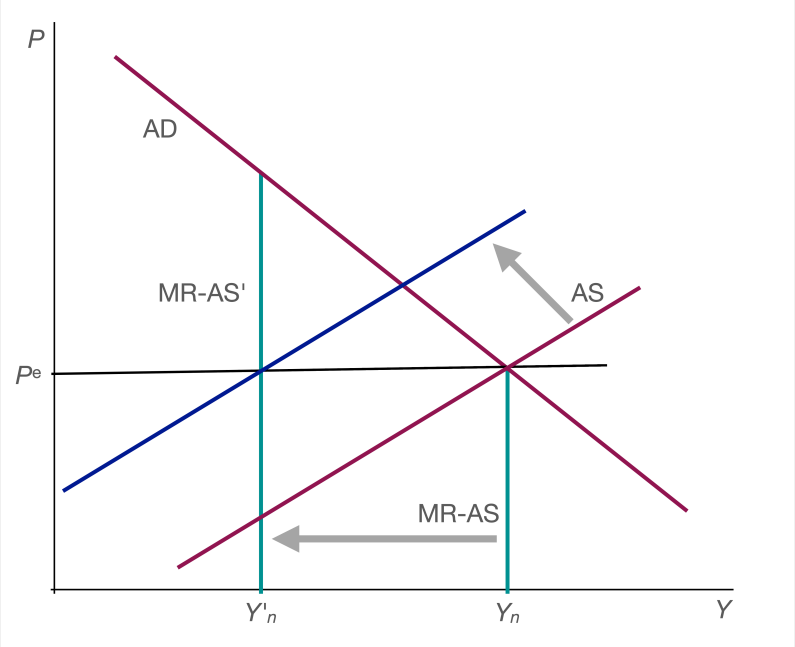
This curve is still downward sloping in P, but easier to think about than the one studied in class.

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

Questions:

1. (16 points) In an AS/AD graph, show how a permanent reduction of 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. Clearly mark the short and medium run equilibrium.

   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 $Y = Y_n$.



2. (16 points) Derive what happens in the **medium run** to output, prices, consumption, investment, the exchange rate, and net exports. Be sure to follow the model's logic and support your conclusions with the model equations.

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

   Lower Y and fixed i reduce C and I. Since the marginal propensity to spend is less than 1, $Y - C - I$ falls.

   E is unchanged from UIP (because the Fed holds i constant).

   Lower output improves NX. Higher prices do the converse. But we can sign the net result from $NX = Y - C - I - G$. Since $Y - C - I$ falls and G is constant, NX must fall.

3. (16 points) Explain **in words** the sequence of events that lead to the changes derived in the previous question. This question asks you to explain the intuition underlying the outcomes you derived in the previous sub-question.

Answer: The sequence of events: Higher m reduces productivity, so that firms have to raise prices (for given Y) to cover costs. Higher prices reduce demand.

Short run:

- If the Fed held M constant, the interest rate would likely rise (their is a math detail here that we don't need to worry about...), crowding out I. But the Fed increases M to hold i constant.
- Higher prices then reduce AD only by lowering NX.
- Falling demand reduces output. This, in turn, reduces C and I.

Medium run:

- Price expectations rise over time, further shifting AS up until output is back at full employment.
- In the background: the Fed again adjusts M to hold i constant. Therefore, the changing prices affect AD (directly) only through NX.

4. (16 points) Explain why the productivity shock reduces the trade balance in the medium run. How can this finding be reconciled with the fact that the productivity shock has no clear effect on either saving rates or investment rates (I/Y)?

Answer: It all works through higher domestic prices. Since the Fed fixes i, higher prices directly raise P/EP^* which reduces NX.

Intuitively: Full employment output falls, but the Fed stabilizes all demand components except for NX. Rising prices get us back to full employment, only by reducing NX.

However, when we look at $NX/Y = S/Y - I/Y$, we find that the change in NX/Y is ambiguous. NX and output both fall. That is consistent with constant saving and investment rates, so our central intuition remains valid.