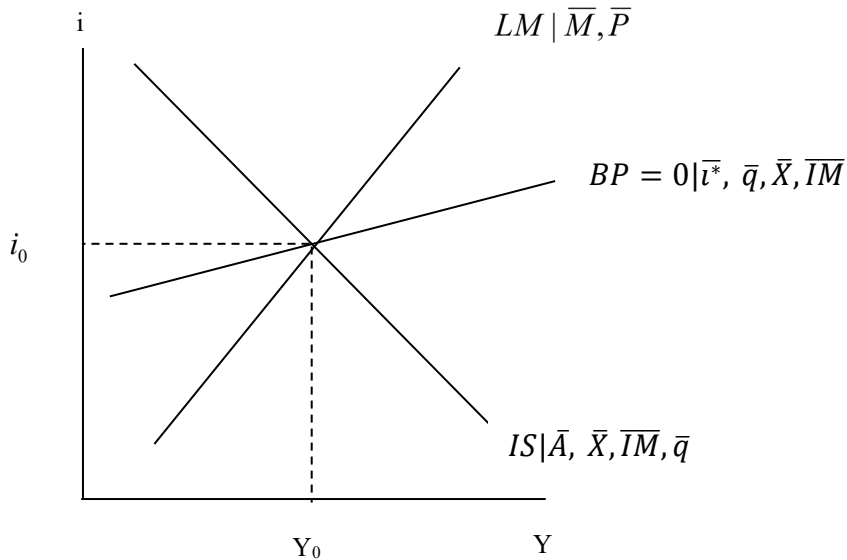


**Midterm 2 Exam Answers** (rev'd 4/27)

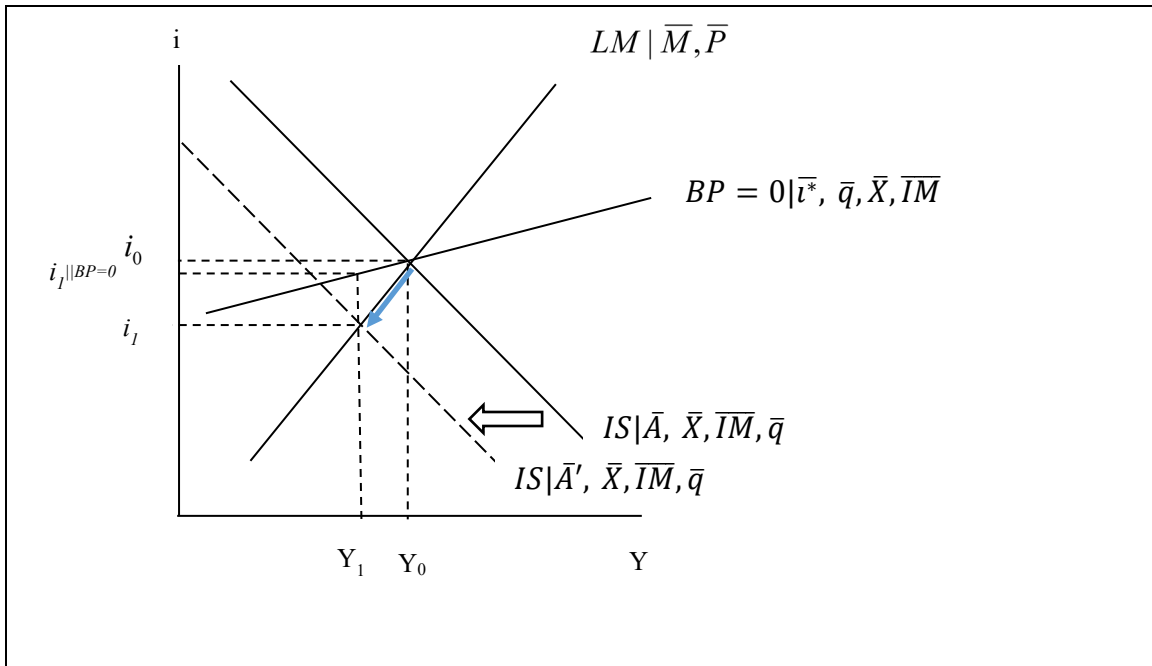
This exam is worth 75 points, although you have 90 minutes to complete it. The points are allocated in proportion to the time you should spend on each problem.

1. (25 minutes total) Suppose you are given a standard IS-LM-BP=0 model for a small open economy operating under a fixed exchange rate regime:



1.1 (5 minutes) Show what happens to output and the interest rate if government spending is decreased, using a graph (show the curve shifts clearly). Assume for the moment the central bank sterilizes flows.

**Answer:** A reduction in government spending shifts inward the IS curve (white arrow). If the central bank sterilizes the capital outflow, the LM curve stays in place. Output falls from  $Y_0$  to  $Y_1$ , interest rate  $i_0$  to  $i_1$ , and equilibrium moves as indicated by the blue arrow.

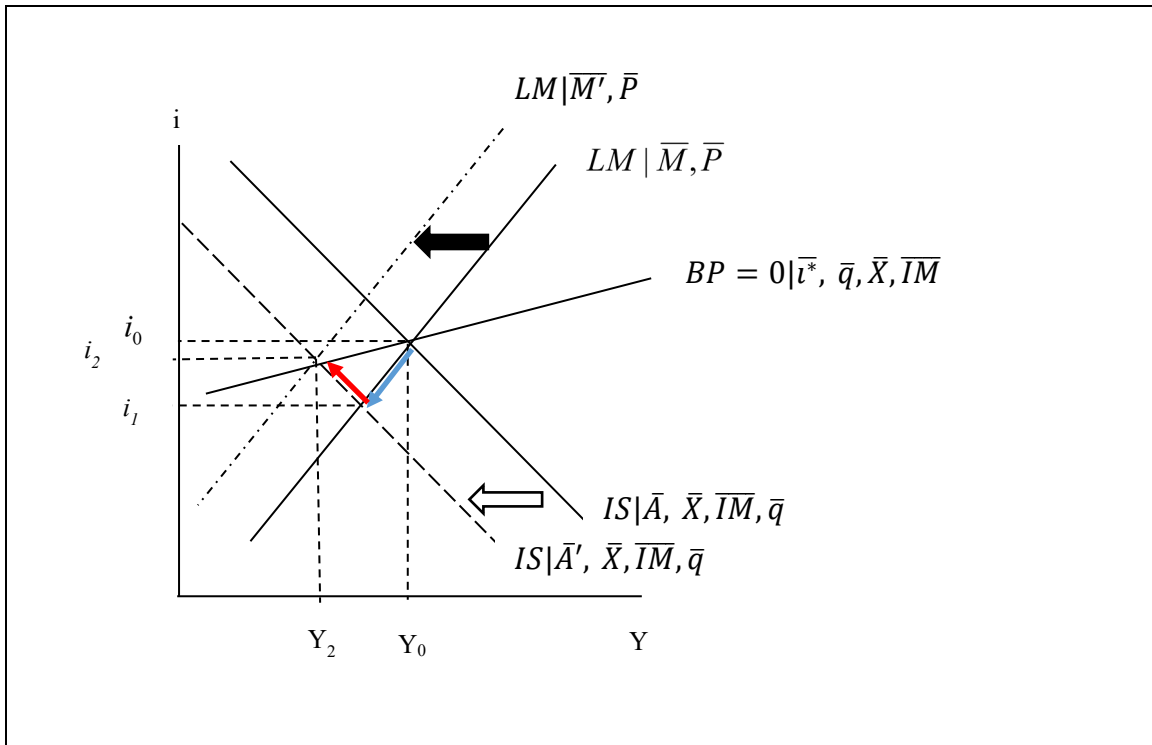


1.2 (5 minutes) Explain what happens to foreign exchange reserves, and why. Can the central bank continue this policy indefinitely?

**Answer:** When the interest rate is at  $i_1$  below  $i_{|BP=0}$ , then  $BP < 0$  and  $ORT > 0$ , so foreign exchange reserves decline. Sterilization means the central bank increases money base (by buying government bonds) to offset the decline in money base which occurs as  $ORT > 0$ . This process can continue until foreign exchange reserves are depleted.

1.3 (5 minutes) Show graphically what happens over time to the curves, and the money supply, if the central bank does not sterilize flows.

**Answer:** If the central bank doesn't sterilize the financial capital outflow, the LM shifts in (black arrow) until the LM intersects the  $BP=0$  curve and IS curve. The interest rate rises from  $i_1$  to  $i_2$ , output falls from  $Y_1$  to  $Y_2$  (equilibrium moves as shown by red arrow),

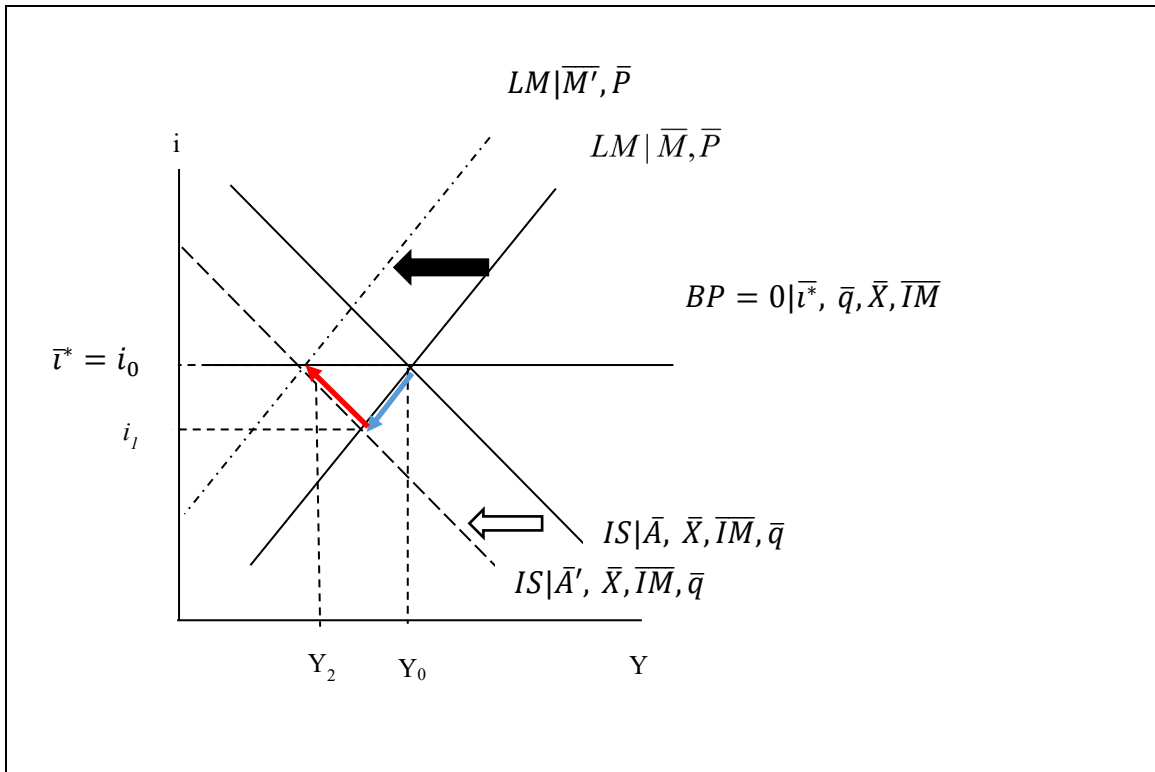


1.4 (5 minutes) Explain what happens in terms of the economics.

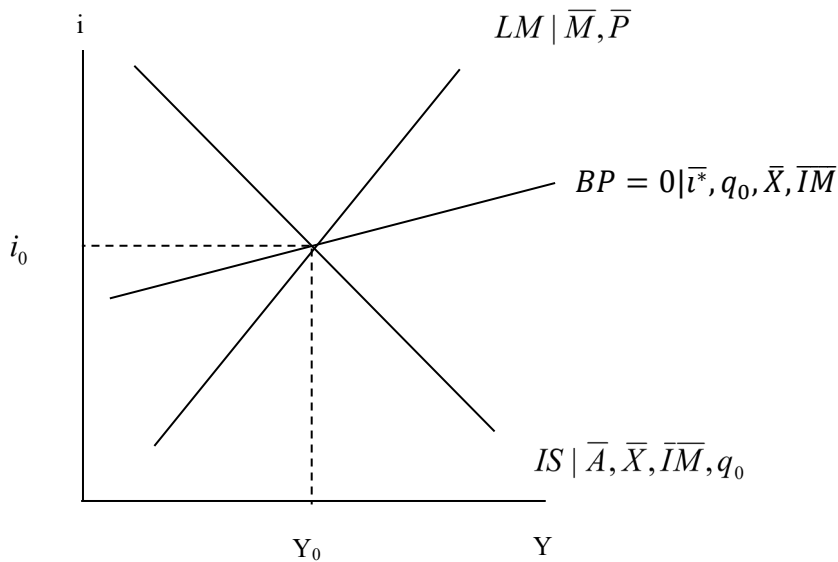
**Answer:** If the central bank does not sterilize the financial account outflow, then the money base and money supply shrink as foreign exchange reserves decline. This shifts the LM curve inward (black arrow). This process continues until the interest rate rises to  $i_2$ , output falls to  $Y_2$  (equilibrium moves as shown by red arrow), as the higher interest rate decreases investment and hence aggregate demand. At that point, the interest rate equals that consistent with external balance, and  $BP=0$ ,  $ORT=0$ , and the LM ceases to shift.

1.5 (5 minutes) Suppose capital mobility increases so that there is no impediment to moving financial capital across the country's borders. Repeat 1.1. Is it feasible for the central bank to sterilize for any measurable period of time?

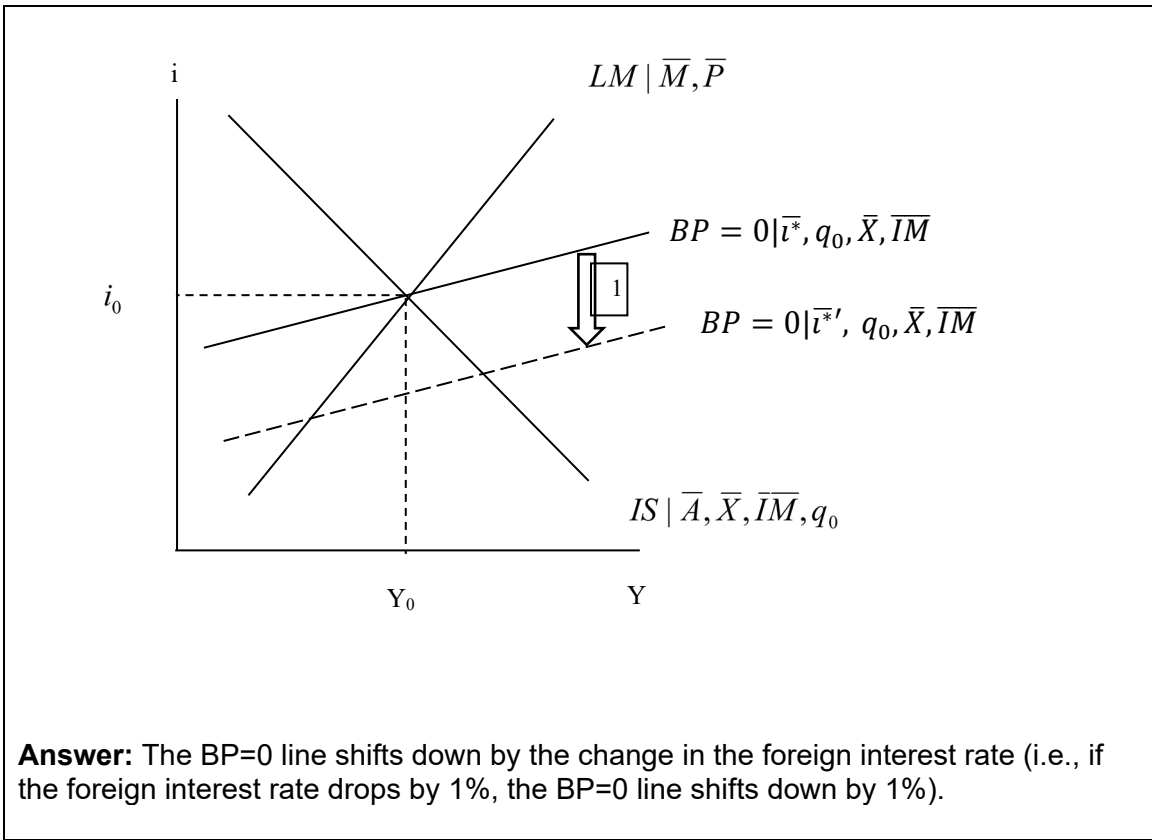
**Answer:** Capital mobility consistent with no impediment to cross border financial capital movements means  $\kappa = \infty$ , so the  $BP=0$  line is flat. Then it is not feasible to sterilize for any instant in time because as soon as the interest rate drops below the foreign interest rate, there would be infinite outflow, and exchange rate reserves would be instantaneously depleted, shifting the LM curve back (black curve).



2. (25 minutes total) Suppose you are given a standard IS-LM-BP=0 model for a small open economy operating under a (pure) floating exchange rate regime:



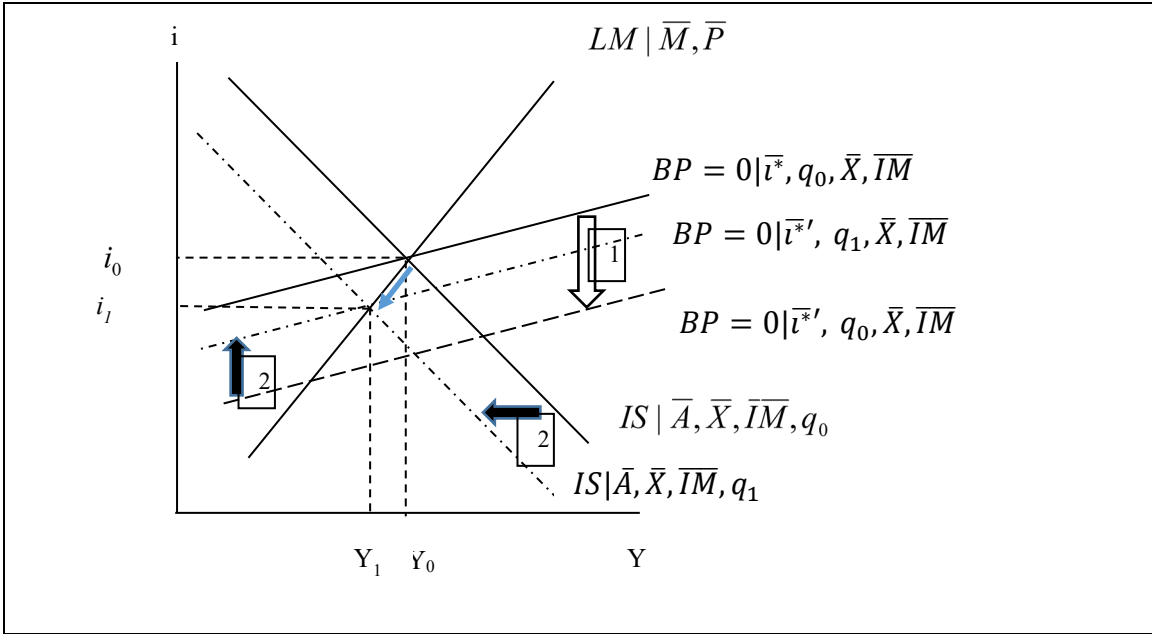
2.1 (5 minutes) Suppose the rest of the world's (specifically the US) interest rates are dropped (as they were in 2020 in response to the pandemic). Show what happens *immediately* to the relevant curve, indicating with arrows (marked [1]) the shift(s). Be sure to indicate what variables are changing, by labeling the curves (changes in foreign interest rate, changes in real exchange rate, etc.)



2.2 (5 minutes) Explain the economics of what is happening, referring to the graph and specific shifts.

**Answer:** The BP=0 line is the combinations of income and interest rates for which BP=0, ORT=0. When the foreign interest rate falls, then the interest rate at any given income level necessary to induce sufficient inflows to balance any current account deficit (or induce sufficient outflows to balance any current account surplus) will drop by the amount of the drop of the foreign interest rate. This would cause an incipient balance of payments deficit.

2.3 (5 minutes) Show what secondary shift(s) occur(s). Mark these arrows with a [2]. Be sure to indicate what variables are changing, by labeling the curves (changes in autonomous exports, changes in real exchange rate, etc.)

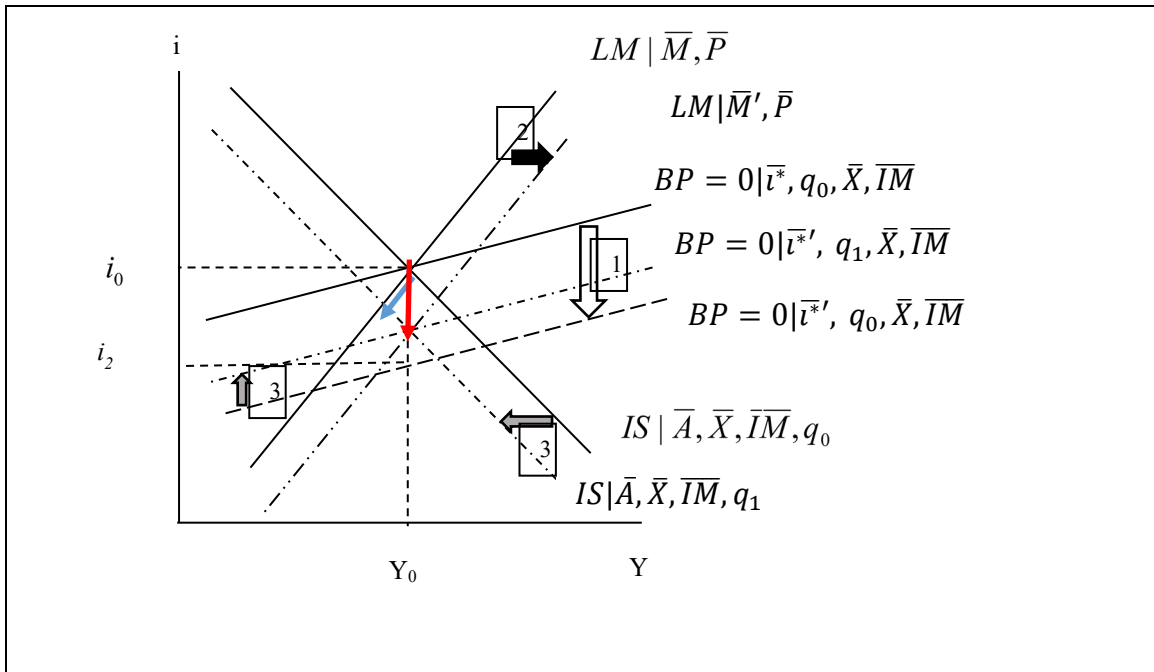


2.4 (5 minutes) Explain the economics of what is happening, referring to the graph and specific shifts.

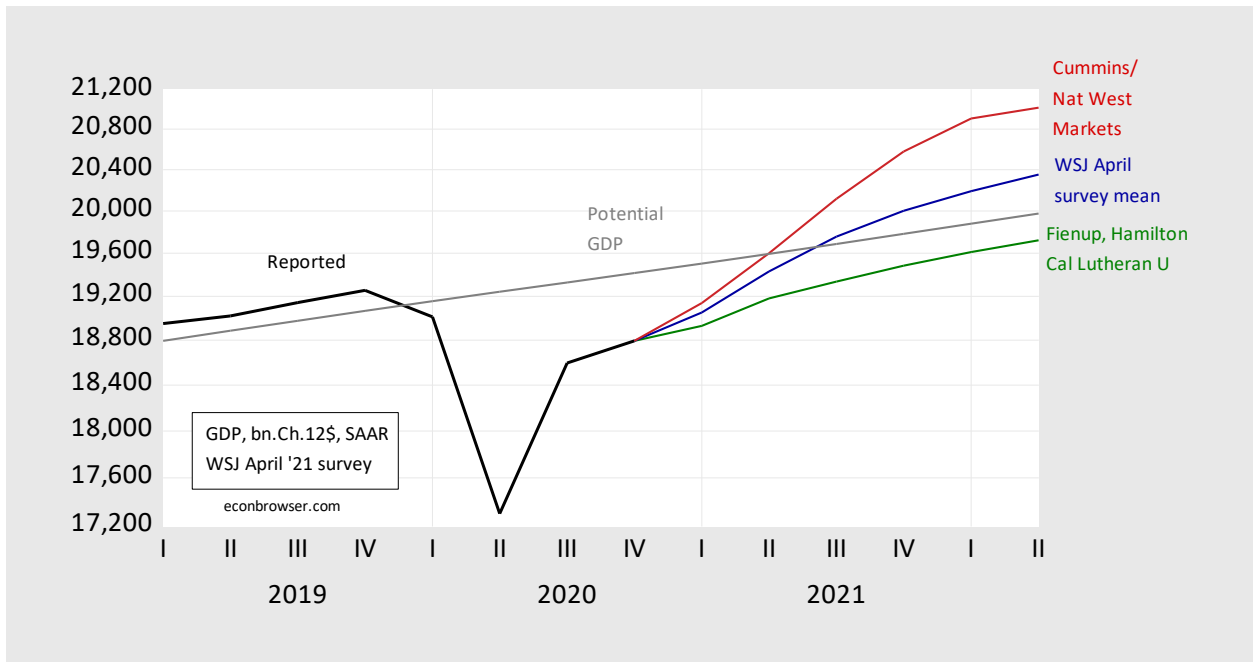
**Answer:** With an incipient balance of payment deficit (but BP can't be in deficit in a free float), the home currency must depreciate from  $q_0$  to  $q_1$ . As the currency depreciates, expenditure switching is spurred so that exports rise, imports fall (for any given income level). As this happens, the IS shifts out (black arrow), BP=0 shifts up (black arrow).

2.5 (5 minutes) Suppose the central bank wants to maintain output in the wake of decline in foreign interest rates. Show what curve(s) the central bank shifts, using a graph with arrows (marked [2] for the second set, and [3] for the third set). Be sure to indicate what variables are changing, by labeling the curves (changes in autonomous exports, changes in real exchange rate, etc.)

**Answer:** LM is shifted out (black arrows) but not as much that would keep exchange rate constant, IS shifts back as real exchange rate appreciates slightly (gray arrow), and consequently BP=0 shifts up partway,  $q_0$  (gray arrow). Equilibrium shifts from  $Y_0$  to  $i_2$  and  $Y_0$  stays at  $Y_0$  (red arrow).

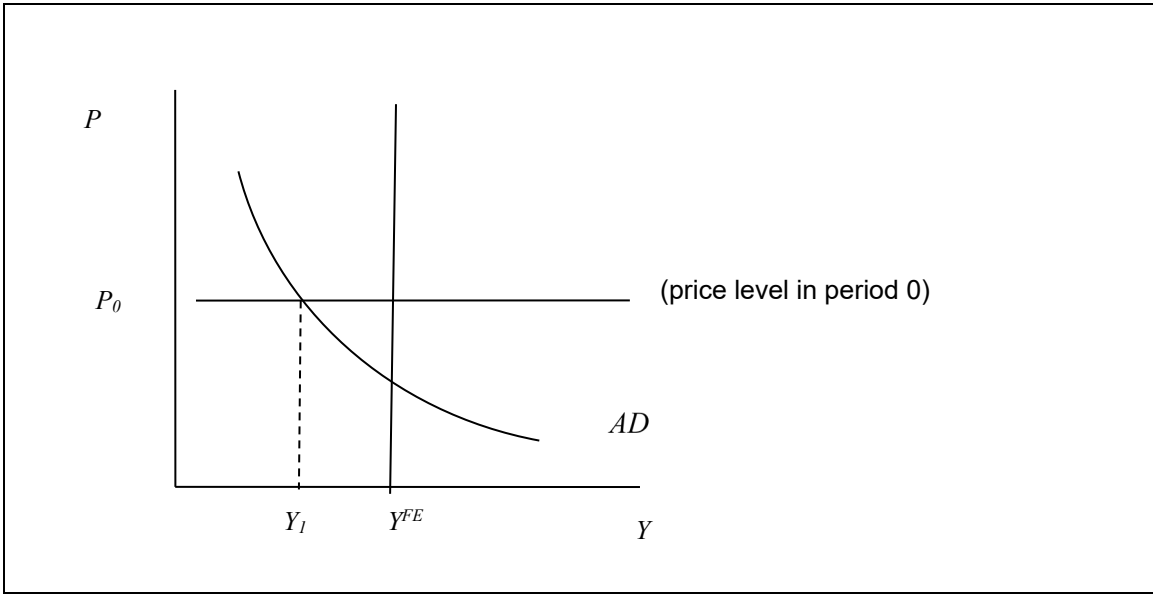


3. (25 minutes total) Consider the following figure, depicting the outlook for the US economy.

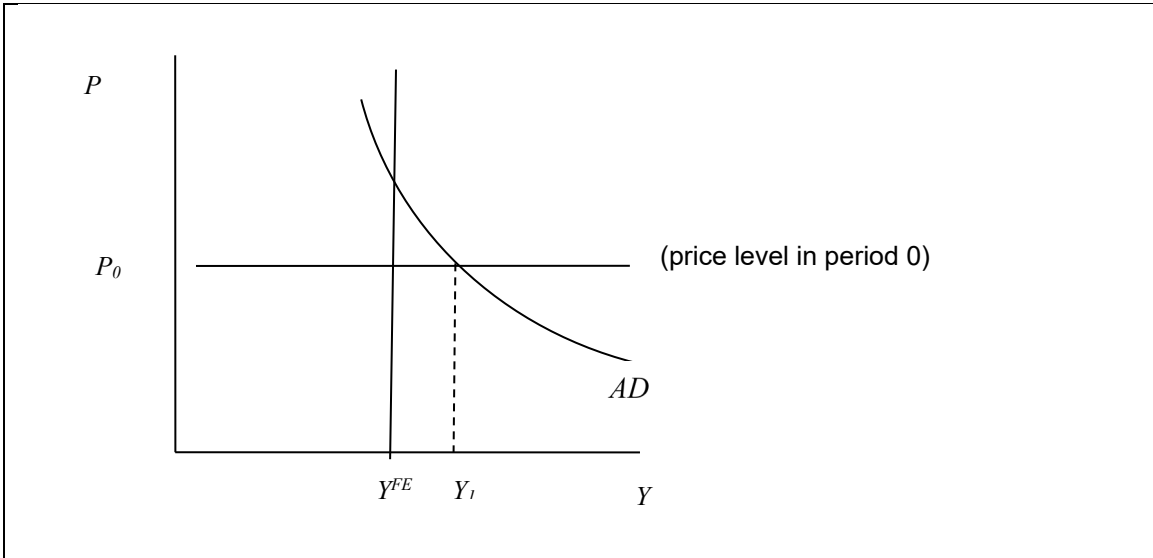


**Figure 1:** US GDP (black), WSJ April survey of forecasts (blue), Cummins/Nat West Markets forecast (red), Feinup & Hamilton/California Lutheran University (green), and potential CBO (gray), in billions of Ch.2012\$ SAAR. Source: BEA, WSJ April survey, CBO (February), and author's calculations.

3.1 (5 minutes) Draw the AD-AS diagram that applies in 2021Q2 if Fienup and Hamilton forecast (green line) is correct.

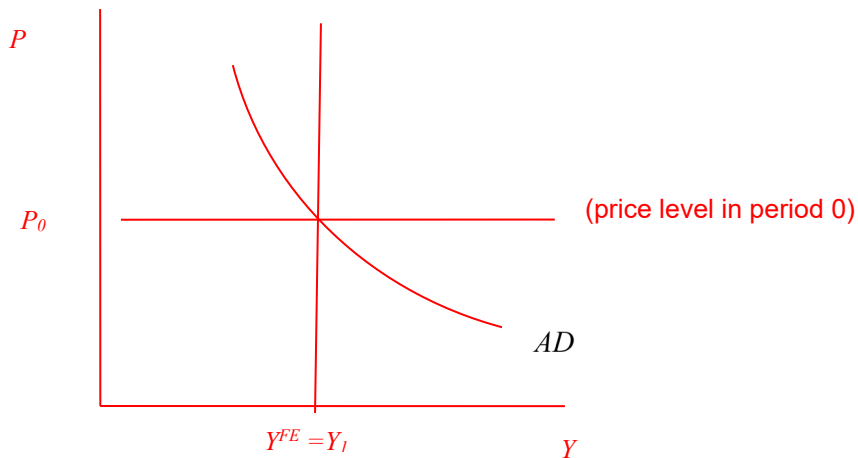


3.2 (5 minutes) Draw the AD-AS diagram that applies in 2021Q2 if the Cummins forecast (red line) is correct.



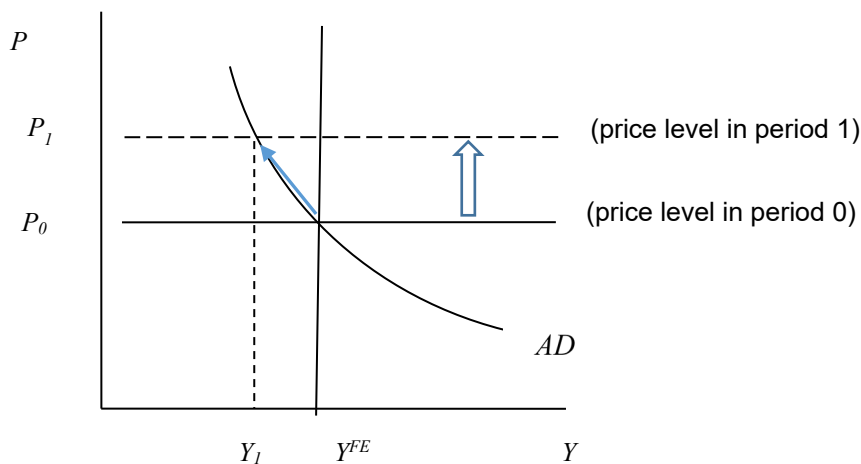
Because it was difficult to see on the chart, I allow for the alternative interpretation of output at near full employment as well, which yields this graph.



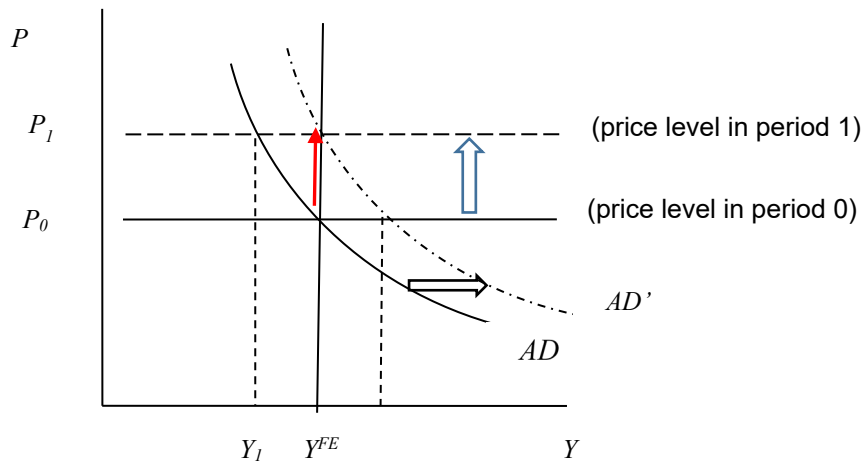


3.3 (5 minutes) Suppose in 2021Q3, output is as predicted by the WSJ survey and potential GDP as projected by the Congressional Budget Office. Show using an AD-AS graph what happens if the Panama Canal, through which much cargo goes through, is closed down for an entire year. Assume inflation expectations are zero, here and in 3.4.

**Answer:** The economy starts at output  $Y_0 = Y^{FE}$  (according to the WSJ mean forecast). The closure of the Panama Canal is a price shock which pushes up the short run aggregate supply curve in the short term (white arrow). This causes the price level to rise to  $P_1$ , output to fall to  $Y_1$  (blue arrow). [An answer that  $Y^{FE}$  decreases is acceptable, although doesn't make complete sense.]

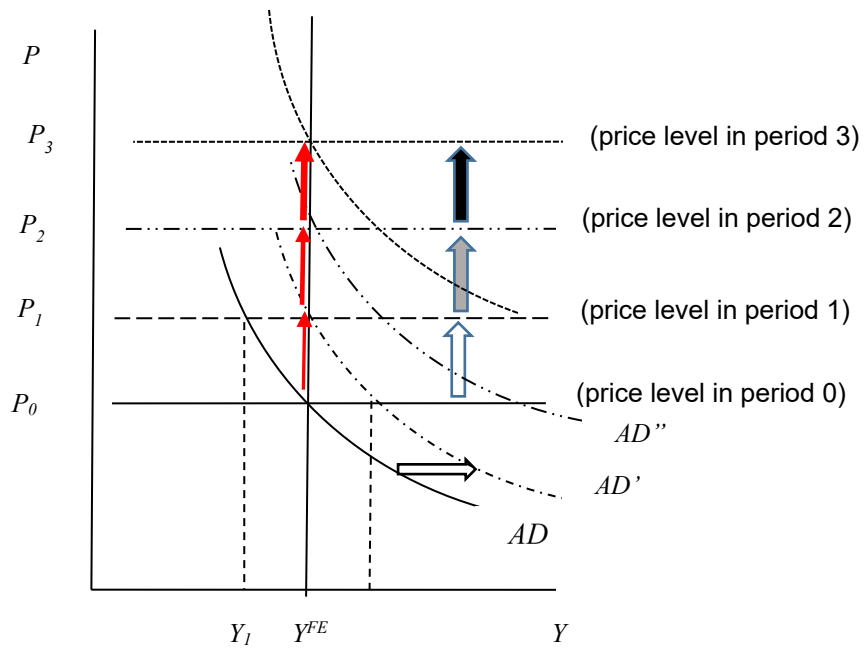


3.4 (5 minutes) In response to the effect of the Panama Canal closures, how can the government keep output constant. Show using an AD-AS graph.



**Answer:** Either the government has to increase government spending/cut taxes or the central bank increase the money supply (white arrow) so as to keep output at  $Y^{FE}$ . The price level rises to  $P_1$  (red arrow).

3.5 (5 minutes) How does your answer to 3.4 change if expectations are adaptive (expected inflation equals last period's inflation rate).



**Answer:** If an expectations augmented aggregate supply curve applies (with adaptive expectations), the government or central bank will need to repeat next period (gray arrow), and the period after that (black arrow), indefinitely, in order to keep output at  $Y^{FE}$ . Inflation could only be wrung out of the economy by undergoing a period of recession (output below potential).