



Problem sets 2: Keynesian business cycles

EE312: Intermediate macroeconomics

Semester 2/2018

Instructor: Dr. Kittichai Saelee

Due on Feb 12<sup>th</sup>, 2019 at the BE office. (before 3 pm)

## Instruction

1. There are two parts. Part I is true/false questions. Part II has one question that requires long answer. Attempt all!
2. Please put the answer of part I and part II in two separate paper. I will grade part 1 and your TA will grade part 2. In part I, make it precise. The most effective way to answer True/false question is to strike to the point, and find a rebuttal case if you believe that it is incorrect. (As you may guess, the most likely answer should be either false or uncertain.)
3. In part II, the question is divided into several parts. Answer the question sequentially.

## Part I:

- 1.1 IS (random) shocks can generate a bigger volatility in real GDP under elastic money demand than under inelastic money demand.

*Recall that the direct impact of IS shocks on real GDP operates through the channel so called DAE multiplier effects. Under the IS-LM model, the multiplier effect is partially weakened by the crowding-out or crowding-in effect, each of which occurs under the positive and negative IS shock, respectively. The key is how much interest rate responds to the IS shocks. Under the elastic money demand, the LM curve is flat. The implication for flat LM curve is that equilibrium interest rate implied by money market will be less sensitive to the change in income. As a result, for given IS shocks, the feedback effect generated by the change in the interest rate will be small; given other things, consumption and investment will not change a lot. From the below figure, one can see that the variability of real GDP is **larger** when the LM curve is flat than when the LM curve is steep. (The graphical illustration assumes that the economy can be subjected two possible (random) situation; one is the positive IS shocks, and the other is negative IS shock.)*

[ see figure for Q1.1]

- 1.2 The effect of fiscal policy is strongest when monetary authority chooses to accommodate the government policy by fixing the interest rate.

*This is **TRUE**. As explained in 1.1 above, the effect of fiscal policy (an example of IS shock) is partially impaired because of the crowding-out effect, i.e. the feedback effect of change in the interest rate on private spending. If the central bank chooses to keep the interest rate fix, the effect of fiscal policy will be the strongest as the crowding-out effect is zero.*

[see figure for Q1.2]

- 1.3 Given the positive comovement between inflation and output in the data, Thai business cycle is *solely* responsible by demand shocks.

*The answer is **NO**. (This question might be beyond the scope of our lecture.) First, note that the pattern of comovement differs under two different versions of shocks. Under the supply shocks, inflation and output should be **negatively** comove. That is, with negative supply shocks, inflation increases while output decrease. Opposite to the supply shocks, inflation and output should be **positively** comove. That is, with positive demand shocks, inflation increases along with the increase in output. Both supply and demand shocks are responsible for the business cycles fluctuations.*

*From time to time, the economy has been randomly hit by different types of shocks. For example, during the flooding 2011, the hit could be viewed as an example of negative supply shocks. When the economy entered into 2012, we were hit by positive demand shock that is attributed to the first-car tax exemption policy, i.e. the big fiscal stimulus package. The conclusion that Thai business cycle is "solely" responsible by demand shocks might be too strong. In fact, both shocks account for the cycle; however, demand shocks appear to have played more important role than supply shocks. That's why we have predominantly observed the positive comovement in the data.*

- 1.4 Interest rate is a procyclical variable under supply shocks.

*The answer is **NO**. Consider a negative supply shock, such an increase in oil price. The negative shock will generally cause a rise in price level and a contraction in the level of economic activities. In general, an increase in the price level brings about an increase in the interest rate. As a result, we see the movement in opposite direction between output and interest if the economy is hit by any supply shocks. Therefore, interest rate is not a procyclical variable under supply shocks; in fact, it is a counter-cyclical variable under supply shocks.*

[ see figure for Q1.4]

## Part 2:

Consider a two country model, namely A and B. Suppose for now that both are closed economy; that is, both A and B do not have exports and imports. The general economic structure of the two countries are identical, expect that the tax system of the two are different. **The marginal tax rate of country A is higher than that of country B.** Consider the following problems.

- 2.1) Using the IS-LM diagram, how can we capture the difference between the tax system of the two countries?

*Difference in the marginal tax rate in the two countries can be graphically captured by the difference in the slope of IS curve. Recall that IS curve can be flat when the effect generated by income-induced expenditure (namely, the multiplier effect) is large. Given the lower marginal tax rate and other things being equal, country B is likely to have larger size of multiplier than country A. As a result, the IS curve in country B should be flatter than that in country A.*

[ see figure for Q2.1]

- 2.2) Based on your answer in (2.1), do you find monetary policy more effective in country A than in country B? Use the IS-LM diagram to show your analysis. Explain your answer.

*Recall that the flat IS curve implies the larger sensitivity of output to the interest rate; a marginal decrease in the interest rate can increase output a lot. As a result, monetary policy, which affects output through the change in interest rate (and hence private spending), should be more effective under the flat IS curve than under the steep one. Monetary policy is therefore more effective in country B than in country A.*

[see figure for Q2.2]

- 2.3) Based on your answer in (2.1), do you find fiscal policy more effective in country A than in country B? Use the IS-LM diagram to show your analysis. Explain your answer

*In lights of the answer given by 2.1, fiscal multiplier in country B should be larger. The figure below compares the effect of fiscal policy when the economy differs with respect to the degree of the sensitivity of income-induced expenditure. multiplier. With the higher sensitivity of income-induced expenditure, fiscal policy generates larger size of horizontal shift in the IS curve, i.e. larger DAE fiscal multiplier. Therefore, fiscal impact is then larger in country B where IS curve is flat due to the lower marginal tax rate.*

[ see figure for Q2.3 ]

- 2.4) Based on your answer in (2.2) and (2.3), do you think the AD curve of country A is flatter or steeper than that of country B? Why? Explain your answer.

*The AD curve in country B should be flatter. Recall that AD curve is derived from the IS-LM equilibrium. Change in price can cause a change in the interest rate, and thus affect the private spending. In country B, the size of income-induced expenditure is larger because of lower marginal tax rate. Therefore, the effect of price change could produce larger impact of private expenditure, and hence equilibrium output. Given this reason, the aggregate demand should be more sensitive to price in country B; the AD curve in country B is flat then.*

Suppose that country A is now importing final products from country B, but not the vice versa. The imports are only used for the household consumption. Assume that country A imports by a fixed fraction out of its domestic output (real GDP), and no other factors affect the import decision of household in country A. Consider the following problems

- 2.5) As graphically illustrated by the IS-LM model, how does the introduction of imports affect the structure of country A's working economy?

*The slope IS curve should be changed. Now, as households in country A can import, there will be some leakage in the private spending that won't be circulated in the domestic economy. From the Keynesian concept, this implies lower multiplier. Therefore, the IS curve in country A should now be **steeper** than before.*

- 2.6) Compared to its closed-economy version, does the AD curve of country A become flatter or steeper under the opened trade structure?

*Following the logic discussed in 2.4), the flatter IS the flatter AD. Under the given trade structure, IS curve in country A become steeper (as already explained in 2.5). Therefore, the AD curve should become steeper as well.*

- 2.7) Under the AD-AS model, do the demand shocks generate more pronounced business cycle volatility for country A when it can import than when it cannot import.

*Recall from 2.6, the AD curve becomes steeper because of the lower multiplier. As a result, demand shocks that are primitively driven by IS/LM shocks, should be producing limited effect on the aggregate spending, and hence the change in AD curve. That is, the size of horizontal shift of AD curve should be smaller under this case. Given this reason, demand shocks should generate less business cycle volatility in country A.*

- 2.8) Suppose in the data, the real GDP of both countries are *positively* correlated. Do you think that it makes sense if one argues for the role of technology shocks in country B as the primary source (global) business cycles? Agree or disagree? Why? State out the conclusion that makes more sense if you find the claim is wrong.

*Based on the model assumption, the primary source of business cycle comovement cannot be due to the technology shocks in country B. Here's the reason. Consider the positive technology shock in country B, which can stimulate the domestic output of country B, and generally lower the price of product in country B. Since country A's import only depends on its own income (by assumption), households in country A will keep the level of imports the same, given that everything remains the same in country A. (We consider the effect of change in country B on country A.) As a result, there should be no correlation under the case.*

*Given the model structure that country A's income determines the imports, it is possible to have positive comovement only if the shocks are generated from country A. For example, under positive demand shocks in country A, income of country A will rise, and therefore resulting in higher imports from country B. Country B's income will rise too because of more exports production to country A. Another example is the negative supply shocks. Given the negative supply shocks in country A, a decline in economic activities of country A should lower the imports, and hence causing a decline in the level of economic activities of country B as well. In any cases, positive comovement can be the result if the shocks originate from country A.*

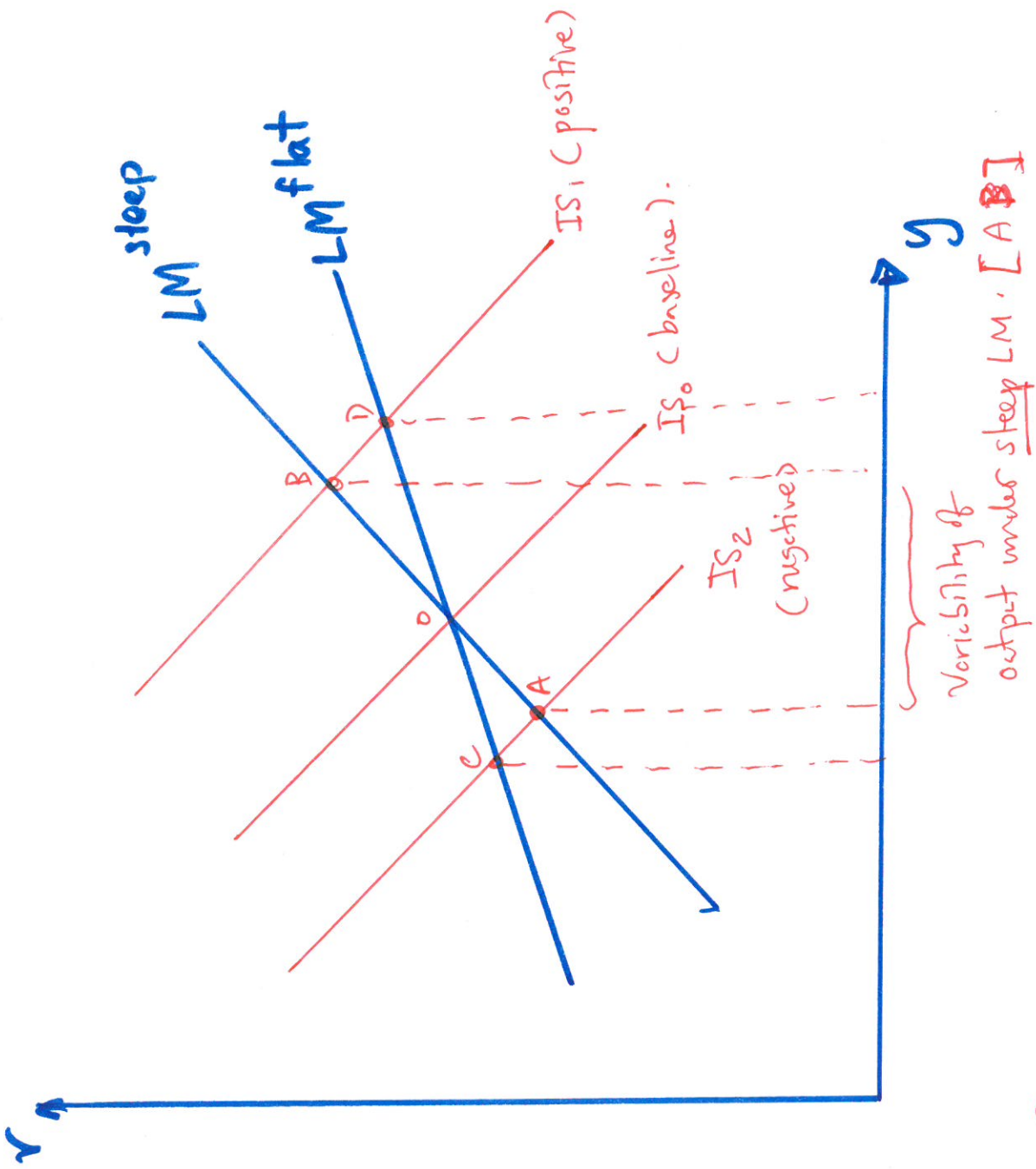


figure 1.1 Part 1

Variability of output under steep LM, [A B]

Variability of output under flat LM, [C D]

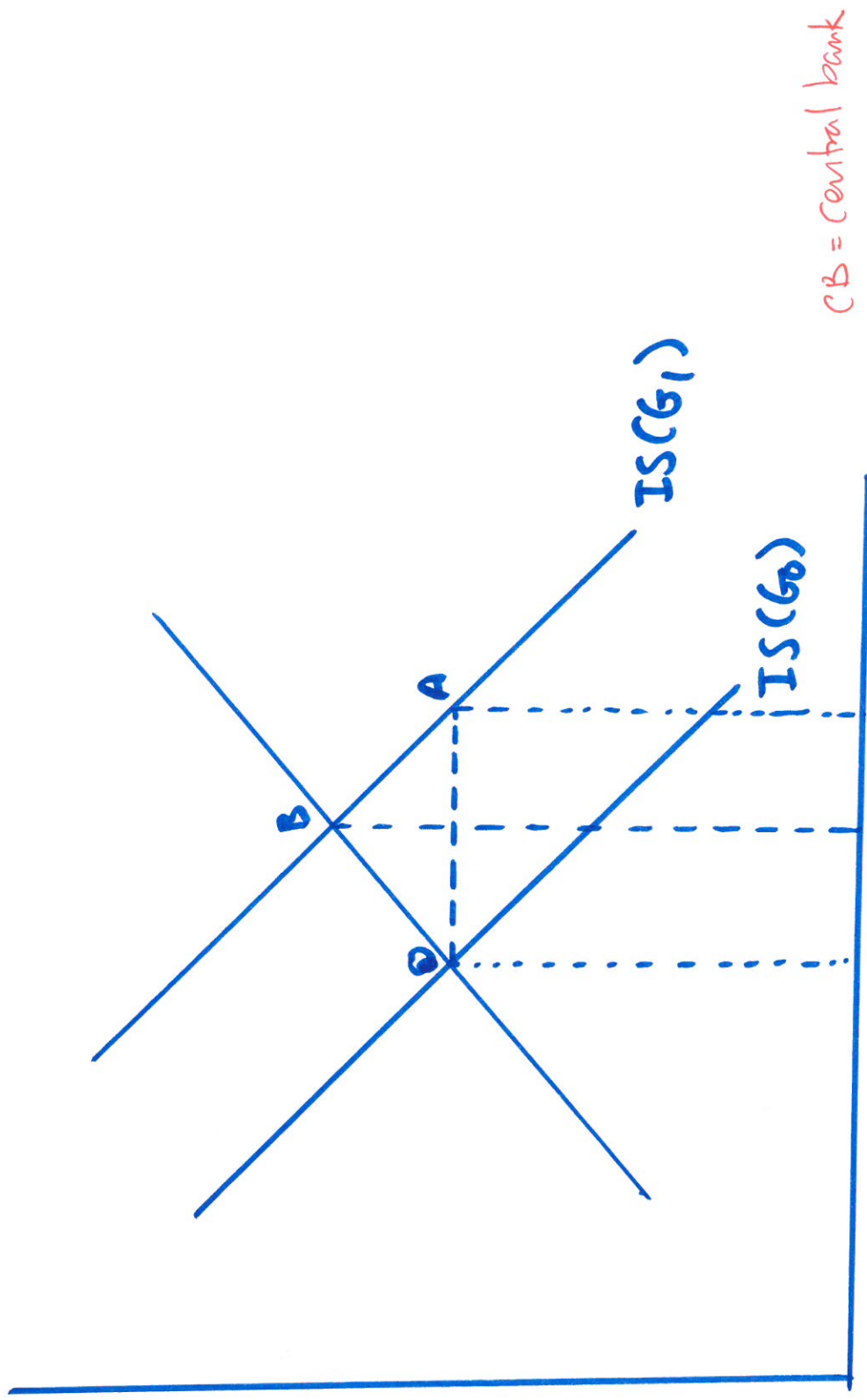


Figure 1.2  
 part 1 & 2

The level of output if interest rate is determined by market without CB's intervention

↳ The level of output if interest is fixed, (CB increases money supply to keep the rate fixed as before)

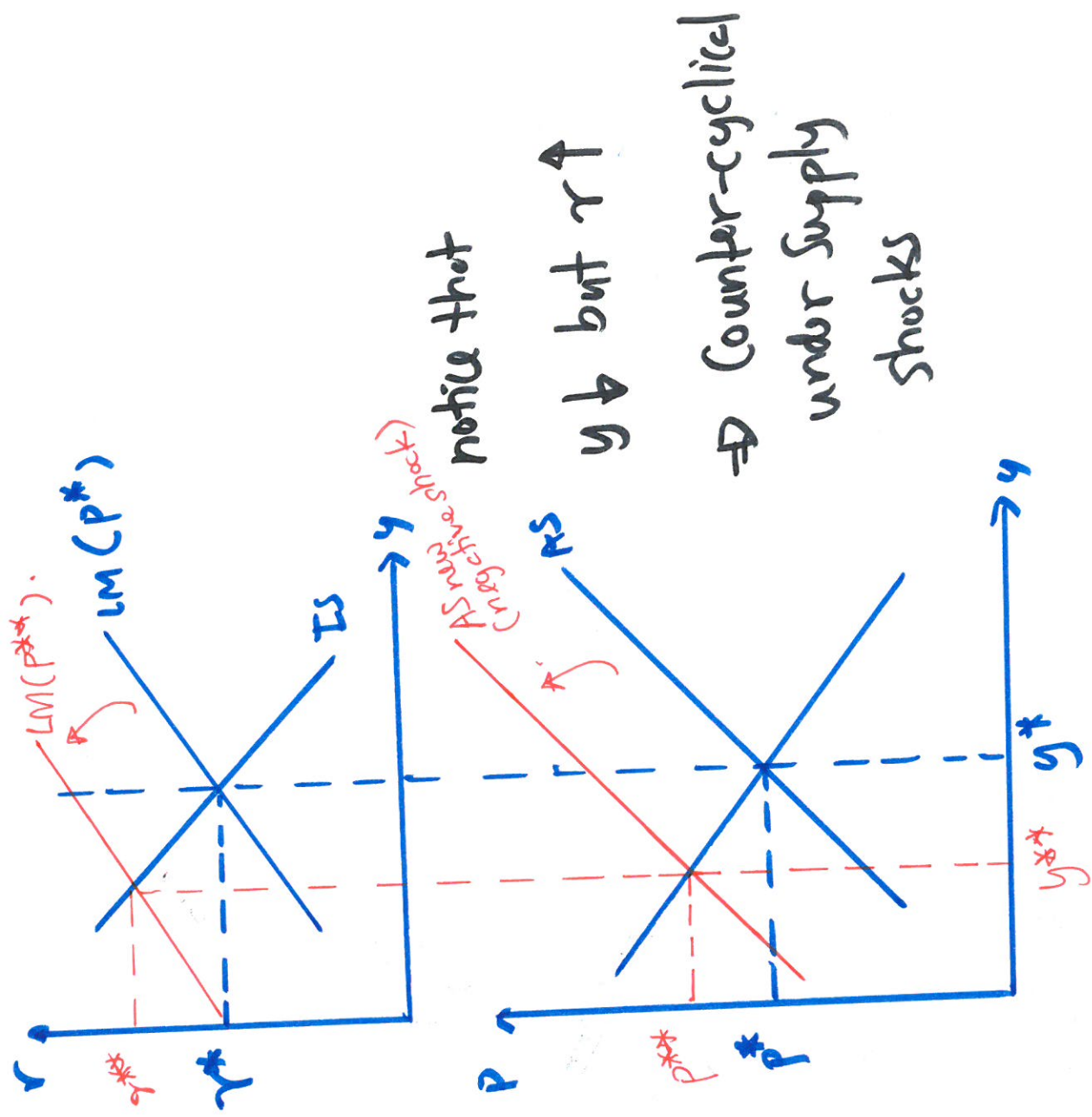
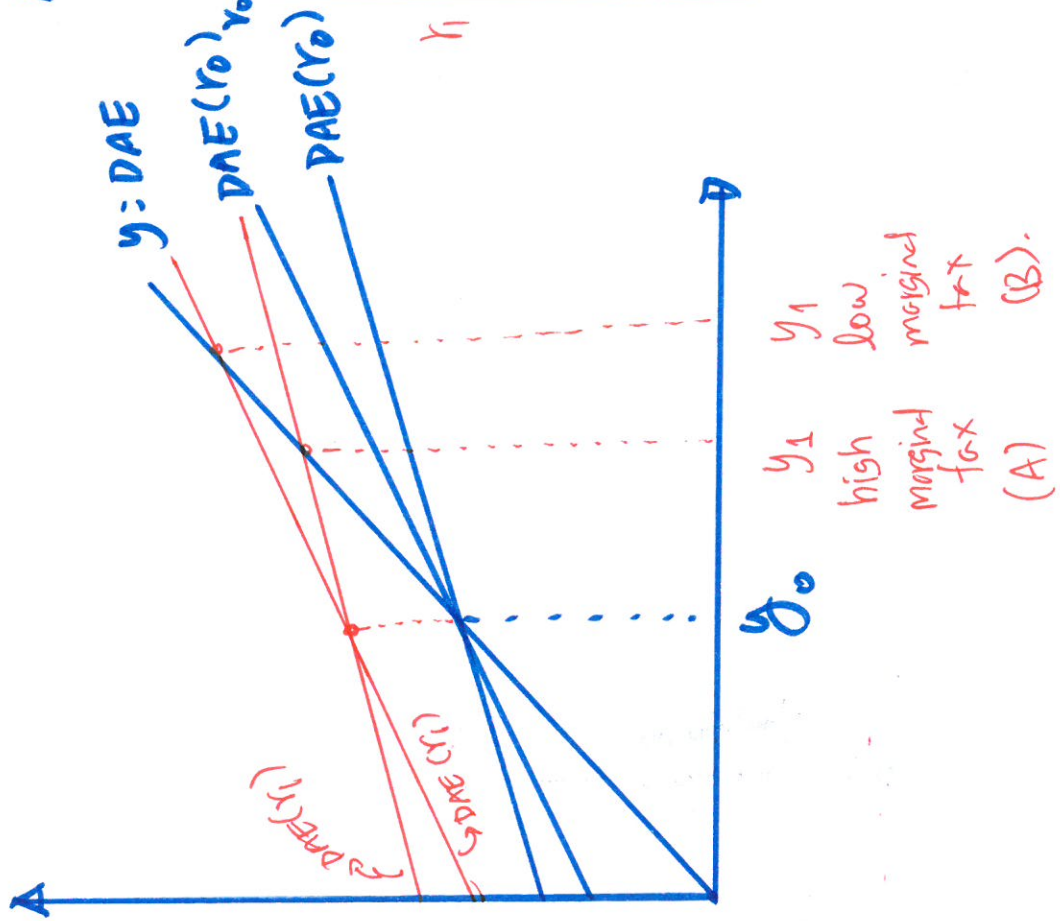


Figure 1.4. Part 1

$$DAE = C_0 + C_1(1-MPT) \cdot Y + \text{terms depends on interest rate}$$

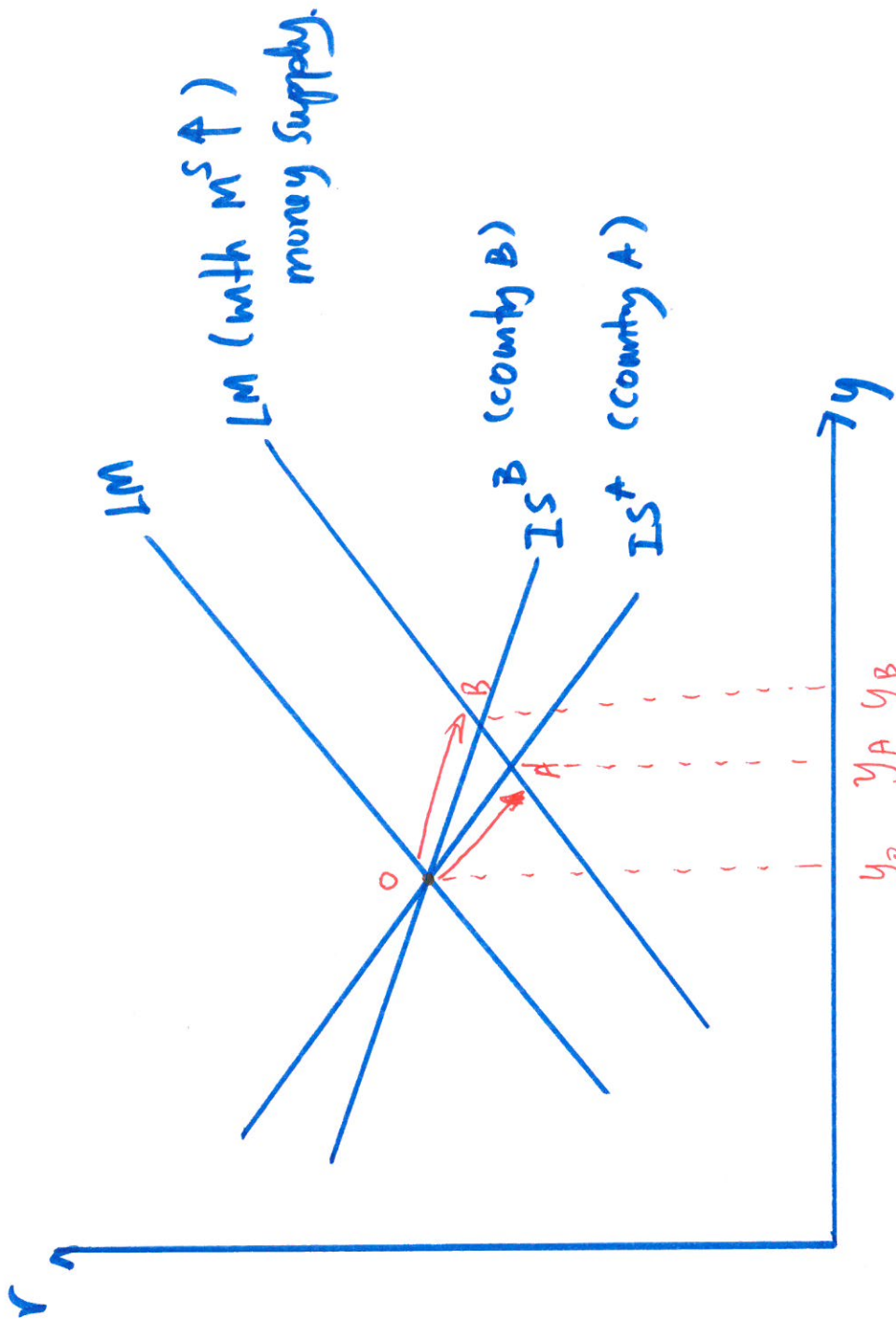
"Marginal" tax

Suppose lowered  $r$ ;  $Y_0 \rightarrow Y_1$ .



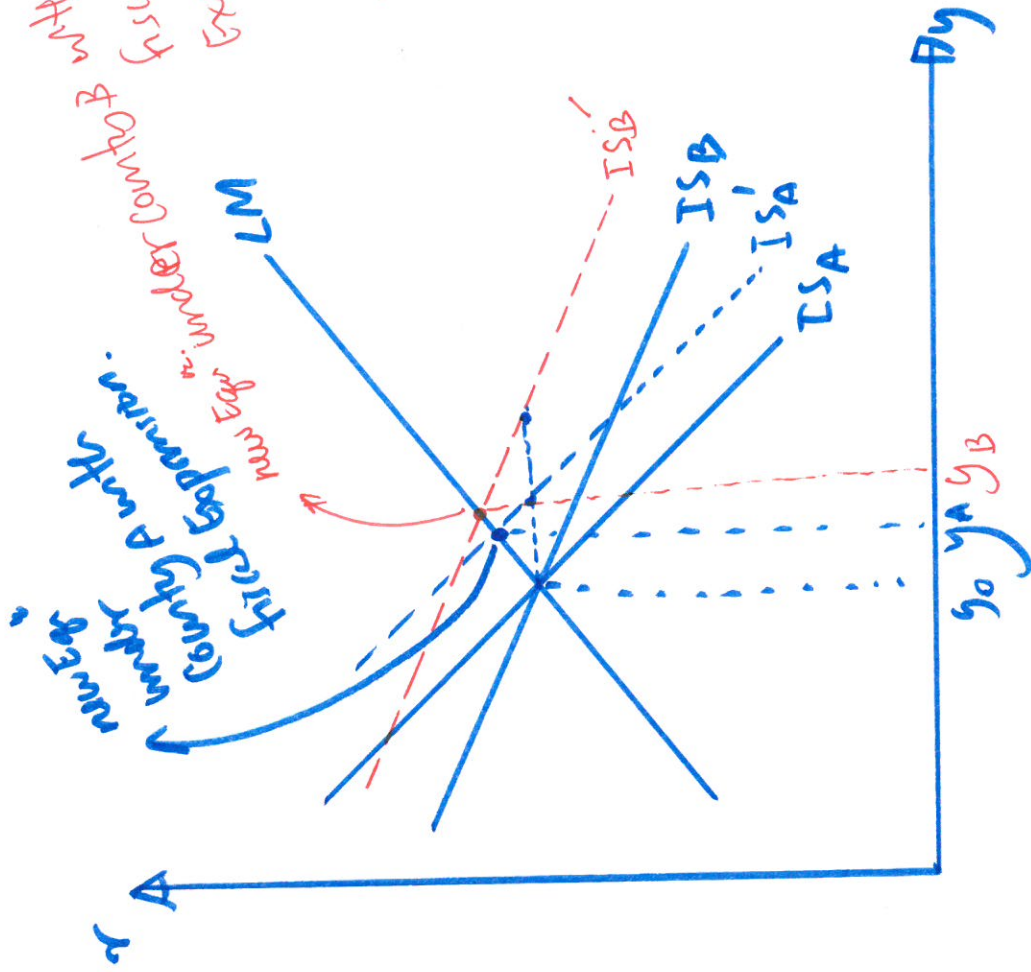
↳ the smaller, the steeper PAE curve and hence the larger income-induced expenditure effect.

Figure A.2.2



$y_0 \rightarrow y_A$  in Country A  
 $y_0 \rightarrow y_B$  in Country B

Figure Q.2.2



under average  
country A with  
fiscal expansion.  
under average  
country B with  
fiscal expansion.

The IS curve in B

will shift ~~the~~ more (larger horizontal shift) because of large DAE multiplier.

The result would be reversed

if the difference in the

slope is due to the

sensitivity of private

spending to interest rate;

the flatter IS, the lower impact of fiscal expansion.

Figure 21.3