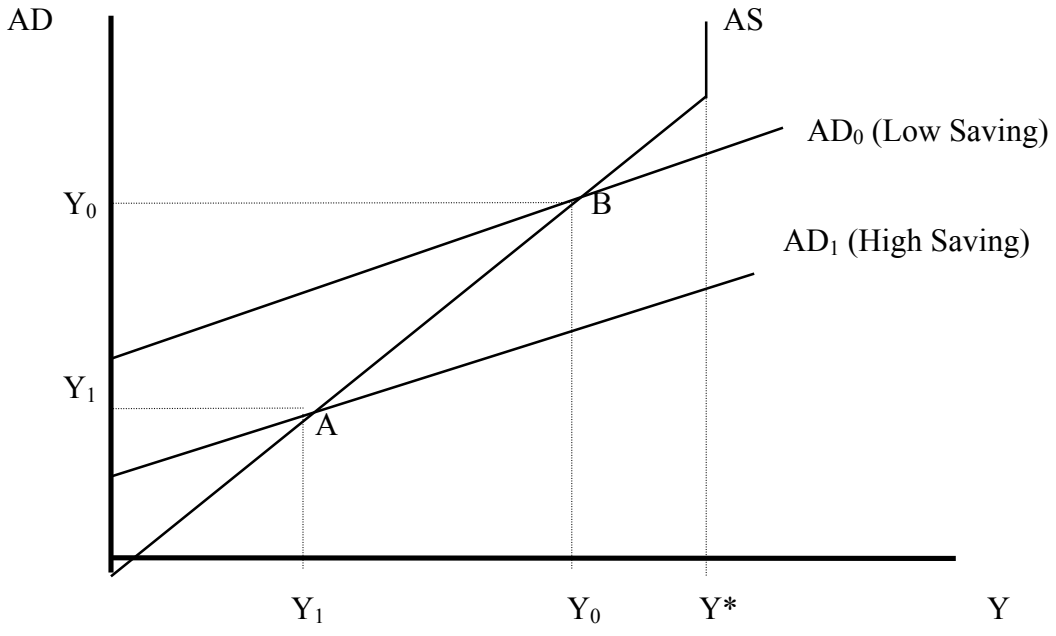
Economics 104B, Section 3 **Prof. Steve Fazzari**
Homework Problem Solutions: Part 5 **Spring, 2013**

1. Alternative "A" is the Keynesian approach because it emphasizes aggregate demand as the engine of economic growth. Demand-side emphasis is the defining feature of Keynesian macro theory. The analysis in "B" is possibly correct, but it focuses on "supply-side" factors that we will discuss in more detail over the next several weeks.

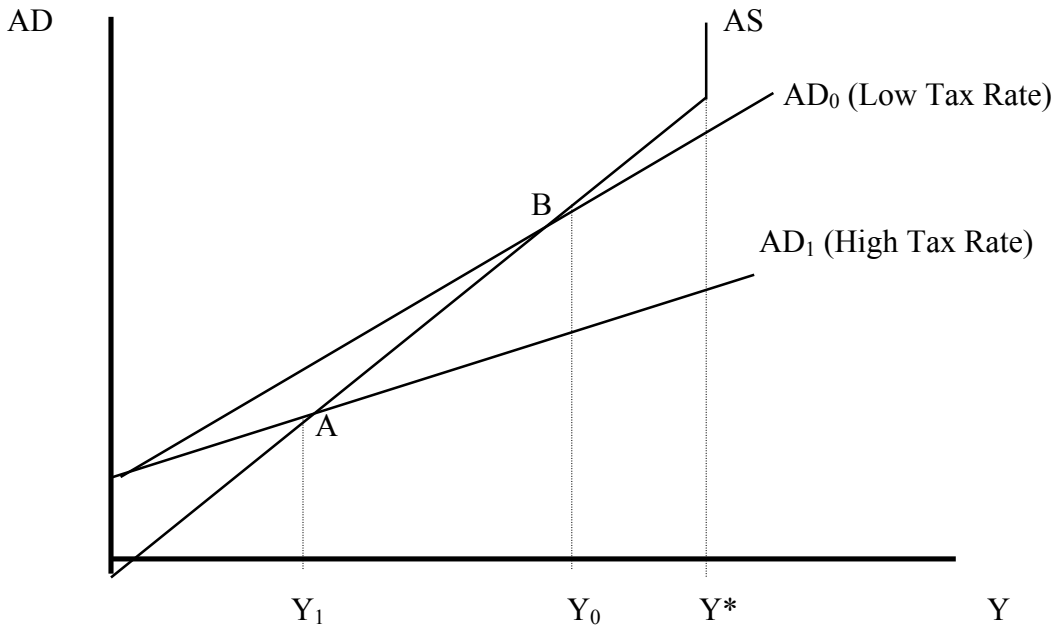
2. Suppose that saving rises (possibly because the government enacts policies to reduce taxes on the returns from saving or to tax consumption spending more heavily). An increase in saving necessarily reduces consumption, for a given level of income. Therefore, aggregate demand falls at every level of income, and the AD_0 curve in the graph below shifts downward to AD_1 (see the diagram below). Firms find that they can no longer sell all the output that they were producing at the old level of output (see the equilibrium output Y_0). Firms' inventories increase, and their sales expectations fall. As a result, firms produce less and lay off workers; actual output begins to decline. As output falls, AD goes down too, but more slowly than the decline of output. The "gap" between the AD_1 curve and output shrinks as Y falls until the economy reaches equilibrium at an output level of Y_1. Output and employment were reduced by this policy.

There may be reasons to increase saving in the U.S. economy (we will discuss this issue further in coming weeks), but this analysis shows that one *cost* of policies designed to stimulate saving will likely be lower output and employment in the immediate aftermath of the policy change.



3. The statement ignores the barrier to expansion posed by "potential" output (Y*). Increases in AD induced by higher government spending raise output as long as Y is below Y*. But, if real demand rises continually, it will eventually reach the constraint imposed by the supply of resources in the economy (labor, capital, raw materials, etc.). Once output hits Y*, further increases in government spending will not lead to output expansion, even in the Keynesian Cross model.

4a. A higher tax rate reduces the slope of AD. (It works just like a reduction in the marginal propensity to consume.) For any initial equilibrium output, an increase in the tax rate reduces AD, which will cause equilibrium output to decline. The graph below shows what your answer should look like. To receive full credit, you need to show both that the slope of the AD curve becomes flatter and that equilibrium output falls.



4b.

$$Y = C + I + G + Ex - Im$$
$$Y = [\, a + MPC\,(Y - tY)\,] + [\, b + ACC\,Y\,] + G + Ex - Im$$
$$Y\,[\,1 - (1 - t)MPC - ACC\,] = a + b + G + Ex - Im$$
$$\text{Equilibrium } Y = \{\, 1 / [\,1 - (1 - t)MPC - ACC\,]\,\}\,[a + b + G + Ex - Im\,]$$

4c. The multiplier is the term in braces in the equation above. A higher tax rate ("t") reduces the size of the multiplier. Part of the economic process that causes the multiplier effect comes from the fact that as income rises, consumption rises which increases aggregate demand further. If more of the increase in income is taxed away, however, consumption will not increase as much for a given rise in income and the multiplier will be smaller.

Note: This is a pretty tough question. It was, however, an exam question a few years ago. I strongly encourage you to study this solution carefully. If you fully understand the

solution, you will be in pretty good shape with respect to the graphical and algebraic versions of the Keynesian Cross model.

5. When income rises, people consume more. This increase of consumption usually will include more imported goods, raising imports. To analyze this effect in the Keynesian Cross model, start with the equilibrium condition between actual output (Y) and aggregate demand:

$$Y = C + I + G + Ex - Im.$$

Now specify the consumption *and* imports as positive functions of Y:

$$C = a + MPC\ (Y)$$

$$Im = c + MPI\ (Y),$$

where c is a constant and "MPI" is the marginal propensity to import, that is, the increase in imports for each dollar increase in income. (It's fine if you also make investment a function of Y for this problem, using the accelerator concept, but that's not necessary here. You also could have endogenous taxes, as in the previous problem, but that is not necessary either.)

Plug the consumption and import functions into the equilibrium condition for output and aggregate demand given above.

$$Y = [a + MPC\ (Y)] + I + G + Ex - [c + MPI\ (Y)].$$

Collect the terms containing Y on the left side of the equation and solve for Y:

$$Y\ [1 - MPC + MPI] = a + I + G + Ex - c$$

$$\text{Equilibrium } Y = [1 / (1 - MPC + MPI)]\ [\ a + I + G + Ex + c].$$

The multiplier is the first term in square brackets on the right side of the equilibrium Y equation. A positive value for MPI increases the multiplier's denominator, and therefore *reduces* the multiplier. Intuitively, when income rises imports also rise which reduces aggregate demand, damping the multiplier process compared with the case in which imports are independent of income.

Note: A challenge in this question is to translate the statement in the problem that "imports depend positively on domestic income" into a mathematical formulation like the import equation given above. Once you have the import equation, the algebra for the rest of the problem is fairly straightforward.

6. a) If output is below the potential level, the economy is not fully utilizing all of its productive resources. The most obvious loss is due to involuntarily unemployed workers, but output is also lost due to the low utilization of the capital stock (machines, factories, offices, etc.) Assuming that social welfare is higher when more goods and services are available ("more is better"), it is undesirable to leave productive resources idle.

b)

$$Y = C + I + G + Ex - Im$$
$$Y = [\ a + MPC\ (Y - T)\ ] + I + G + Ex - Im$$
$$Y\ [\ 1 - MPC\ ] = a - (MPC)\ T + I + G + Ex - Im$$
$$\text{Equilibrium } Y = [\ 1 / (\ 1 - MPC\ )]\ [a - (MPC)\ T + I + G + Ex - Im\ ]$$

c) Express the solution for equilibrium output in "change" form. The change in equilibrium Y caused by a change in <u>*both*</u> taxes and government spending is:

$$\Delta Y = [\ 1 / (\ 1 - MPC\ )]\ [\ - (MPC)\ \Delta T + \Delta G\ ]$$

For example, an increase in taxes causes output to fall (note the negative sign on the (MPC) ΔT term) but an increase in government spending causes equilibrium output to rise. Now, if the government budget must be balanced, you can equate ΔT and ΔG. So you can write the change in Y as:

$$\Delta Y = [\ 1 / (\ 1 - MPC\ )]\ [\ 1 - (MPC)\ ]\ \Delta G\ =\ \Delta G$$

Therefore the change in output exactly equals the change in government spending (or the change in taxes). The recommended policy to stimulate the economy would be an increase in government spending, which requires an equivalent increase in taxes.

Why does this work? You can think of this policy as two simultaneous "demand shocks." It's clear that the higher level of government spending on goods and services increases AD and that by itself raises output. But higher taxes reduce disposable income and lower consumption, which reduces AD. How do you know which effect is larger? The key is to understand the role of the marginal propensity to consume. If government spending rises by $10 billion, AD goes up by $10 billion directly. This policy alone therefore creates an initial demand shock of $10 billion. If taxes rise by $10 billion, however, consumption does not fall by $10 billion (unless the MPC is one). Some of the tax increase is absorbed by lower saving. The result of a $10 billion tax increase, therefore, is an initial negative demand shock of (MPC) x $10 billion. Putting the two shocks together, the size of the positive AD shock from higher G more than offsets the size of the negative AD shock from higher T. The algebra above confirms this intuition.

Note: Again, this is a tough problem. Study the solution very carefully!