Solutions to

Exercises 7, 8 and 9 of

chapter 11 of the textbook

"Macroeconomics" by Charles Jones

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Vivaldo Mendes
Patricia Amaro

Exercise 7

Consider the specific consumption function:

$$C_t = \left(\bar{a}_c + \bar{x}\tilde{Y}_t\right)\bar{Y}_t \,.$$

Step 1: Start with the fundamental identity from National Accounts

$$Y_t = C_t + G_t + I_t + EX_t - IM_t$$

Step 2: Divide both sides by $\bar{Y}_t$

$$\frac{Y_t}{\bar{Y}_t} = \frac{C_t}{\bar{Y}_t} + \frac{G_t}{\bar{Y}_t} + \frac{I_t}{\bar{Y}_t} + \frac{EX_t}{\bar{Y}_t} - \frac{IM_t}{\bar{Y}_t}$$

Step 3: Plug in the determinants of C_t, G_t .... into the previous equation

$$\frac{Y_t}{\bar{Y}_t} = \bar{a}_c + \bar{x}\tilde{Y}_t + \bar{a}_g + \bar{a}_i - \bar{b}(R_t - \bar{r}) + \bar{a}_{ex} - \bar{a}_{im}$$

step 4: Subtract -1 from both sides and arrange the terms

$$\underbrace{\frac{Y_t}{\bar{Y}_t}-1}_{\tilde{Y}_t} = \underbrace{\bar{a}_c+\bar{a}_g+\bar{a}_i+\bar{a}_{ex}-\bar{a}_{im}\overbrace{}^{-1}}_{\bar{a}} - \bar{b}(R_t-\bar{r})+\bar{x}\tilde{Y}_t$$

step 5: Simplify things

$$\tilde{Y}_t = \bar{a} - \bar{b}(R_t-\bar{r}) + \bar{x}\tilde{Y}_t$$

step 6: Solve for $\tilde{Y}_t$

$$\tilde{Y}_t(1-\bar{x}) = \bar{a} - \bar{b}(R_t-\bar{r})$$

step 7: Final result is

$$\tilde{Y}_t = \underbrace{\frac{1}{1-\bar{x}}}_{\text{Aggregate demand mutiplier.}}\left[\bar{a}-b(R_t-\bar{r})\right].$$

$\Rightarrow$ larger than 1 because $\bar{x}>0$.

Exercise 8

Consider our original model, where consumption depends only upon potential output. Now suppose that what changes is the original Imports function. Now this looks like

$$IM_t = (\bar{a}_{im} + \bar{n}\tilde{Y})\bar{Y}_t$$

(a) Follow exactly the same steps as in the previous exercise. If you do that in step 4 you should have something like this

$$\tilde{Y}_t = \underbrace{\bar{a}_c + \bar{a}_g + \bar{a}_i + \bar{a}_{ex} - \bar{a}_{im} - 1}_{\bar{a}} - \bar{b}(R_t - \bar{r}) - \bar{n}\tilde{Y}$$

simplifying we will get

$$\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r}) - \bar{n}\tilde{Y}$$

Therefore, if you solve for $\tilde{Y}_t$ you will get

$$\tilde{Y}_t = \underbrace{\frac{1}{1+\bar{n}}}_{\substack{\text{Aggregate demand} \\ \text{multiplier}}} \left[\bar{a} - \bar{b}\left(R_t - \bar{r}\right)\right]$$

$\Rightarrow$ <u>lower</u> than 1, as $\bar{n} > 0$.

So it looks like that instead of a multiplier we have a <u>reducer</u>, because it reduces the impact of changes in $\bar{a}$ upon the output gap ($\tilde{Y}_t$).

(b) The economic explanation is simple: if imports increase when the output gap increases, it means that a certain increase in $\bar{a}$ will produce a lower positive impact on $\tilde{Y}$ because, instead of relying on domestic production, we have to import goods and services produced abroad.

Exercise 9

Consider now that what changes in out basic scenario is that Consumption is also affected by real interest rate

$$C_t = \bar{a}_c \bar{Y}_t - \bar{b}_c (R_t - \bar{r}) \bar{Y}_t$$

(a)
Follow the same steps as in exercise 7, and if you do so, when you get to step 4 the result will be like this

$$\tilde{Y}_t = \bar{a}_c + \bar{a}_g + \bar{a}_i + \bar{a}_{ex} - \bar{a}_{im} - 1 - \bar{b}(R_t - \bar{r}) - \bar{b}_c (R_t - \bar{r})$$

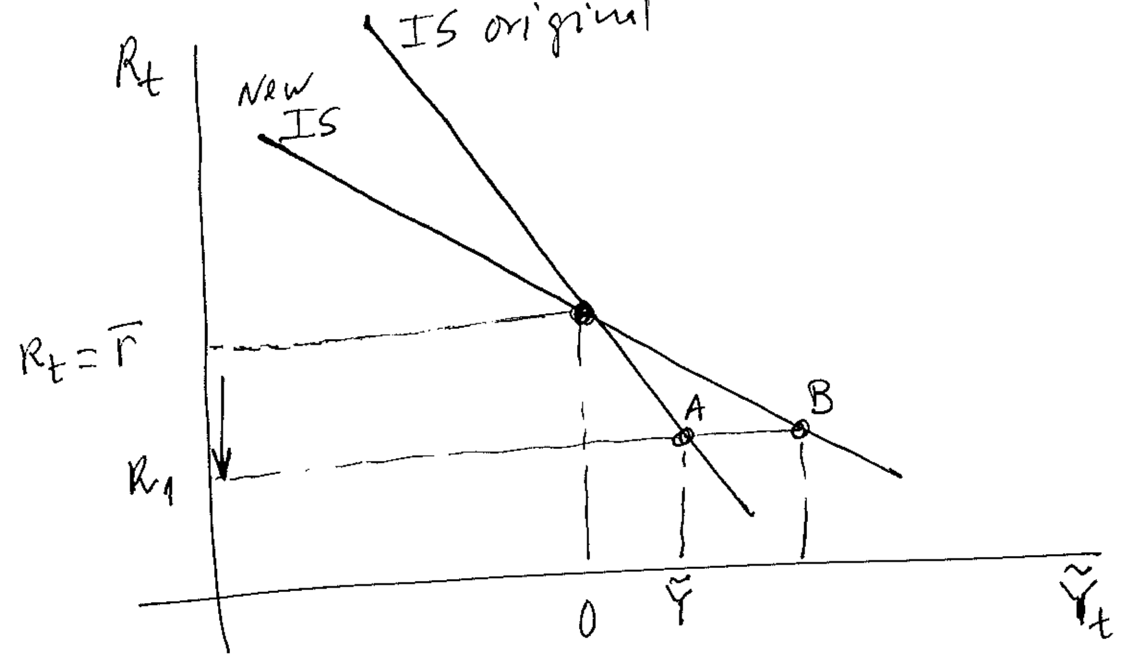
simplifying

$$\tilde{Y}_t = \bar{a} - \bar{b}(R_t - \bar{r}) - \bar{b}_c (R_t - \bar{r})$$

solving for $\tilde{Y}_t$, we get

$$\tilde{Y}_t = \bar{a} - (\bar{b} + \bar{b}_c)(R_t - \bar{r}).$$

(b) what changes in the solution above, regarding the initial solution to the IS curve, is that the slope is <u>now</u> more negative. Instead of $-\bar{b}$ we have now $-(\bar{b}+\bar{b}_c)$, and $\bar{b}_c > 0$. Graphically, it looks like



Notice that if R goes down to R_1, the output gap increases more in the new IS than in the old case, because not only investment but also consumption is stimulated by that reduction.