Advanced Macroeconomics II
Spring 2020
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Due date: 14 April at midnight (email to mario.giarda@upf.edu AND andrea.chiavari@upf.edu)

Problem Set 1

1. [The macroeconomic impact of a lockdown]

Consider an economy whose GDP is constant (for simplicity). Because of the COVID-19 crisis, non-essential sectors accounting for a fraction α of GDP are forced to stop completely for N months ($t = 1, 2, ..., N$). The rest of sectors keep their level of activity unchanged. After N months (i.e. in period $N + 1$), activity in the non-essential sectors goes back to normal. For the six combinations of $\alpha \in \{0.4,\ 0.5\}$ and $N = \{1, 2, 3\}$

a) Determine the *percent* decline (from peak to trough) in *quarterly* GDP (for simplicity assume the lockdown starts on April 1st, i.e. at the beginning of the second quarter).

b) Determine the *cumulative* loss of GDP during the lockdown *as a fraction of annual* GDP.

c) How would your answers to a) and b) change if only half the remaining output gap was closed each month after the lockdown.

d) Compare analogous statistics for the U.S. economy during the Great Recession of 2008-09 and the Spanish economy during the "double dip" recession of 2008-2013. Compare and discuss your findings with the above hypothetical scenarios. [You can find the data at https://fred.stlouisfed.org ; make sure you use GDP at constant prices ; check whether the reported quarterly series is expressed in quarterly or annual rates (i.e. multiplied by 4) and make the necessary adjustments]

2. [Interpreting correlations in a simple model economy]

Consider an economy where output Y_t is determined by the sum of private consumption C_t and government spending G_t:

$$Y_t = C_t + G_t$$

Private consumption is given by:

$$C_t = \alpha + \beta(Y_t - T_t) + \varepsilon_t$$

where $T_t = \tau Y_t$ denotes taxes (with τ a constant tax rate) and ε_t is an exogenous i.i.d. consumption shock with mean zero and variance σ_ε^2. We assume $0 < \beta < 1$ and $0 < \tau < 1$.

Government spending is given by

$$G_t = \gamma + v_t$$

where v_t is an exogenous i.i.d. fiscal shock with variance σ_v^2. Define the government budget deficit as:

$$D_t = G_t - T_t$$

a) Solve for output, consumption, and the budget deficit as a function of the exogenous shocks ε_t and v_t.

b) Determine whether each of the following variables is procyclical or countercyclical. In case of ambiguity, explain the conditions under which it will be procyclical or countercyclical. (i) consumption, (ii) government spending, (iii) taxes, and (iv) the budget deficit.

c) Trace the effects of a unit shock to consumption ($\varepsilon_t = 1$) on the different variables. Do the same for a unit shock to government spending ($v_t = 1$). What is the cyclical behavior of (i) consumption, (ii) government spending, (iii) taxes, and (iv) the budget deficit *in each case*? Use your findings to explain your answers to (b).

d) Is the budget deficit in advanced economies procyclical or countercyclical? (try to find evidence on this, e.g. by looking at the patterns during recessions) What does that evidence imply as to the role played consumption vs fiscal shocks as sources of fluctuations?