Written Exam at the Department of Economics summer 2020

Economics of Exchange Rates

May 26, 2020
(3 hour open book exam)

Answers only in English.

Upload your answers in Digital Exam as one pdf. file (including appendices) and name your pdf with your examination number only, e.g., 12.pdf or 127.pdf

This exam question consists of 4 pages in total including this front page.

This exam has been changed from a written Peter Bangsvej exam to a take-home exam with helping aids.
Please read the following text carefully in order to avoid exam cheating.

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You cheat at an exam, if you during the exam:

- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text. This also applies to text from old grading instructions.
- Make your exam answers available for other students to use during the exam
- Communicate with or otherwise receive help from other people
- Use the ideas or thoughts of others without making use of source referencing, so it may appear to be your own idea or your thoughts
- Use parts of a paper/exam answer that you have submitted before and received a passed grade for without making use of source referencing (self plagiarism)

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Exam cheating is always sanctioned with a warning and dispelling from the exam. In most cases, the student is also expelled from the university for one semester.

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Number of questions: This exam consists of 2 questions.

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1. **Portfolio Balance Model**
   Consider the standard Portfolio Balance Model comprised of the following functions

$$W \equiv M + B_p + SF_p \tag{1}$$

$$M = m\left(r, E\dot{s}, Y, W\right) \quad m_r < 0, m_{E\dot{s}} < 0, m_y > 0, m_w > 0 \tag{2}$$

$$B_p = b\left(r, E\dot{s}, Y, W\right) \quad b_r > 0, b_{E\dot{s}} < 0, b_y < 0, b_w > 0 \tag{3}$$

$$SF_p = f\left(r, E\dot{s}, Y, W\right) \quad f_r < 0, f_{E\dot{s}} > 0, f_y < 0, f_w > 0 \tag{4}$$

   Notation is standard.

   (a) Consider first the short-term version of this model, i.e., we assume that prices are constant. Given the formal model above, explain what happens to (a) the interest rate that maintains money market equilibrium following a rise in the exchange rate, (b) the interest rate that maintains bond market equilibrium following a rise in the exchange rate, and (c) the exchange rate that maintains equilibrium in the market for foreign bonds following a rise in the interest rate.

   (b) We can solve the portfolio balance model given the assumptions that $dY = dE\dot{s} = 0$ to find that

$$\begin{bmatrix} dr \\ dW \\ dS \end{bmatrix} = \begin{bmatrix} \frac{m_w}{b_r m_w - b_w m_r} & 0 & -\frac{b_w}{b_r m_w - b_w m_r} \\ -\frac{m_r}{b_r m_w - b_w m_r} & 0 & \frac{b_r}{b_r m_w - b_w m_r} \\ \frac{f_r m_w - f_w m_r}{F_p(b_r m_w - b_w m_r)} & -\frac{1}{F_p} & \frac{b_r f_w - b_w f_r}{F_p(b_r m_w - b_w m_r)} \end{bmatrix} \begin{bmatrix} dB_p \\ SdF_p \\ dM \end{bmatrix}$$

   Assume that the government has decided to stimulate the economy using fiscal policy. Use the model above to derive the analytical effects of a money financed expansionary fiscal policy. Explain carefully.

   (c) An alternative to money financed fiscal stimulus is to use bond financing. Use the model above to derive the analytical effects of a bond financed fiscal stimulus. Explain carefully.

(d) Relax the assumption that the price level is constant. We still assume a small-open economy and that the current account is in balance, and net exports is zero initially. Assume that the monetary authority expands the money stock by purchasing domestic assets. Show how the expansionary monetary policy affects prices, net exports and the exchange rate in the long-run. A graphical and verbal analysis suffice. [Hint: Assume that the economy is in full equilibrium initially, the three asset markets are in equilibrium, net foreign investment income is zero and the trade balance is zero such that the current account is zero. Normalize the exchange rate and the price level such that they are both equal to unity.]

2. **Micro-based macro model**

Consider the following version of the micro-based macro model by Evans. It is assumed that the log spot price quoted by dealers at the start of time period t is given by UIP with a risk premium

$$s_t = \mathbb{E}_t^D s_{t+1} + \hat{r}_t - r_t - \delta_t. \tag{5}$$

where s_t is the log of the spot exchange rate measured as home currency units per unit foreign currency, r_t is the home interest rate, $\hat{r}_t$ is the foreign interest rate and δ_t is the risk premium. We will assume that the home country sets the interest rate using an extended Taylor-rule where the interest rate is set conditional on a real exchange rate target. Dealers then expect that the domestic interest rate at time $t+i$ is set according to

$$\mathbb{E}_t^D r_{t+i} = \gamma_\pi \mathbb{E}_t^D \Delta p_{t+1+i} + \gamma_y \mathbb{E}^D y_{t+i} + \gamma_\varepsilon \mathbb{E}_t^D \varepsilon_{t+i} \tag{6}$$

where the real exchange rate ε_t is defined as

$$\varepsilon_t \equiv s_t + \hat{p}_t - p_t. \tag{7}$$

whereas dealers expect that the foreign interest rate is set according to a conventional Taylor-rule

$$\mathbb{E}_t^D \hat{r}_{t+i} = \gamma_\pi \mathbb{E}_t^D \Delta \hat{p}_{t+1+i} + \gamma_y \mathbb{E}^D \hat{y}_{t+i} \tag{8}$$

(a) Derive the dealers' expectation of the spot exchange rate in period $t+1$ conditional on public information available at time t, i.e., show that the dealers' expectation has the following form

$$\mathbb{E}_t^D s_{t+1} = \mathbb{E}_t^D \sum_{i=1}^{\infty} \rho^i (f_{t+i} - \delta_{t+i}) \tag{9}$$

for suitable definitions of the fundamentals f_t and the discount factor ρ.

(b) Show that the equilibrium spot exchange rate at time t can be written as

$$s_t = (\hat{r}_t - r_t) + \mathbb{E}_t^D \sum_{i=1}^{\infty} \rho^i f_{t+i} - \mathbb{E}_t^D \sum_{i=0}^{\infty} \rho^i \delta_{t+i} \tag{10}$$

(c) The micro-based macro model has implications for how new information, for example news about monetary policy, oral interventions and other communication from policy makers affect exchange rates. President Trump is very active on twitter commenting on various issues. The following was posted on August 30, 2019 at 3:55PM: "The Euro is dropping against the Dollar "like crazy," giving them a big export and manufacturing advantage...and the Fed does NOTHING! Our Dollar is now the strongest in history. Sounds good, doesn't it? Except to those (manufacturers) that make product for sale outside the U.S." Use the model above to explain how you think this statement should affect the USD/Euro exchange rate in the short-run as well as in the long-run.