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Econ 443/543 **Ivan Tchinkov**
International Economics: Finance **Winter 2016**

Midterm Examination

FIRST NAME: ________________________ **LAST NAME:**________________________

STUDENT NUMBER: ________________________

I. True/False/Uncertain - Briefly explain. No credit without an explanation (5 marks each).

1. A country can run a current account deficit forever.

   Uncertain. In an economy with finite periods, the country needs to be an initial lender to run CA deficits forever. With infinite periods, it can run CA forever even if it is an initial borrower.

2. In both a closed and a small open economy, interest rates are determined by the world interest rate.

   False. In a SOE, domestic interest rates are determined by world interest rates. In a closed economy, they are determined by the tangency of indifference curves and PPF, i.e. they are determined by domestic technology (slope of PPF), preferences (MRS) and endowment.

3. An increase in depreciation, δ, increases second period output Q_2 in an investment economy.

   False. An increase in δ increases the cost of capital, $\delta + r_1$. From FOC: $F'(K_2) = (\delta + r_1)$, it follows that K_2 should fall and so will $Q_2 = F(K_2)$, since $F(.)$ is increasing and concave.

4. The Global Savings Glut hypothesis explains the US CA dynamics better than the Great Moderation hypothesis.

   False. The former attributes the worsening of US CA deficit during the 1995-2005 to excess savings from the rest of the world, which would have lead to lower interest rates. Since this is the evidence, it explains well US CA deterioration during that period. But it cannot explain US CA improvement since then, because interest rates have not increased.

   By contrast, the Great Moderation explains well both the deterioration and improvement in US CA deficit as a result of a decrease and an increase in uncertainty during those 2 periods, respectively.

5. An investment surge in the US, a large economy, will worsen its current account more than it would in a small, open economy (SOE).

   False. An investment surge shifts the $I(r)$ curve to the right and the $S(r, Q)$ surve to the left. As a result the $CA(r)$ curve shifts to the left. Since US is large, equilibrium interest rates rise and CA drops by less than in the case of SOE, where rates are unchanged.

II. Problems - You have to show your work. No credit without an explanation (25 marks each).

1. Let endowment be constant, so that $Q_1 = Q_2 = Q$. Also, assume zero world real interest rate and zero initial asset position, i.e. $r^* = 0$ and $B_0^* = 0$. Utility is given by $U(C_1, C_2) = C_1^{1/2} C_2^{1/2}$.

   (a) Solve for C_1, C_2, TB_1 and CA_1 and provide intuition for the result. (5 marks)

Substituting $r^* = 0$, $B_0^* = 0$ and $Q_1 = Q_2 = Q$ in the intertemporal budget constraint

$$C_1 + \frac{C_2}{(1+r^*)} = (1+r_0)B_0^* + Q_1 + \frac{Q_2}{(1+r^*)}$$

we get the simplified budget constraint

$$C_2 = 2Q - C_1$$

From first order tangency condition $MRS = -(1+r^*)$ we get

$$\frac{C_2}{C_1} = 1$$

Substituting this in the simplified budget constraint and solving we get

$$C_1 = C_2 = Q$$

Also, from the definition of CA and TB we get

$$CA_1 = r_0 B_0^* + TB_1$$

substituting $B_0^* = 0$ we get

$$CA_1 = TB_1 = Q - C_1 = 0$$

So,

$$C_1 = C_2 = Q$$

and

$$CA_1 = TB_1 = 0$$

The intuition is that with constant, certain endowment and zero r_0 and B_0^*, there is no consumption smoothing, in each period the entire endowment is consumed.

Now assume second period endowment is uncertain, i.e.

$$Q_2 = \begin{cases} Q + \sigma & \text{with probability } 1/2 \\ Q - \sigma & \text{with probability } 1/2 \end{cases}$$

where $\sigma > 0$ is the standard deviation of Q_2.

b) Should optimal C_1 in this case be more or less than before? (10 marks)

Now country maximizes expected utility. Substituting simplified budget constraint in the utility function, problem becomes

$$\max_{C_1} EU(C_1, C_2) = \frac{1}{2}\left[C^{1/2} \underbrace{(2Q + \sigma - C_1)^{1/2}}_{\textbf{good state } C_2}\right] + \frac{1}{2}\left[C^{1/2} \underbrace{(2Q - \sigma - C_1)^{1/2}}_{\textbf{bad state } C_2}\right]$$

Taking the FOC, simplifying and substituting the certainty solution $C_1 = Q$, one obtains

$$\frac{\partial EU}{\partial C_1} < 0$$

Thus, $C_1 = Q$ is not a solution here. Moreover, C_1 now has to drop below Q, so that LHS rises and FOC $\frac{\partial EU}{\partial C_1} = 0$ holds. Thus, the optimal C_1 here is smaller than before. Another way to see this is to realize that the utility function is a monotonic transformation of $U = lnC_1 + lnC_2$, so the solution is the same as in the online text (see Ch.5).

c) What happens to the CA_1 and TB_1 in this case? (5 marks)

With C_1 now lower, we get

$$CA_1 = TB_1 = Q - C_1 > 0$$

Thus, both CA and TB increase.

d) Intuitively, how does the increase in uncertainty affect the current account?(5 marks)

So, as a result from the increased uncertainty about second period endowment, the country chooses to consume less today, and save more, i.e. run CA and TB surpluses. This is to hedge against a bad endowment realization in the second period.

2. Suppose a country has a negative Net International Investment Position ($NIIP < 0$), but a positive Net Investment Income ($NII > 0$). Assume$NIIP = -\$2.5$ trillion, $NII = \$170$ billion, its assets A are \$20.3 trillion, its liabilities L are \$22.8 trillion, r (interest rate on net foreign assets) is 5%, r^L (return on foreign-owned domestic assets) is 3% and r^A is the return on domestically-owned foreign assets.

   (a) Assuming the NIIP is incorrectly measured, i.e. there is dark matter, how much should the true NIIP (TNIIP) and the associated dark matter be? (10 marks)

Since

$$TNIIP = NIIP + DarkMatter$$

and

$$NII = rTNIIP$$

we have

$$TNIIP = \frac{NII}{r} = \frac{170}{.05} = \$3.4$$

So, TNIIP is \$3.4 trillion, NIIP is -\$2.5 trillion, so Dark Matter is around \$6 trillion.

b) Alternatively, without dark matter, what is the return differential, $r^A - r^L$, that will account for the observed NII? (10 marks)

Without Dark Matter, we have

$$NII = r^A A - r^L L$$

Plugging the numbers we get

$$.170 = r^A(20.3) - (.03)(22.8)$$

Solving for r^A we get

$$r^A = \frac{(.170) + (.03)(22.8)}{20.3} = \frac{.854}{20.3} = 0.042$$

So, r^A is 4.2% and r^L is 3%, so the return differential, $r^A - r^L$ is 1.2%.

c) Which one of those 2 explanations of the NIIP paradox is more likely? (5 marks)

The second one.

3. Consider a two-period model of a small open economy with a single good each period and no investment. Let preferences of the representative household be described by the utility function

$$U(C_1, C_2) = \sqrt{C_1} + \beta\sqrt{C_2}$$

The parameter β is known as the subjective discount factor. It measures the consumer's degree of impatience in the sense that the smaller is β , the higher is the weight the consumer assigns to present consumption relative to future consumption. Assume that $\beta = 1/1.1$. The representative household has initial net foreign wealth of $(1+r_0)B_0^* = 1$, with $r_0 = 0.1$, and is endowed with $Q_1 = 5$ units of goods in period 1 and $Q_2 = 10$ units in period 2. The world interest rate paid on assets held from period 1 to period 2, $r*$, equals 10% (i.e., $r* = 0.1$) and there is free international capital mobility.

a) Calculate the equilibrium levels of consumption in period 1, C_1,consumption in period 2, C_2, the trade balance in period 1, TB_1, and the current account balance in period 1, CA_1. (10 marks)

Maximizing utility subject to the budget constraint leads to the usual tangency condition:

$$\frac{\sqrt{C_2}}{\sqrt{C_1}} = \beta(1 + r*) = 1$$

So, we have

$$C_1 = C_2$$

Plug that in the budget constraint and get:

$$C_1 = C_2 = 7.9$$

Then, the trade balance is:

$$TB_1 = Q_1 - C_1 = -2.9$$

And the current account is:

$$CA_1 = TB_1 + r_0 B_0^* = -2.9 + .1(.91) = -2.81$$

b) Suppose now that the government imposes capital controls that require that the country's net foreign asset position at the end of period 1 be nonnegative ($B_1^* \geq 0$). Compute the equilibrium value of the domestic interest rate, r_1, consumption in periods 1 and 2, and the trade and current account balances in period 1. (10 marks)

From the current account expression:

$$CA_1 = B_1^* - B_0^*$$

we have $B_1^* = 0$, since the constraint is binding. Then

$$CA_1 = -B_0^* = -.91$$

From

$$CA_1 = TB_1 + r_0 B_0^*$$

we have

$$TB_1 = CA_1 - r_0 B_0^* = -.91 - .1(.91) = -1$$

Then from

$$TB_1 = Q_1 - C_1$$

we have

$$C_1 = Q_1 - TB_1 = 5 + 1 = 6$$

To find C_2**use the budget constraint and substitute all knowns into it to get:**

$$6 + \frac{C_2}{1 + r_1} = 1 + 5 + \frac{10}{1 + r_1}$$

or

$$C_2 = 10$$

To find the domestic interest rate, use the tangency condition:

$$C_2 = C_1 \beta^2 (1 + r_1)^2$$

Plug in the known values and solve for r_1**:**

$$r_1 = \frac{1}{\beta}\sqrt{\frac{C_2}{C_1}} - 1 = 1.1\sqrt{\frac{10}{6}} - 1 = .42$$

So, $r_1 = 42\%$**.**

c) Evaluate the effect of capital controls on welfare. Specifically, find the level of utility under capital controls and compare it to the level of utility obtained under free capital mobility. (5 marks)

To compare utility under both free capital mobility and capital controls, plug the solutions for consumption in the utility function.

Under free capital mobility:

$$U = \sqrt{C_1} + \beta\sqrt{C_2} = \sqrt{7.9} + .91\sqrt{7.9} = 5.37$$

Under capital controls:

$$U = \sqrt{C_1} + \beta\sqrt{C_2} = \sqrt{6} + .91\sqrt{10} = 5.33$$

Then we have

$$U_{free} = 5.37 > U_{cc} = 5.33$$

The country is better off under free capital mobility.