Econ 434 Professor Ickes

Fall 2004

Midterm Exam I

Answer Sheet

1. *(30%) Consider the two-country model of interest-rate determination with savings and investment. Suppose that at the initial world interest rate the home country has a current account surplus. Draw the savings-investment diagram and the equilibrium world interest rate for both countries.*

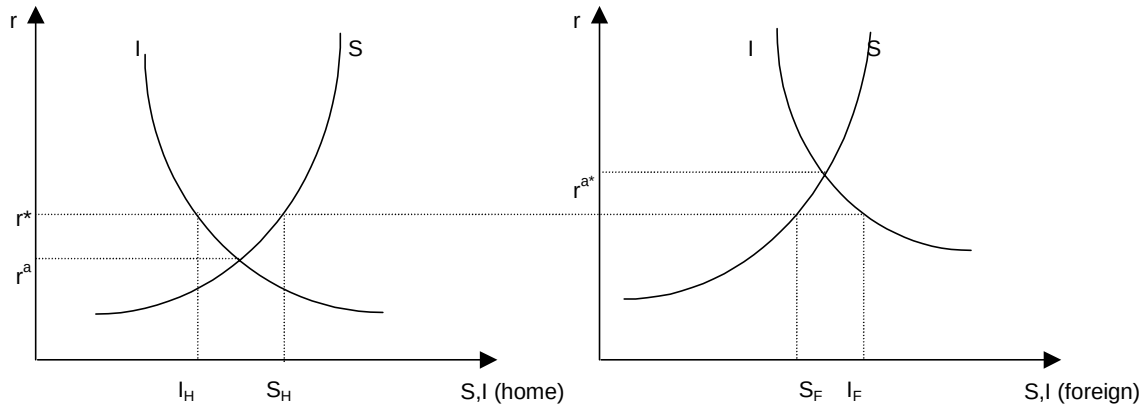

Figure 1:

(a) *Suppose that preferences in the foreign country change so that savings is greater at every value of the interest rate. Show (using graphs wherever possible) what happens to the current account balance in the home and foreign country. What happens to the equilibrium world interest rate?*

brief answer The savings function for the foreign country shifts to the right. This causes the current account deficit in the foreign country to become smaller. This means that the world interest rate must fall, since $CA_H + CA_F = 0$. At a lower world interest rate the current account surplus of the home country must decrease.

(b) *Suppose that in some periods the preference for savings increases in the foreign country (as in part a) and that in other periods it decreases (below its average value). What would you expect the relationship between* $\frac{savings}{gdp}$ *and* $\frac{investment}{gdp}$ *to be in the two countries? Would the correlation be high or low?*

brief answer In part (a) the shift in the savings function caused savings and investment to rise in the foreign country. In the home country investment rose (because the interest rate fell) but savings fell. So in foreign country the changes were positively

correlated, in the home country negatively correlated. Now consider a negative shift if foreign savings. This causes the world interest rate to increase above its initial value. Savings and investment both fall in the foreign country. In the home country savings increases and investment falls (the current account in the home country must improve while it deteriorates in the foreign country). So in this case savings and investment changes are negatively correlated in the home country and positively correlated in the foreign country. What we can conclude is that savings and investment rates should not be highly correlated in the open economy.

(c) *How would your answer to part (b) change if there was autarky?*

brief answer If there is autarky then investment and savings changes must be perfectly correlated. No current account surpluses or deficits.

(d) *How would your answer to part (b) change if the savings and investment rates were calculated as averages over 20 year intervals? Explain.*

brief answer Over longer time horizons the correlation must increase. The reason is that current account deficits cannot persist forever due to the intertemporal budget constraint.

2. *(30%) Consider the dynamic model of the current account balance. Let f be the payments by each young person to the government for taxes (f^* for the foreign country). The tax revenue is wasted by the government – it has no productive result. Suppose that f increases, f^* unchanged.*

(a) *What happens to the steady state capital-labor ratio of the home country if the economy is closed? Explain.*

brief answer It must fall because some of savings is being wasted by the government. The transition curve $G(k)$ must shift down in, as in figure 2. This is evident also from the equation for the capital-labor ratio, $k_{t+1} = (1-\alpha)(1-\beta)A_t k_t^{\beta} - f$. Clearly, for any level of k_t a higher f means a lower k_{t+1}.

(b) *What happens to the world steady state capital-labor ratio if the economy is open?*

brief answer The world steady state capital-labor ratio must fall in this case. You can simply re-label figure 2 for the world capital-labor ratio by noting that it is now world savings that matters, which is an average of savings in each country. Thus, the equation for the world steady state capital-labor ratio is $k_{t+1} = (1-\overline{\alpha})(1-\beta)A_t k_t^{\beta} - \overline{f}$, where $1-\overline{\alpha}$ is the population-weighted average savings rate ($\overline{\alpha} = \frac{N\alpha + N^*\alpha^*}{N+N^*}$), and $\overline{f}$ is the population-weighted average tax, $\overline{f} = \frac{Nf + N^*f^*}{N+N^*}$. Since f^* did not change, $\overline{f}$ must rise, and so the world steady state capital labor ratio must fall.

(c) *What happens to the current account balance in the home country when f rises? What happens to the current account balance of the foreign country? Which country will experience net capital inflows?*

brief answer In the home country the current account balance must fall. In the absence of trade its capital-labor ratio would be below that in the foreign country. So the rate of return would be higher. Factor-price equalization requires that capital flow from the foreign country to the home country. Hence, the home country will experience

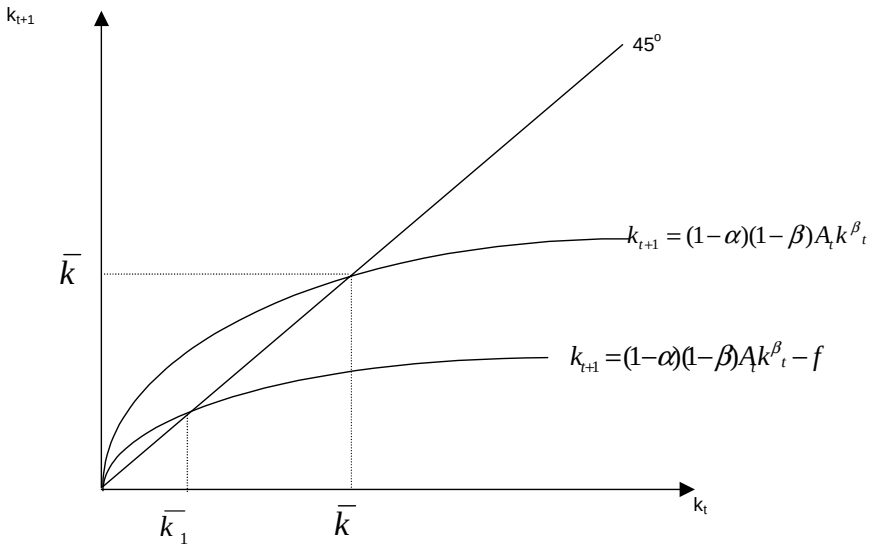

Figure 2:

a net capital inflow. The foreign country experiences a net capital outflow, as they invest some of their assets abroad.

(d) *How does this analysis compare to what would happen if the savings rate in the home country fell?*

brief answer It is exactly the same answer (this is enough for full credit). The world capital-labor ratio falls, the home country runs a current account deficit and imports capital. Perhaps the only difference is that in this case the change is in accord with people's preferences. If people in the home country voted to waste their taxes, then the case is identical. It is hard to believe that people would vote for taxes that the government just wastes, though perhaps casual observation suggests otherwise. If the taxes were imposed involuntarily they are worse off.

3. *(15%) The US government wants the Chinese government to let its currency (yuan) be flexible (abandon its fixed exchange rate) so it can appreciate in value. Draw a demand-supply diagram for the yuan under these current conditions (i.e., before it becomes flexible).*

brief answer In the figure, $\overline{e}$ is the fixed exhange rate of the yuan and e is the market clearing exchange rate. At the fixed exchange rate there is an excess demand for yuan.

(a) *How can the fixed exchange rate be kept different from the market-clearing exchange rate? Explain. Can the Chinese government persist in this activity over time? Explain.*

brief answer The Chinese central bank must sell yuan and buy dollars, thus filling the gap. They can persist in this for a long time – all they have to do is build warehouses for the dollars. Of course, if the dollar does depreciate eventually they will incur a capital loss. But there is no inherent difficulty in accumulating foreign exchange by selling paper they can print at will.

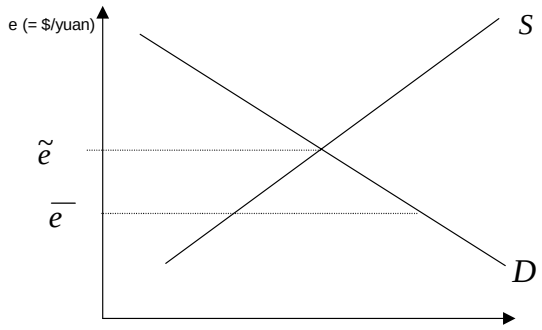

Figure 3:

(b) *If there was a forward market for yuan what would be the likely relationship between the forward price and the current price of the yuan? Explain.*

brief answer The forward price of yuan would be higher than the current price. You would have to offer more dollars in the future for a yuan. There would be a forward premium for yuan, a forward discount for dollars.

extra discussion Notice (this is not part of the answer) that as long as the yuan was not devalued in any period the forward price would have exceeded the actual spot price for that date. That is, the forward price would have turned out to have been an incorrect forecast. And in each period the error would be the same. There would be many periods of small forecast errors as long as the Chinese did not devalue. This would seem to indicate that investors would be making biased forecasts, a sign of irrationality. But this is not the case. The reason is that in the period when the Chinese finally re-value the yuan there would be a big forecast error in the other direction. With a fixed exchange rate the forward price is a weighted average of the small probability of a big devaluation and the higher probability of no change on a single day and a small forecast error. It is like carrying an umbrella when it does not rain. This is a small cost compared with no umbrella in a storm. The forward price will average out the likelihood of the two events. On any given day China is unlikely to revalue the yuan. But when it does this will be large. See the discussion in the notes on Peso Problems.

4. *(25%) Pecunia and Macronesia are small closed economies. Both choose to liberalize their economies to capital flows. In Pecunia this leads to a current account deficit and in Macronesia a current account surplus.*

(a) *Does this mean that agents in Pecunia are necessarily more impatient than those in Macronesia? Explain. Show how this pattern of current accounts could occur even if preferences are identical in the two countries.*

brief answer The countries could have different productive opportunities. Facing a common world interest rate Pecunia could be investing in future production while Macronesia chooses to invest much less. This is evident in the figure, where one

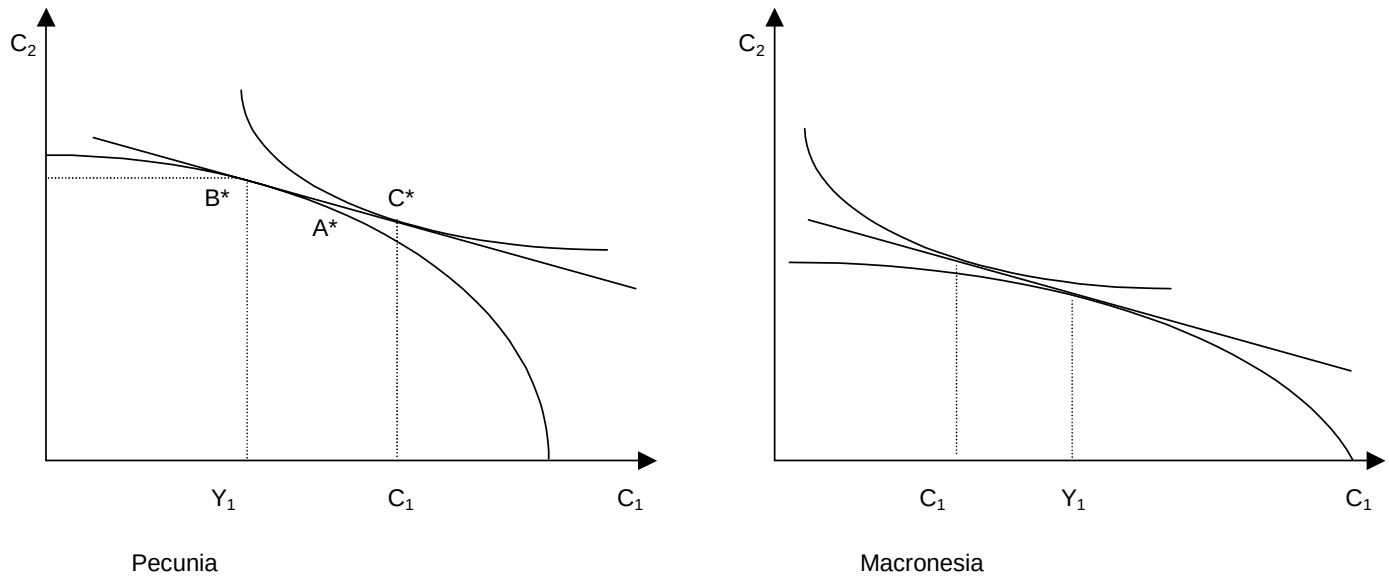

Figure 4:

sees that at a common world interest rate $C_1 > Y_1$ in Pecunia, and $C_1 < Y_1$ in Macronesia.

(b) *Suppose that the pattern of current account deficits is, in fact, caused by differences in preferences. Does this mean that Pecunia and/or Macronesia is worse off from liberalizing its economy? Explain.*

brief answer No, it does not. If Pecunia is relatively more impatient access to world markets allows it to achieve a better consumption bundle than is possible under autarky. Just because Pecunia runs a current account deficit does not mean it is worse off. Obviously the autarky rate in Pecunia is greater than the world interest rate (if they are running a current account deficit). So access to world capital markets gives Pecunians better opportunities to trade future for current consumption. Similarly, access to the world market allows Macronesians to earn a higher return on their savings than they could domestically.