

**Midterm Exam I: Answer Sheet**

1. (35%) Consider the economy of Macronesia (which is small despite its name). Here people have access to world capital markets but under current circumstances they choose neither to borrow or lend. In a two-period diagram draw production opportunities and indifference curves for Macronesia, and draw the world interest rate. Label the consumption point as A.

**brief answer** the production possibilities curve and the indifference curve are tangent to each other and the budget line with the slope  $1 + \hat{r}$  where  $\hat{r}$  is the world interest rate (see figure 1):

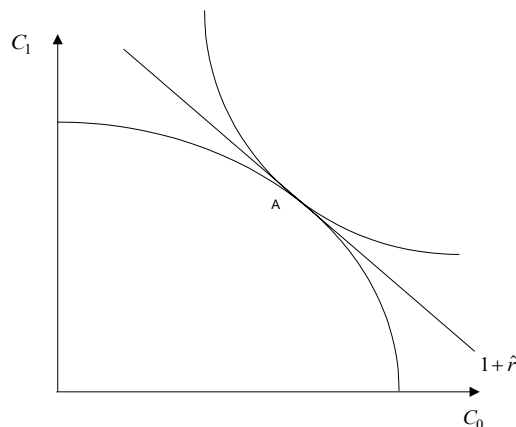


Figure 1:

2. (a) Imagine that a great natural disaster (perhaps a flood) occurs which will greatly reduce current income in Macronesia, but leave future income unchanged. How does the production opportunities set shift? What would happen to consumption if Macronesia did not have access to world capital markets? Label this consumption point B.

**brief answer** Current consumption opportunities are reduced. The new frontier lays inside the old one as in figure 2. The new autarky consumption point is B.

- (b) What happens to the autarky rate of interest in Macronesia? Explain.

**brief answer** The autarky rate rises because there is less current production. Under autarky interest rates must rise to balance savings and investment domestically. Basically, the slope of the PPF (and of the indifference curve) is steeper at point B than at point A.

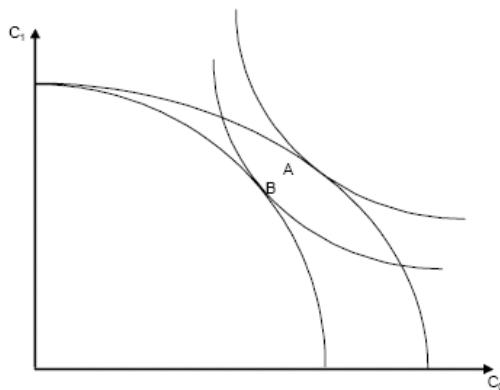


Figure 2: Disaster in a closed economy

- (c) *If Macronesia has access to the world capital markets what happens to production and consumption? Explain. Label the new consumption point C. In the wake of the crisis is welfare higher with open or closed capital markets? Explain.*

**brief answer** With open capital markets Macronesia can finance current consumption out of future production. Since Macronesia is small the interest rate is unchanged, so the budget line is parallel to the one tangent to point A. The production point moves towards the northwest to point D, but the consumption point is at C. See figure 3. Citizens are better off at point C than at point B; hence, welfare is higher in the open economy. But clearly they are worse off than at point A, because they have experienced a natural disaster.

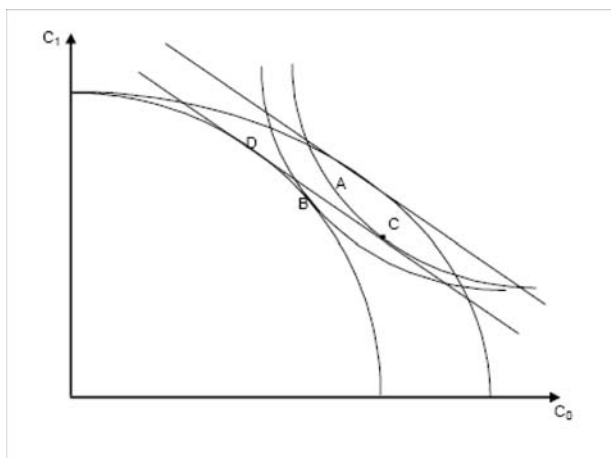


Figure 3: Disaster with open capital markets

- (d) *Suppose Macronesia was a large economy. How does your answer to part (c) change, if at all? Explain. Is welfare higher after the flood when Macronesia is small or large? Explain.*

**brief answer** If the economy were large the world interest rate would have to rise. The disaster would reduce world savings at the old interest rate. Since Macronesia will

borrow in the current period, world current account balances will be in deficit, so the world interest rate would rise. This means that Macronesia will borrow less than in part (c). Current consumption is thus impacted more – there is less insurance provided by the rest of the world when Macronesia is large than when it is small.

2. (30%) Consider the dynamic model of the current account balance. Suppose that the government levies a tax of  $f$  per worker on each young person. ( $f^*$  for the foreign country). The tax revenue is wasted by the government — it has no productive result. Suppose that  $f$  increases, but  $f^*$  is 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 4. 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  $k_{t+1}$ .

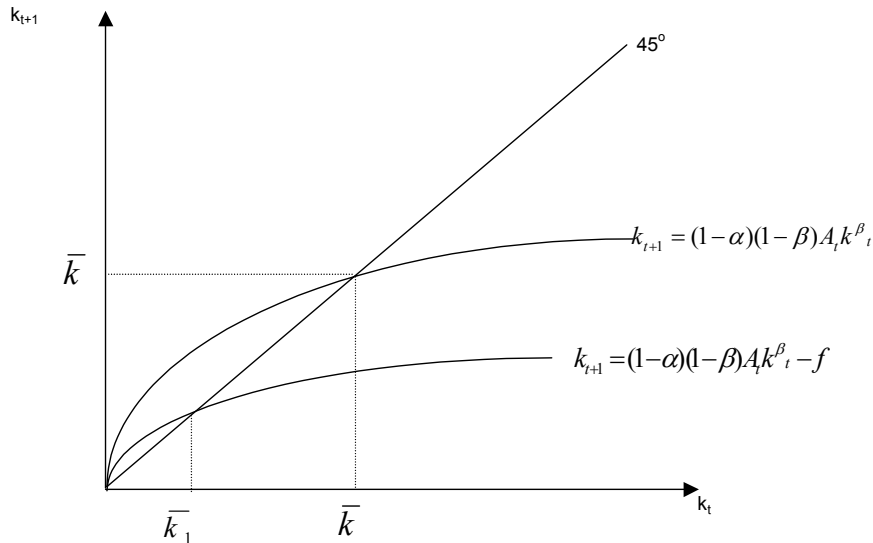


Figure 4:

- (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 4 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  $k_{t+1} = (1 - \bar{\alpha})(1 - \beta)A_t k_t^\beta - \bar{f}$ , where  $1 - \bar{\alpha}$  is the population-weighted average savings rate ( $\bar{\alpha} = \frac{N\alpha + N^*\alpha^*}{N + N^*}$ ), and  $\bar{f}$  is the population-weighted average tax,  $\bar{f} = \frac{Nf + N^*f^*}{N + N^*}$ . Since  $f^*$  did not change,  $\bar{f}$  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 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. (20%) *What role does the rate of interest and the growth rate of the economy play in determining current account stability? Explain.*

**brief answer** For a country with  $\frac{NFA}{Y} < 0$  the interest rate makes it harder to stabilize and faster growth helps. The reason is that the interest rate tells us how fast the numerator is growing – that is, how fast our debt is growing – and the growth rate tells us how fast the denominator is growing.

- (a) *How does the sustainability of any given path change if the rate of interest increases? How does it change if the growth rate increases? Explain.*

**brief answer** For a country like the US with negative NFA, as the difference  $r - g$  increases the path of the current account takes on more of a doom trajectory. Of course, if  $NFA > 0$  then an increase in  $r - g$  would cause improvement not doom.

- (b) *What is the valuation effect? How can a country that has negative net foreign assets earn positive net interest income? Explain.*

**brief answer** If domestic and foreign assets are imperfect substitutes their returns can differ. If  $r^A > r^L$ , then the income from gross assets can exceed the payments on the liabilities, even if the latter are larger.

4. (15%) *Short answer questions.*

- (a) *Give or take \$500 billion, how large are US net foreign assets (or, within 5% what share are NFA of US GDP)?*

**brief answer**  $-\$2.6$  trillion, or about  $-24\%$  of GDP.

- (b) *"The US current account deficit is about equal in size to the current account surpluses of oil exporting countries." True or False.*



Figure 5:

**brief answer** False. It is more than twice the current account surpluses of oil exporters. Remember, China and Japan also have big current account surpluses, and only the US has a large (by world standards) current account deficit. Recall figure 5, for example.

- (c) *Suppose the US net foreign debt is 25% of GDP and that foreign assets and liabilities pay an interest rate of 10% per year. What would be the drain on US GDP (as a percentage) from paying interest on the net foreign debt? Is this number bigger or smaller than the current US current account deficit? What if the net foreign debt were 100% of GDP? How would the drain compare to the current account deficit?*

**brief answer** 10% of 25% of GDP is 2.5% of GDP. This is smaller than the current account deficit which is over 5% of GDP. But if  $L = Y$ , then  $.1(Y) = 10\%$  of GDP, which is larger than the current account deficit.