

Problem Set 2

International Financial Integration - Current Account Sustainability

Due: Thursday, October 7th, before the class

Question 1: What are the benefits of financial integration for an individual financial investor? What are the benefits for a firm?

Question 2: Consider the return on a portfolio in which w is the share of wealth (normalized to 1) invested in domestic assets, and r_D and r_F are the gross returns on domestic and foreign assets. The return is:

$$R_P = r_D w + r_F (1 - w)$$

Suppose that the expected return on domestic assets is equal to the expected return on foreign assets, so that risk averse investors choose the portfolio composition, i.e. the fractions w and $1 - w$ of domestic and foreign bonds respectively, that minimizes the variance of the portfolio return. Then, note that the variance of the portfolio return is:

$$Var(R_P) = Var(r_D)w^2 + Var(r_F)(1 - w)^2 + 2Cov(r_D; r_F)w(1 - w)$$

where Var denotes the variance and Cov the covariance of the return(s).

- (a) If $Var(r_D) = 2$, $Var(r_F) = 8$ and $Cov(r_D; r_F) = 0$, what are the fractions w and $1 - w$ that investors choose? Explain why investors want to hold a fraction of their portfolio in foreign assets despite the higher volatility of their return.
- (b) How does your answer change if $Cov(r_D; r_F) = -4$? Explain why.

Question 3: Take the No-Ponzi Game condition that:

$$\lim_{T \rightarrow \infty} \frac{1}{(1 + r)^T} NFL_T \leq 0$$

- (a) Discuss what the NPG implies regarding the borrowing behavior of a country; i.e. what behavior it prevents.
- (b) Use the Transversality condition and the flow budget constraint $NFL_1 = (1 + r)NFL_0 - TB_1$ to derive the Intertemporal Budget constraint. What is required for the Net Foreign Liability position, NFL_0 , to be sustainable? Are present and/or future trade surpluses needed? Are present and/or future current account surpluses needed?
- (c) Suppose $NFL = 60 \text{ billion}$, and the interest rate is 5%. Compute the constant trade surplus that, if maintained forever, satisfies the IBC. Shows that running this constant trade surplus allows to maintain a constant foreign liability position.
- (d) How would the constant trade surplus of point (c) change if the interest rate increased up to 8%?

Question 4: Consider a two-period economy that, at the beginning of period 1, has a net foreign liability position of 60, that is $NFL_0 = -B_0 = 60$, where B_0 denotes net foreign assets or NIIP. Assume that, in both periods the interest rate is 10 percent, that is, $r = 0.10$.

- (a) Suppose that in period 1, the country runs a current account surplus of $CA_1 = 24$. Find the trade balance in period 1, TB_1 , the country's net foreign liability position at the beginning of period 2, $NFL_1 = -B_1$, and the trade balance in period 2, TB_2 , that ensures $B_2 = 0$ (the economy ends and no asset is left).
- (b) Now suppose the interest rate unexpectedly rises to 20% in period 2, i.e. $r_2 = 0.20$. Find the new current account balance and trade balance in period 2, CA_2 and TB_2 .
- (c) Now, suppose that in period 1, the country runs a current account deficit, $CA_1 = -6$. Find the trade balance in period 1, TB_1 , the country's net foreign liability position at the beginning of period 2, $NFL_1 = -B_1$, and the trade balance in period 2, TB_2 , that ensures $B_2 = 0$.

Question 5: A country has a Net Foreign Liability position of 45 and runs a trade deficit of 2 each year for the next 10 (ten) years. The rate of return on these liabilities is going to be $r = 0.01$.

- (a) Suppose that, starting with the 11th year, a constant trade surplus is run forever. How much this constant trade surplus should be in order to satisfy the Intertemporal Budget Constraint?
- (b) Repeat the exercise in part (a) but now assume that the trade deficit of 2 is run for the first 15 years (instead of 10). How much should be the constant trade surplus starting in the 16th year in order to satisfy the Intertemporal Budget Constraint?
- (c) How much the constant trade surplus should be in order to reach a zero liability position after 60 years from now?
- (d) How would your answer in part (a) change if the rate of return (interest rate) were $r = 0.02$? (Consider a 0.02 rate over both periods). What does this result suggest about the benefit of liabilities paying low returns as in the US case?

Question 6 : The Sustainability of the US Net Liability Position

The returns/payments on US foreign assets exceed the returns on US foreign liabilities so that US net investment income is positive despite the huge net liability position. Such a situation can be formalized by a negative rate of return, $i_t^{US} < 0$ on the US net liability position, NFL_t .

- (a) Given that the return on net liabilities is given by:

$$\text{Return} = i_t^L L_t - i_t^A A_t$$

Derive the expression for the average rate of return on net foreign liabilities, i_t^{US} , as in Lecture 27, Slide 9. Given that $i_t^A > i_t^L$, under which condition i_t^{US} is negative?

- (b) Given that $NFL_t = L_t - A_t$ at the end of 2020 was equal to 67% of GDP, and A_t was equal to 154% of GDP (See Slide 13), if i_t were equal to 1%, i.e. $i_t^L = 0.01$, how large should be i_t^A for investment income to be non-negative, i.e. for $i_t^{US} = 0$? How large would i_t^A have to be to yield an investment income equal to 1% of GDP in 2021?
- (c) Suppose US financial integration increases, so that both A_t and L_t increase by 40%. How does this affect US investment income if the rates of return remain the same; i.e. $i_t^L = 0.01$ and i_t^A as found at the end of question b)?

- (d) Suppose investment income will remain positive in 2021 and equal to 1% of GDP, while the sum of US net labor income and net transfers will stay negative and equal to -0.7% of GDP. What trade balance would be needed to stabilize the US net liability position in 2021 at 67% of GDP in the absence of valuation changes if nominal GDP grew, as expected, at the rate of 4.4%? How does the stabilizing trade balance change if nominal GDP grew only at a rate of 2% because of a slower recovery from the Covid pandemic crisis? [Hint: Repeat the analysis in Slide 10 of Lecture 27]