M339W: January 22nd, 2021

UNIVERSITY OF TEXAS AT AUSTIN

Quiz 1

Foreign currencies.

Problem 1.1. (15 points) Maria lives in Austria and receives her salary in Euro. She decides to spend 1000 Euro and let the proceeds of the exchange accrue interest at the USD continuously compounded risk-free interest rate .

(i) (1 pt) Given that the initial exchange rate is 1.21 USD per Euro, how much (in USD) does Maria receive? $1000(1.21) = \dots = 1210$

(ii) (2 pts) Given that the USD continuously compounded risk-free interest rate is equal to $r_\$ = 0.02$, what is the balance in Maria's account three months after the initial transaction? Assume that there were no intermediate deposits or withdrawals. $1210\, e^{0.02(0.25)} = 1216.07$

(iii) (1 pt) Maria decides to withdraw the balance in her account at that time (still three months from the initial exchange) and exchange it back to Euros. Given that the exchange rate at that time equals 1.17 USD per Euro, how much (in Euro) does Maria receive? $1216.07 / 1.17 = 1039.38$

(iv) (2 pts) Given that the Euro continuously compounded risk-free interest rate equals $r_€ = 0.03$, what would have Maria's balance have been had she decided to simply deposit her initial investment in a Euro savings account? $1000\, e^{0.03(0.25)} = 1007.53$

(v) (9 pts) Has Maria discovered an arbitrage opportunity? Why (not)?

No. She could not have anticipated the future exchange rate.

Def'n. We say that a portfolio is an **arbitrage portfolio** if its profit satisfies:

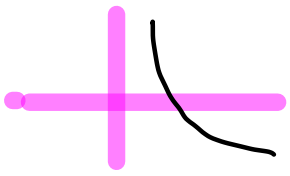
- it's nonnegative in all states of the world;
- it's strictly positive in @ least one state of the world.

In the problem:

$x(0)$ ... the initial exchange rate

Initial cost: 1000

Payoff: $1000 \cdot x(0) \cdot e^{r_\$ \cdot T} / x(T)$



Profit = Payoff − FV(Init. Cost)

$= 1000 \cdot x(0) \cdot e^{r_\$ \cdot T} / x(T) - 1000\, e^{r_€ \cdot T}$

Housekeeping

- Quiz #1 due @ midnight
- Extra Credit HW: 6 of them : due on Thursdays
  each counts for 1% on top of your final score in the course
- Breakout Rooms: Yes
  On your time over the weekend : No

Whoever participates gets a full score in a quiz. ☺