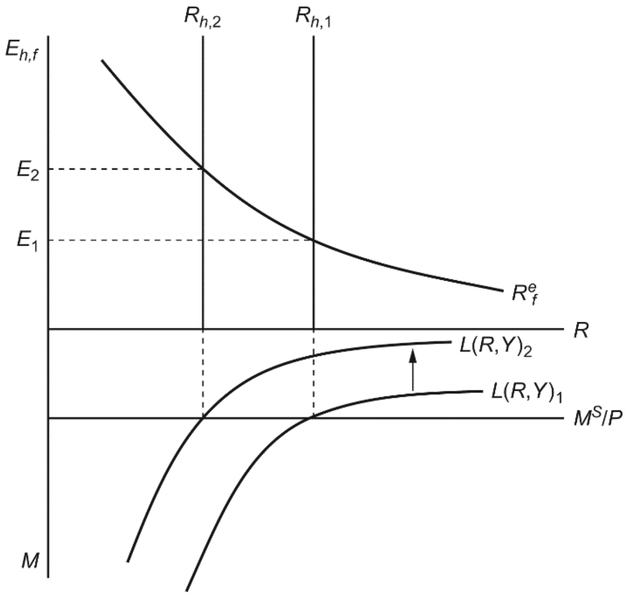
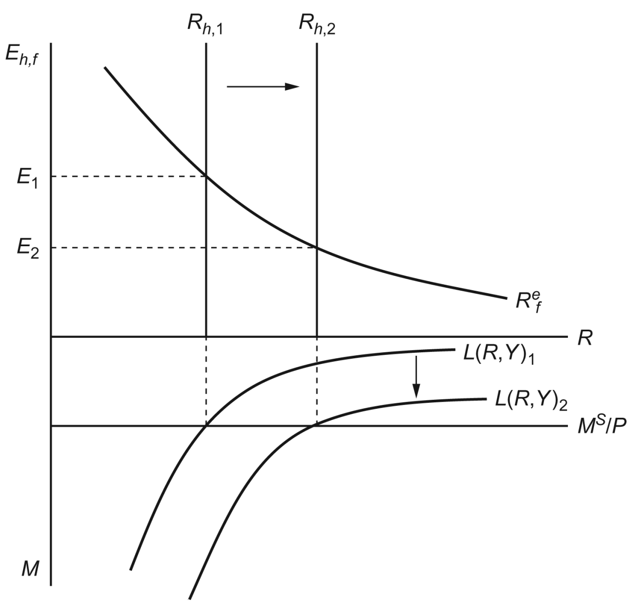
ECON 1550 Spring 2026: Problem Set 4 Answer Key

1. (a) A reduction in the home money demand causes interest rates in the home country to fall from $R_{h,1}$ to $R_{h,2}$. With no change in expectations, there will be a depreciation of the home currency from E_1 to E_2 as investors shift their savings into higher-interest-paying foreign assets.

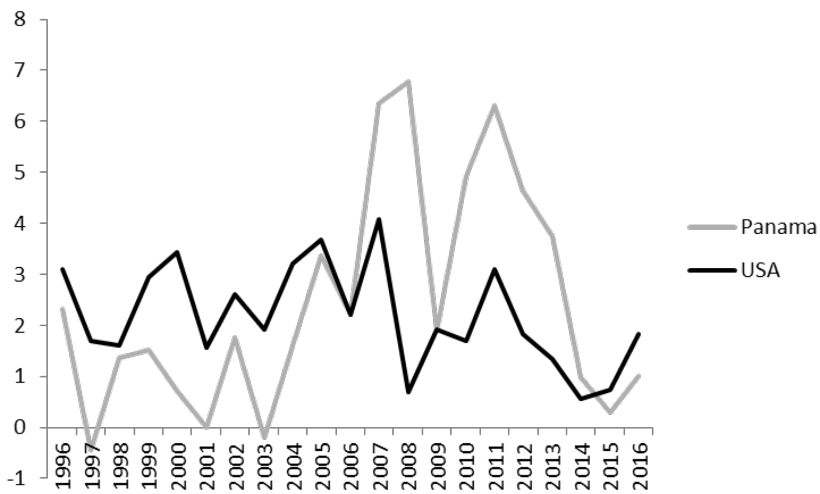


(b) An increase in domestic real GNP will cause domestic real money demand to rise. This will cause domestic real interest rates to rise from $R_{h,1}$ to $R_{h,2}$ (see graph below). With no change in expectations, there will be an appreciation of the home currency from E_1 to E_2 as investors channel their savings into domestic assets.



(c) Because Panama uses the US dollar as its currency, we would expect that, all else being equal, inflation in Panama and that in the United States should be identical. The chart below gives inflation rates in Panama and the United States over the past 20 years.

On the one hand, the inflation rates in the two countries tend to move together, as we would expect because they share the same money supply. That said, the inflation rates are not identical between the two countries. This is because prices (and thus inflation) are not determined by the money supply alone. Recall the long-run price level defined as $P = M^S/L(R,Y)$. Although Panama and the United States share the same money supply, the demand for money in each country may differ, allowing for differences in price levels.



2. (a) The textbook explained that the expected exchange rate jumps at t_0 and was assumed to remain constant at the new value after t_0.

To find the long-run value of E^e, we use that:

(i) $R_€ = R^1_\$$ (by assumption in the textbook)

(ii) The long-run value of $R_\$$ is $R^1_\$$

(iii) The long-run value of E is E^3

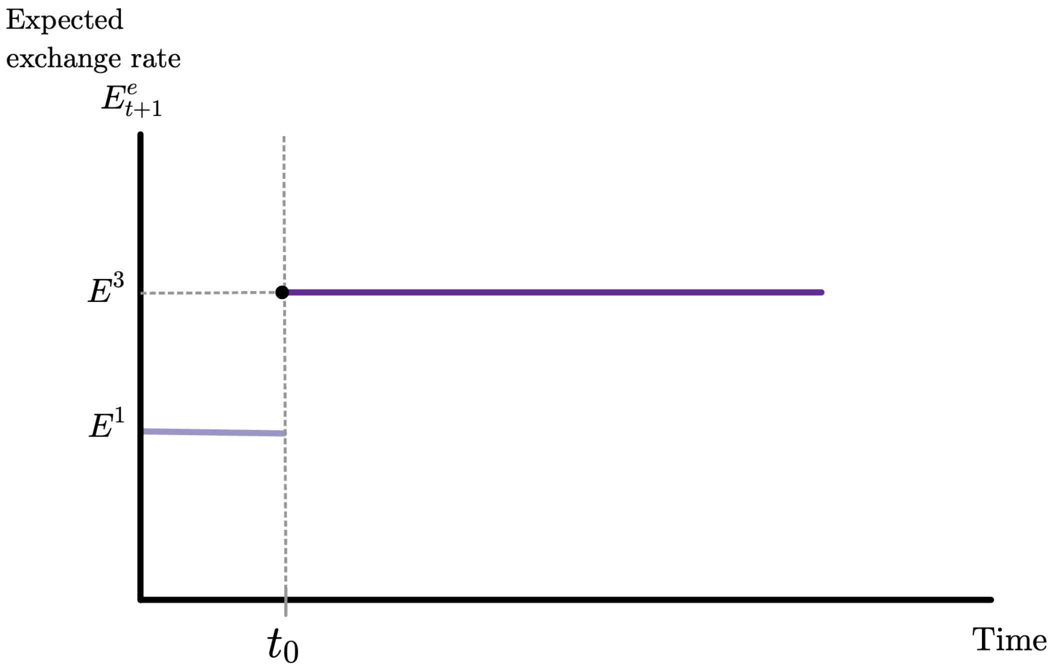
(iv) Since interest parity holds, in the long run:

$$0 = R_\$ - R_€ - \left(\frac{E^e}{E} - 1\right)$$

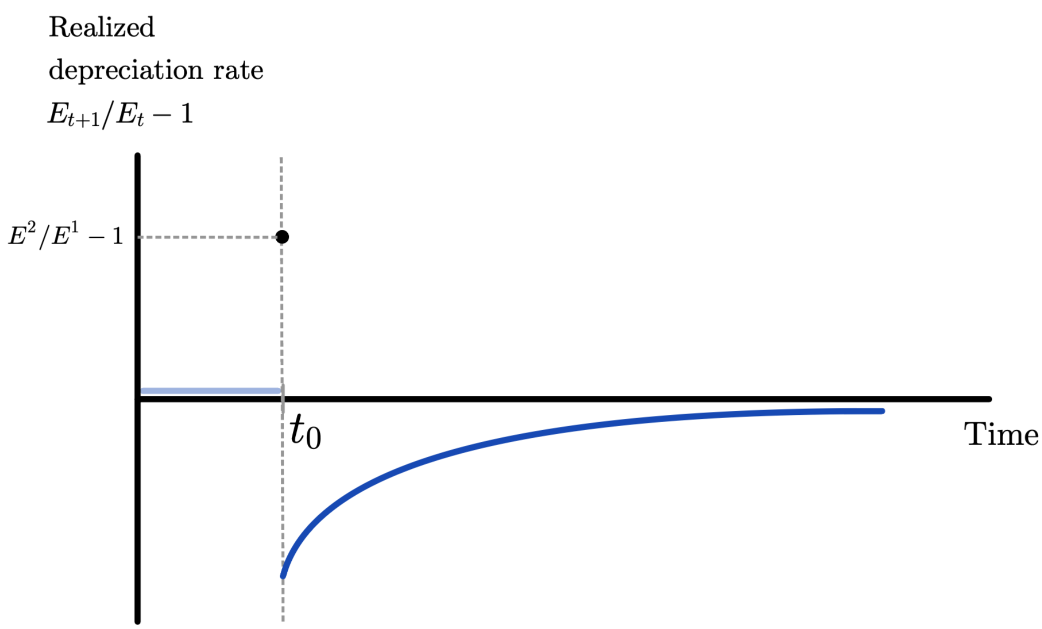
Using (i), (ii) and (iii) in the interest parity condition from (iv) we find that in the long run:

$$0 = R_\$ - R_€ - \left(\frac{E^e}{E} - 1\right) = R^1_\$ - R^1_\$ - \left(\frac{E^e}{E^3} - 1\right) = 1 - \frac{E^e}{E^3}$$

Therefore, $0 = 1 - E^e/E^3$, which gives $E^e = E^3$.



(b) The realized depreciation rate can be found by looking at the time-path of the exchange rate in panel (d) of the textbook's figure. At t_0, the exchange rate jumps from E^1 to E^2, so the initial depreciation rate is $E^2/E^1 - 1$. After t_0, the exchange rate decreases from E^2 to E^3, so the depreciation rate is negative. Eventually, the exchange rate converges, so the depreciation rate is zero in the long run.



Note that this solution requires the "Time" axis to be reported in terms of $t+1$ rather than t, i.e., [realized depreciation rate $]_{t+1} \equiv E_{t+1}/E_t - 1$. If we instead used [realized depreciation rate $]_t \equiv$

$E_{t+1}/E_t - 1$, a depreciation at $t+1 = t_0$ would enter the realized depreciation rate at $t = t_0 - 1$, i.e., before the public had any knowledge of the coming money supply shock.

(c) We use R^* to denote the euro interest rate and R to denote the dollar interest rate. The realized carry trade returns are:

$$RET_{t+1} = R_t - \left[R_t^* + \left(\frac{E_{t+1}}{E_t} - 1 \right) \right]$$

We will analyze the behavior of RET_{t+1} in three different stages: before t_0, exactly at t_0, and after t_0.

Before t_0

When $t + 1 < t_0$, we have $RET_{t+1} = 0$ since E_{t+1} is constant and $R_t = R_t^*$.

Exactly at t_0

We found in part b) of this question that the realized depreciation rate $E_{t+1}/E_t - 1$ jumps up at $t + 1 = t_0$, generating lower RET_{t+1}, so the carry trade returns go down.

The dollar interest rate also drops to $R_{t_0} < R_{t_0 - 1}$, but this change isn't incorporated into returns realized at t_0: These returns depend only on interest rates set at $t_0 - 1$.

Since returns were zero before t_0, they are negative at exactly t_0.

After t_0

We start by analyzing what happens in the long run (as t grows to infinity).

- From part a) of this question, we know that in the long run, $R_t = R_t^*$.
- Additionally, panel (d) of the textbook's figure shows that the exchange rate eventually becomes constant and therefore, in the long run, $E_{t+1}/E_t - 1 = 0$.

Together, $R_t = R_t^*$ and $E_{t+1}/E_t - 1 = 0$ imply that, in the long run, we have $RET_{t+1} = 0$.

Now we show that $RET_{t+1} < 0$ between t_0 and the long run. First, note that for any $t + 1 > t_0$, we have:

$$E_{t+1} > E^3 \quad (1)$$

as can be directly seen in panel (d) of the textbook's figure. In addition, because the interest parity condition holds, we have $R_t - R_t^* = E_{t+1}^e / E_t - 1$.

Using the result from part b) that $E^e = E^3$ after t_0, we get:

$$R_t - R_t^* = \frac{E^3}{E_t} - 1 \quad (2)$$

Using equations (1) and (2),

$$RET_{t+1} = R_t - R_t^* - \left(\frac{E_{t+1}}{E_t} - 1\right) = \left(\frac{E^3}{E_t} - 1\right) - \left(\frac{E_{t+1}}{E_t} - 1\right) = \frac{E^3 - E_{t+1}}{E_t} < 0$$

Therefore, we know carry trade returns are always negative after t_0.

We now examine what happens *immediately* after t_0, i.e., at $t + 1 = t_0 + 1$.

From panel (d) of the textbook's figure, we see that depreciation maxes out at t_0; after that, the dollar only appreciates toward its long-run level. So, in $t_0 + 1$, realized depreciation contributes *positively* to returns: $E_{t_0+1} < E_{t_0}$, so $-(E_{t_0+1}/E_{t_0} - 1) > 0$.

But RET_{t_0+1} also depends on the dollar interest rate realized in t_0. From panel (b) in the textbook's figure, we know the dollar interest rate drops abruptly at t_0: $R_{t_0} < R_{t<t_0}$ contributes *negatively* to returns.

Combining these two pieces and drawing on our discussion of RET_{t+1} over the long run allows us to state $\Delta R_{t_0} < RET_{t_0+1} < 0$. But how does RET_{t_0+1} compare to RET_{t_0}?

Since $E_{t+1}/E_t = 1$ and $R_{t_0-1} = R^*_{t_0-1} \quad \forall t+1 < t_0$ in the long-run equilibrium preceding t_0, RET_{t_0} can be expressed in terms of E_{t_0}, the one variable that changes, as $-\Delta E_{t_0}/E_{t_0-1}$. Recalling our UIP condition

$$E_t = \frac{E^e}{1 + R_t - R_t^*}$$

lets us study ΔE_{t_0} in terms of $\Delta E^e_{t_0}$ and ΔR_{t_0} by evaluating the **total derivative** of E at t_0:

$$\begin{aligned}
\Delta E_{t_0} &= \frac{\partial E_{t_0-1}}{\partial E^e_{t_0-1}} \cdot \Delta E^e_{t_0} + \frac{\partial E_{t_0-1}}{\partial R_{t_0-1}} \cdot \Delta R_{t_0} \\
&= \frac{\Delta E^e_{t_0}}{1 + R_{t_0-1} - R^*_{t_0-1}} - \frac{E^e_{t_0-1} \cdot \Delta R_{t_0}}{(1 + R_{t_0-1} - R^*_{t_0-1})^2} \\
&= \Delta E^e_{t_0} - E^e_{t_0-1} \cdot \Delta R_{t_0}
\end{aligned}$$

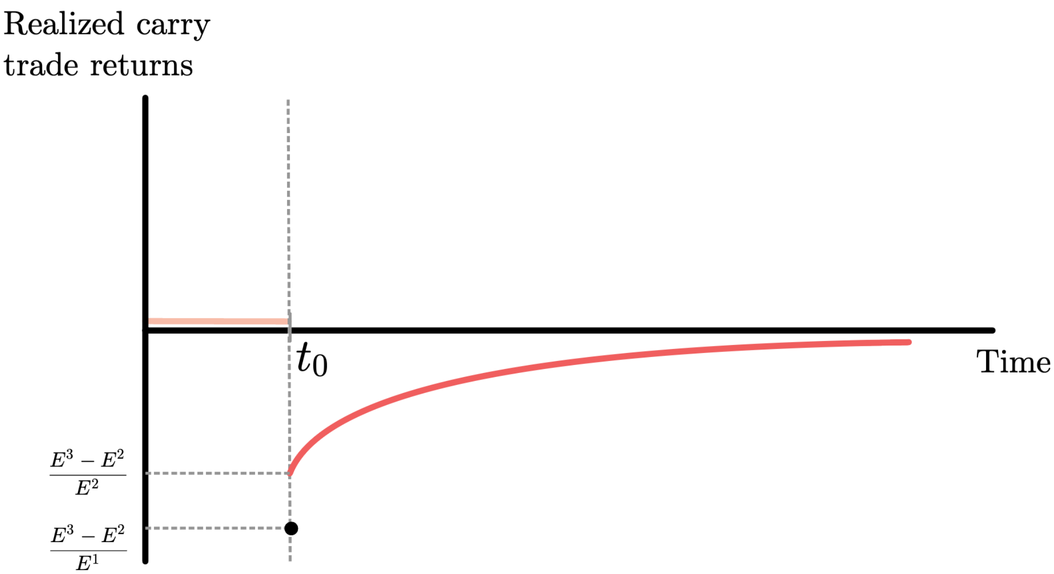
We therefore have

$$RET_{t_0} = -\frac{\Delta E^e_{t_0} - E^e_{t_0-1} \cdot \Delta R_{t_0}}{E_{t_0-1}} = -\frac{\Delta E^e_{t_0}}{E_{t_0-1}} + \frac{E^e_{t_0-1} \cdot \Delta R_{t_0}}{E_{t_0-1}}$$

The second term on the right-hand side simplifies to ΔR_{t_0} because $E^e_{t_0-1} = E_{t_0-1}$ in the long-run equilibrium that prevailed at $t_0 - 1$. The first term is negative because $\Delta E^e_{t_0}$ is positive: The expected exchange rate is permanently higher after the money supply shock at t_0. This gives us

$$RET_{t_0} = -\frac{\Delta E^e_{t_0}}{E_{t_0-1}} + \Delta R_{t_0} < \Delta R_{t_0} < RET_{t_0+1}$$

The reasoning above gives the following time path for realized carry trade returns:



The graph shows that carry trade returns jump up between t_0 and the instant immediately after t_0. This is a consequence of exchange rate overshooting, which induced a positive depreciation rate at t_0 but a negative one immediately after t_0, and of the interest parity condition, which guaranteed that the change in R did not perfectly offset the movements in returns caused by the exchange rate.