Econ 4382 - International Finance
Granados

Practice Problems - Part 1

This practice set covers all major topics from Chapters 12-15 of Feenstra & Taylor. Work through all questions to prepare for the midterm.

1. (8 points) Real-World Exchange Rate Transaction

   Two years ago, you invested EUR 30,000 in a U.S. stock index fund. At that time, the exchange rate was 1.18 USD/EUR. The fund returned +15% in USD terms. Today, the exchange rate is 1.12 USD/EUR. Calculate your return in EUR terms, showing the breakdown between the U.S. market return and the exchange rate effect.

Convert initial investment to USD

$$30,000 \text{ EUR} \times 1.18 \text{ USD/EUR} = 35,400 \text{ USD}$$

Apply the USD return

$$35,400 \text{ USD} \times 1.15 = 40,710 \text{ USD}$$

Convert back to EUR at today's rate

$$40,710 \text{ USD}/1.12 \text{ USD/EUR} = 36,348.21 \text{ EUR}$$

Total EUR return:

$$\frac{36,348.21 - 30,000}{30,000} = 0.2116 \text{ or } 21.16\%$$

Breakdown into components:

Market return component: +15% (the USD return on the investment)

Exchange rate component:

To find the FX effect, we need to see how the dollar changed from the EUR investor's perspective. We can express this using EUR/USD rates:

Two years ago: EUR/USD = $1/1.18 = 0.8475$ (euros per dollar)

Today: EUR/USD = $1/1.12 = 0.8929$ (euros per dollar)

Change in dollar value (from EUR perspective):

$$\frac{0.8929 - 0.8475}{0.8475} = 0.0536 \text{ or } +5.36\%$$

The dollar **appreciated** by 5.36% against the euro (it now takes more euros to buy one dollar).

Combined effect:

$$(1 + 0.15) \times (1 + 0.0536) - 1 = 1.15 \times 1.0536 - 1 = 0.2116 \text{ or } 21.16\%$$

Interpretation:

The EUR investment had a 21.16% return, which comes from:

- 15% market return in USD (by buying the US asset)
- 5.36% from dollar appreciation (FX movement from exchanging to USD and back to EUR)

The dollar strengthened against the euro during this period, which benefited the EUR investor holding USD-denominated assets. When converting back to euros, the stronger dollar meant more euros received.

2. (9 points) Purchasing Power Parity Applications

(a) A standardized basket of goods costs USD 100 in the United States and MXN 1,900 in Mexico. The exchange rate is 19.5 MXN/USD. Calculate the real exchange rate. Is the peso overvalued or undervalued? By how much?

Real exchange rate:

$$q = \frac{E_{\text{MXN/USD}} \times P_{\text{US}}}{P_{\text{Mexico}}} = \frac{19.5 \times 100}{1,900} = \frac{1,950}{1,900} = 1.026$$

Since $q > 1$, the Mexican basket is cheaper in dollar terms than the U.S. basket. This means the peso is **undervalued**.

Degree of undervaluation: $(1.026 - 1)/1 = 0.026$ or **2.6% undervalued**

For PPP to hold, either:

- The peso should appreciate (exchange rate should decrease to 19 MXN/USD), or
- Mexican prices should rise relative to U.S. prices

(b) U.S. inflation is projected at 2.5% per year while Mexico's inflation is projected at 4.0% per year. According to relative PPP, what is the expected rate of change in the MXN/USD exchange rate?

From relative PPP (approximation):

$$\frac{\Delta E_{\text{MXN/USD}}}{E_{\text{MXN/USD}}} \approx \pi_{\text{Mexico}} - \pi_{\text{US}} = 4.0\% - 2.5\% = 1.5\%$$

The peso is expected to **depreciate by 1.5% per year** (the MXN/USD rate will increase by 1.5%).

More precisely (in case you don't want to rely on the approximation above), we can use the PPP in levels in the two points in time and take the ratio of the implied exchange rates (equations): $\frac{E_1}{E_0} = \frac{1+\pi_{\text{MXN}}}{1+\pi_{\text{USD}}} = \frac{1.04}{1.025} = 1.0146$

This gives a 1.46% expected depreciation of the peso.

Intuition: Higher Mexican inflation erodes the peso's purchasing power, requiring depreciation to maintain PPP.

Also, either the approximate answer above or the exact below are valid answers.

3. (10 points) Money Market Equilibrium

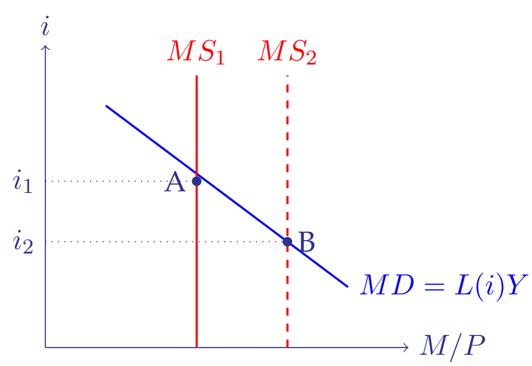
Consider the money market equilibrium condition: $M/P = L(i) \times Y$, where $L(i)$ is a decreasing function of the interest rate i.

(a) The central bank temporarily increases the money supply by 10% while prices and real income remain constant in the short run. Using a money market diagram, show what happens to the interest rate. Explain the economic intuition.

With $M \uparrow 10\%$, P constant, and Y constant, we have $M/P \uparrow 10\%$.

The money supply curve shifts right from MS_1 to MS_2. At the initial interest rate i_1, there is now excess supply of money.

To restore equilibrium, the interest rate must fall to i_2, increasing money demand $L(i)$ until $L(i_2) \times Y = M_2/P$.



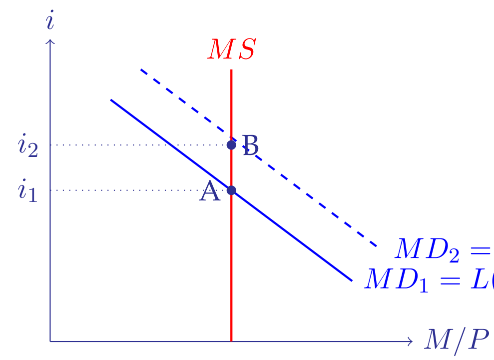
Economic intuition: More money is available relative to demand. The "price" of money (interest rate) must fall to induce people to hold the additional money balances. Lower rates make holding money less costly (lower opportunity cost).

(b) Now suppose real income Y increases by 20% while the money supply and prices remain constant. What happens to the interest rate? Draw a new diagram and explain.

With $Y \uparrow$ 20%, M constant, and P constant, the money demand increases: $L(i) \times Y \uparrow$.

The money demand curve shifts right from MD_1 to MD_2. At the initial interest rate i_1, there is now excess demand for money.

To restore equilibrium, the interest rate must rise to i_2, decreasing money demand per unit of income $L(i)$ until $L(i_2) \times Y_2 = M/P$.



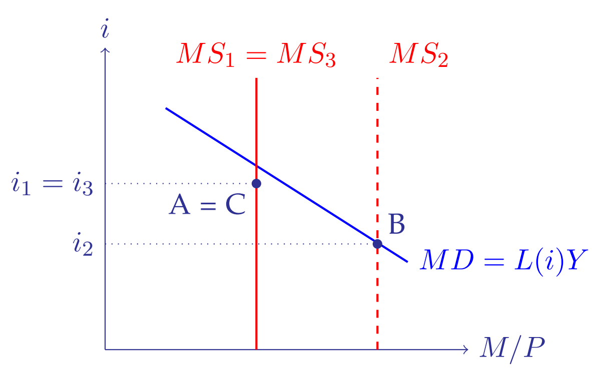
Economic intuition: Higher real income means more transactions, increasing demand for money. With fixed money supply, the "price" of money (interest rate) rises to ration the scarce money. Higher rates make holding money more costly, reducing quantity demanded.

(c) How would your answer to (a) change if you focus on the long-run changes? Show the final equilibrium point in the diagram. Explain the intuition.

In the long run, prices are flexible and will adjust to the money supply change.

With a 10% increase in M and flexible prices, P will eventually increase by 10% as well (from quantity theory). This means M/P returns to its original level.

The money supply curve shifts back left from MS_2 to MS_1 (in real terms), and the interest rate returns to i_1.



Path: A (initial) $\rightarrow$ B (short run with $i \downarrow$) $\rightarrow$ C = A (long run, back to original)

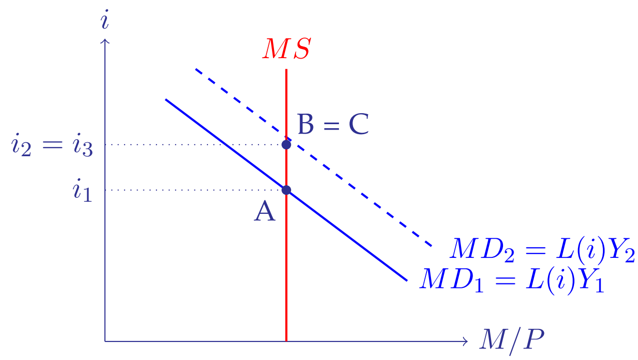
Long-run intuition: Money is neutral in the long run. The 10% increase in nominal money supply is fully absorbed by a 10% increase in the price level. Real money balances (M/P) and the real interest rate return to their original levels.

(d) How would your answer to (b) change if you focus on the long-run changes? Show the final equilibrium point in the diagram. Explain the intuition.

In the long run, the real income increase is permanent, so the higher money demand persists. Unlike a monetary shock, a real shock does not revert.

With Y permanently 20% higher and M fixed by the central bank, the money demand curve remains at $MD_2 = L(i)Y_2$.

The interest rate remains permanently elevated at i_2 to equilibrate the money market.



Long-run result: The equilibrium remains at point B. The interest rate stays at i_2.

Long-run intuition: This is a **real shock**, not a monetary shock. Higher real income from productivity growth or capital accumulation creates permanently higher money demand for transactions.

With the central bank maintaining a fixed money supply, the only way to clear the money market with higher Y is through a permanently higher interest rate: $M/P = L(i_2) \times Y_2$ where $L(i_2) < L(i_1)$.

The money supply curve does NOT shift because the central bank keeps M constant. There's no reason for prices to change—this is a supply-side improvement, not a monetary phenomenon.

(e) Answer briefly, which of these effects would affect the **long-run** exchange rate and why? You don't have to draw any plot for this, but you must mention each of the four economic shocks or episodes above.

Effect (a) - Money supply increase, short run: NO. Prices adjust proportionally in the long run, so all real variables (including the real exchange rate) return to original levels via monetary neutrality.

Effect (b) - Real income increase, short run: YES. Real shock has permanent effects—interest rate stays elevated, currency remains appreciated.

Effect (c) - Money supply increase, long run: YES. Price level rises by 10%, so PPP implies 10% permanent depreciation (though less than the short-run overshooting).

Effect (d) - Real income increase, long run: YES. Higher Y permanently reduces $E_{h/f}$ via the monetary formula (or permanently higher interest rate)—currency appreciates.

4. (9 points) Quantity Theory and Inflation

Country A has money supply growth of 6%, real GDP growth of 3%, and constant liquidity. Country B has money supply growth of 3%, real GDP growth of 4%, and constant liquidity.

(a) Calculate the inflation rate in each country using the quantity theory of money.

From quantity theory: $M/P = L \times Y$

In growth rates (with constant L): $\mu = \pi + g$

Where μ = money growth, π = inflation, g = real GDP growth

Country A:

$$\pi_A = \mu_A - g_A = 6\% - 3\% = 3\%$$

Country B:

$$\pi_B = \mu_B - g_B = 3\% - 4\% = -1\%$$

Country A has 3% inflation. Country B has 1% deflation (negative inflation).

(b) If the global real interest rate is 2%, use the Fisher equation to find the nominal interest rate in each country.

Fisher equation: $i = r + \pi$

Country A:

$$i_A = 2\% + 3\% = 5\%$$

Country B:

$$i_B = 2\% + (-1\%) = 1\%$$

Country A has a higher nominal rate (5%) due to its inflation, but both countries have the same real interest rate (2%).

(c) According to relative PPP, what is the expected rate of change in the exchange rate between currencies A and B (in units of A per B)?

From relative PPP:
$$\frac{\Delta E_{A/B}}{E_{A/B}} \approx \pi_A - \pi_B = 3\% - (-1\%) = 4\%$$

Currency A is expected to **depreciate by 4% per year** relative to currency B.

This makes sense: Country A has higher inflation (3% vs. -1%), so its currency's purchasing power erodes faster, requiring depreciation to maintain parity.

5. (8 points) Uncovered Interest Parity (UIP)

(a) State the UIP condition and explain what it means economically. Under what conditions would you expect UIP to hold?

UIP condition:
$$i_h = i_f + \frac{E^e_{h/f} - E_{h/f}}{E_{h/f}}$$

Or equivalently: $E_{h/f} = \frac{1+i_f}{1+i_h} E^e_{h/f}$

Economic meaning: The expected return on domestic deposits should equal the expected return on foreign deposits when measured in the same currency. The interest differential should be offset by expected exchange rate changes.

If $i_h > i_f$, the home currency must be expected to depreciate to equalize returns.

Conditions for UIP:

i. Free capital mobility (no capital controls)

ii. Risk-neutral investors (no risk premium demanded)

iii. Rational expectations (unbiased forecasts of future exchange rates)

iv. No transaction costs

v. No systematic expectational errors

Empirical reality: UIP fails dramatically in the data. High interest rate currencies tend to appreciate rather than depreciate (the "forward premium puzzle" or "carry trade puzzle"). This suggests risk premiums are important.

(b) The U.S. interest rate is 3%, the UK interest rate is 4%, and the current spot rate is 1.30 USD/GBP. According to UIP, what should be the expected exchange rate one year from now?

From UIP (treating US as home):

$$E_{\text{USD/GBP}} = \frac{1 + i_{\text{UK}}}{1 + i_{\text{US}}} E^e_{\text{USD/GBP}}$$

Solving for expected future rate:

$$E^e_{\text{USD/GBP}} = E_{\text{USD/GBP}} \times \frac{1 + i_{\text{US}}}{1 + i_{\text{UK}}} = 1.30 \times \frac{1.03}{1.04} = 1.2875$$

UIP predicts the pound will **depreciate** to 1.2875 USD/GBP (from 1.30), a depreciation of:

$$\frac{1.2875 - 1.30}{1.30} = -0.0096 \text{ or } -0.96\%$$

Equivalently, the dollar will **appreciate**. From the dollar's perspective (GBP/USD rates):

Current: GBP/USD = $1/1.30 = 0.7692$ (pounds per dollar)

Expected: GBP/USD = $1/1.2875 = 0.7767$ (pounds per dollar)

Dollar appreciation:

$$\frac{0.7767 - 0.7692}{0.7692} = 0.0097 \text{ or } +0.97\%$$

Interpretation: The higher UK interest rate (4% vs. 3%) is offset by expected pound depreciation (dollar appreciation) of approximately 1%. This maintains UIP equilibrium where expected returns are equalized across currencies.

6. (10 points) Permanent Money Supply Increase (Flexible Prices)

Consider a permanent 8% increase in the home money supply. Assume prices are flexible and adjust immediately, and the foreign country is unaffected.

(a) What happens immediately to the home price level? Explain using the quantity theory.

From quantity theory: $M = P \times L(i) \times Y$

With a permanent 8% increase in M and flexible prices: In the long run, real variables (Y, $L(i)$, i) return to their natural levels. Only nominal variables (M, P, expected future prices) change permanently.

For equilibrium: $M_{\text{new}}/P_{\text{new}} = M_{\text{old}}/P_{\text{old}}$

If M increases by 8%, then P must also increase by 8% immediately (since prices are flexible).

Price level jumps up by 8% immediately.

Real money balances M/P remain unchanged, so the interest rate doesn't change.

(b) What happens to the home interest rate in the long run? Use the Fisher equation in your explanation.

With a permanent money supply increase (not money growth increase), there's a one-time 8% increase in the price level, but inflation returns to zero in the new steady state.

Fisher equation: $i = r^* + \pi^e$

Long-run inflation (π^e) is zero in the new steady state (just a one-time level shift, not ongoing inflation).

Real rate r^* is determined globally and unchanged.

Therefore, the nominal interest rate i is unchanged in the long run.

Note that (i) this is the expected effect as flexible prices offset whatever change induced by the higher money supply, and (ii) there might be a brief transition period with positive inflation as prices jump, but in the new steady state, inflation is zero again.

(c) What happens to the exchange rate $E_{h/f}$ (home per foreign)? Has the home currency appreciated or depreciated?

From PPP: $E_{h/f} = P_h/P_f$

With $P_h \uparrow 8\%$ and P_f unchanged:

$$E_{h/f}^{\text{new}} = \frac{1.08 \times P_h^{\text{old}}}{P_f} = 1.08 \times E_{h/f}^{\text{old}}$$

The exchange rate increases by 8% (home currency depreciates by 8%).

Since prices are flexible, the depreciation happens immediately—there's no overshooting.

Intuition: The 8% increase in home money supply causes 8% inflation (one-time). This erosion of purchasing power requires an 8% currency depreciation to maintain PPP.

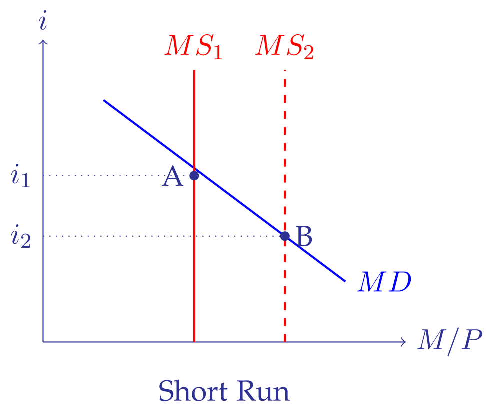
7. (10 points) Temporary Money Supply Increase (Sticky Prices)

Now consider a *temporary* increase in the home money supply. Prices are sticky in the short run but flexible in the long run.

(a) Using a money market diagram, show what happens to the home interest rate in the short run.

In the short run, prices are sticky (P fixed), so an increase in M means real money supply M/P increases.

Money supply curve shifts right. At the initial interest rate, there's excess money supply. The interest rate falls to restore equilibrium.



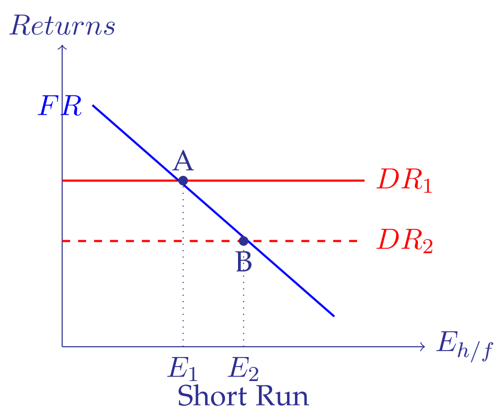
Interest rate falls from i_1 to i_2 in the short run.

(b) Using an FX market diagram, show what happens to the exchange rate in the short run.

In the FX market, the domestic return (DR) falls from i_1 to i_2 (shifts down).

The foreign return (FR) is unchanged because the shock is temporary—expected future exchange rate E^e doesn't change.

New equilibrium at point B: exchange rate increases (home currency depreciates).



Exchange rate increases (depreciates) from E_1 to E_2.

(c) What happens in the long run when the temporary shock ends? Do all variables return to their initial values?

The shock is temporary, so eventually the money supply returns to M_1.

In the long run:

- Money supply shifts back left to MS_1
- Interest rate returns to i_1

- DR shifts back up to DR_1
- Exchange rate returns to E_1
- Prices return to P_1 (if they changed at all during the sticky-price period)

Yes, all variables return to their initial values. Temporary shocks have no permanent effects.

Time paths:

- i: Drops to i_2, then returns to i_1
- E: Jumps to E_2, then returns to E_1
- M/P: Increases temporarily, then returns to initial

8. (9 points) Exchange Rate Overshooting

Consider a *permanent* decrease in the home money supply. Prices are sticky in the short run but flexible in the long run.

(a) What happens to the exchange rate in the short run versus the long run? Does it "overshoot" its long-run value?

Long run (prices flexible):

Permanent decrease in M leads to proportional decrease in P. From PPP: $E_{h/f} = P_h/P_f$ decreases (home currency appreciates).

Say M falls by 10%, then P falls by 10%, so E falls by 10%. Call this new long-run rate E_3.

Short run (prices sticky):

$M \downarrow$ but P fixed initially, so $M/P \downarrow$. Interest rate rises sharply.

In FX market:

- DR shifts up (higher i)
- FR shifts down (left) because expected future E is lower (permanent shock affects expectations)

Exchange rate falls sharply to E_2 (strong appreciation).

Overshooting: Yes! The short-run appreciation ($E_1 \to E_2$) is larger than the long-run appreciation ($E_1 \to E_3$).

$E_2 < E_3 < E_1$

Over time, as prices fall and interest rates normalize, the exchange rate gradually depreciates from E_2 toward E_3.

This is the Dornbusch overshooting result: Exchange rates overshoot their long-run equilibrium in the short run when prices are sticky.

(b) Explain the economic intuition for why overshooting occurs. Why doesn't the exchange rate jump directly to its long-run value?

Why overshooting occurs:

The exchange rate must do "double duty" in the short run because prices can't adjust:

i. **Short-run role:** Clear the money market by adjusting returns. With M/P falling and prices sticky, the interest rate rises sharply. To maintain UIP equilibrium with the higher interest rate, the exchange rate must be below its expected future value (expected to depreciate back toward long-run).

ii. **Long-run role:** Reflect relative price levels via PPP.

Since prices are sticky, the exchange rate must over-adjust (overshoot) to provide the expected depreciation that offsets the temporarily high interest rate.

Mathematical intuition from UIP:

$$i_h - i_f = \frac{E^e - E}{E}$$

With permanently tighter money: $i_h \uparrow$ sharply in short run, $E^e \downarrow$ (lower long-run expected rate).

For UIP to hold, E must be even lower than E^e to generate expected depreciation that offsets high i_h.

Note: If you find this depreciation transition confusing —given the main effects induces appreciations. Note that E_3 is depreciated with respect to E_2, however, both E_2 and E_3 are **appreciated** relative to the initial ER (E_1). Thus, the expected depreciation in the UIP refers to the adjustment from the initial overreaction of the ER to its new long-run level.