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INTERNATIONAL FINANCE

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PRACTICE PROBLEM SET 2: FOREX & ASSET MKTS

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Topic: Saving, Current Account

Review/Practice Questions & Answers

1. Suppose the government is considering a tax policy that will reduce taxes by $100. In the economy, households consume 80% of each additional dollar earned. Assume that the tax cut has no effect on GDP (Y).

a) How will this tax cut affect consumption?

Answer: Consumption will increase by 80% of the increase in disposable income:

Change in consumption = 0. 80 × $100 =$80

b) Calculate the change in private savings.

Answer: From the definition of private savings:

$S_P = Y - T - C$

Change in S_P = Change in income - Change in taxes - Change in consumption

Change in S_P = $0 - (-$100) - (+$80)

Change in S_P = +$20

c) Calculate the change in government savings and national savings.

Answer: From the definition of government savings:

$S_G = T - G$

Change in S_G = Change in taxes —Change in government spending

Change in S_G = +$100 - $80

Change in S_G = +$100

Therefore, the change in national savings is:

Change in S = Change in S_P + Change in S_G = -$80

d) What will happen to the current account as a result of this policy?

Answer: From the current account identity:

CA = S - I

Change in CA = Change in S - Change in I

Change in CA = +$80 - $0

Change in CA = +$80

e) How would your previous answers change if we assume Ricardian equivalence?

Answer: According to Ricardian equivalence, when households observe the tax cut, they will increase in their savings by more than the increase given in (b). From this theory, we

assume that households will adjust their consumption/savings decisions to offset the effects of changes in taxes. Specifically, households will respond by saving the entire tax cut (rather than spending a portion on consumption), leaving consumption unchanged. This implies that national savings (= Y - C - G), and therefore the current account, would not be affected by the tax cut.

2. Evaluate the validity of each of the following statements. You should support your answer with relevant definitions/equations.

a) When there are no domestic taxes in an open economy, GNI is equal to GNDI.

Answer: False. A country can still receive or give unilateral transfers, even if it has no domestic taxes:

$$GNI = GNE + TB + NFIA$$

$$GNDI = GNE + TB + NFIA + NUT$$

b) When the government runs a budget deficit, the current account must also be in deficit.

Answer: False. Combining the current account identity with the definition of savings:

$$CA = S_P + S_G - I$$

Note that even if $S_G < 0$, if private savings are high enough (relative to investment), then it is possible for the country to have a current account surplus.

c) In a closed economy, GNE is equal to GNI.

Answer: True. From the GNI identity:

$$GNI = C + I + G + TB + NFIA$$

In a closed economy, CA = 0 = TB = NFIA = NUT. Therefore:

$$GNI = C + I + G = GNE$$

d) In an open economy, if there is no NFIA, then GNE is equal to GNI.

Answer: False. From the GNI identity:

$$GNI = C + I + G + TB + NFIA$$

If NFIA = 0:

GNI = GNE + TB. GNE (unless TB = 0)

e) In an open economy with no taxes, government saving is equal to private saving.

Answer: False. The definitions of private and government savings are:

$S_P = Y - T - C$

$S_G = T - G$

If $T = 0$, then:

$S_P = Y - C$

$S_G = - G \neq SP$

f) In a closed economy, domestic saving is equal to domestic investment.

Answer: True. From the current account identity:

$CA = S - I$

In the closed economy, $CA = 0$:

$S = I$

g) In an open economy, if the economy has a current account surplus, this implies that domestic savings exceeds domestic investment.

Answer: True. From the current account identity:

$CA = S - I$

If $CA > 0$:

$CA = S - I > 0$

Therefore, $S > I$.

3. Consider the economy of Aureus. In Aureus, domestic investment is $300 million and its residents earned $10 million in capital gains during 2006. Residents of Aureus purchased $150 million in new foreign assets during the year and foreigners purchased $120 million in Aureus assets. Assume the valuation effects total $1 million in capital gains.

a) Calculate the change in domestic wealth in Aureus. Note, we need to assume a value for the capital account. We will assume KA = 0 in the transactions below.

Answer: The change in domestic wealth is the sum of additions to the capital stock plus capital gains earned on domestic assets:

Change domestic wealth = I + Capital gains on K = $300 + $10 = $310 million

b) Calculate the change in external wealth for Aureus.

Answer: The change in external wealth is:

W = Valuation effects + (- FA) = $1 - ($120 - $150) = $31 million

c) Calculate the total change in wealth for Aureus.

Answer: The change in total wealth is:

Change total wealth = Change domestic wealth + Change in external wealth = $310 + ($31) = $341 million

d) Calculate domestic savings for Aureus.

Answer: To calculate national savings, note the change in total wealth is:

Change total wealth = S + KA + Capital gains on K + Capital gains on (A - L)

$341 = S + $0 + ($10 + $1)

S = $330 million

e) Calculate Aureus' current account. Is the CA in deficit or surplus?

Answer: Using the current account identity: S = I + CA:

S = I + CA

$330 = $300 + CA

CA = $30 million (surplus)

Or, we could use the definition of the change in total wealth:

Change total wealth *= I + (CA + KA*) + Capital gains on *K* + Capital gains on *(A - L)*

$341 = $300 + CA + $0 + $10 + $1

CA = $30 million

f) Explain the intuition for the CA deficit/surplus in terms of savings in Aureus, financial flows, and its domestic/external wealth position.

Answer: Aureus experienced a $310 million increase in its domestic wealth while gaining $31 million in external wealth. $330 million of this increase in domestic wealth was financed through domestic savings, plus wealth grew because of capital gains on the existing stock of

wealth ($10). This leaves $30 million excess of savings that can be used to loan out to foreigners (through purchasing foreign assets). That way Aureus is able to finance growth in both domestic and external wealth. This is reflected in the current account surplus, identifying Aureus' position as a net lender. Aureusites are thrifty, with relatively high income (GNE < GNI), allowing them to run a CA surplus and loan to foreign entities abroad ($\Delta W > 0$).

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Topic: Foreign Exchange Market

Review/Practice Questions & Answers

1. Use the table below to answer the following questions ($ refers to the US$):

Country (currency)	Currency Symbol	Exchange Rates on June 30, 2010 (1) Per $	(2) Per £	(3) Per €	Exchange Rates on June 30, 2009 one year previous (4) Per $	(5) Per £	(6) Per €
Canada (dollar)	C$	1.063	1.59	1.302	1.161	1.913	1.629
Denmark (krone)	DKr	6.081	9.098	7.449	5.309	8.743	7.447
Euro (euro)	€	0.816	1.221	—	0.713	1.174	—
Japan (yen)	¥	88.49	132.39	108.39	96.49	158.9	135.34
Norway (krone)	NKr	6.503	9.729	7.966	6.437	10.6	9.028
Sweden (krona)	SKr	7.782	11.643	9.532	7.748	12.76	10.868
Switzerland (franc)	SFr	1.078	1.613	1.321	1.088	1.791	1.536
United Kingdom (pound)	£	0.668	—	0.819	0.607	—	0.852
United States (dollar)	$	—	1.496	1.225	—	1.647	1.403

a. Calculate the U. S. dollar–Swiss franc exchange rate, $E_{\$/franc}$, and the U. S. dollar–British pound exchange rate, $E_{\$/£}$ as of June 30, 2010.

Answer:

$E^{09}_{\$/franc} = 1/(1.088) = \$0.919$; while $E^{10}_{\$/franc} = 1/(1.078) = \$0.928$; such that E increases in 2010 from 2009 implying a depreciation of the U$

$E^{09}_{\$/£} = 1/(0.607) = \$1.647$; while $E^{10}_{\$/£} = 1/(0.668) = \$1.497$; such that E falls in 2010 from 2009 implying an appreciation of the U$

b. What has happened to the value of the U. S. dollar relative to the Swiss franc and the British pound between 2009 and 2010? Calculate the percentage change in the value of the U. S. dollar relative to each currency using the U. S. dollar–foreign currency exchange rates you calculated in (a).

Answer: Between those two years, the value of the U. S. dollar depreciated against the Swiss franc and appreciated against the British pound. The percentage of appreciation/depreciation in each currency relative to the dollar is given by the following:.

$\%\Delta E_{\$/franc}$ = ($0. 928 - $0. 919) / $0.9191 = 0. 0093 = 0. 93% appreciation in the franc vis-à-vis the dollar, because in 2009 you needed SFr1.088 to buy US$1, while in 2010 you needed fewer SFr1.078 to buy US$1

$\%\Delta E_{\$/£}$ = ($1. 497 - $1. 647) / $1. 647 = – 0. 0913 = 9. 13% depreciation in the pound vis-à-vis the US dollar, because in 2009 you needed only £0.607 to buy US$1, while in 2010 you needed more £0.668 to buy US$1

c. Using the information in the table for the most recent year, calculate the Japanese yen–Norwegian krone exchange rate.

Answer:

2010: $E_{¥/\$}$ = (88. 49¥/$) / (6. 503krone/$) = 13. 61 ¥/ per krone; meaning you need ¥13. 61 to buy NKr1.

2. Suppose that the U. S. dollar has appreciated relative to the Chinese yuan and depreciated relative to the Mexican peso. What has happened to the value of the dollar based on the effective exchange rate? How is your answer based on the relative importance of U. S. trade with China and Mexico? Explain.

Answer: When the dollar depreciates against one currency (peso) and appreciates relative to another (yuan), the effective exchange rate weights the percentage change in the exchange rates according to how much the U. S. trades with each country. Because the United States trades more with Mexico than with China (Mexico is the United States' second-largest trading partner after Canada), the depreciation will receive greater weight. Therefore, looking at the effective exchange rate, the U. S. dollar has depreciated against a basket that includes the peso and the yuan.

3. In Munich at Bierfest a bratwurst costs 5 euros; a hot dog costs $4 at Canada Wonderland park. At an exchange rate of $1.05/per euro, what is the price a baratwurst in terms of a hot dog? All else equal, how does this relative price change if the dollar depreciates $1.25 per euro? Compared with the initial situation, has a hot dog become more or less expensive relative to a bratwurst?

Answer: At an exchange rate of 1.05 $ per euro, a 5 euro bratwurst costs 1.05$/euro × 5 euros = $5.25. Thus, the bratwurst in Munich is $1.25 more expensive than the hot dog

at Canada Wonderland. The relative price is $5.25/$4 = 1.31. A bratwurst costs 1.31 hot dogs. If the dollar depreciates to 1.25$/euro, the bratwurst now costs 1.25$/euro × 5 euros = $6.25, for a relative price of $6.25/$4 = 1.56. You have to give up 1.56 hot dogs to buy a bratwurst. Hot dogs have become relatively cheaper than bratwurst after the depreciation of the dollar.

4. A CAN dollar costs 7.5 Norwegian kroner, but the same dollar can be purchased for 1.25 Swiss francs. What is the Norwegian krone/Swiss franc exchange rate?

Answer: E(NOK/CHF) = E(NOK/CAN D)/E(CHF/CAN D) = 7.5/1.25 = 6 NOK/CHF

5. Petroleum is old in a world market and tends to be priced in US dollars. The Nippon Steel Chemical Group of Japan must import petroleum to use in manufacturing plastics and other products. How are its profits affected when the yen depreciates against the dollar?

Answer: When the yen depreciates vs. the dollar, its costs go up. This depresses its profits. On the other hand, if it exports products to the United States, it can increase the yen price (without changing the dollar price) so there may be some offsetting effects. But, by and large, a firm that has substantial imported input costs does not relish a depreciating home currency.

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Topic: Foreign Exchange and Asset Market Interactions

Review/Practice Questions & Answers

1. Calculate the dollar rates of return on the following assets:

a) A painting whose price rises from $200,000 to $250,000 in a year.

Answer: ($250,000 - $200,000)/$200,000 = 0.25.

b) A bottle of a rare Burgundy, Domaine de la Romanee-Conti 1978, whose price rises from $255 to 275 between 2013 to 2014.

Answer: ($275 - $255)/$255 = 0.08.

c) A £10,000 deposit in a London bank in a year when the interest rate on pounds is 10% and the $/£ exchange rate moves from $1.50 per pound to $1.38 per pound.

Answer: There are two parts to this return. One is the loss involved due to the appreciation of the dollar; the dollar appreciation is ($1.38 - $1.50)/$1.50 = -0.08. The other part of the return is the interest paid by the London bank on the deposit, 10 percent. (The

size of the deposit is immaterial to the calculation of the rate of return.) In terms of dollars, the realized return on the London deposit is thus 2 percent per year.

2. What would be the real rates of return on the assets in the preceding question if the price changes described were accompanied by a simultaneous 105 increase in all dollar prices? Recalculate parts (a), (b) and (c).

Answer: Note here that the ordering of the returns of the three assets is the same whether we calculate real or nominal returns.

a) The real return on the house would be 25% - 10% = 15%. This return could also be calculated by first finding the portion of the $50,000 nominal increase in the house's price due to inflation ($20,000), then finding the portion of the nominal increase due to real appreciation ($30,000), and finally finding the appropriate real rate of return ($30,000/$200,000 = 0.15).
b) Again, subtracting the inflation rate from the nominal return, we get 8% - 10% = -2%.
c) 2% - 10% = -8%.

3. Explain how triangular arbitrage works. Why is this important for vehicle currencies in global markets?

Answer: A triangular trade occurs in the following way. First, the arbitrager buys one currency, A. Then she sells A for another currency, B. Finally, she sells B for a third currency, C. The vast majority of currency pairs are exchanged through a third currency. This is because some foreign exchange transactions are relatively rare, which makes it more difficult to exchange currency directly. When a third currency is used in these types of transactions, it is known as a vehicle currency.

4. In June 2006, a Korean investor is considering investing in bank deposits in Korea and Japan. The annual interest rate on Korean deposits is 6.25%, versus 3.75% on deposits in Japan. Suppose that the forward rate in June 2006 is equal to $F_{won/¥} = 8.20$. In June 2006, the expected exchange rate is 8.2 won/¥. For the remainder of this question, please use the linear approximations for uncovered and covered interest rate parity. The spot exchange rate in June 2006 is $E_{won/¥} = 8$.

a. Does covered interest parity hold in this example? If so, how do you know? Calculate the expected return in Japanese deposits (denominated in Korean won) in this case.

Answer:

CIP: $i_{won} = i_{¥} + (F_{won/¥} - E_{won/¥}) / E_{won/¥}$

Return on Korean deposits: $i_{won} = 6.25\%$

Return on Japanese deposit (in won, covered by forward contract):

$i_{¥} + (F_{won/¥} - E_{won/¥}) / E_{won/¥} = 3.75\% + (8.2 - 8) / 8 = 3.75\% + 2.50\% = 6.25\%$

Yes, CIP does hold because the return on a Korean deposit is equal to the return on the Japanese yen deposit (covered by a forward contract).

b. Does uncovered interest parity hold in this example? If so, how do you know? If not, what is the implied risk premium? Which deposits pay a higher expected return? Calculate the return on Japanese deposits (denominated in Korean won) in this case.

Answer:

UIP: $i_{won} = i_{¥} + (E^{e}_{won/¥} - E_{won/¥}) / E_{won/¥}\, i_{won} = 6.25\%$

Expected return on Japanese deposit (in won, not covered by forward contract):

$i_{¥} + (E^{e}_{won/¥} - E_{won/¥}) / E_{won/¥} = 3.75\% + (8.25 - 8) / 8 = 3.75\% + 3.125\% = 6.875\%$

UIP does not hold in this case because the expected returns are not equal.

c. Suppose the exchange rate in June 2007 is equal to 7.472 won per yen. Calculate the Korean investor's actual return, assuming that he invests in Japanese deposits in June 2006. How do these answers compare with those from (b)?

Answer: We know what happened to the won. It appreciated by (7.472 - 8)/8 = 6.6% against the yen. Actual return on Japanese deposit:

$i_{¥} + (E^{2007}_{won/¥} - E^{2006}_{won/¥}) / E^{2006}_{won/¥} = 3.75\% + (-6.\ 6\%) = -2.85\%$

If an investor left his deposits in the Japanese bank for the whole year, he would have earned a loss.

d. Consider two Korean investors: one uses speculation and the other uses hedging. Based on your previous answers, which one earned a higher return (or smaller loss) on Japanese assets between June 2006 and 2007? Explain briefly why.

Answer: Although investors expected a depreciation back in June 2006, the won actually appreciated against the yen between June 2006 and June 2007. Therefore, speculators who bet on the won depreciation will lose. The investors who hedged against the depreciation in the won will earn higher returns (or earn relatively smaller losses).

5. Consider an investor seeking to invest in France. Using the UIP condition (allowing for risk), explain how each of the following would affect the value of the euro and U. S. dollar.

a. A decrease in U. S. interest rates.

Answer: $i_{\$}$ decreases → return on $ deposits decreases → $ depreciates, € appreciates, $E_{\$/€}$ increases

b. A decrease in France's interest rates.

Answer: $i_{€}$ decreases → return on € deposits decreases → $ appreciates, € depreciates, $E_{\$/€}$ decreases

c. A decrease in the expected future exchange rate, $E^{e}_{\$/€}$

Answer: $E^{e}_{\$/€}$ decreases → return on € deposits increases → $ appreciates, € depreciates, $E_{\$/€}$ decreases

6. Consider the different interest rate parity conditions. Why might the exchange rate used in forward contracts differ from the current spot rate? Why might the forward rate differ from the future spot rate expected by investors? Explain.

Answer: According to CIP, the difference between the forward rate and the current spot rate reflects differences in interest rates over time. Because investors can easily arbitrage away these differences without risk, the CIP holds, but this does not imply that forward rates and spot rates are equal.

If UIP and CIP hold, then $F_{\$/£} = E^{e}_{\$/£}$.

Therefore, we would expect that the forward rate and expected future spot rate are equal. If they differ, this would reflect errors in investors' forecasts. It is worth noting, however, that UIP involves risky arbitrage—investors are trading on their forecasts expected exchange rates, without the cover of a forward contract.

7. Suppose the dollar interest rate and the pound sterling interest rate are the same, 5% per year. What is the relation between the current equilibrium $/£ exchange rate and its expected future level? Suppose the expected future $/£ exchange rate, $1.52 per pound, remains constant as Britain's intrest rate rises to 10% per year. If the Canadian interest also remains contant, what is the new equilibrium $/£ exchange rate?

Answer: The current equilibrium exchange rate must equal its expected future level since, with equality of nominal interest rates, there can be no expected increase or decrease in the dollar/pound exchange rate in equilibrium. If the expected exchange rate remains at $1.52 per pound and the pound interest rate rises to 10 percent (5 percent higher than Canadian interest rates), then interest parity is satisfied only if the current exchange rate changes such that there is an expected appreciation of the dollar equal to 5 percent. This

will occur when the exchange rate rises to $1.60 per pound (a depreciation of the dollar against the pound).

8. Suppose the dollar exchange rates of the euro and the yen are equally variable. The euro, however, tends to depreciate unexpectedly against the dollar when the return on the rest of your wealth is unexpectedly high, while the yen tends to appreciate unexpectedly in the same circumstances. As a Canadian resident, which currency, the euro or the yen, would you consider riskier?

Answer: The euro is less risky for you. When the rest of your wealth falls, the euro tends to appreciate, cushioning your losses by giving you a relatively high payoff in terms of dollars. Losses on your euro assets, on the other hand, tend to occur when they are least painful, that is, when the rest of your wealth is unexpectedly high. Holding the euro therefore reduces the variability of your total wealth.

9. In October 1979, the U.S. central bank (the U.S. Fed) announced it would play a less active role in limiting fluctuations in dollar interest rates. After this new policy was put into effect, the U.S. dollar's exchange rate against foreign currencies became more volatile. Does the analysis of the foreing exchange rate market suggest any connection between these events?

Answer: The interest rate parity condition tells us that interest rates and exchange rates are directly linked.

As interest rates become more volatile, so too will exchange rates. For example, suppose that the European Central Bank actively limits fluctuations in euro interest rates while the Federal Reserve does not intervene to keep dollar interest rates stable. Interest rate parity states that:

$$R_{\text{US}} - R_{\text{EU}} = (E^{e}_{\$/€} - E_{\$/€})/E_{\$/€}$$

If the left-hand side of this equation becomes more volatile, then so too must the right-hand side. Assuming that expectations remain unchanged, then this increase in volatility will be reflected in higher variablility of the exchange rate.

10. Imagine that everyone in the world pays a tax of τ percent on interest earnings and on any capital gains due to exchange rate changes. How would such a tax alter the analysis of the interest parity condition? How does your answer change if the tax applies to interest earnings bu not to capital gains, which are untaxed?

Answer: A tax on interest earnings and capital gains leaves the interest parity condition the same, since all its components are multiplied by one less the tax rate to obtain after-tax returns. If capital gains are untaxed, the expected depreciation term in the interest parity

condition must be divided by 1 less the tax rate. The component of the foreign return due to capital gains is now valued more highly than interest payments because it is untaxed.

11. Suppose the one-year forward $/€ exchange rate in $1.26 per euro and the spot exchange rate is $1.2 per euro. What is the forward premium on euros (the forward discount on dollars)? What is the difference between the interest rate on one-year dollar deposits and that on one-year deposits (assuming no repayment risk)?

Answer: The forward premium can be calculated as described in the Appendix. In this case, we find the forward premium on euro to be (1.26 - 1.20)/1.20 = 0.05. The interest rate difference between one-year dollar deposits and one-year euro deposits will be 5 percent because the interest difference must equal the forward premium on euro against dollars when covered interest parity holds.

12. Multinationals generally have production plants in a number of countries. Consequently, they can move production from expensive locations to cheaper ones in response to various economic developments – a phenomenon called *outsouring* when a domestically based firm moves part of its production abroad. If the dollar depreciates, what would you expect to happen to outsourcing by Canadian companies? Explain and provide an example.

Answer: If the dollar depreciated, all else being equal, we would expect outsourcing to diminish. If, as the question states, much of the outsourcing is an attempt to move production to locations that are relatively cheaper, then Canada becomes relatively cheap when the dollar depreciates. While it may not be as cheap a destination as some other locations, at the margin, labour costs in Canada will have become relatively cheaper, making some firms choose to retain production at home. For example, we could say that the labour costs of producing a computer in Malaysia is $220 and the extra transport cost is $50, but if costs in Canada were $300, then we would expect the firm to outsource. On the other hand, if the dollar depreciated 20% against the Malaysian ringitt, the labour costs in Malaysia would now be $264 (that is, 20% higher in dollar terms, but unchanged in local currency). This, plus the transport costs makes production in Malaysia more expensive than in Canada, making outsourcing a less attractive option.

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