Exchange Rates

Chapter 14
Basics

• Definition
  – Direct (American) dollar price of foreign currency = dollars/foreign currency
  – Indirect (European) foreign currency price of domestic currency = foreign currency/dollar

• Changes in exchange rates
  – Appreciation of dollar
    Increase in value of dollar
    = decrease in dollars/foreign currency
    = increase in foreign currency/dollar
  – Depreciation of dollar (opposite)
Relative Prices

• Dollars/euro = 1.085
• Euros/dollar = 1/1.085 = 0.922
• Problem: Five star restaurant meal in Paris costs €100 and similar meal in NY costs $105. Which meal is more expensive?
  – Compare in dollars – dollar price of Paris meal
    €100 × 1.085 = $108.50
  – Compare in euros – euro price of NY meal
    $105 × 0.922 = €96.81
Relative Prices and Exchange Rates

- Prices are relatively sticky
- Exchange rates are highly volatile
- When exchange rate changes and price levels don’t, relative price changes
  - Price of US goods $P$
  - Dollar price of European goods $E/€ \times P_€$
  - Relative price of US goods
    \[ \frac{P_\$}{(E/€ \times P_€)} \]
Inflation, Relative Prices and Exchange Rates

- In countries with high inflation, prices are not sticky
- When $E_{peso} / \$ \text{ increases} $
  \[ P_{peso} < E_{peso} / \$ \times P_{\$} \]
  Peso goods are relatively cheap
- Excess demand for peso goods increases $P_{peso}$ relative to $P_{\$}$
- Domestic currency depreciation is inflationary
Foreign Exchange Market

• Participants
  – Commercial banks
    • Customer needs
    • Interbank market – quantities of $1 million or more
  – Firms
  – Non-bank financial institutions
  – Central banks
    • Intervene with purpose of influencing exchange rate
Foreign Exchange Market Characteristics

• Major market locations
  – London, Frankfort, Tokyo, Singapore, New York
  – 24 hour trading
• Daily volume of trade in 2010 was $4 trillion (GDP in 2009 was 14.3 trillion)
• Arbitrage assures prices across markets equal
• Vehicle currency
  – 85% of interbank transactions in April 2010 were in US dollars
  – Liquidity
Foreign Exchange Contracts

- **Spot** exchange rate – exchange rate set today for contemporaneous exchange (2 business days)
- **Forward** exchange rate – contract set today for future exchange – standard intervals of 30, 90, 180, and other
  - Merchants use to hedge exchange risk
    - Expect payment in yen in 90 days
    - Buy dollars to be delivered for yen in 90 days and eliminate risk of exchange rate change
Foreign Exchange Contracts (cont)

- **Foreign Exchange Swap** = spot sale combined with a forward repurchase
  - Take advantage of good interest rate on 90 day Euro asset – buy Euro’s today and simultaneously sell in 90 days
- **Future Exchange** = contract arranged by a third party for promise to deliver a standard amount of foreign currency on a standard future date
  - Primary difference from forward rate is ability to buy and sell in an organized market
- **Option** = right, but not the obligation, to buy or sell a standard amount of currency at a standard price at any time up to an expiration date
  - Put option is the right to sell foreign exchange
  - Call option is the right to buy foreign exchange
  - Use to speculate on future exchange rate changes
Nominal Returns

- E is dollars per Euro
- Nominal return (dollar values)
  - Dollar value of investment in period t+1 relative to value in period t (gross)
  - Dollar bond $1 + R$
  - $\ln(1 + R) \sim R$
  - Euro bond $[(1 + R) \times E_{t+1}] / E_t$
  - $\ln([(1 + R) \times E_{t+1}] / E_t) \sim R + (\ln E_{t+1} - \ln E_t) \sim R + (E_{t+1} - E_t) / E_t$
Real Returns

- **Real return (values in terms of purchasing power)**
  - real value of investment in period $t+1$ relative to value in period $t$ (gross)
  - Dollar bond $P_t[1 + R\$]/P_{t+1}$
  - $\ln (P_t[1 + R\$]/P_{t+1}) \sim R\$ - (P_{t+1} - P_t)/ P_t$
  - Euro bond $P_t [(1 + R\€)\times E_{t+1}]/E_tP_{t+1}$
  - $\ln (P_t [(1 + R\€)\times E_{t+1}]/E_tP_{t+1}) \sim R\€ + (E_{t+1} - E_t)/ E_t - (P_{t+1} - P_t)/ P_t$
Equilibrium in Foreign Exchange Market

Demand for assets depends on
- Nominal rates of return
- Risk
- Liquidity

Interest rate parity
- Define $E_t$ as dollars per foreign currency
  \[ R_\$ = R_\€ + \frac{(E_{t+1} - E_t)}{E_t} \]
- Let expected future exchange rate, $R_\$, and $R_\€$ be exogenous and $E_t$ be endogenous
  - Graph $R_\$ against $E_t$
  - Graph $R_\€ + \frac{(E_{t+1} - E_t)}{E_t}$ against $E_t$
Changes in Exogenous Variables

- $R_\text{\$}$ increases
- $R_\text{€}$ increases
- $E_{t+1}$ increases
Covered Interest Rate Parity

• Use the forward market
• Replace $E_{t+1}$ with $F_t$
• Covered interest rate parity

\[ R_\$ = R_€ + \frac{(F_t - E_t)}{E_t} \]