

Issues in International Finance

Exchange rates review

UW – Madison // Fall 2018

Administrative things

- ▶ PS #2 solutions posted this afternoon
- ▶ Last set of marked up slides posted this afternoon
- ▶ Practice exam and solutions posted
- ▶ Office hours (7444 Soc Sci):
 - ▶ Today (10/2) 2:30PM–3:30PM
 - ▶ Tomorrow (10/3) 5:30PM–6:30PM
 - ▶ Thursday (10/4) 9:00AM–10:00AM
- ▶ Next week: Start Ch. 16 “National and International Accounts”

Exam I: Thursday 10/4

- ▶ Exam duration is 75 minutes
- ▶ We will start on time; arrive early
- ▶ Bring
 - ▶ Calculator
 - ▶ One page of notes (8.5"x11")
 - ▶ No wireless devices or other materials
- ▶ Show your work!

Big picture

- ▶ Exam information
- ▶ Introduction to exchange rates
 - ▶ Definitions: appreciate, depreciate, multilateral fx rates
 - ▶ Exchange rate regimes: fixed, floating, somewhere in between
 - ▶ Types of fx contracts
 - ▶ Triangle arbitrage
 - ▶ Covered interest parity
 - ▶ Uncovered interest parity

Big picture

- ▶ Exchange rates in the long run: Monetary approach
 - ▶ Key assumption: Flexible prices
 - ▶ Law of one price
 - ▶ Purchasing power parity: Absolute and relative
 - ▶ Quantity theory of money: Prices depend on money supply
 - ▶ Hyperinflations
 - ▶ Real and nominal interest rates (the Fisher effect)
 - ▶ Real interest rate parity
 - ▶ Nominal anchors

- ▶ Big idea: long-run exchange rates determined by money supply

- ▶ Big idea: nominal interest rates determined by expected inflation

Big picture

- ▶ Exchange rates in the short run: Asset approach
 - ▶ Key assumption: Sticky prices
 - ▶ Long-run model (PPP) pins down expected exchange rate
 - ▶ UIP pins down short-run exchange rate
 - ▶ Sticky prices: Change in money change $M/P, i$
 - ▶ Temporary shocks vs. permanent shocks
 - ▶ Overshooting

- ▶ Big idea: short-run exchange rates determined by UIP

- ▶ Big idea: nominal interest rates determined in money market

Introduction to fx rates: Key equations

- ▶ Triangle no-arbitrage

$$E_{\$/\$} = E_{\$/\text{€}} \times E_{\text{€}/\$}$$

- ▶ Covered interest parity

$$F_{\$/\text{€}} = \frac{1 + i_{\$}}{1 + i_{\text{€}}} E_{\$/\text{€}}$$

- ▶ Uncovered interest parity

$$E_{\$/\text{€},t} = \frac{1 + i_{\text{€}}}{1 + i_{\$}} E_{\$/\text{€},t+1}^e$$

$$d_{\$/\text{€}}^e + i_{\text{€}} = i_{\$}$$

- ▶ Where the expected depreciation rate of the dollar is

$$d_{\$/\text{€}}^e = \frac{E_{\$/\text{€},t+1}^e}{E_{\$/\text{€},t}}$$

Long-run monetary approach: Key equations

- ▶ Purchasing power parity

$$P_{us} = P_{eu} \times E_{\$/\text{€}}$$

$$\pi_{us} - \pi_{eu} = d_{\$/\text{€}}$$

- ▶ Money market equilibrium → price level

$$P = \frac{M}{L(i)Y}$$

- ▶ Expressed in changes → inflation rate

$$\pi_{us} = \mu_{us} - g_{us} - \lambda_{us}$$

Long-run monetary approach: Relationships

- ▶ Assumptions: flexible prices, no-arbitrage

	Levels	Expected change
Fx rate	$E_{H/F} = \frac{P_H}{P_F}$	$d_{H/F}^e = \pi_H^e - \pi_F^e$
Price	$P_H = \frac{M_H}{L(i_H)Y_H}$	$d_{H/F}^e = \mu_H^e - g_H^e - \lambda_H$
Nominal interest rate	$i_H = r^* + \pi_H^e$	

- ▶ Similar equations hold for foreign country
- ▶ Shocks: changes in $M_H, M_F, Y_H, Y_F, \mu_H, \mu_F, g_H, g_F$

Long-run monetary approach: Expectations

- ▶ Flexible prices: real variables are unaffected by changes in money
- ▶ Unstable expectations create unstable exchange rates and interest rates
- ▶ **Expectation management** is important for policy makers
- ▶ Nominal anchors help to coordinate expectations
 - ▶ Exchange rate target: $\pi_H = d_{H/F} + \pi_F$
 - ▶ Money supply target: $\pi_H = \mu_H - g_H - \lambda_H$
 - ▶ Inflation target: $\pi_H^e = i_H - r^*$

Short-run asset approach: Key equations

- ▶ Bring together long-run and short-run models
- ▶ Long run: Purchasing power parity

$$E_{H/F}^e = \frac{P_H^e}{P_F^e}$$

- ▶ Long run: Quantity theory with flexible prices (in expected value)

$$P_F^e = \frac{M_F^e}{L_F(i_F^e) Y_F^e}$$

$$P_F^e = \frac{M_F^e}{L_F(i_F^e) Y_F^e}$$

Short-run asset approach: Key equations

- ▶ Bring together long-run and short-run models
- ▶ Short run: UIP

$$i_H = i_F + \frac{E_{H/F}^e}{E_{H/F}} - 1$$

- ▶ Short run: Quantity theory with fixed prices

$$\bar{P}_F = \frac{M_F}{L_F(i_F)Y_F}$$

$$\bar{P}_F = \frac{M_F}{L_F(i_F)Y_F}$$

Short-run approach: Relationships

- ▶ Assumption: Long run = monetary approach in levels
- ▶ Assumption: Prices are sticky, but expectations adjust instantly
- ▶ Assumption: Over time, prices gradually adjust to long-run level

	Short run	Long run
Fx rate	$E_{H/F} = \frac{E_{H/F}^e}{1+i_H-i_F}$	$E_{H/F} = \frac{P_H}{P_F}$
Price	fixed	$P_H = \frac{M_H}{Y_{HL}(i_H)}$
Nominal interest rate	$\frac{M_H}{P_H} = Y_{HL}(i_H)$	

- ▶ Similar equations hold for foreign country
- ▶ Shocks: changes in M_H, M_F, Y_H, Y_F both temporary and permanent

Short-run approach

- ▶ Sticky prices: fx rates more volatile than prices
- ▶ Permanent shocks create fx rate overshooting