

Lecture 3 Exchange Rates and Foreign Exchange Market

Fei Tan

Department of Economics
Chaifetz School of Business
Saint Louis University

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What Is Exchange Rate?

- ▶ A rate at which one currency exchanges for another
 - ▶ how much yen is one dollar? ($\text{¥}97.385/\text{\$}$)
⇒ **price** of domestic currency in foreign currency
 - ▶ how much dollar is one yen? ($\text{\$}0.01027/\text{¥}$)
⇒ **price** of foreign currency in domestic currency
- ▶ Why is it important
 - ▶ comparing prices of goods/services produced in different countries becomes easy
 - ▶ $\text{\$}22,000$ Ford v.s. $\text{¥}2,500,000$ Nissan
 - ▶ $\text{¥}2,500,000 = \text{\$}2,500,000 \times 0.01027$

Exchange Rate Quotations

CURRENCIES

		DOLLAR		EURO		POUND				DOLLAR		EURO		POUND	
		Closing	Day's	Closing	Day's	Closing	Day's			Closing	Day's	Closing	Day's	Closing	Day's
Jan 19	Currency	Mid	Change	Mid	Change	Mid	Change	Jan 19	Currency	Mid	Change	Mid	Change	Mid	Change
Argentina	Argentine Peso	15.9795	0.0015	16.9567	-0.1293	19.6613	-0.0603	Indonesia	Indonesian Rupiah	13373.5000	31.0000	14191.3620	-76.4156	16454.8381	-13.7391
Australia	Australian Dollar	1.3250	0.0031	1.4061	-0.0076	1.6303	-0.0014	Israel	Israeli Shekel	3.8222	0.0157	4.0559	-0.0145	4.7029	0.0045
Bahrain	Bahraini Dinar	0.3771	0.0000	0.4001	-0.0030	0.4639	-0.0014	Japan	Japanese Yen	115.2950	2.0200	122.3458	1.2155	141.8596	2.0450
Bolivia	Bolivian Boliviano	6.9300	-	7.3538	-0.0568	8.5267	-0.0269	One Month		115.2949	2.0198	122.3458	1.2156	141.8596	2.0449
Brazil	Brazilian Real	3.2087	-0.0094	3.4049	-0.0363	3.9480	-0.0241	Three Month		115.2945	2.0191	122.3458	1.2156	141.8594	2.0445
Canada	Canadian Dollar	1.3327	0.0233	1.4142	0.0139	1.6398	0.0235	One Year		115.2927	2.0155	122.3459	1.2156	141.8596	2.0437
Chile	Chilean Peso	661.4250	2.0350	701.8740	-3.2428	813.8212	-0.0597	Kenya	Kenyan Shilling	103.9000	-	110.2539	-0.8512	127.8392	-0.4039
China	Chinese Yuan	6.8786	0.0424	7.2971	-0.0110	8.4610	0.0256	Kuwait	Kuwaiti Dinar	0.3054	0.0002	0.3240	-0.0023	0.3757	-0.0009
Colombia	Colombian Peso	2942.8500	7.4950	3122.8189	-16.0953	3620.9004	-2.1895	Malaysia	Malaysian Ringgit	4.4490	0.0045	4.7211	-0.0316	5.4741	-0.0117
Costa Rica	Costa Rican Colon	553.0400	3.3600	586.8608	-0.9380	680.4637	1.9971	Mexico	Mexican Peso	21.9550	0.1729	23.2976	0.0050	27.0136	0.1280
Czech Republic	Czech Koruna	25.4634	0.1957	27.0206	0.0007	31.3303	0.1426	New Zealand	New Zealand Dollar	1.3942	0.0049	1.4795	-0.0061	1.7154	0.0007
Denmark	Danish Krone	7.0073	0.0534	7.4358	-0.0003	8.6218	0.0387	Nigeria	Nigerian Naira	304.7500	-10.0000	323.3868	-13.1902	374.9662	-13.5278
Egypt	Egyptian Pound	18.9085	0.0350	20.0648	-0.1175	23.2651	-0.0303	Norway	Norwegian Krone	8.4894	0.0389	9.0086	-0.0279	10.4454	0.0151
Hong Kong	Hong Kong Dollar	7.7569	0.0008	8.2313	-0.0626	9.5441	-0.0291	Pakistan	Pakistani Rupee	104.8050	-	111.2143	-0.8587	128.9527	-0.4075
Hungary	Hungarian Forint	290.9580	3.0774	308.7513	0.9071	357.9963	2.8673	Peru	Peruvian Nuevo Sol	3.3408	-0.0062	3.5451	-0.0340	4.1105	-0.0206
India	Indian Rupee	68.1625	0.1060	72.3309	-0.4451	83.8675	-0.1342	Philippines	Philippine Peso	49.9875	0.1900	53.0445	-0.2064	61.5049	0.0402

Rates are derived from WM Reuters Spot Rates and MorningStar (latest rates at time of production). Some values are rounded. Currency redenominated by 1000. The exchange rates printed in this table are also available at www.FT.com/marketsdata

DOLLAR					EURO					POUND					DOLLAR					EURO					POUND				
Jan 19	Currency	Closing Mid	Day's Change		Closing Mid	Day's Change		Closing Mid	Day's Change	Jan 19	Currency	Closing Mid	Day's Change		Closing Mid	Day's Change		Closing Mid	Day's Change	Jan 19	Currency	Closing Mid	Day's Change		Closing Mid	Day's Change		Closing Mid	Day's Change
	Poland Polish Zloty	4.1188	0.0378		4.3707	0.0067		5.0678	0.0306		Three Month	0.8130	0.0026		0.8623	-0.0039		-	-										
	Romania Romanian Leu	4.2381	0.0334		4.4973	0.0010		5.2146	0.0248		One Year	0.8141	0.0026		0.8616	-0.0039		-	-										
	Russia Russian Ruble	58.8644	0.5419		63.5254	0.0890		73.8575	0.4361		United States United States Dollar	-	-		1.0612	-0.0082		1.2304	-0.0039										
	Saudi Arabia Saudi Riyal	3.7505	-0.0001		3.9798	-0.0308		4.8146	-0.0147		One Month	-	-		1.0610	-0.1731		1.2305	-0.0039										
	Singapore Singapore Dollar	1.4296	0.0082		1.5170	-0.0029		1.7590	0.0046		Three Month	-	-		1.0607	-0.1731		1.2307	-0.0039										
	South Africa South African Rand	13.6088	0.1300		14.4410	0.0275		16.7443	0.1075		One Year	-	-		1.0589	-0.1732		1.2318	-0.0038										
	South Korea South Korean Won	1177.6000	10.8500		1249.6154	1.9545		1448.9259	8.8139		Venezuela Venezuelan Bolivar Fuerte	9.9950	0.0050		10.6082	-0.0765		12.2979	-0.0377										
	Sweden Swedish Krona	9.0063	0.0963		9.5571	0.0292		11.0814	0.0839		Vietnam Vietnamese Dong	22565.0000	-8.0000		23944.9840	-193.3965		27764.1271	-97.6229										
	Switzerland Swiss Franc	1.0107	0.0091		1.0725	0.0014		1.2435	0.0072		European Union Euro	0.9424	0.0072		-	-		1.1595	0.0052										
	Taiwan New Taiwan Dollar	31.5900	0.0465		33.5219	-0.2091		38.8685	-0.0654		One Month	0.9422	0.0072		-	-		1.1594	0.0053										
	Thailand Thai Baht	35.3785	0.0680		37.5420	-0.2171		43.5299	-0.0536		Three Month	0.9419	0.0072		-	-		1.1593	0.0052										
	Tunisia Tunisian Dinar	2.3061	0.0244		2.4471	0.0072		2.8374	0.0212		One Year	0.9401	0.0072		-	-		1.1587	0.0053										
	Turkey Turkish Lira	3.8317	0.0630		4.0660	0.0359		4.7145	0.0628																				
	United Arab Emirates UAE Dirham	3.6731	0.0001		3.8977	-0.0300		4.5194	-0.0142																				
	United Kingdom Pound Sterling	0.8127	0.0026		0.8624	-0.0039		-	-																				
	One Month	0.8128	0.0026		0.8624	-0.0039		-	-																				

► Source: Financial Times, January 20, 2017

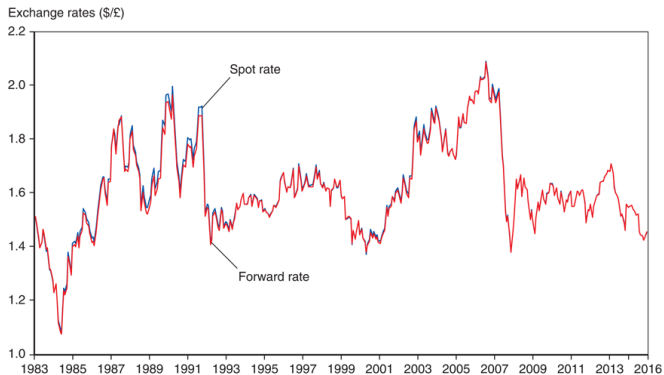
Changes in Exchange Rates

- ▶ Depreciation – decrease in value of one currency relative to another
 - ▶ $\$1/\text{€} \uparrow \$1.2/\text{€}$: dollar becomes less valuable relative to euro
 - ▶ a Nissan costs more as dollar depreciates from $\$0.01027/\text{¥}$ to $\$0.011185/\text{¥}$
 - ▶ price of exports \downarrow relative to price of imports
- ▶ Appreciation – increase in value of one currency relative to another
- ▶ domestic currency depreciates (appreciates) \Leftrightarrow foreign currency appreciates (depreciates)

Foreign Exchange Markets

- ▶ A set of markets where participants buy and sell foreign currencies
 - ▶ commercial banks (retail v.s. wholesale rates)
 - ▶ non-bank financial institutions (e.g. mutual funds)
 - ▶ non-financial businesses (e.g. corporations)
 - ▶ central banks
- ▶ **Arbitrage** \Rightarrow no significant difference in exchange rates across locations
- ▶ Other methods of currency exchange: swaps, futures, options

Spot Rate v.s. Forward Rate



- Dollar/pound spot and forward (90-day) exchange rates, 1983-2016 (source: Datastream)

The Road Ahead...

- ▶ Asset returns
- ▶ Currency returns
- ▶ Interest parity condition
- ▶ Equilibrium exchange rate

Asset Returns

- ▶ Nominal rate of return – percentage change in monetary value of an asset during a time period
 - ▶ e.g. stock price = \$100 today, dividend = \$1, stock price = \$109 next year

$$\text{nominal rate of return} = \frac{(\$109 + \$1) - \$100}{\$100} = 10\%$$

- ▶ Real rate of return – inflation-adjusted rate of return
 - ▶ *ex-ante* real rate \approx nominal rate – expected inflation
 - ▶ *ex-post* real rate \approx nominal rate – actual inflation
- ▶ Demand for assets primarily depends on rate of return
 - ▶ secondary factors: risk, liquidity, etc.

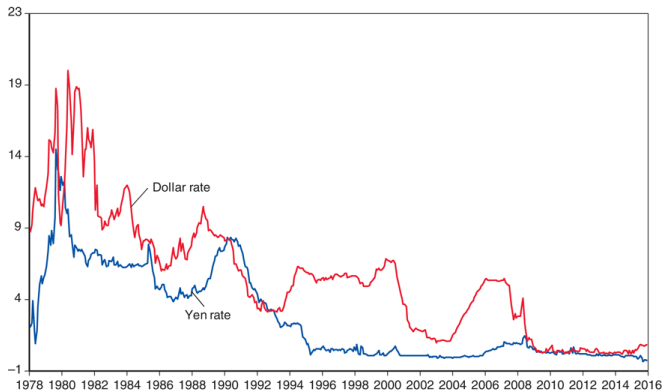
Currency Returns

- ▶ Two pieces of information needed to compare currency returns (e.g. dollar v.s. euro)
 - ▶ interest rate on each currency (\$ rate = 2%, € rate = 4%)
 - ▶ expected change in exchange rate (from \$1/€ to \$0.97/€)
- ▶ Which currency is more desirable?
 - ▶ step 1: dollar rate of return in dollar = 2%
 - ▶ step 2: euro rate of return in dollar

$$\frac{\$1}{\$1/\text{€}} \times (1 + 4\%) \times \$0.97/\text{€} - \$1 = 0.88\%$$

- ▶ step 3: $2\% > 0.88\% \Rightarrow$ hold dollar

Interest Rates on Dollar and Yen



► Annualized 3-month interest rates (source: Datastream)

Currency Returns (Cont'd)

A useful approximation

$$\text{euro return in dollar} \approx R_{\text{€}} + \underbrace{\frac{E_{\$/\text{€}}^e - E_{\$/\text{€}}}{E_{\$/\text{€}}}}_{\text{expected rate of euro appreciation}}$$

- ▶ Some notations
 - ▶ $R_{\text{€}}$ = today's euro interest rate
 - ▶ $R_{\$}$ = today's dollar interest rate
 - ▶ $E_{\$/\text{€}}$ = today's dollar/euro exchange rate
 - ▶ $E_{\$/\text{€}}^e$ = expected dollar/euro exchange rate next year
- ▶ What if we measure both returns in euro?

$$\text{dollar return in euro} \approx R_{\$} - \underbrace{\frac{E_{\$/\text{€}}^e - E_{\$/\text{€}}}{E_{\$/\text{€}}}}_{\text{expected rate of dollar depreciation}}$$

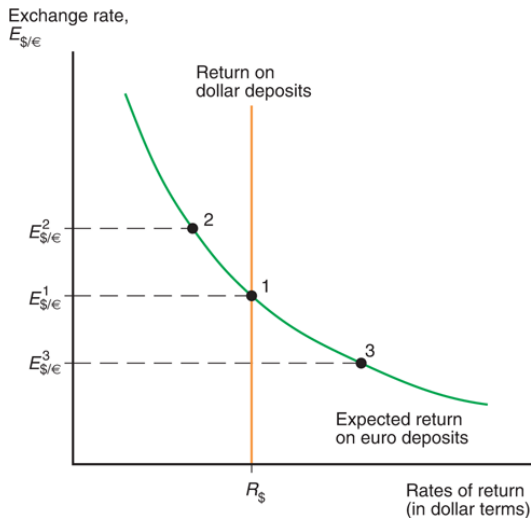
Equilibrium Exchange Rate

Interest parity condition

$$\underbrace{R_{\$}}_{\text{dollar return in dollar}} = R_{\text{€}} + \underbrace{\frac{E_{\$/\text{€}}^e - E_{\$/\text{€}}}{E_{\$/\text{€}}}}_{\text{euro return in dollar}} \quad (\text{no arbitrage})$$

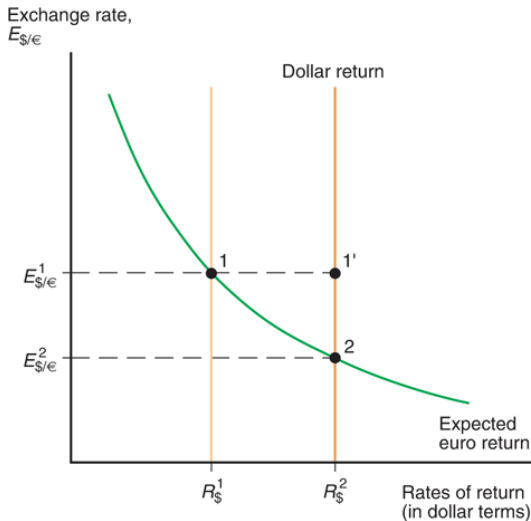
- ▶ Equilibrium happens when interest parity holds
 - ▶ suppose not, e.g. $\text{LHS} > \text{RHS}$
 - ▶ excess supply for € \Rightarrow dollar price of euro \downarrow
 - ▶ excess demand for \$ \Rightarrow euro price of dollar \uparrow
 - ▶ $E_{\$/\text{€}} \downarrow$ until $\text{LHS} = \text{RHS}$

Equilibrium Exchange Rate (Cont'd)



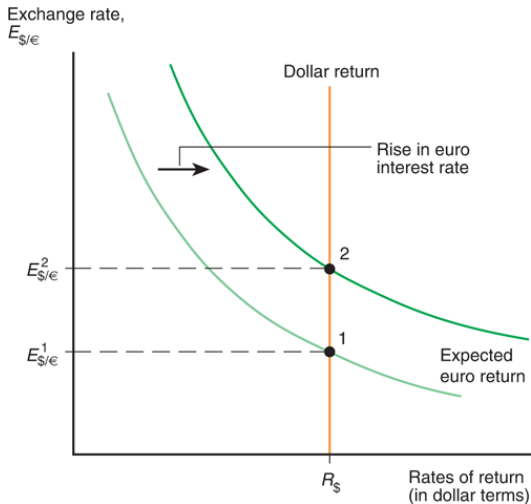
- ▶ Graphical illustration of interest parity condition
- ▶ Exogenous: $(R_{\$}, R_{\epsilon}, E_{\$/\epsilon}^e)$; endogenous: $E_{\$/\epsilon}$

Effect of Higher Dollar Rate



- ▶ Excess demand for dollar, excess supply of euro
- ▶ Dollar appreciates ($E_{\$/\epsilon} \downarrow$) to restore equilibrium

Effect of Higher Euro Rate



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Readings & Exercises

- ▶ Readings

- ▶ KOM: chapter 14

- ▶ Exercises

- ▶ KOM: problem 1, 5
 - ▶ Derive interest parity condition (in-class quiz)
 - ▶ What is effect of expected euro appreciation? Has euro actually appreciated? (self-fulfilling prophecy)