Lecture 3 Exchange Rates and Foreign Exchange Market

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January 29, 2025

The Road Ahead...

1. Introduction
2. Demand for Currency Deposits
3. Equilibrium in Foreign Exchange Market

What Is Exchange Rate?

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

Exchange Rate Quotations

CURRENCIES

		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
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	Bahrainin 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	6.8766	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 Peson	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	2.6673	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
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	59.8644	0.5419	63.5254	0.0890	73.6575	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	4.6146	-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	10.6062	-0.0765	12.2979	-0.0327
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

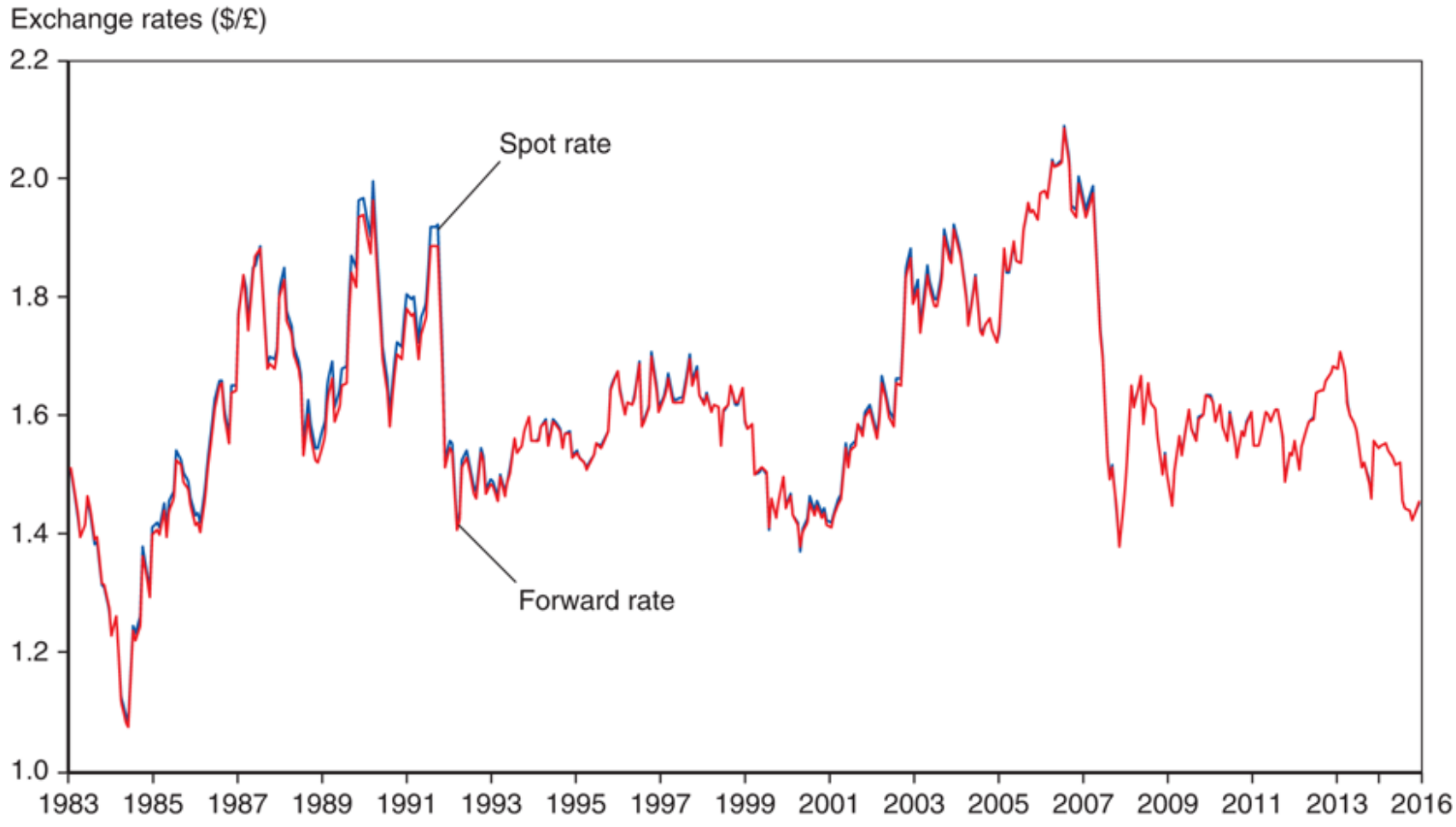
Changes in Exchange Rates

- Depreciation – decrease in value of one currency relative to another
  - \$1/€ ↑ \$1.2/€: dollar becomes less valuable relative to euro
  - a Nissan costs more as dollar depreciates from \$0.01027/¥ to \$0.011185/¥
  - price of exports ↓ relative to price of imports
- Appreciation – increase in value of one currency relative to another
- domestic currency depreciates (appreciates) ⇔ 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...

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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.

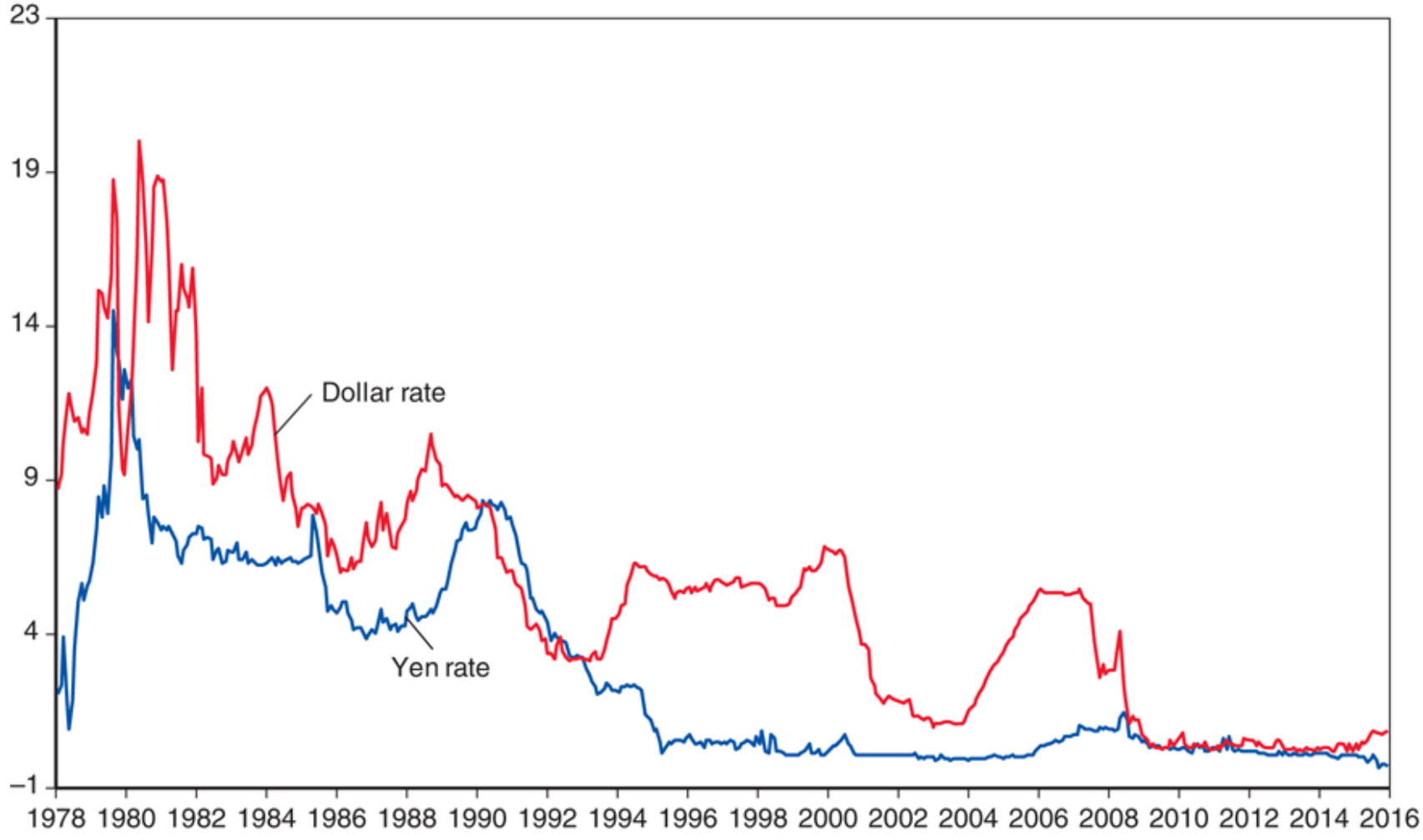
Currency Returns

- 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

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

  - 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

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

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

The Road Ahead...

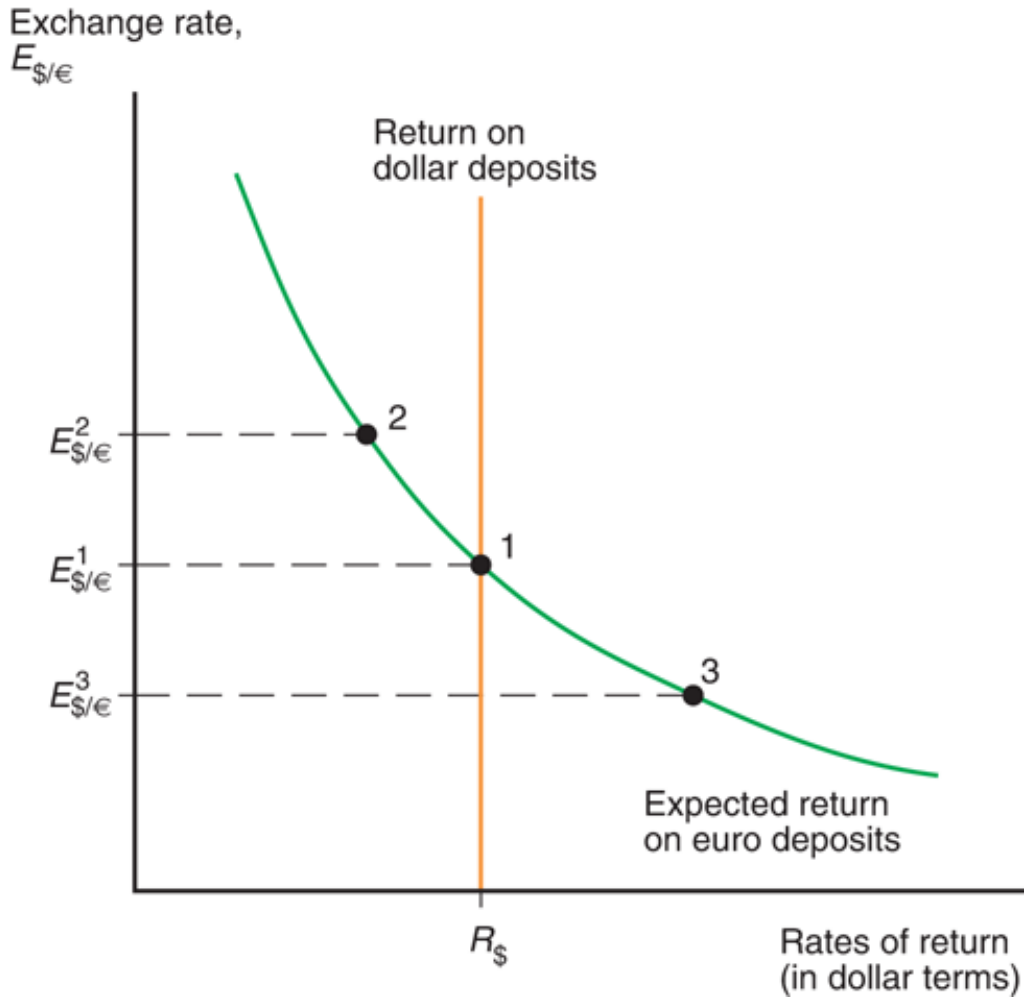
Equilibrium Exchange Rate

Interest parity condition

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

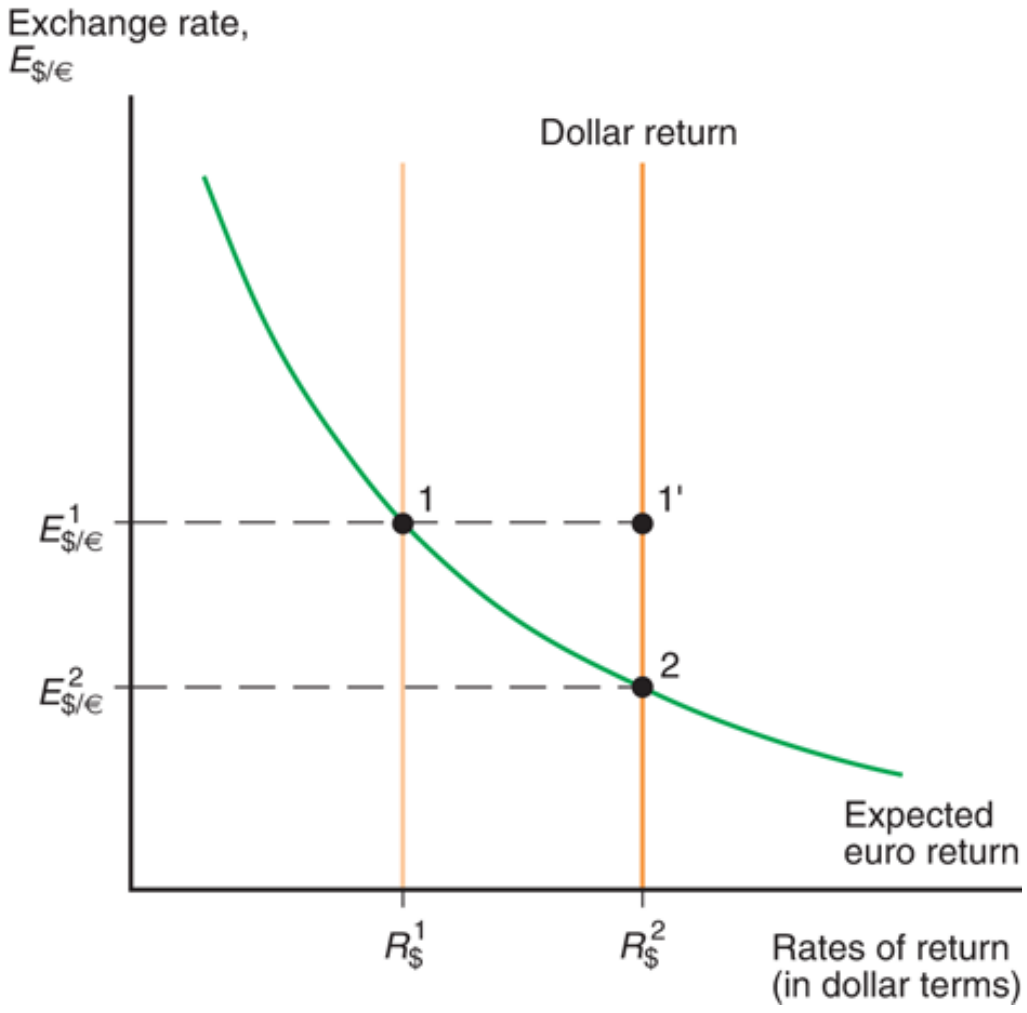
- Equilibrium happens when interest parity holds
  - suppose not, e.g. LHS $>$ RHS
  - excess supply for € $\Rightarrow$ dollar price of euro $\downarrow$
  - excess demand for \$ $\Rightarrow$ euro price of dollar $\uparrow$
  - $E_{\$/€} \downarrow$ until LHS $=$ RHS

Equilibrium Exchange Rate (Cont'd)



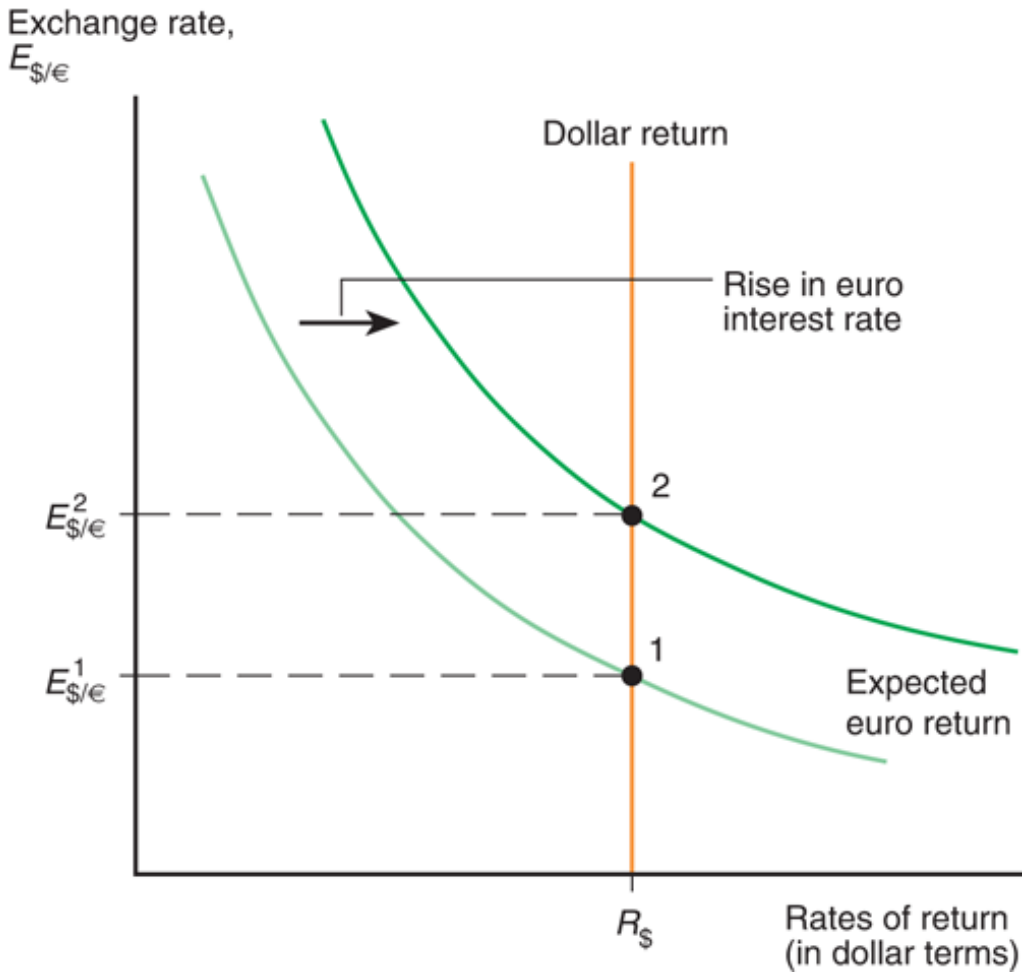
- Graphical illustration of interest parity condition
- Exogenous: $(R_\$, R_€, E^e_{\$/€})$; endogenous: $E_{\$/€}$

Effect of Higher Dollar Rate



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

Effect of Higher Euro Rate



- Excess demand for euro, excess supply of dollar
- Euro appreciates ($E_{\$/€} \uparrow$) to restore equilibrium

Readings & Exercises

- Readings
  - KOM: chapter 14
- Exercises
  - KOM: problem 1, 5
  - Derive interest parity condition
  - What is effect of expected euro appreciation? Has euro actually appreciated? (self-fulfilling prophecy)