

International Economics - B.Sc. IBP

8. Open-Economy Macroeconomics: National Accounting and Balance of Payment. Exchange Rates

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Battista Severgnini

Department of Economics-CBS



**Copenhagen
Business School**

Plan for Today

Chapter 13:

- ▶ National income accounts
- ▶ National saving, investment, and the current account

Chapter 14:

- ▶ Exchange rate
- ▶ The foreign exchange market
- ▶ The demand of currency deposits

Chapter 13: National Income Accounting and the Balance of Payments

National Income

- ▶ Definition: *income earned by factors of production of a nation*
- ▶ amount of expenditure by buyers ($C + I + G + CA$) = amount of income for sellers (F (*factors*)) = value of production (Y)

Gross National Product (GNP) (1)

GNP is the value of all final goods and services produced by a nation's factors of production.

Factors of production are:

1. human capital
2. physical capital K (better without depreciation δ (GNP adjusted))
3. natural resources
4. others (e.g. unilateral transfers (GNP adjusted))

Problem: physical capital is often constructed using the following formula $K_t = (1 - \delta) K_{t-1} + I_{t-1}$ (Burda and Severgnini, 2010)

Gross National Product (GNP) (2)

$$GNP = C + I + G + CA$$

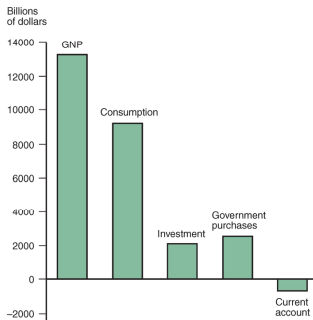
where

- ▶ C is consumption
- ▶ I is investment
- ▶ G is government purchases
- ▶ CA is current account balance (exports minus imports)

Gross National Product (GNP) (3)

$$\begin{aligned} GNP &= C + I + G + CA \\ &= C + I + G + EX - IM \end{aligned}$$

Fig. 13-1: U.S. GNP and Its Components



Gross Domestic Product (GDP) (1)

- ▶ GDP product measures the final value of all goods and services that are produced within a country in a given time period.
- ▶ $GDP = GNP - \text{payments from foreign countries for factors of production} + \text{payments to foreign countries for factors of production}$

Gross Domestic Product (GDP) (2)

$$CA = EX - IM = Y - (C + I + G)$$

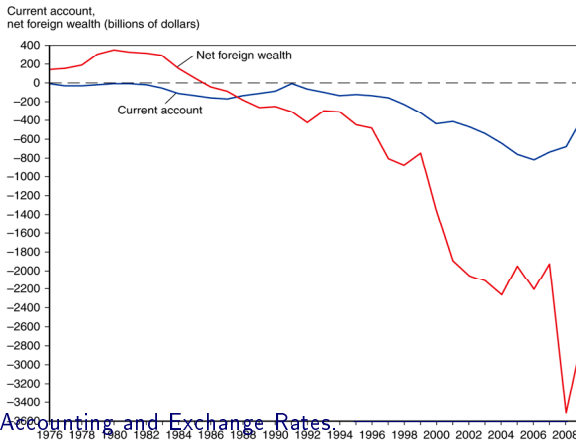
When production $>$ domestic expenditure, exports $>$ imports:
current account > 0 and trade balance > 0

- ▶ if $Y > (C + I + G) \Rightarrow EX > IM \Rightarrow CA > 0$ (surplus)
- ▶ if $Y < (C + I + G) \Rightarrow EX < IM \Rightarrow CA < 0$ (deficit)

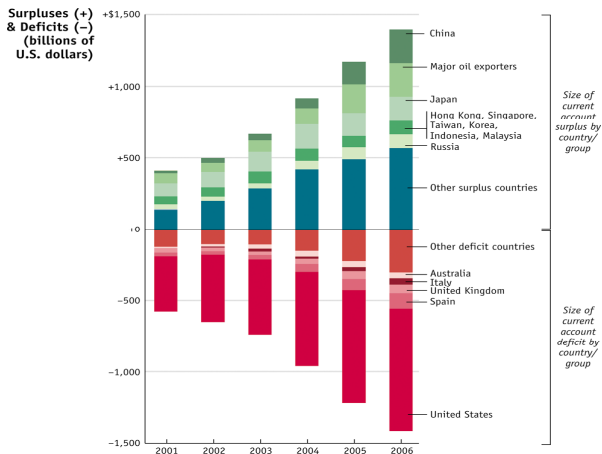
It is not possible for all countries to run deficits at the same time.

- ▶ Globally, deficits and surpluses balance.
- ▶ In recent years there have been some large surplus countries, and some large deficit countries: **global imbalances**.

Fig. 13-2: U.S. Current Account and Net Foreign Wealth, 1976-2009



Figure; Deficits and Surpluses: The Balance of Payments (Source: IMF, International Financial Statistics)



National Saving (S) and the Current Account

$$S = Y - C - G$$

$$S = (Y - C - T) + (T - G)$$

$$S = S^p + S^g$$

Current Account = National Saving Investment

$$CA = Y - (C + I + G)$$

$$CA = (Y - C - G) - -I$$

$$CA = S - I$$

or

$$S = CA + I$$

Countries can finance investment either by saving or by acquiring foreign funds equal to the current account deficit.

Current Account & National Saving

$$CA = S^P + S^G - I$$

Government deficit is negative. Government saving equal to $G - T$
A high government deficit causes a negative current account balance when other factors remain constant.

The Barro–Ricardo Equivalence (1)

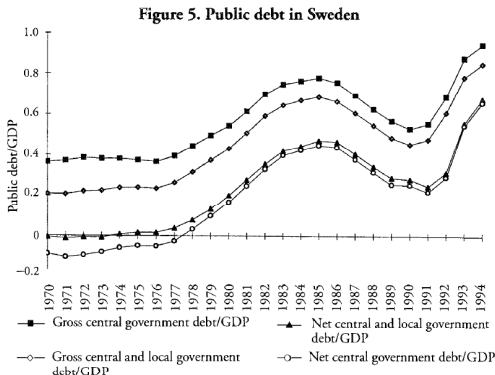
Barro (1989):

$$CA = S^P - I - (G - T)$$

$$(G - T) \uparrow \Rightarrow S^P \uparrow \Rightarrow CA \Leftrightarrow$$

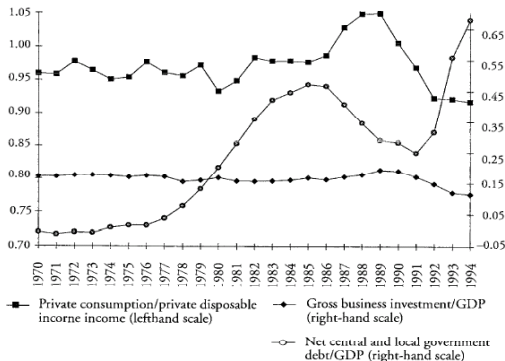
Evidence for the EU (page 335)

The Barro–Ricardo Equivalence (2): Giavazzi and Pagano (1996)



The Barro–Ricardo Equivalence (3): Giavazzi and Pagano (1996)

Figure 6. Consumption, investment and public debt in Sweden



Balance of Payments Accounts

current account + financial account + capital account = 0

1. **current account**: accounts for flows of goods and services (imports and exports)
2. **financial account**: accounts for flows of financial assets (financial capital).
3. **capital account**: flows of special categories of assets (capital): typically non-market, non-produced, or intangible assets like debt forgiveness, copyrights and trademarks.

Example (1): Import a DVD from Japan by using your Debit Card

DVD purchase (current account)	-\$30
Credit ("sale") of deposit in account by bank (financial account)	+\$30

Example (2): Invest in the Japanese stock market.

Purchase of stock (financial account)	-\$500
Credit ("sale") of deposit in account by bank (financial account)	+\$500

Example (3): Forgiving Argentinian Debt.

Purchase of stock (financial account)	-\$500
Credit ("sale") of deposit in account by bank (financial account)	+\$500

U.S. Balance of Payments Accounts for 2006 (billions of dollars)

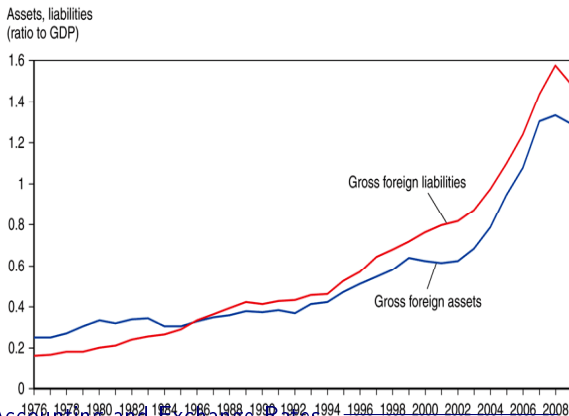
	Credits	Debits
Current Account		
(1) Exports	+2,096.2	
Of which:		
Goods	+1,023.1	
Services	+422.6	
Income receipts	+650.5	
(2) Imports		-2,818.0
Of which:		
Goods		-1,861.4
Services		-342.8
Income payments		-613.8
(3) Net unilateral current transfers		-89.6
Balance on current account		-811.5
[(1) + (2) + (3)]		
Capital Account		
(4)		-3.9

U.S. Balance of Payments Accounts for 2006 (billions of dollars)

Financial Account		
(5) U.S. assets held abroad, excluding financial derivatives		-1,055.2
(increase -)		
Of which:		
Official reserve assets	+2.4	
Other assets		-1,057.6
(6) Foreign assets held in U.S., excluding financial derivatives	+1,859.6	
(increase +)		
Of which:		
Official reserve assets	+440.3	
Other assets	+1,419.3	
(7) Financial derivatives, net	+28.8	
Balance on financial account	+833.2	
[(5) + (6) + (7)]		
Statistical discrepancy		-17.8
[sum of (1) through (7) with sign reversed]		

Source: U.S. Department of Commerce, Bureau of Economic Analysis, June 15, 2007, release. Totals may differ from sums because of rounding.

Fig. 13-3: U.S. Gross Foreign Assets and Liabilities, 1976–2009



National Accounting and Exchange Rates.

Chapter 14: Exchange Rates and the Foreign Exchange Market: An Asset Approach

Exchange Rates

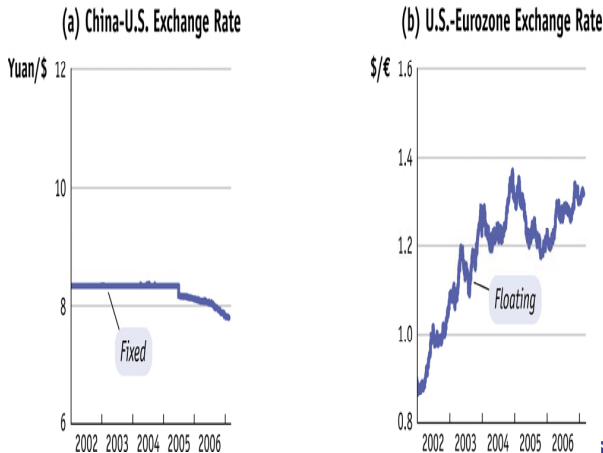
If you live in Denmark:

- ▶ **Direct:** The price of the foreign currency in terms of DKK (e.g., 7.45 DKK per Euro): $E_{DKK/EURO}$
- ▶ *Indirect* : The price of DKK in terms of the foreign currency (e.g., 0.13 Euro per 1 DKK)

Exchange rate regimes:

- ▶ *flexible*: Exchange rate is determined by the market
- ▶ *fixed*: Exchange rate is politically determined

Figure: Fixed and Floating Exchange Rate



National Accounting and Exchange Rates.

Table 14-1: Exchange Rate Quotations

Currencies

July 23, 2007

U.S.-dollar foreign-exchange rates in late New York trading

Country/currency	Mon in US\$	US\$ vs. per US\$	YTD chg (%)	Country/currency	Mon in US\$	US\$ vs. per US\$	YTD chg (%)
Americas				Europe			
Argentina peso ^a	3199	3.1260	2.2	Czech Rep. koruna ^a	.04892	20.442	-1.9
Brazil real	5427	1.8426	-13.7	Denmark krone	.1855	5.3908	-4.6
Canada dollar	9552	1.0469	-10.2	Euro area euro	1.5901	.7246	-4.3
1-mos forward	9558	1.0462	-10.2	Hungary forint	.005611	178.22	-6.4
3-mos forward	9568	1.0452	-10.1	Malta lira	3.2147	.3111	-4.3
6-mos forward	9580	1.0438	-10.0	Norway krone	.1745	5.7307	-8.1
Chile peso	.001943	514.67	-3.3	Poland zloty	.3668	2.7263	-6.1
Colombia peso	.0005224	1914.24	-14.5	Russia ruble [‡]	.03935	25.413	-3.5
Ecuador US dollar	1	1	unch	Slovak Rep koruna	.04176	23.946	-8.3
Mexico peso ^a	.0930	10.7330	-0.4	Sweden krona	.1502	6.6570	-2.7
Peru new sol	.3168	3.157	-1.2	Switzerland franc	.8285	1.2070	-1.0
Uruguay peso [‡]	.04220	23.70	-2.8	1-mos forward	.8306	1.2039	-1.0
Venezuela bolivar	.000466	2145.92	unch	3-mos forward	.8340	1.1990	-0.8
				6-mos forward	.8391	1.1918	-0.7
Asia-Pacific				Turkey lira ^a	8017	1.2473	-11.9
Australian dollar	.8827	1.1329	-10.6	UK pound	2.0578	.4860	-4.8
China yuan	.1322	7.5620	-3.1	1-mos forward	2.0568	.4862	-4.8
Hong Kong dollar	.1279	7.8215	0.6	3-mos forward	2.0547	.4867	-4.7
India rupee	.02492	40.128	-0.0	6-mos forward	2.0505	.4877	-4.5
Indonesia rupiah	.0001102	9074	0.9	Middle East/Africa			
Japan yen	.008250	121.21	1.9	Bahrain dinar	2.6526	.3770	unch
1-mos forward	.008286	120.69	1.8	Egypt pound ^a	.1763	5.6725	-0.7
3-mos forward	.008347	119.80	1.9	Israel shekel	.2302	4.1962	-0.4
6-mos forward	.008440	118.48	1.9	Jordan dinar	1.4116	.7084	-0.1
Malaysia ringgit [‡]	.2934	3.4083	-3.4	Kuwait dinar	3.4854	.2869	-0.8
New Zealand dollar	.8057	1.2412	-12.6	Lebanon pound	.0006614	1511.94	unch
Pakistan rupee	.01653	60.496	-0.5	Saudi Arabia riyal	.2666	3.7509	unch
Philippines peso	.0223	44.803	-0.6	South Africa rand	1.468	6.8120	-2.6
Singapore dollar	.6629	1.5085	-1.6	UAE dirham	.2723	3.6724	unch
South Korea won	.0010927	915.16	-1.6				
Taiwan dollar	.01048	32.806	0.7				
Thailand baht	.03350	29.851	-15.8	SDR ^{††}	1.5358	.6511	-2.0

^aFloating rate [†]Financial [‡]Government rate [‡]Russian Central Bank rate ^{**}Rebased as of Jan 1, 2005^{††}Special Drawing Rights (SDR); from the International Monetary Fund; based on exchange rates for U.S., British and Japanese currencies.

Note: Based on trading among banks of \$1 million and more, as quoted at 4 p.m. ET by Reuters.

Source: Data from "Currencies," *Wall Street Journal*, July 24, 2007, p. C5.

Depreciation and Appreciation

We are under **flexible exchange rates**:

1. **Depreciation** $E_{DKK/EURO} \uparrow$ the Euro becomes more expensive, i.e., DKK becomes less valuable.
2. **Appreciation** $E_{DKK/EURO} \downarrow$ the Euro becomes less expensive, i.e., DKK becomes more valuable.

Devaluation and Revaluation

We are under **fixed exchange rates**:

1. **Devaluation** $E_{DKK/EURO} \uparrow$ the Euro becomes more expensive, i.e., DKK becomes less valuable.
2. **Revaluation** $E_{DKK/EURO} \downarrow$ the Euro becomes less expensive, i.e., DKK becomes more valuable.

The Foreign Exchange Market

Four actors:

1. **Commercial banks and other depository institutions:** transactions involve buying/selling of deposits in different currencies for investment purposes.
2. **Non-bank financial institutions** may buy/sell foreign assets for investment.
3. **Non-financial businesses** conduct foreign currency transactions to buy/sell goods, services and assets
4. **Central banks** conduct official international reserves transactions

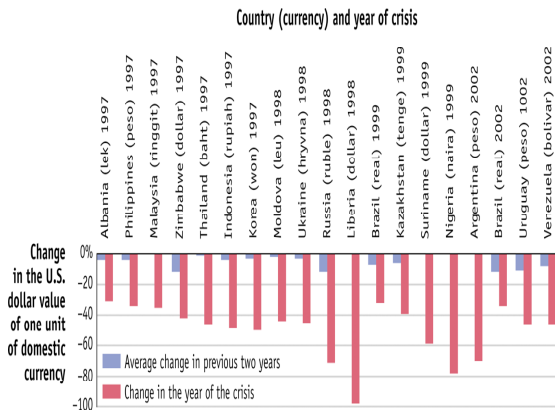
ICT and the integration of markets imply that there is no significant *arbitrage* (=buying at a low price and selling at a high price for a profit) between markets.

When Exchange Rates Misbehave (1)

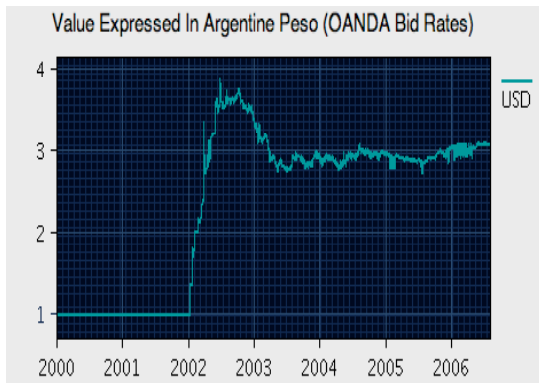
- ▶ **Exchange rate crises** occur when a currency experiences a sudden decrease in value against another currency.
 - ▷ Such crises are fairly common 19 crises 1980-2002
- ▶ Crises can have severe economic consequences.
 - ▷ Government default
 - ▷ Financial and banking collapses
 - ▷ Severe contraction in output and decline in real wages
- ▶ Politically embarrassing
 - ▷ Countries experiencing crises often seek help from international development agencies, such as the International Monetary Fund (IMF).

When Exchange Rates Misbehave (2).

Source: IMF, International Financial Statistics.



Case Study: Argentina (2001)



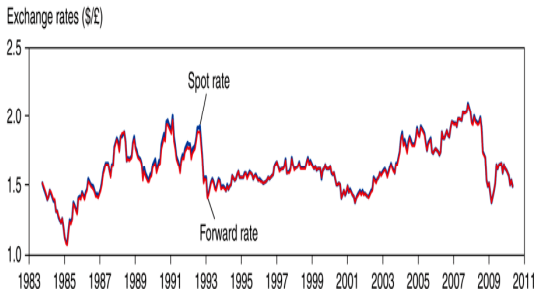
Spot and Forward Rates

- ▶ **Spot rates:** exchange rates for currency exchanges "on the spot", or when trading is executed in the present.
- ▶ **Forward rates:** may buy/sell foreign assets for investment.

Other methods:

1. Foreign exchange swaps
2. Futures contracts
3. Options contracts

Fig. 14-1: Dollar/Pound Spot and Forward Exchange Rates, 1981-2009



The Demand of Currency Deposits (1)

Factors that influence the return on assets determine the demand of those assets.

- ▶ **Rate of return:** the % change in value that an asset offers during a time period
- ▶ **Real rate of return:** inflation-adjusted rate of return
- ▶ if inflation=0 \Rightarrow rate of return=real rate of return

The Demand of Currency Deposits (2)

Example: Should we invest in a Danish bond or an Euro bond?

- ▶ 1 DKK in DK bonds $\Rightarrow (1 + R_{DKK,t})$ DKK in a year
- ▶ 1 DKK in Euro bonds: $\Rightarrow \left(\frac{1}{E_{DKK/EURO,t}} \right) (1 + R_{EURO,t})$
- ▶ at time $t + 1$: $\Rightarrow E_{DKK/EURO,t+1}^e \left(\frac{1}{E_{DKK/EURO,t}} \right) (1 + R_{EURO,t})$
- ▶ No arbitrage: the two returns have to be equal

The Uncovered Interest Parity (1)

We can rewrite the relation as:

$$(1 + R_{DKK,t}) = E_{DKK/EURO,t+1}^e \left(\frac{1}{E_{DKK/EURO,t}} \right) (1 + R_{EURO,t})$$

$$\Rightarrow$$

$$(1 + R_{DKK,t}) = (1 + R_{EURO,t}) \left(\frac{E_{DKK/EURO,t+1}^e}{E_{DKK/EURO,t}} \right)$$

Taking logs,

$$R_{DKK,t} \approx R_{EURO,t} + \left(\frac{E_{DKK/EURO,t+1}^e - E_{DKK/EURO,t}}{E_{DKK/EURO,t}} \right)$$

The Uncovered Interest Parity (2)

In other words, arbitrage ensures that the domestic interest rate equals the foreign interest rate plus the expected percentage depreciation of the domestic currency.

$$\blacktriangleright E_{DKK/EURO,t+1}^e = E_{DKK/EURO,t} \Rightarrow R_{DKK,t} = R_{EURO,t}$$

Table 14-3: Comparing Dollar Rates of Return on Dollar and Euro Deposits

Case	Dollar Interest Rate	Euro Interest Rate	Expected Rate of Dollar Depreciation Against Euro	Rate of Return Difference Between Dollar and Euro Deposits
	$R_{\$}$	R_{ϵ}	$\frac{E_{\$/\epsilon}^e - E_{\$/\epsilon}}{E_{\$/\epsilon}}$	$R_{\$} - R_{\epsilon} - \frac{(E_{\$/\epsilon}^e - E_{\$/\epsilon})}{E_{\$/\epsilon}}$
1	0.10	0.06	0.00	0.04
2	0.10	0.06	0.04	0.00
3	0.10	0.06	0.08	-0.04
4	0.10	0.12	-0.04	0.02

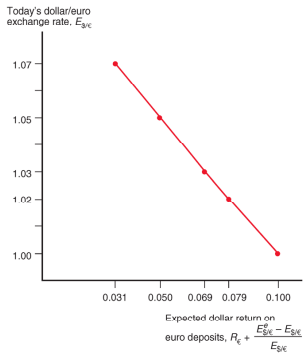
Equilibrium in the Foreign Exchange Market

The Equilibrium Exchange Rate

- ▶ Exchange rates always adjust to maintain interest parity.
- ▶ Assume that the DKK interest rate R_{DKK} , the Euro interest rate R_{EURO} , and the expected future DKK/EURO exchange rate E_e , are all given

Table 14-4:

Today's Dollar/Euro Exchange Rate	Interest Rate on Euro Deposits	Expected Dollar Depreciation Rate Against Euro	Expected Dollar Return on Euro Deposits
$E_{\$/\epsilon}$	R_{ϵ}	$\frac{1.05 - E_{\$/\epsilon}}{E_{\$/\epsilon}}$	$R_{\epsilon} + \frac{1.05 - E_{\$/\epsilon}}{E_{\$/\epsilon}}$
1.07	0.05	-0.019	0.031
1.05	0.05	0.00	0.05
1.03	0.05	0.019	0.069
1.02	0.05	0.029	0.079
1.00	0.05	0.05	0.10

Fig. 14-3

The Current Exchange Rate and the Expected Rate of Return on Dollar Deposits

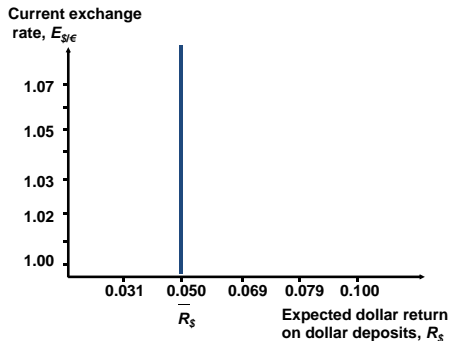
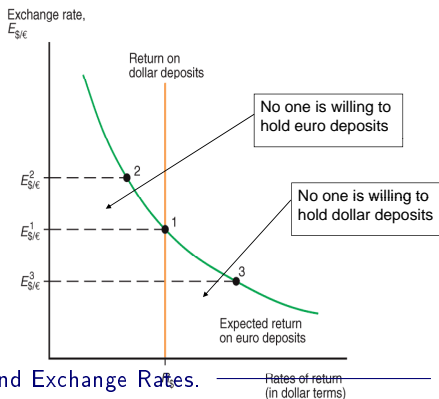


Fig. 14-4: Determination of the Equilibrium Dollar/Euro Exchange Rate

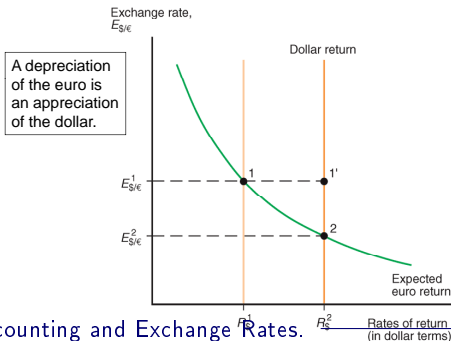


Model of Foreign Exchange Markets

The effects of changing interest rates:

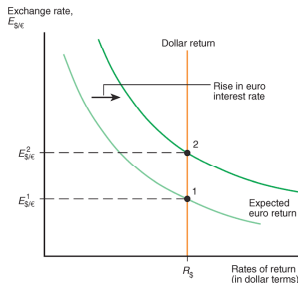
- ▶ an increase in the interest rate paid on deposits denominated in a particular currency will increase the rate of return on those deposits.
- ▶ this leads to an appreciation of the currency.

Fig. 13-5: Effect of a Rise in the Dollar Interest Rate



National Accounting and Exchange Rates.

The Effect of an Expected Appreciation of the Euro



National Accounting and Exchange Rates.

Suggested Articles



Barro, R.

The Ricardian approach to budget deficits,
[The Journal of Economic Perspectives 3 \(2\)., 1989](#)



Burda, M.C., Severgnini, B.

Solow Residuals without Capital Stocks,
[CEPR Discussion Papers 7990, 2010](#)



Giavazzi, F., Pagano, M.

Non-Keynesian Effects of Fiscal Policy Changes: International Evidence
and the Swedish Experience
[Swedish Economic Policy Review, 3, 67-103, 1996](#)