

Chapter #3



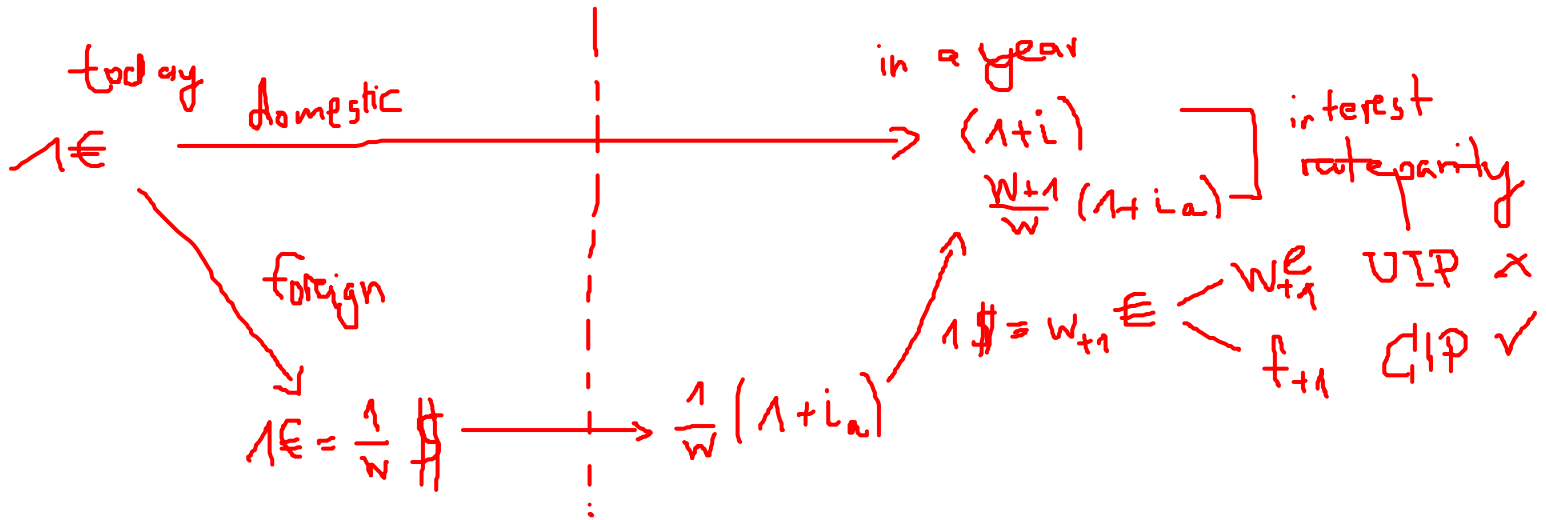
Summer term 2020



Nominal interest rate parity

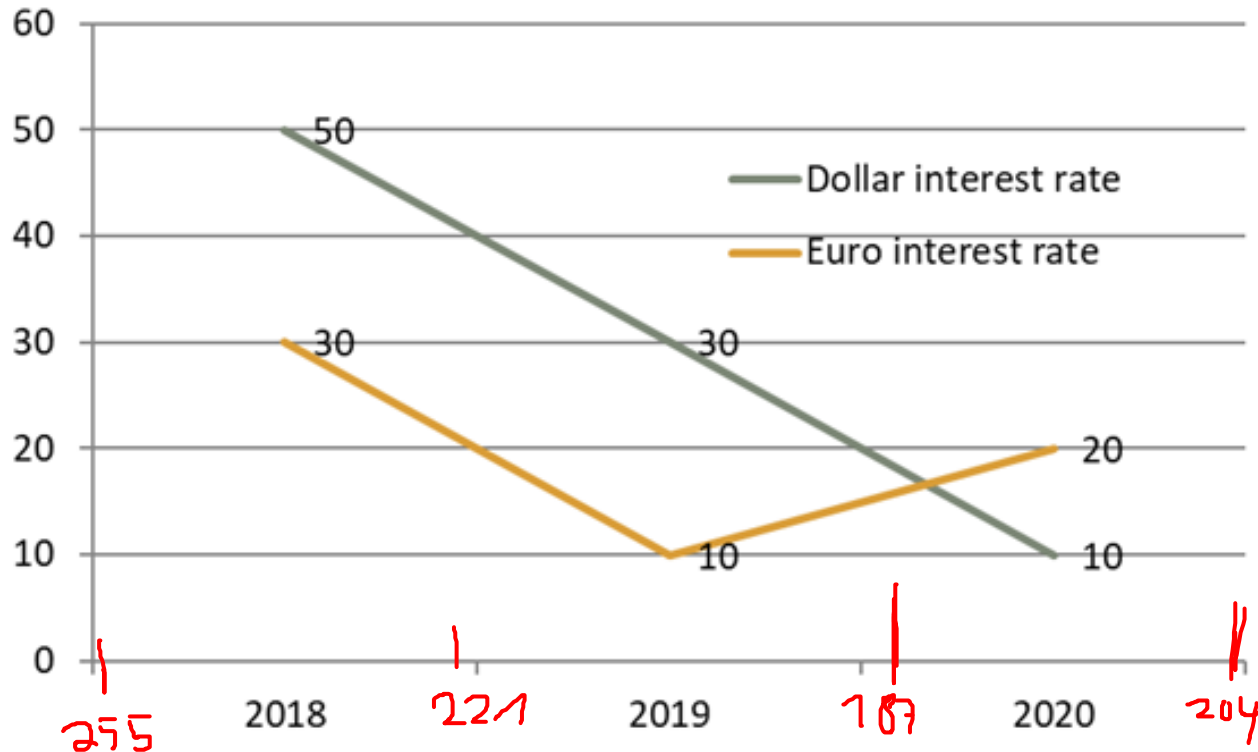
$\text{interest rate parity} + \text{PPP} = \text{real interest rate parity}$
 $r = r_a$

domestic: € foreign: US $\pi = \pi_a$



■ Problem 3.3a

$$(1+i) = \frac{W_{t+1}}{W_t} (1+i_a) \Rightarrow W_t = \frac{W_{t+1} (1+i_a)}{1+i}$$



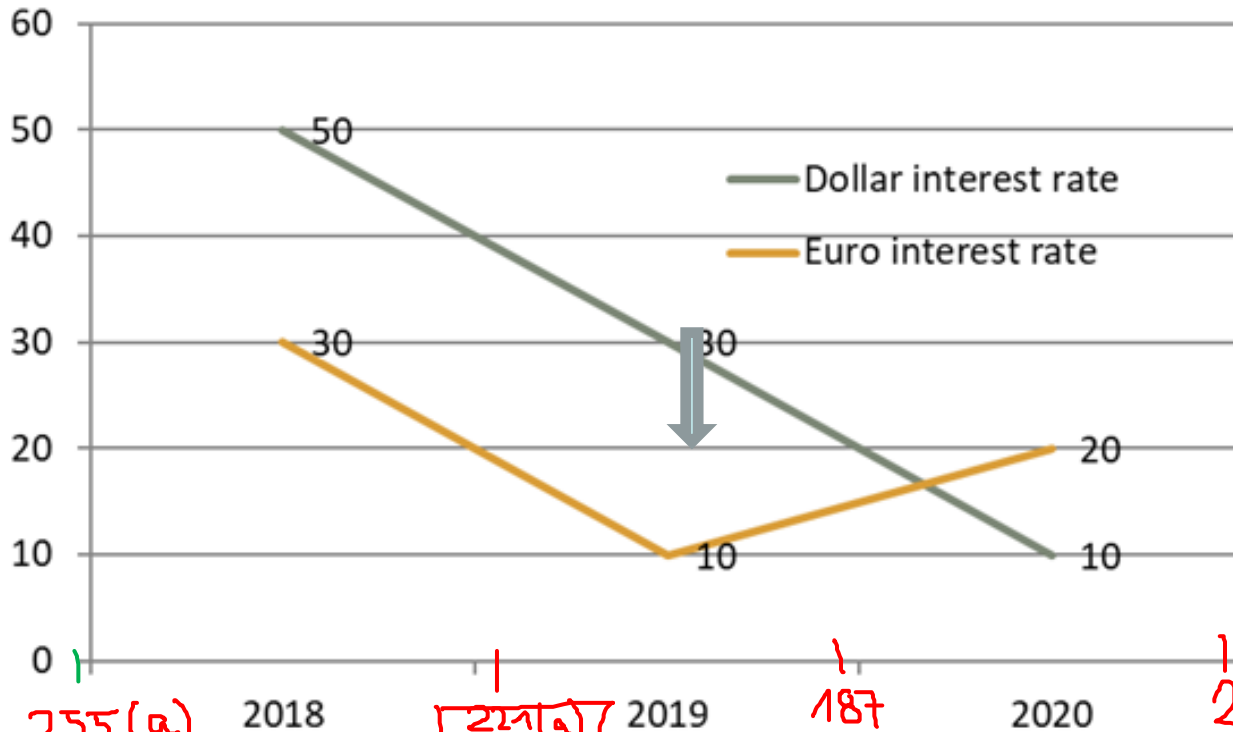
$$W_{2020} = 204 \frac{\text{€-Cent}}{\text{\$}}$$

$$W_{2019} = 204 \cdot \frac{1+0.1}{1+0.2} = 187$$

$$W_{2018} = 187 \cdot \frac{1+0.3}{1+0.1} = 221$$

$$W_{2017} = 221 \cdot \frac{1+0.1}{1+0.3} = 255$$

Problem 3.3b+c



$$W_{2020} = 204$$

$$W_{2019} = 187$$

$$W_{2018} = 187 \cdot \frac{1.2}{1.1} = 204$$

$$W_{2017} = 204 \cdot \frac{1.5}{1.3} = 235.38$$

255 (a)
235.38 (b)

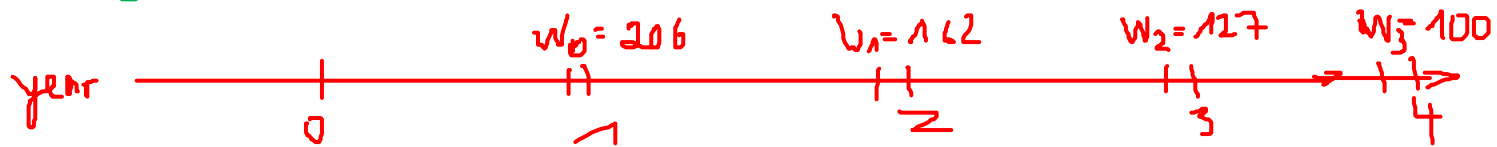


~~€~~ overvalued

I should sell future \$ in 2018
I can buy them back in 2019

■ Problem 3.2 – fish and rabbits

- $\underline{i} = 0.1$ (fish) $\underline{i}_a = 0.4$ (rabbit) $\underline{w}_3 = 100 \frac{\text{fish}}{100 \text{ rabbits}}$



$$a_1 \quad w_2 = 100 \cdot \frac{1.4}{1.1} = 127$$

$$w_1 = 127 \cdot \frac{1.4}{1.1} = 162$$

$$b_1 \quad w_0 = 162 \cdot \frac{1.4}{1.1} = 206$$

c, analogy to ~~FX~~ FX, yearly investments

$$d_1 \quad w_2 = 100 \cdot 1.4 = 140$$

$$w_1 = 140 \cdot 1.4 = 196$$

$$w_0 = 196 \cdot 1.4 = 274.4$$

$$e_1 \quad w_2 = 100 \cdot 1.4 = 140$$

$$w_1 = 140 \cdot \frac{1.4}{1.1} = 178$$

$$w_0 = 178 \cdot \frac{1.4}{1.1} = 226.78$$

buying rabbits as they relatively cheap!

■ Real interest rate parity

- So far:
 - Difference in interest rates
 - Differences in exchange rate
- Real interest rate parity = nominal interest rate parity + PPP
- Assumption: no expectation of change of real exchange rate
- Inflation differences are taken into account $\pi \neq \pi_a$
 - Countries with high inflation $\pi > \pi_a \Rightarrow$ devaluing local currency ($w \uparrow$)
 $\uparrow \pi_p = \uparrow p_a \underline{w \uparrow}$
 - Countries with low inflation $\pi < \pi_a \Rightarrow w \downarrow$
 $\uparrow p = \uparrow \pi_p \underline{w \downarrow}$

$$(1) w^r = \frac{P_a}{P} W \Rightarrow W = \frac{w^r P}{P_a} \quad (2) (1+i) = (1+i_a) \frac{W_{+1}}{W} \quad (3) = \pi_{+1} = \frac{P_{+1} - P}{P}$$

$$1 + \pi_{+1} = \frac{P_{+1}}{P}$$

(1) + (2):

$$(1+i) = (1+i_a) \frac{\frac{w_{+1}^r P_{+1}}{P_{a+1}}}{\frac{w^r P}{P_a}} \Leftrightarrow (1+i) = (1+i_a) \frac{P_{+1} P_a}{P P_{a+1}} \cdot \frac{w_{+1}^r}{w^r}$$

$$\underbrace{\frac{P_{+1} P_a}{P P_{a+1}}}_{1 + \pi_{+1}} \cdot \underbrace{\frac{w_{+1}^r}{w^r}}_{1 + \pi_{a+1}}$$

approx:
 $r \approx i - \pi_{+1}$

$$\frac{(1+i)}{(1+\pi_{+1})} = \frac{(1+i_a)}{(1+\pi_{a+1})} \cdot \frac{w_{+1}^r}{w^r}$$

$$1+r = (1+r_a) \cdot \frac{w_{+1}^r}{w^r}$$

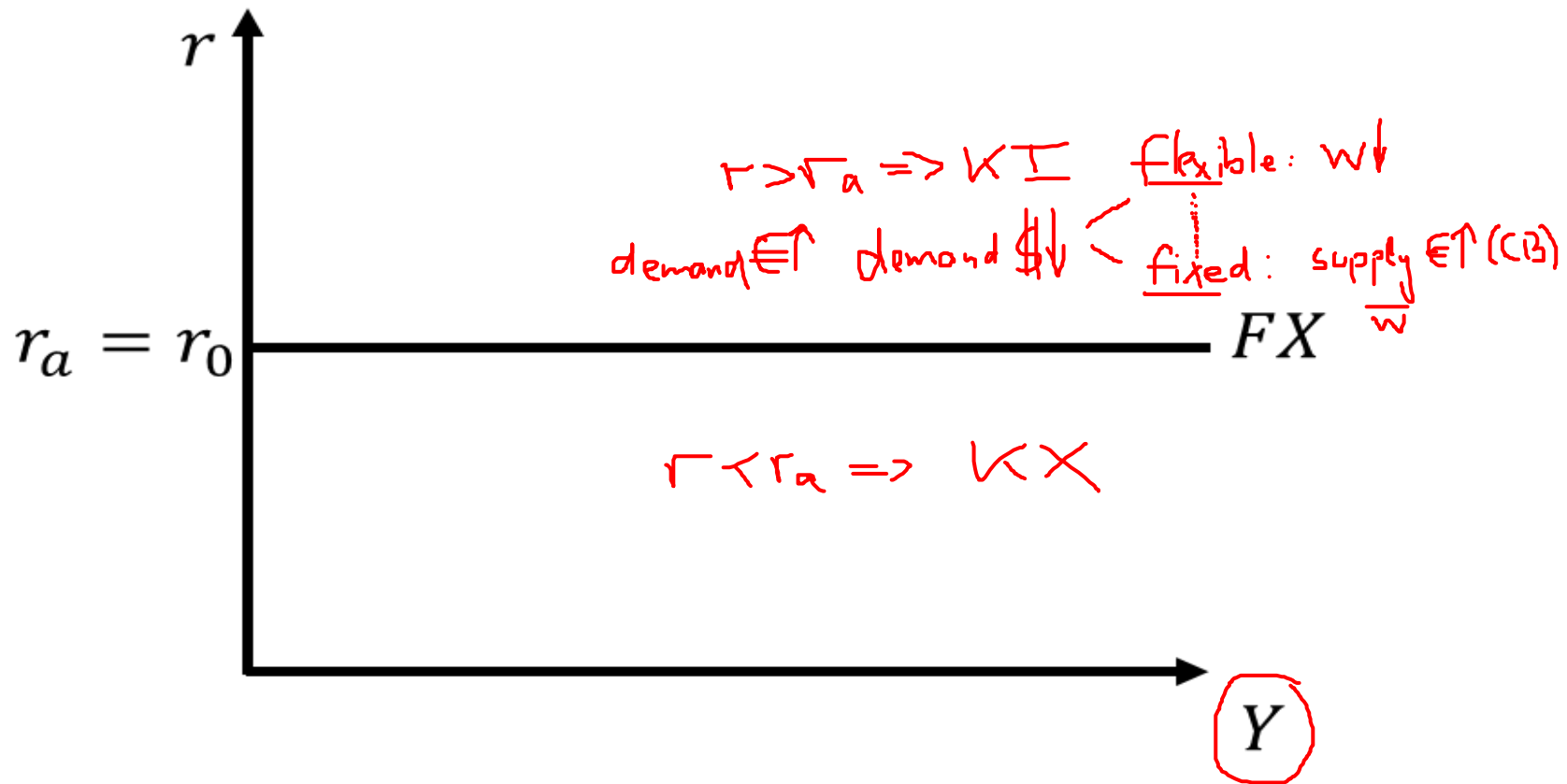
$$\boxed{r = r_a}$$

$1 \Rightarrow$ no expect. about change w^r

■ Problem 3.1

Country	Concept	Data Source	Status	Unit	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Euro Area	Consumer Prices, All items	International Financial Statistics (IFS)	Published	Percent Change over Corresponding Period of Previous Year	2.428	2.254	2.131	2.181	2.178	2.203	2.141	3.292	0.295	1.624	2.720	2.496
Euro Area	Interest Rates, Money Market Rate	International Financial Statistics (IFS)	Published	Percent per Annum	4.263	3.259	2.262	2.046	2.123	3.006	3.981	3.783	0.695	0.481	0.816	0.064
Euro Area	National Currency per U.S. Dollar, period average	International Financial Statistics (IFS)	Published	National Currency per US Dollar	1.118	1.063	0.886	0.805	0.804	0.797	0.731	0.683	0.720	0.755	0.719	0.778
Serbia, Republic of	Consumer Prices, All items	International Financial Statistics (IFS)	Published	Percent Change over Corresponding Period of Previous Year	95.005	19.491	9.876	11.026	16.120	11.724	6.392	12.411	8.117	6.143	11.137	7.330
Serbia, Republic of	Interest Rates, Money Market Rate	International Financial Statistics (IFS)	Published	Percent per Annum	31.909	15.481	12.692	12.861	20.510	16.510	10.310	15.551	11.010	13.100	11.040	11.890
Serbia, Republic of	National Currency per U.S. Dollar, end of period	International Financial Statistics (IFS)	Published	National Currency per US Dollar	67.670	58.985	54.637	57.936	72.219	59.976	53.727	62.900	66.729	79.280	80.866	86.176

■ The FX market



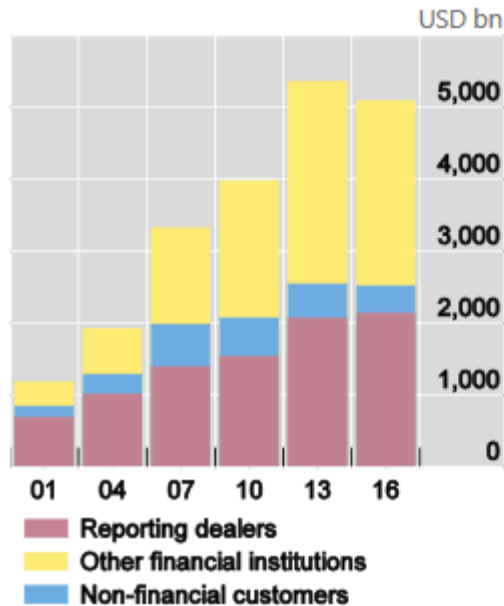
FX markets

Foreign exchange market turnover by counterparty

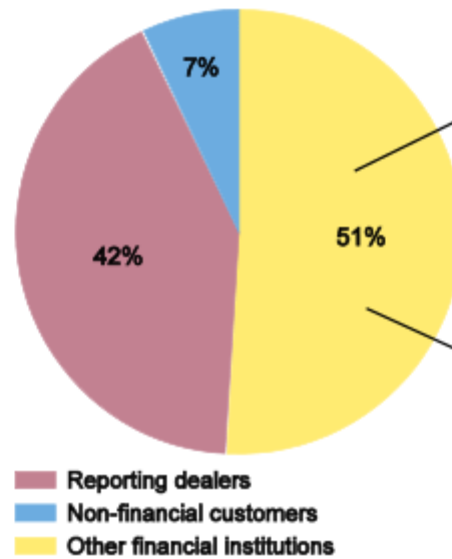
Net-net basis,¹ daily averages in April

Graph 3

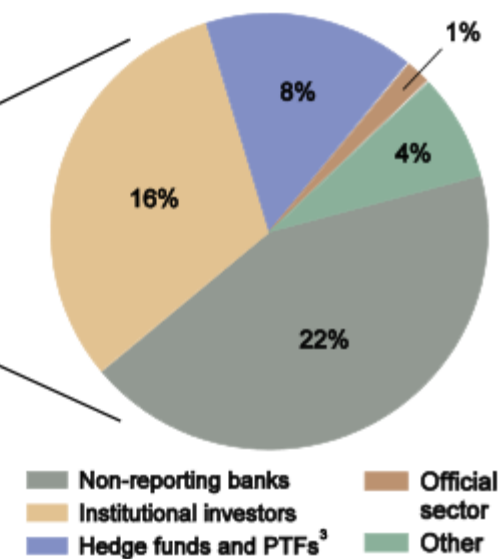
2001-16



2016



Breakdown of other financial institutions²



¹ Adjusted for local and cross-border inter-dealer double-counting. ² For definitions of counterparties, see page 18. ³ Proprietary trading firms.

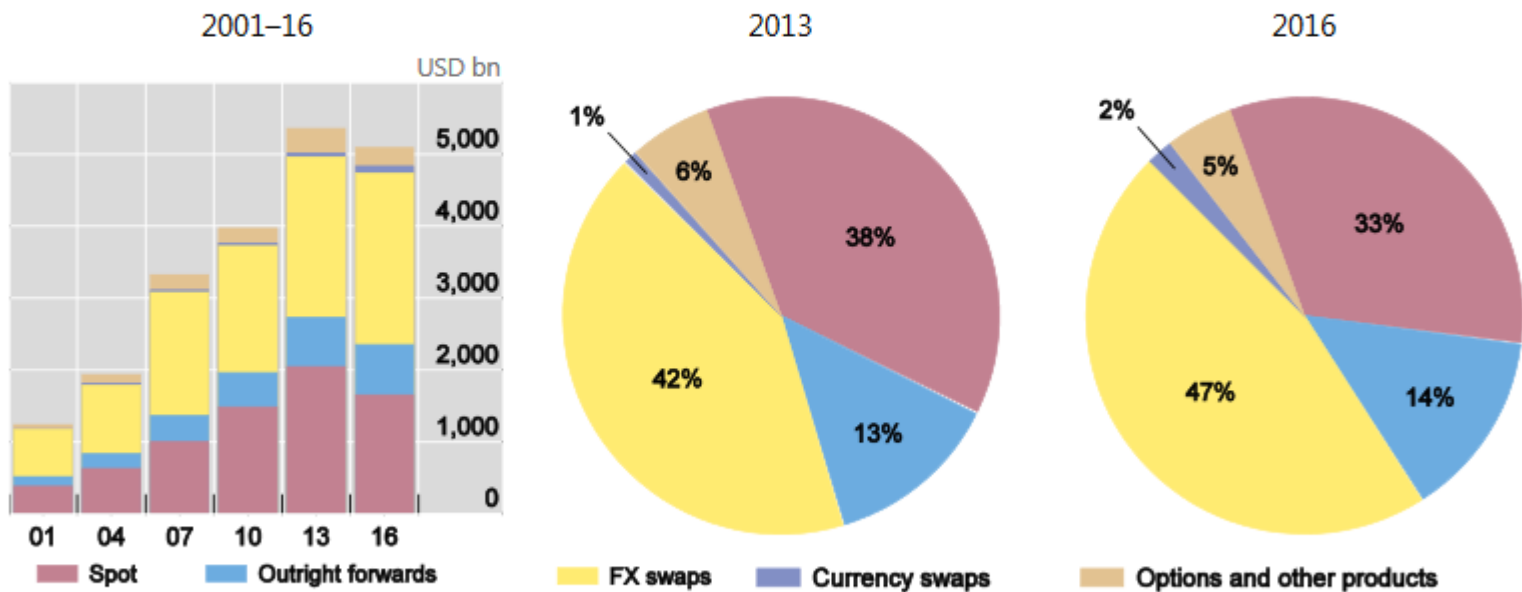
Source: BIS Triennial Central Bank Survey. For additional data by counterparty, see Tables 4 and 5 on pages 12 and 13.

FX markets

Foreign exchange market turnover by instrument

Net-net basis,¹ daily averages in April

Graph 2



¹ Adjusted for local and cross-border inter-dealer double-counting.

Source: BIS Triennial Central Bank Survey. For additional data by instrument, see Table 1 on page 9.

Quelle: Bank of International Settlement
<http://www.bis.org/publ/rpfx16fx.pdf>

■ FX exchange interventions

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TABLE 2—DESCRIPTIVE CHARACTERISTICS OF INTERVENTIONS BY REGIME TYPE

Indicator	Total	Free floaters	Broad bands	Narrow bands	Other
Number of country-regime observations ^a	43	6	14	17	6
Trading days covered	113,842	19,330	41,604	42,961	9,947
Share of days with FX intervention	0.191	0.073	0.093	0.336	0.207
Share of these with FX purchase	0.761	0.948	0.735	0.732	0.636
Share of these with FX sale	0.239	0.052	0.265	0.268	0.364
Average daily volume on intervention day in million USD	44.3	59.2	42.7	27.1	157.7
Average daily volume of FX purchases in million USD	44.4	52.7	45.8	24.9	190.6
Average daily volume of FX sales in million USD	44.1	177.1	34.2	33.3	100.2
Average daily intervention size as share of GDP	0.0005	0.0002	0.0003	0.0005	0.0010
Average daily intervention size as share of daily traded FX volume ^b	0.046	0.010	0.052	0.051	0.065
FX purchasing episodes ^c	2,388	70	551	1,491	276
FX sale episodes ^c	2,161	25	511	1,402	223
Average length of episode in days	4.5	9.2	3.5	4.8	4.4
Share of intervention episodes leaning with the wind	0.355	0.253	0.471	0.333	0.256
Share of intervention episodes toward the fundamental	0.480	0.400	0.488	0.482	0.466
Trading days covered in turbulent times	5,638	949	1,975	2,178	536
Share of days with FX intervention in turbulent times	0.225	0.027	0.092	0.435	0.207

^aCountries changing their regimes are counted more than once. No country returned to a previous regime after an interruption. Country-regime combinations are combined in “other,” i.e., belong to other regime classifications such as pegs.

^bNot available for all emerging markets, cf. Table 1.

^cAccording to 10-day definition. Interventions leaning with the wind are defined as interventions that take the same direction as the previous two weeks’ trend. Interventions toward the fundamental that aim into the direction of the three year moving average of the exchange rate. Turbulent times are defined as times when the CBOE VIX is 2 standard deviations above its median during the covered period.

Problem 3.3

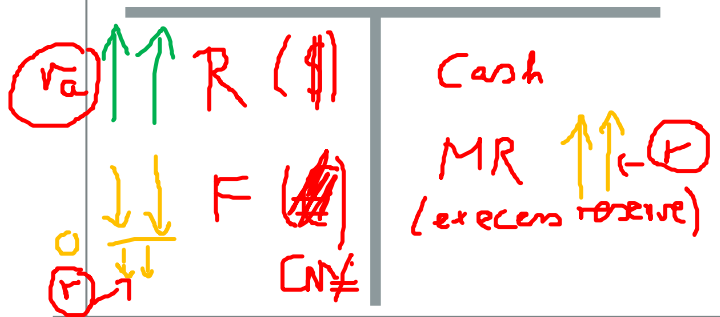
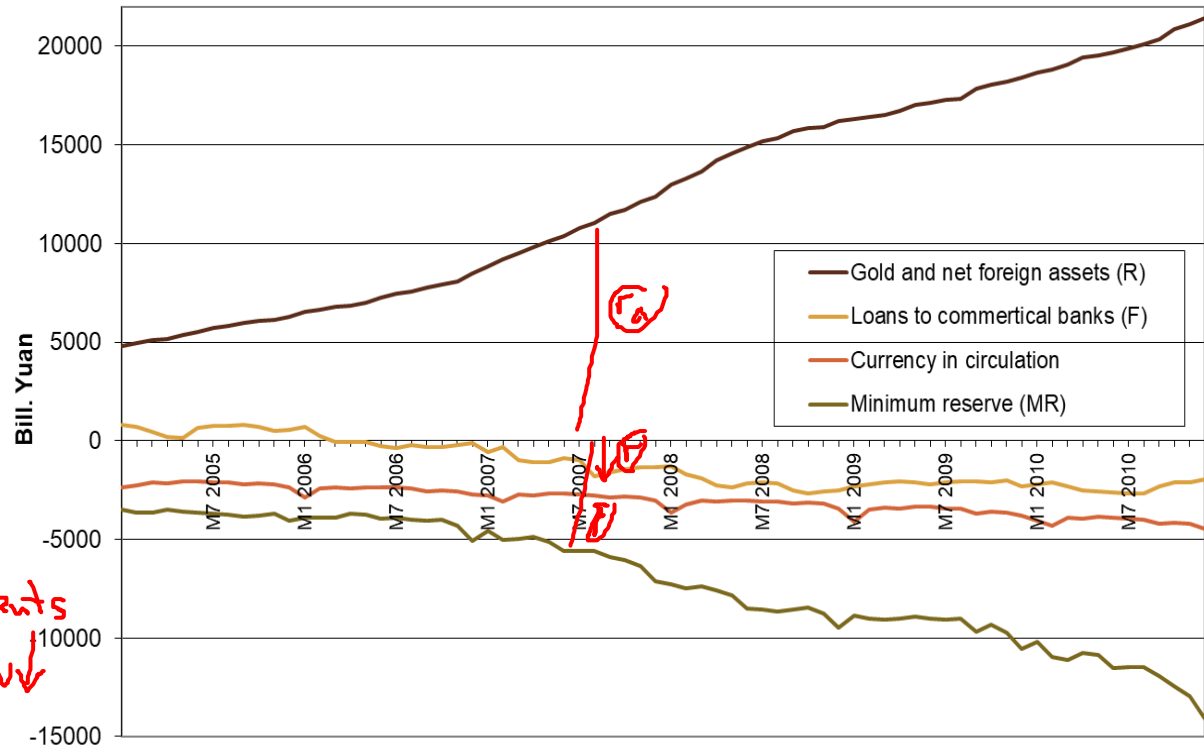
a, reason R_{MM}
 => stabilize w!

b, neutralisation the
 add. liquidity

c, fix exchange rate
 is costly
 $r > r_a \Rightarrow KI$

→ losses on interest payments
 → exchange rate losses if w ↓
 CB (fails)

Balance sheet positions, People's Bank of China



■ Problem 3.4



reduce
transaction
costs

- 1) bank account
- 2) German banks operate in US!
- 3) Trade US shares in Germany
- 4) Off-shore trusts