KEEP
CALM
IT'S THE
LAST DAY
OF CLASS

1. Real interest rate

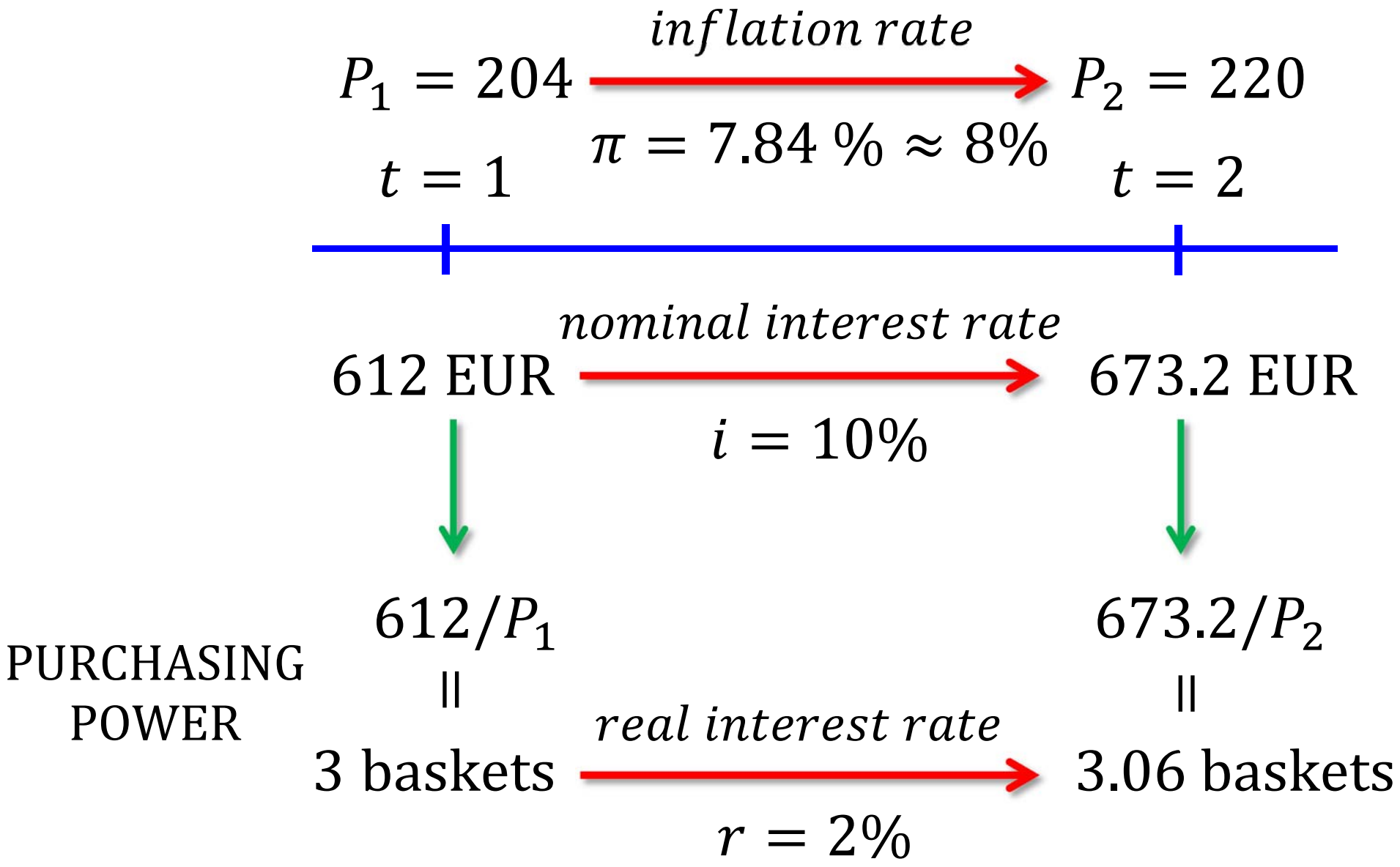
- Numerical example
- Fisher equation

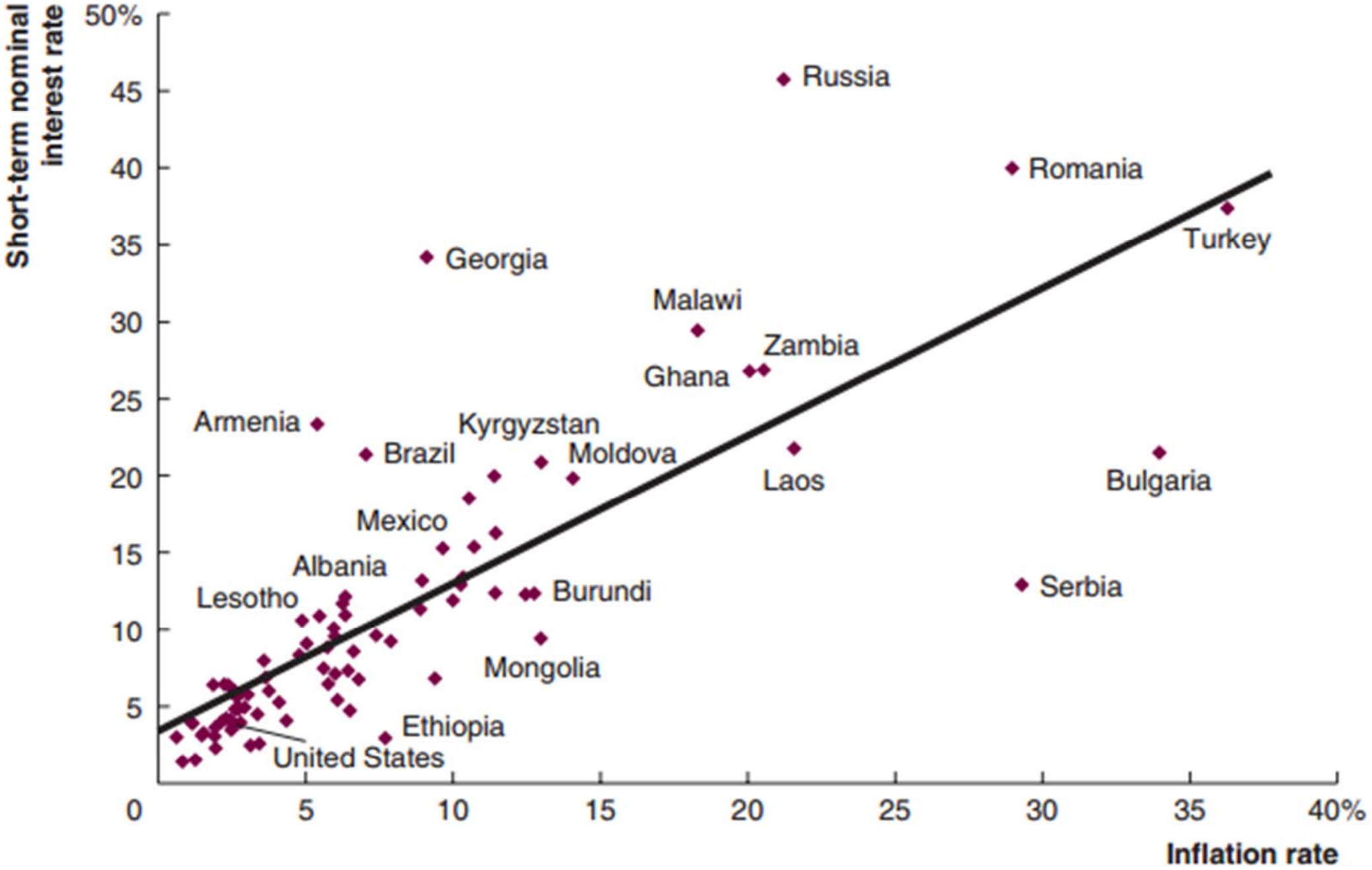
$$i = r + \pi$$

- Fisher effect

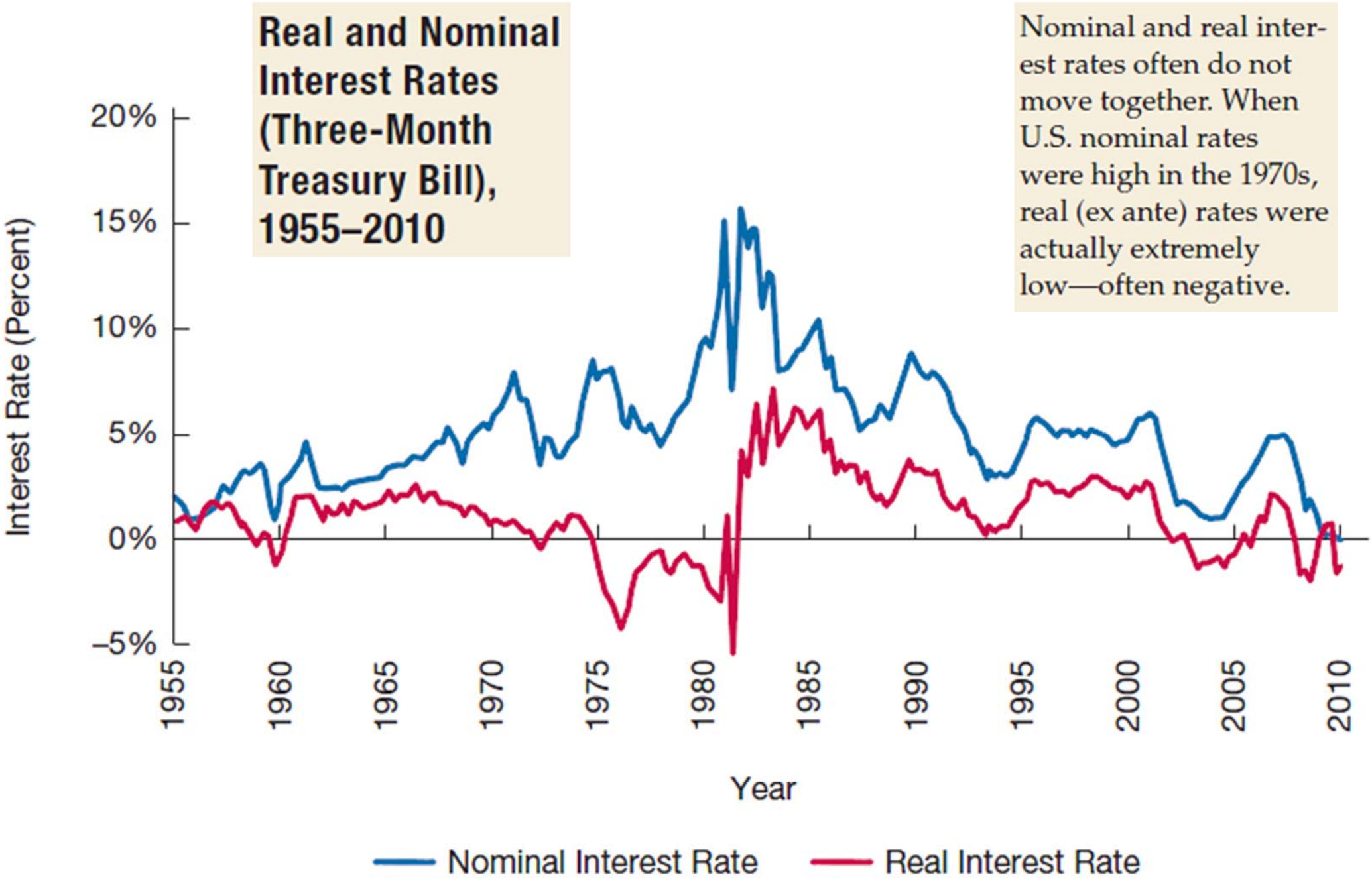
$$\uparrow \pi \Rightarrow \uparrow i$$

- Lucas paradox


$P_1 = 204$
$inflation\ rate$
$P_2 = 220$
$\pi = 7.84\ \% \approx 8\%$
$t = 1$
$t = 2$
$nominal\ interest\ rate$
612 EUR
673.2 EUR
$i = 10\%$
PURCHASING POWER
$612/P_1$
$673.2/P_2$
3 baskets
$real\ interest\ rate$
3.06 baskets
$r = 2\%$



RG Hubbard, AP O'Brien, M Rafferty (2012): Macroeconomics, p. 204



Frederic S Mishkin (2011): *Macroeconomics. Theory and practice*, p. 40

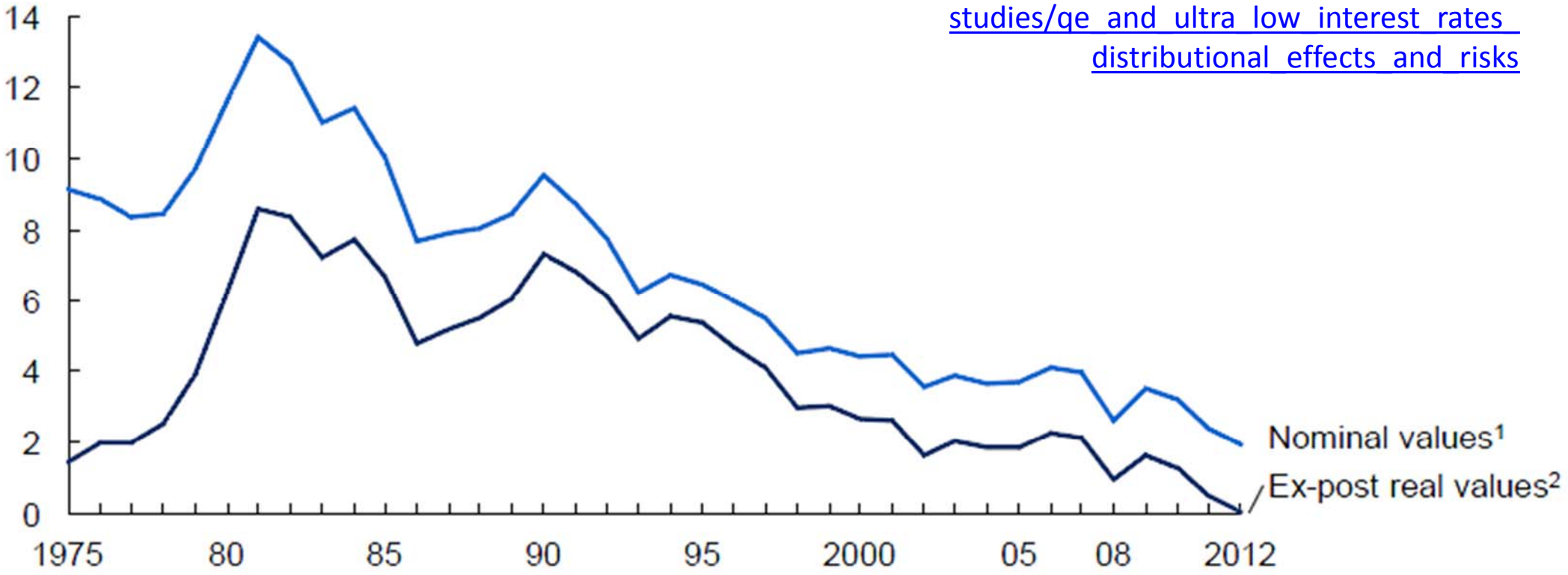
Central bank action has come at the end of a 30-year period of declining real and nominal interest rates

Long-term interest rates in developed economies

Yield to redemption on long-term government bonds, 1975–2012

%, GDP-weighted average

http://www.mckinsey.com/insights/economic_studies/qe_and_ultra_low_interest_rates_distributional_effects_and_risks

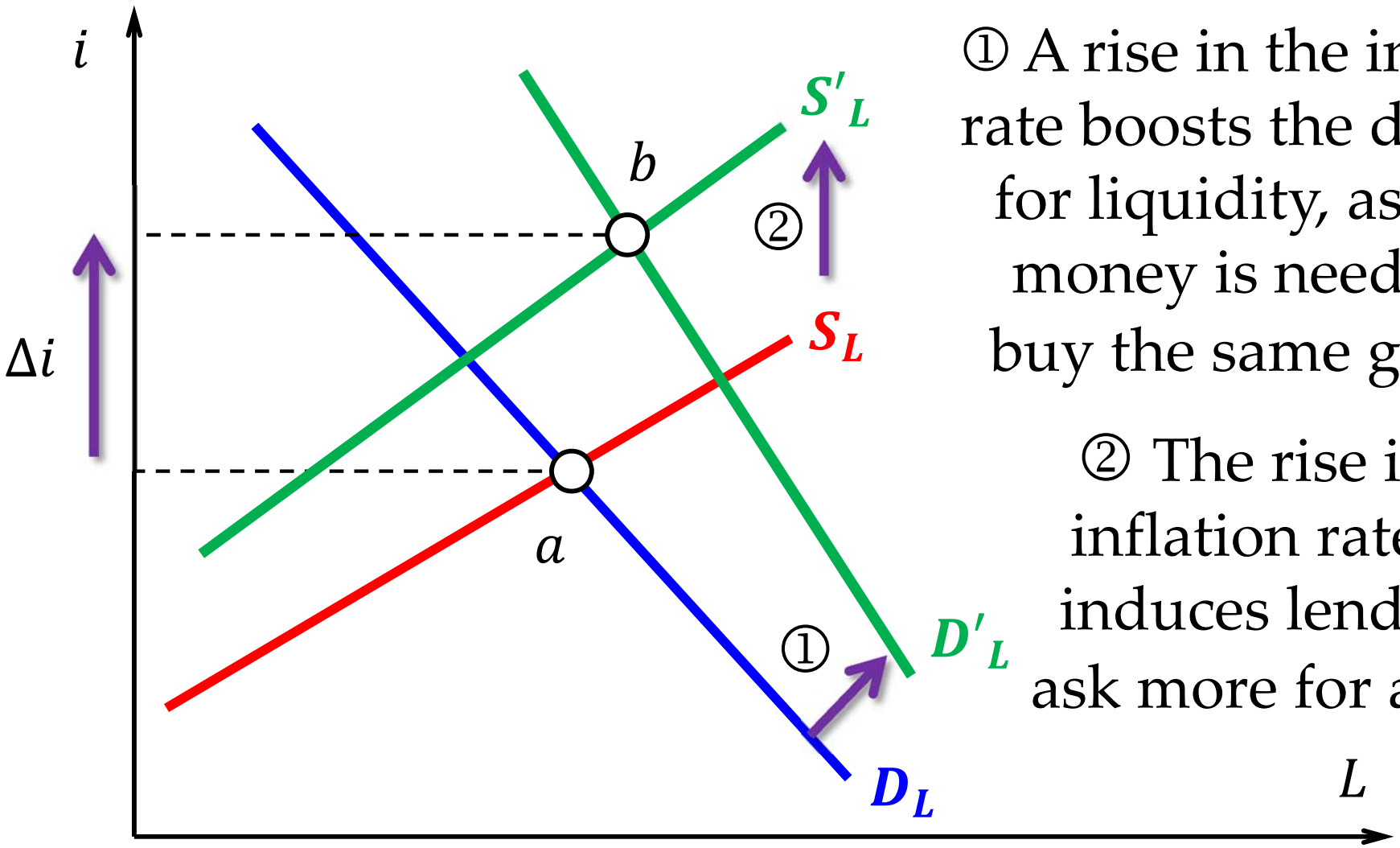


1 Ten-year government bonds, where available, for Australia, Canada, France, Germany, Italy, Japan, South Korea, Spain, the United Kingdom, and the United States.

2 Ex-post real values calculated as nominal yield on ten-year bonds in current year minus average realized inflation over next ten years. IHS Global Insight inflation estimates used for 2012–22.

SOURCE: International Monetary Fund International Financial Statistics; IHS Global Insight; Bloomberg; Organisation for Economic Co-operation and Development; McKinsey Global Institute analysis

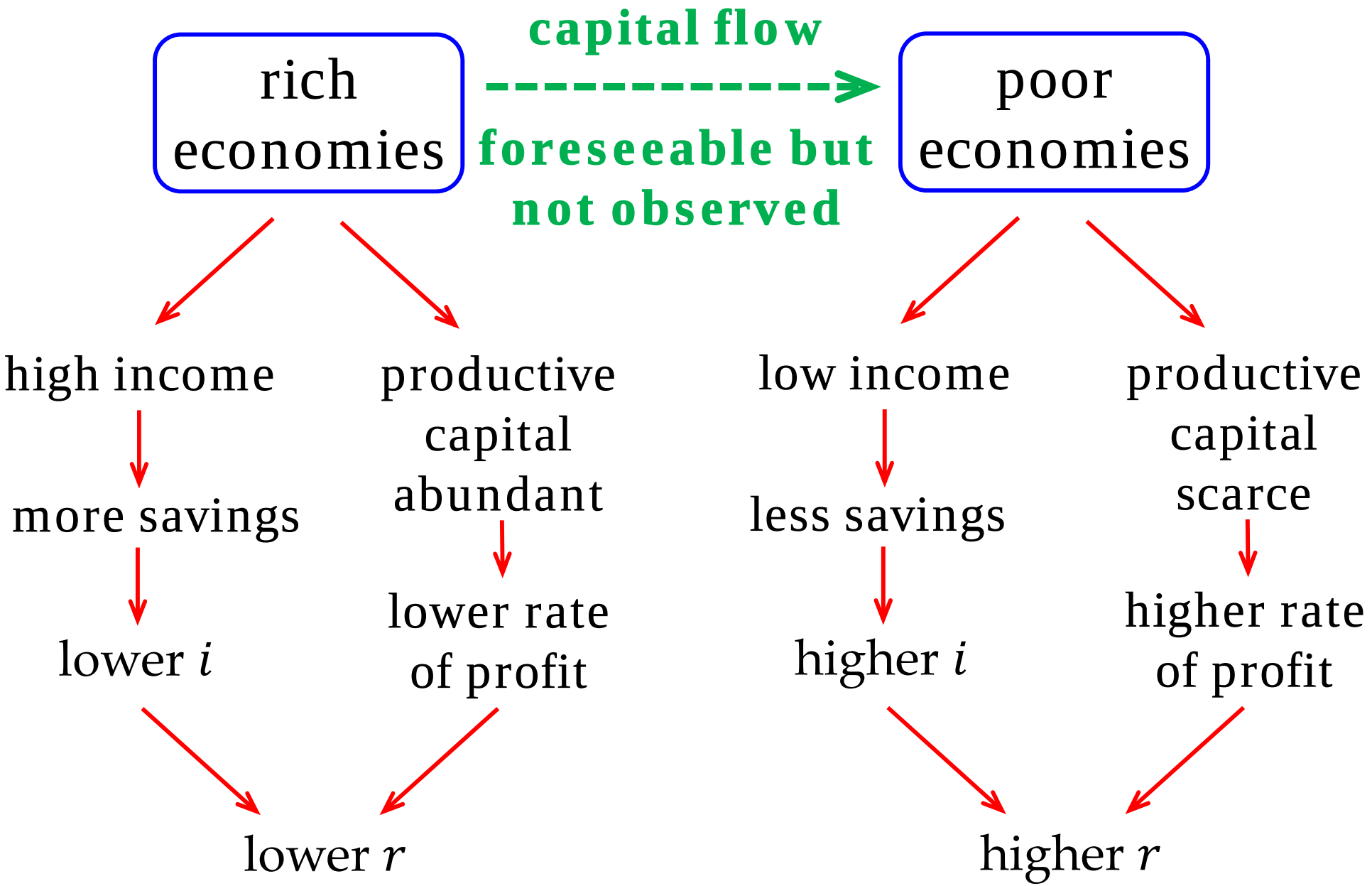
The Fisher effect

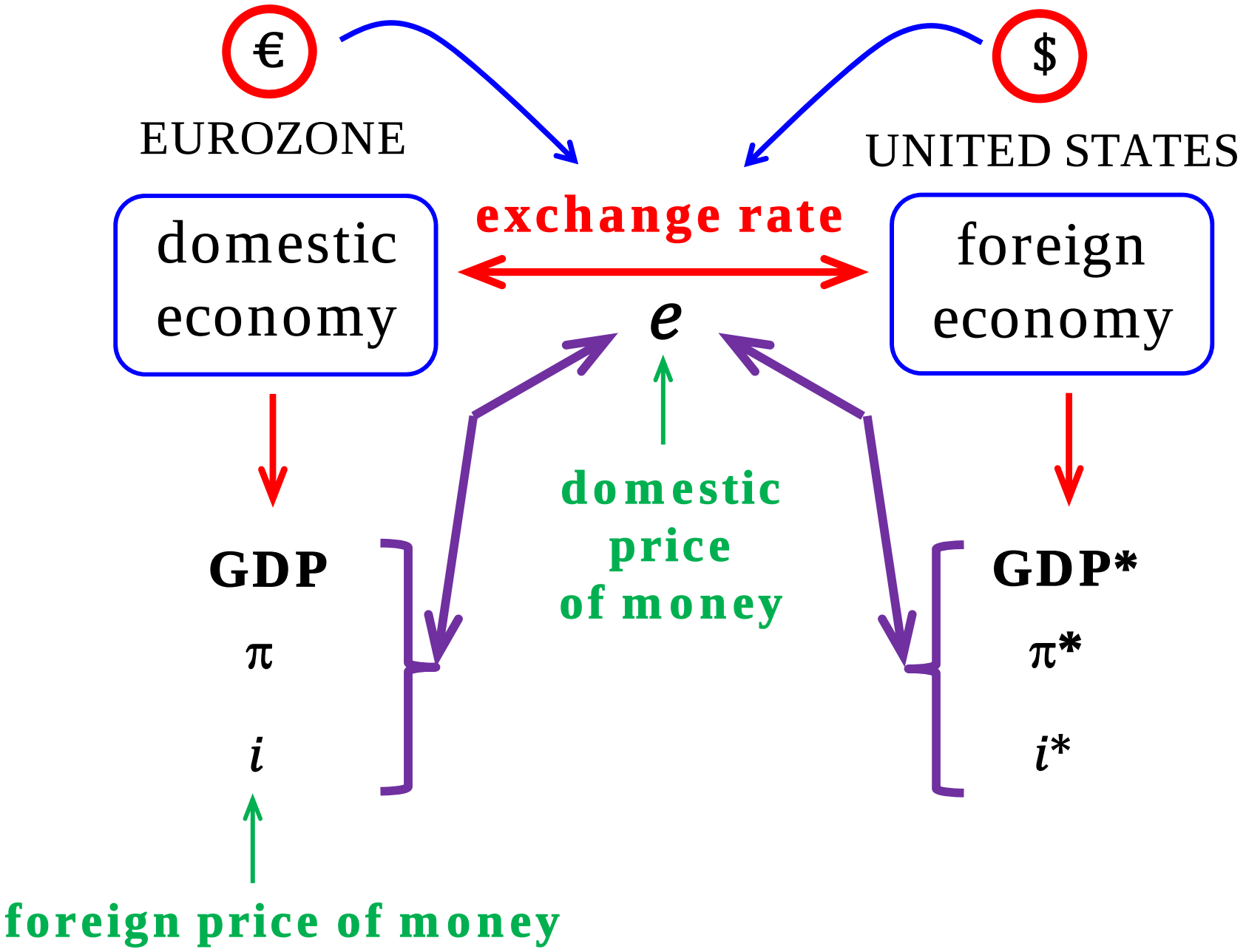


① A rise in the inflation rate boosts the demand for liquidity, as more money is needed to buy the same goods.

② The rise in the inflation rate also induces lenders to ask more for a loan.

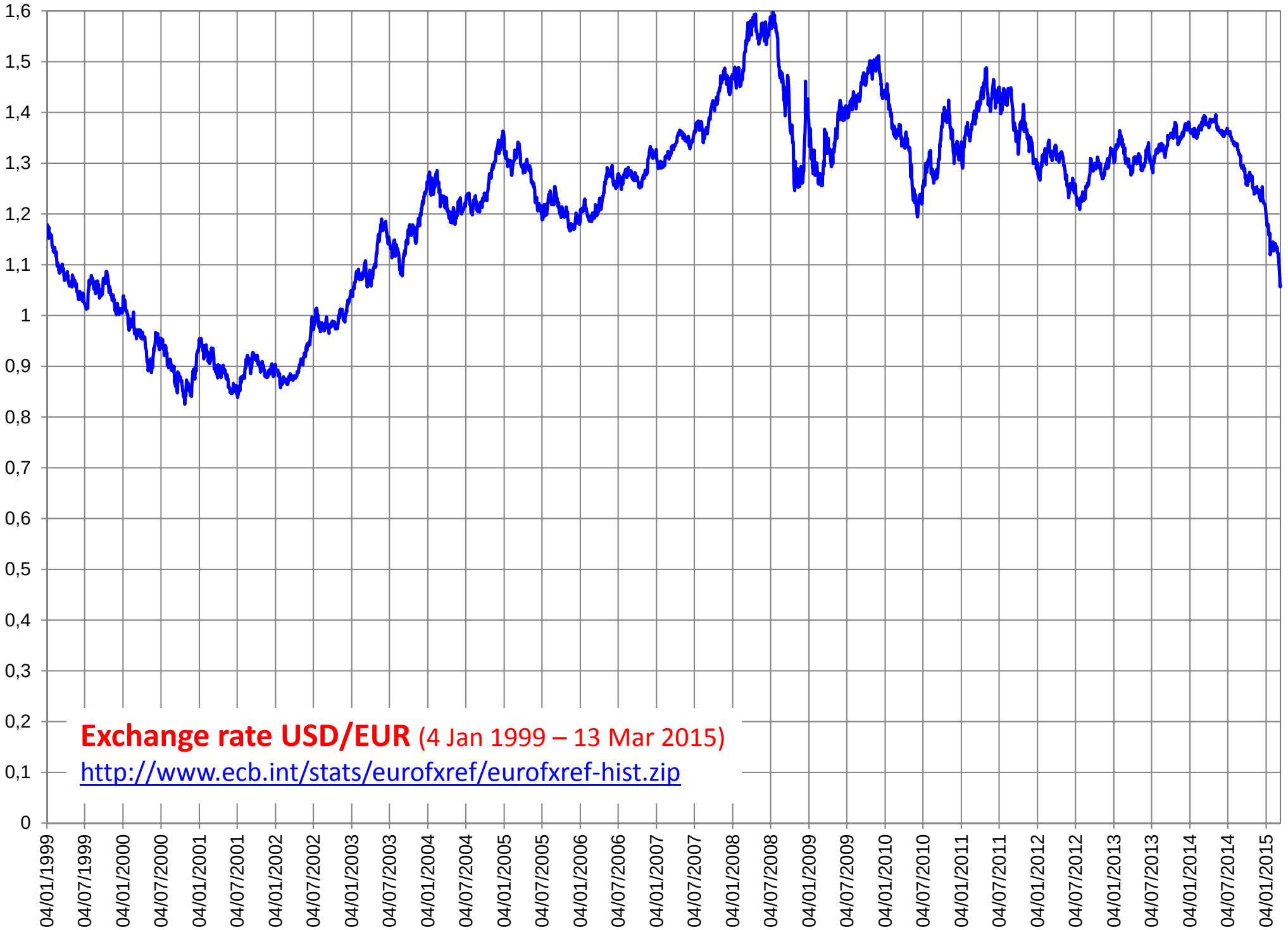
The Lucas paradox




€
$
EUROZONE
UNITED STATES
domestic economy
exchange rate
foreign economy
e
domestic price of money
GDP
π
i
GDP*
π*
i*
foreign price of money

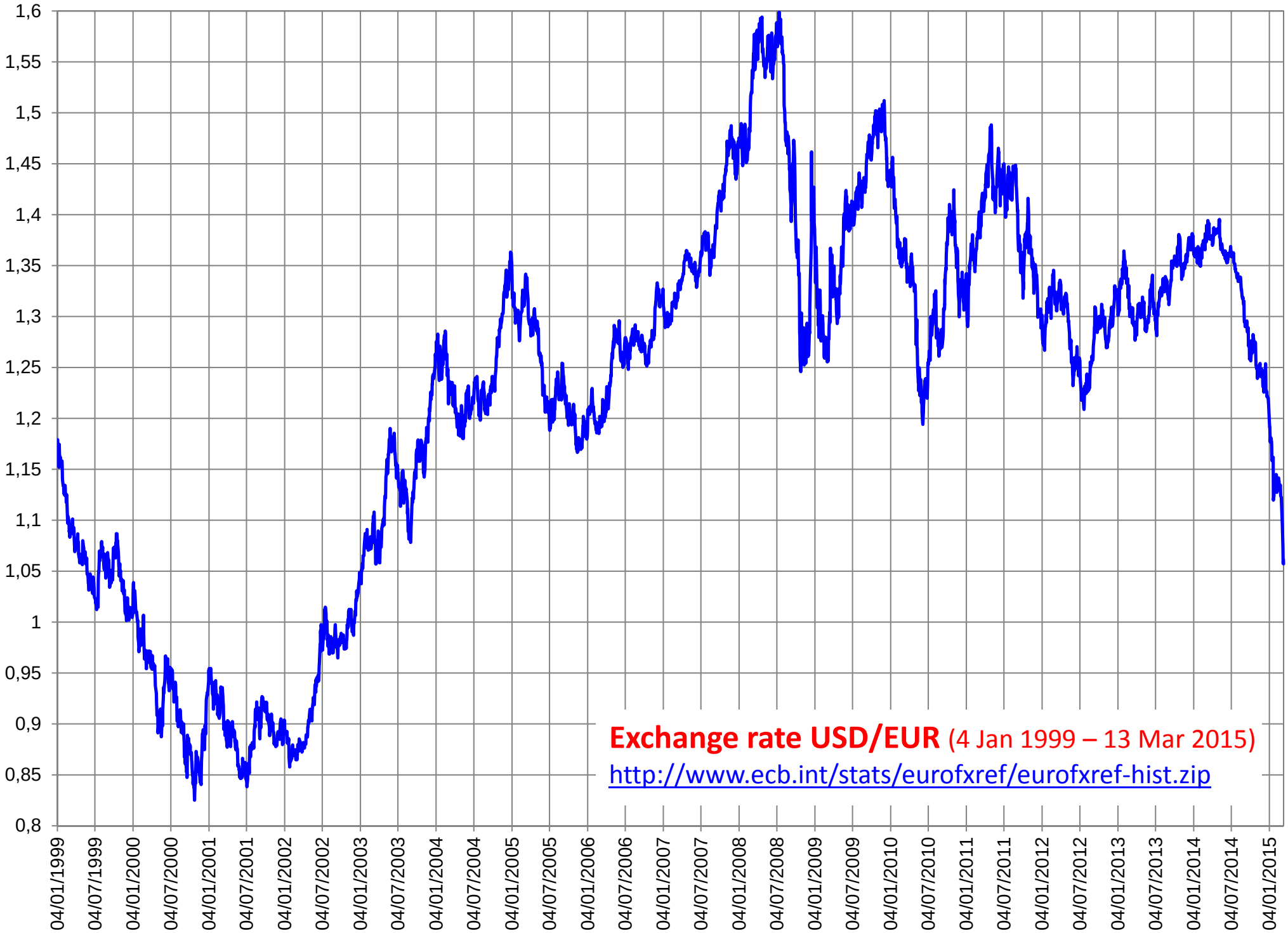
2. Exchange rate

- Definition: relative price between two currencies
- Direct and indirect quotation
- Appreciation / depreciation
- Characteristics of the currency market: largest and most liquid market in the world



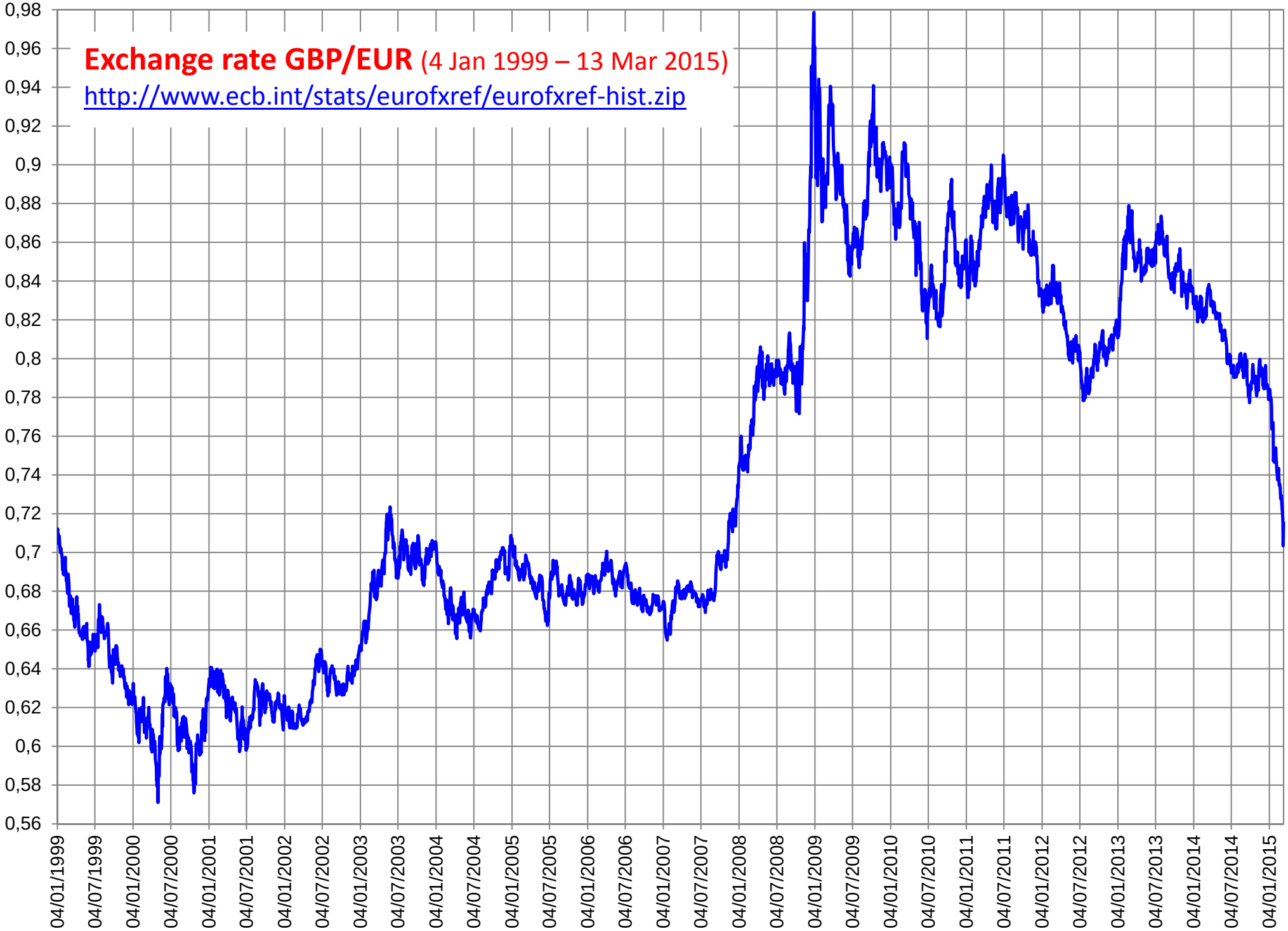
Exchange rate USD/EUR (4 Jan 1999 – 13 Mar 2015)

http://www.ecb.int/stats/eurofxref/eurofxref-hist.zip



Exchange rate USD/EUR (4 Jan 1999 – 13 Mar 2015)

http://www.ecb.int/stats/eurofxref/eurofxref-hist.zip


Exchange rate GBP/EUR (4 Jan 1999 – 13 Mar 2015)
http://www.ecb.int/stats/eurofxref/eurofxref-hist.zip
0,98
0,96
0,94
0,92
0,9
0,88
0,86
0,84
0,82
0,8
0,78
0,76
0,74
0,72
0,7
0,68
0,66
0,64
0,62
0,6
0,58
0,56
04/01/1999
04/07/1999
04/01/2000
04/07/2000
04/01/2001
04/07/2001
04/01/2002
04/07/2002
04/01/2003
04/07/2003
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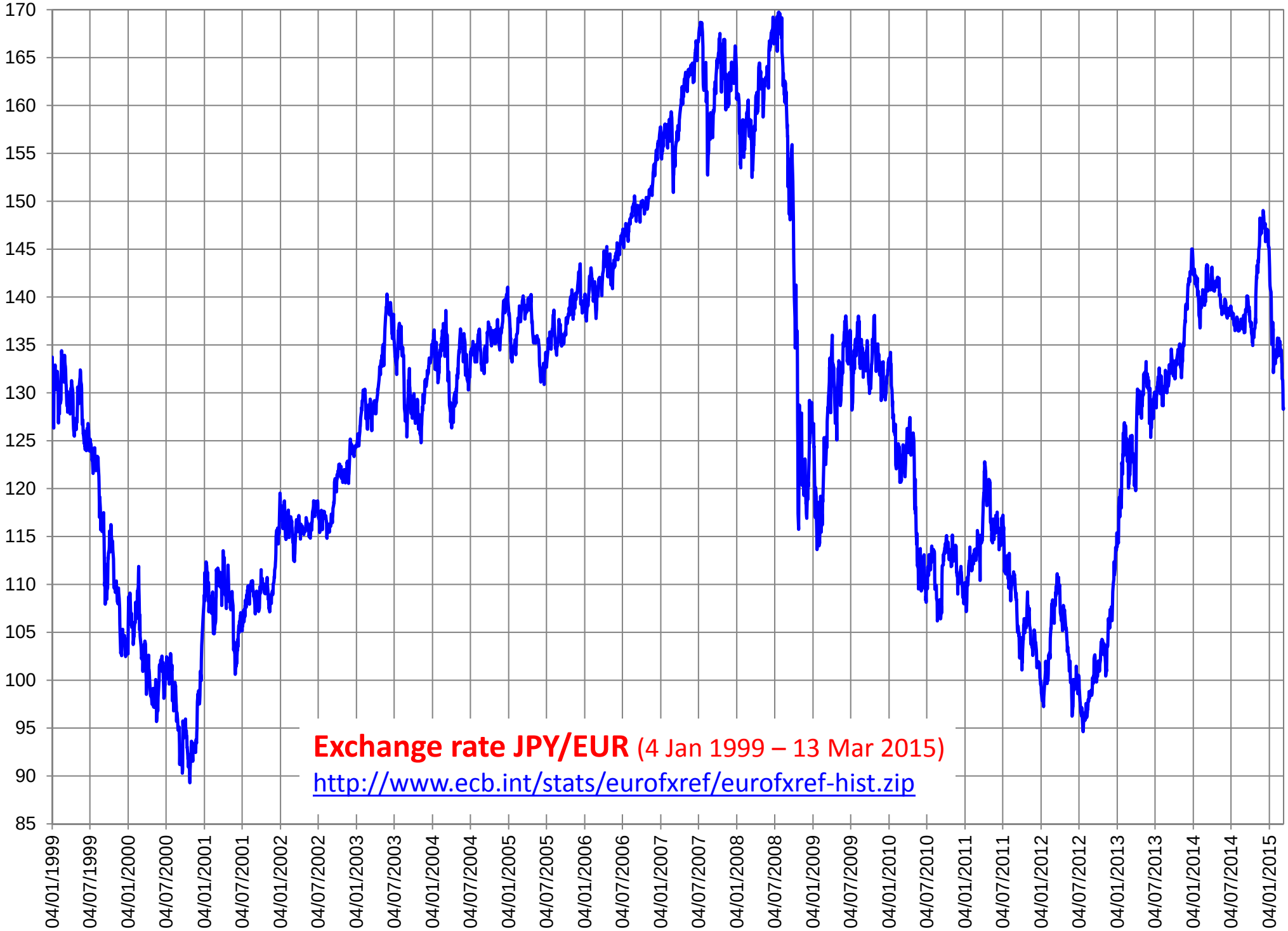
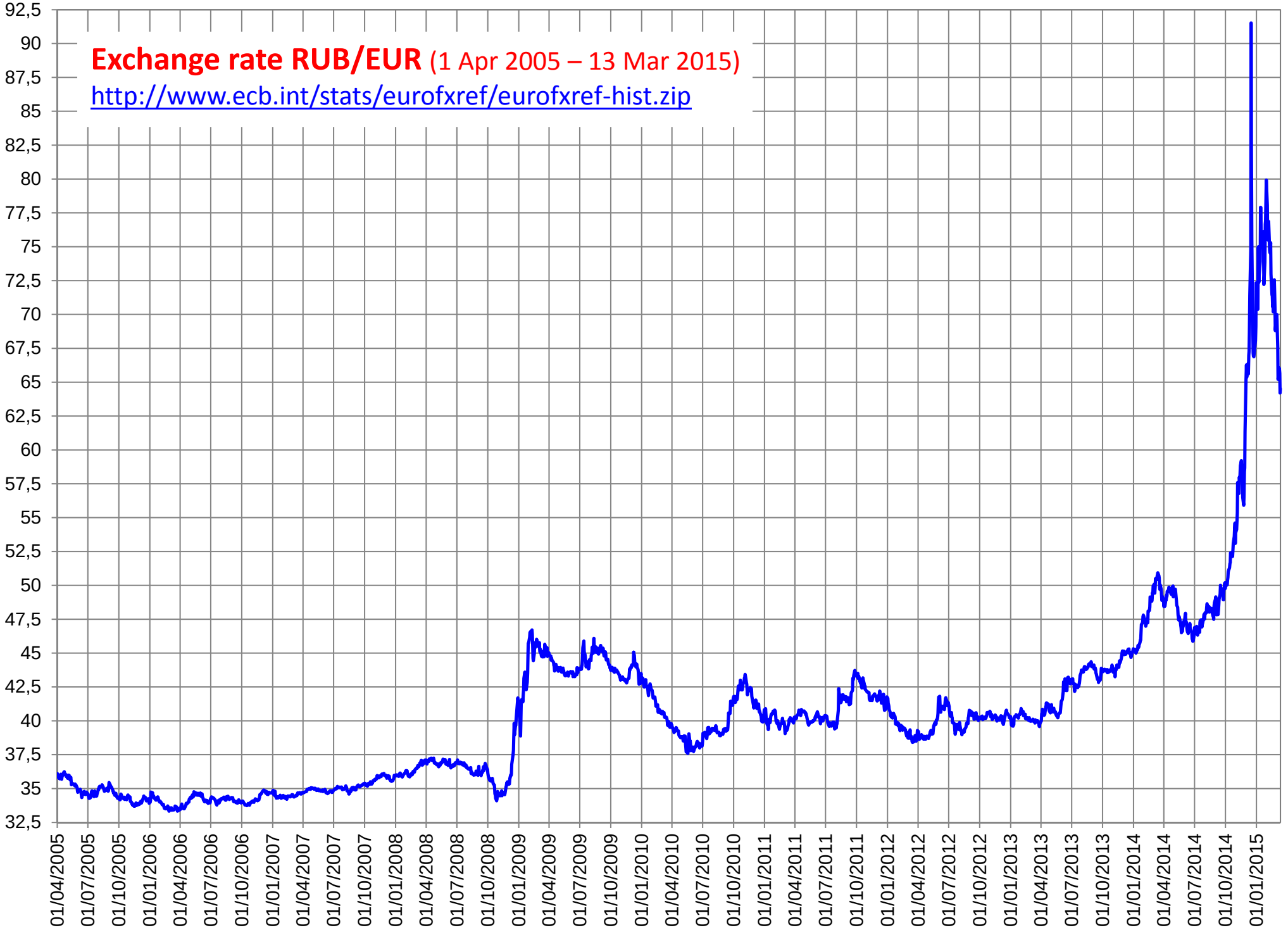
04/01/2015



Exchange rate JPY/EUR (4 Jan 1999 – 13 Mar 2015)

http://www.ecb.int/stats/eurofxref/eurofxref-hist.zip


Exchange rate RUB/EUR (1 Apr 2005 – 13 Mar 2015)
http://www.ecb.int/stats/eurofxref/eurofxref-hist.zip
92,5
90
87,5
85
82,5
80
77,5
75
72,5
70
67,5
65
62,5
60
57,5
55
52,5
50
47,5
45
42,5
40
37,5
35
32,5
01/04/2005
01/07/2005
01/10/2005
01/01/2006
01/04/2006
01/07/2006
01/10/2006
01/01/2007
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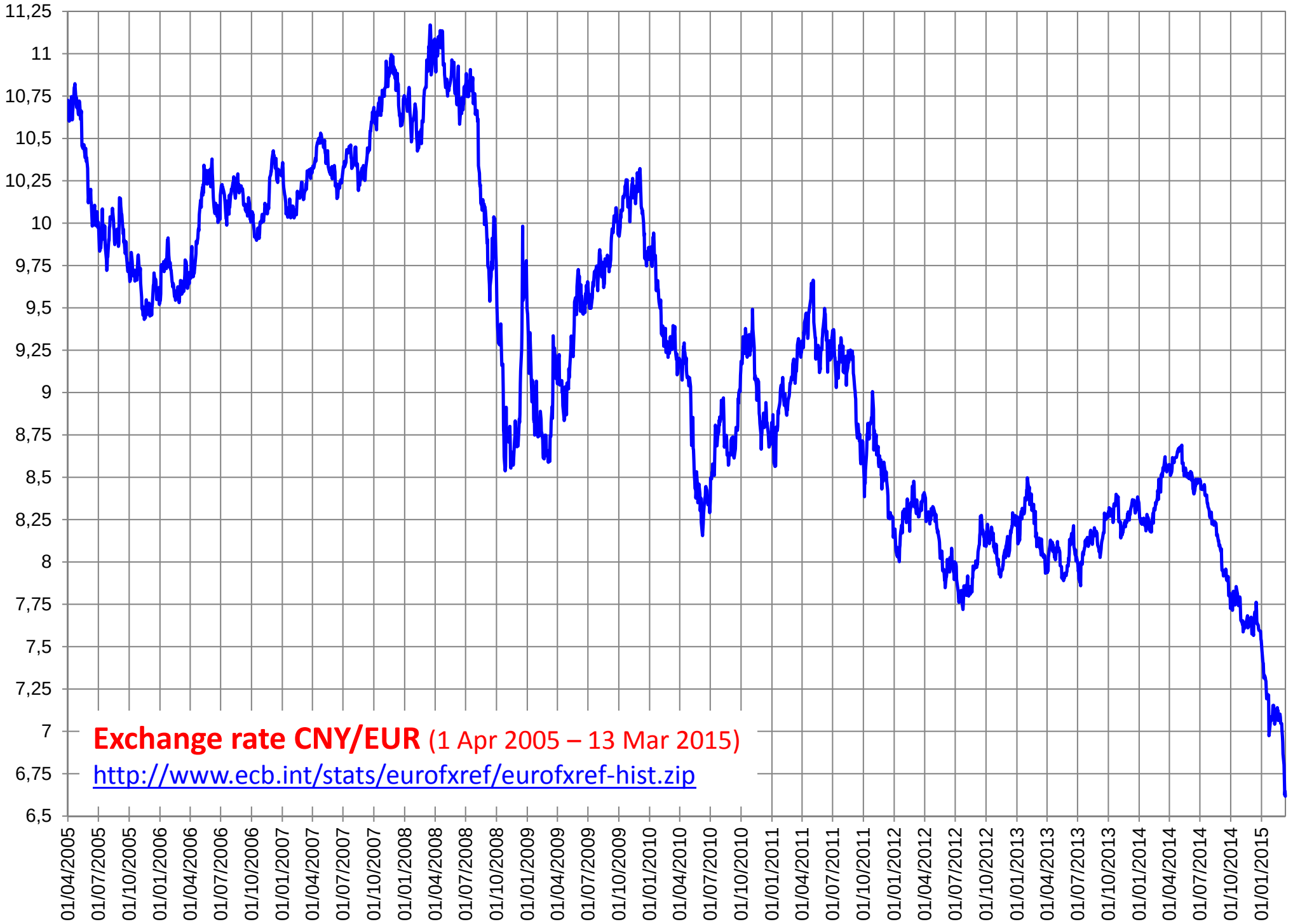
01/01/2015

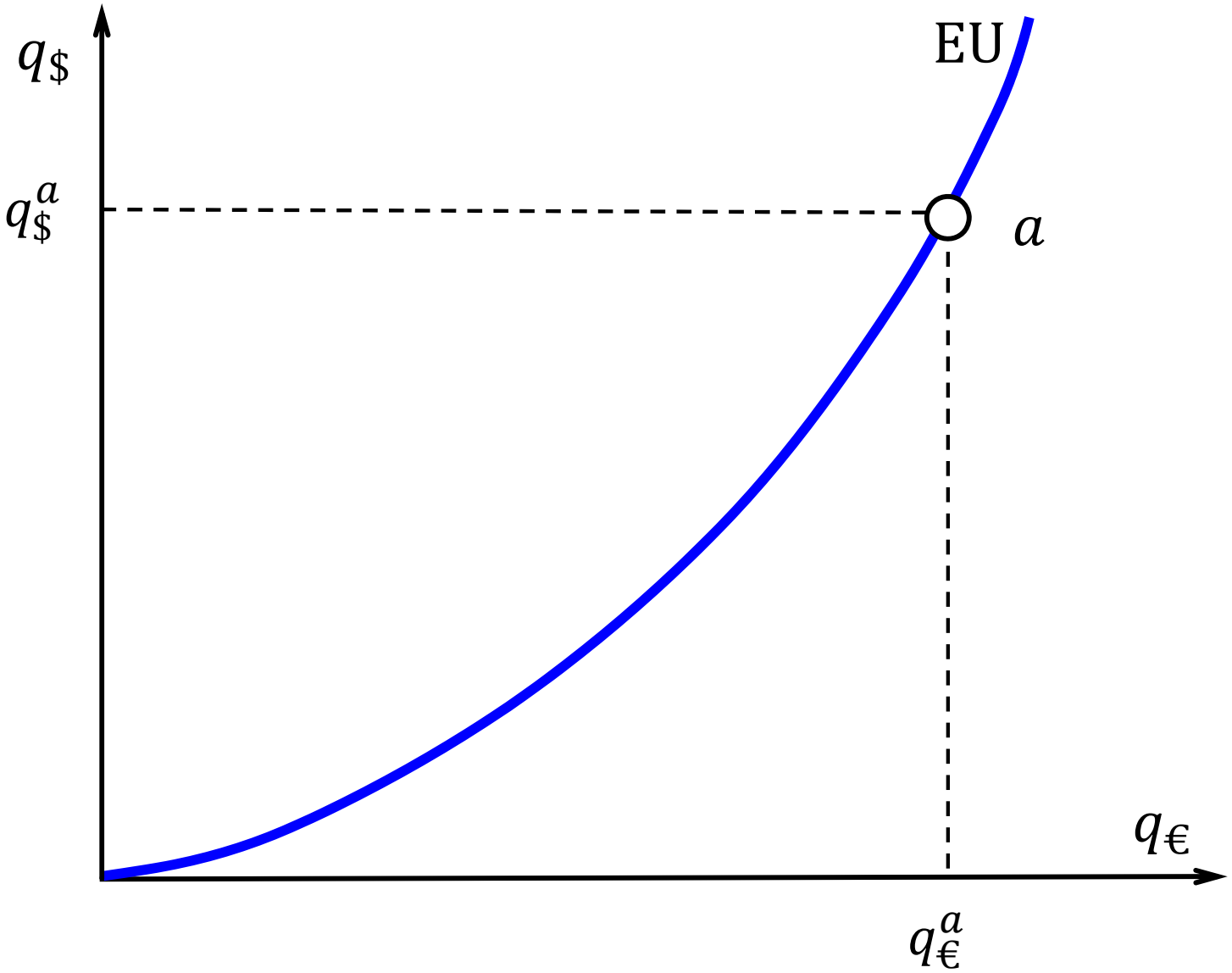


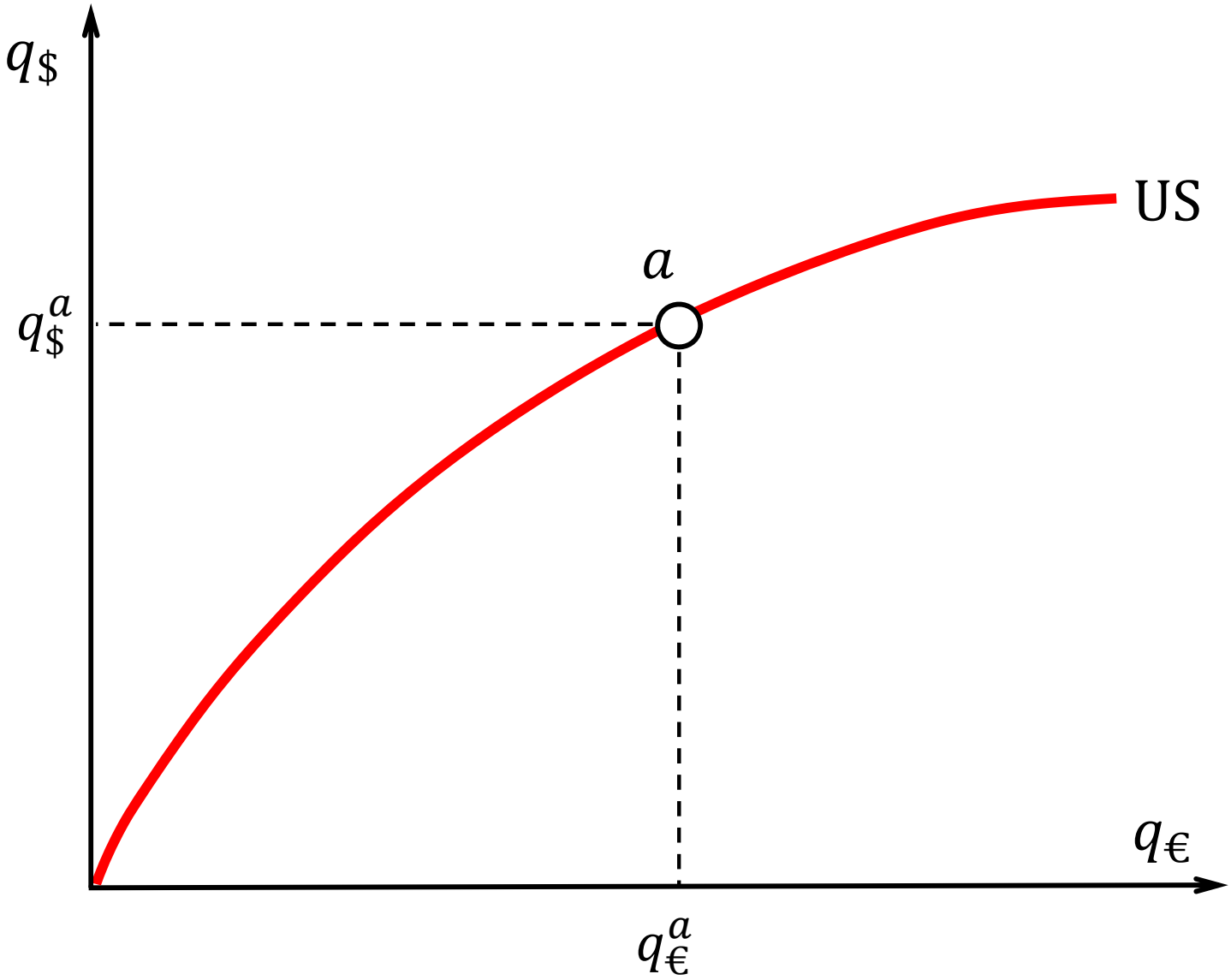
Exchange rate CNY/EUR (1 Apr 2005 – 13 Mar 2015)

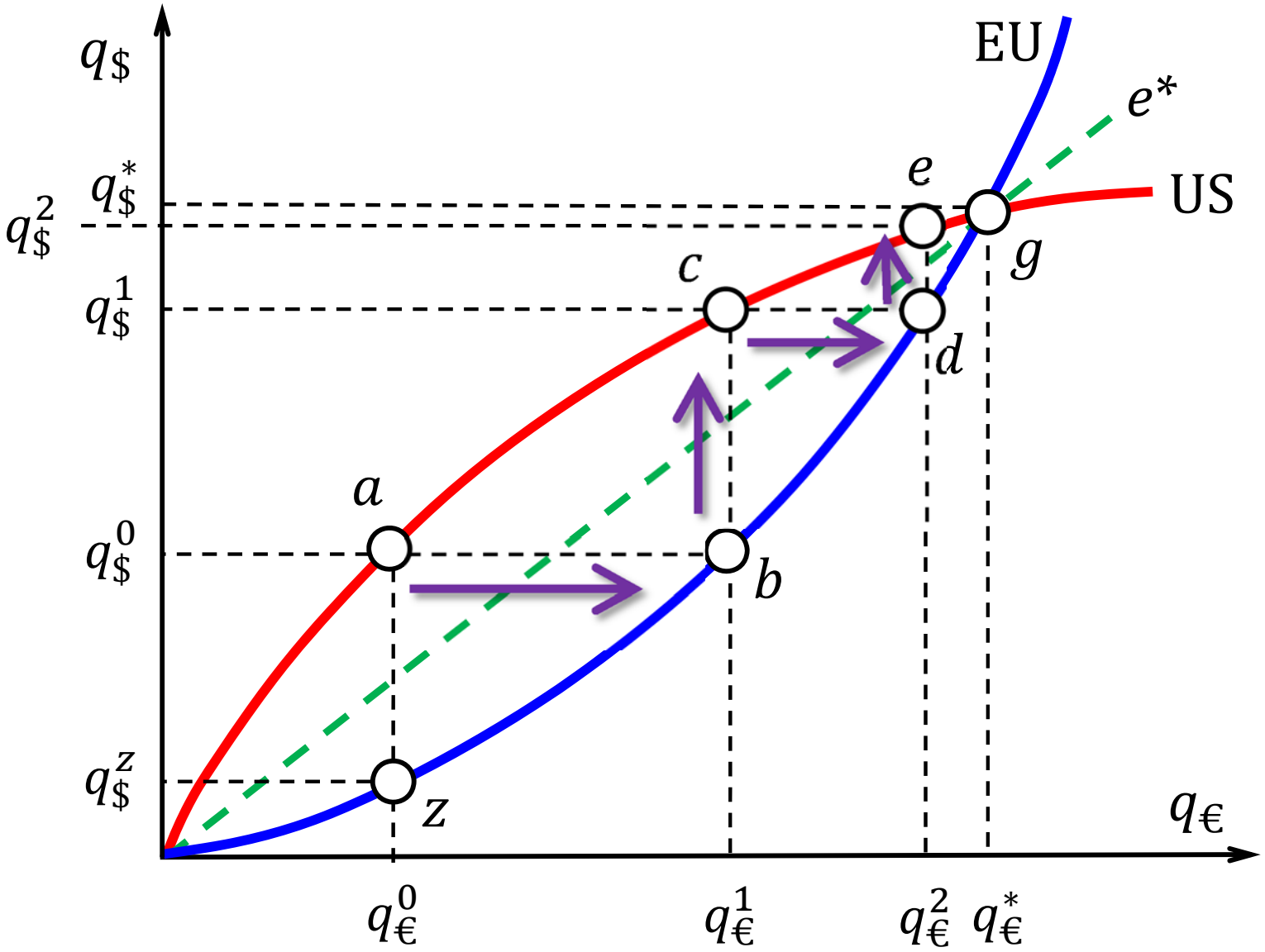
http://www.ecb.int/stats/eurofxref/eurofxref-hist.zip

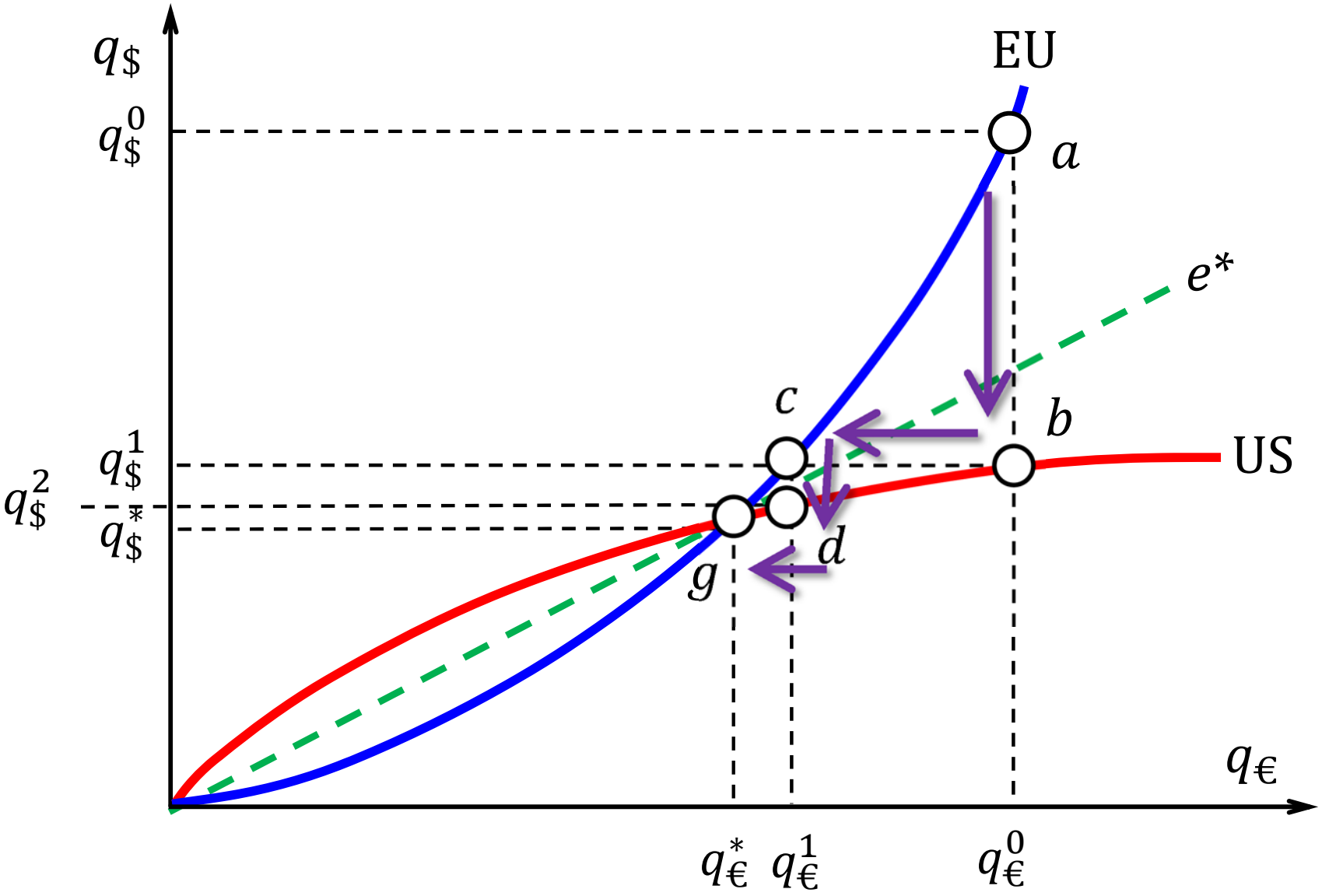
3. The currency market model

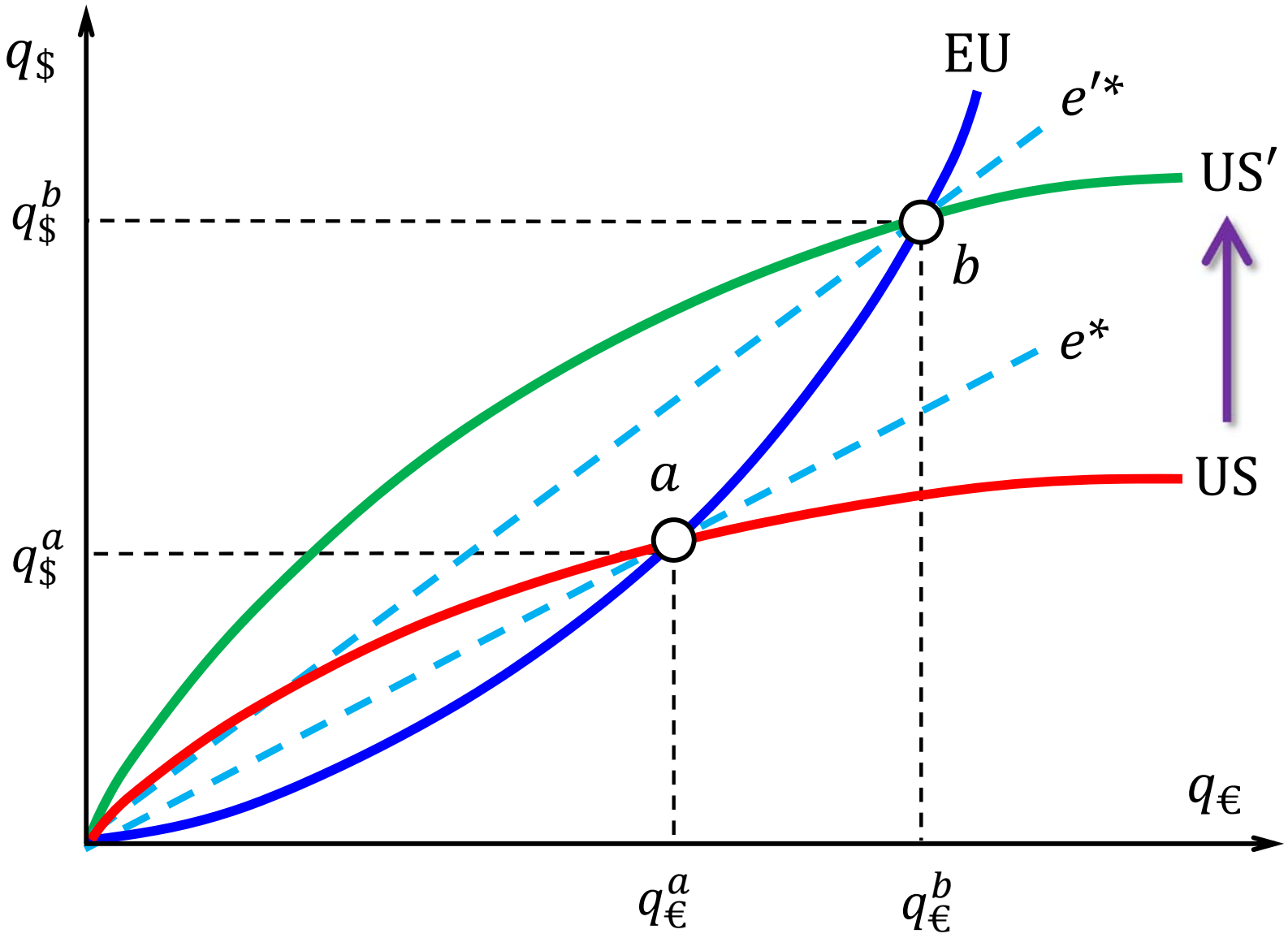
- Supply of euros: by Europeans (demand dollars)
- Demand for euros: by Americans (supply dollars)
- Equilibrium exchange rate e^*
- Comparative statics: impact on e^* of a change in
  - domestic GDP
  - foreign GDP
  - domestic inflation
  - foreign interest rates

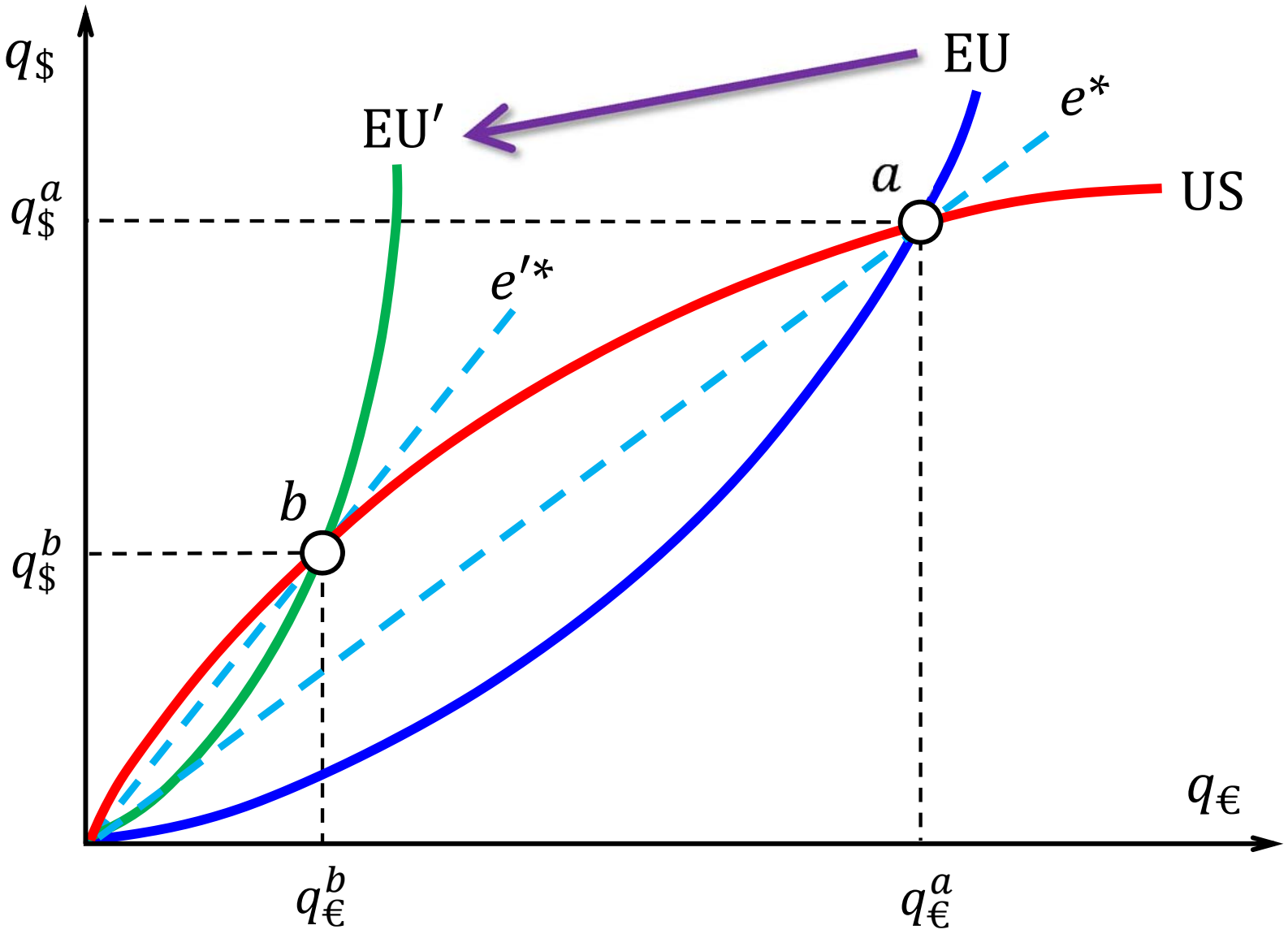

$q_\$$
EU
$q_\$^a$
a
$q_€$
$q_€^a$

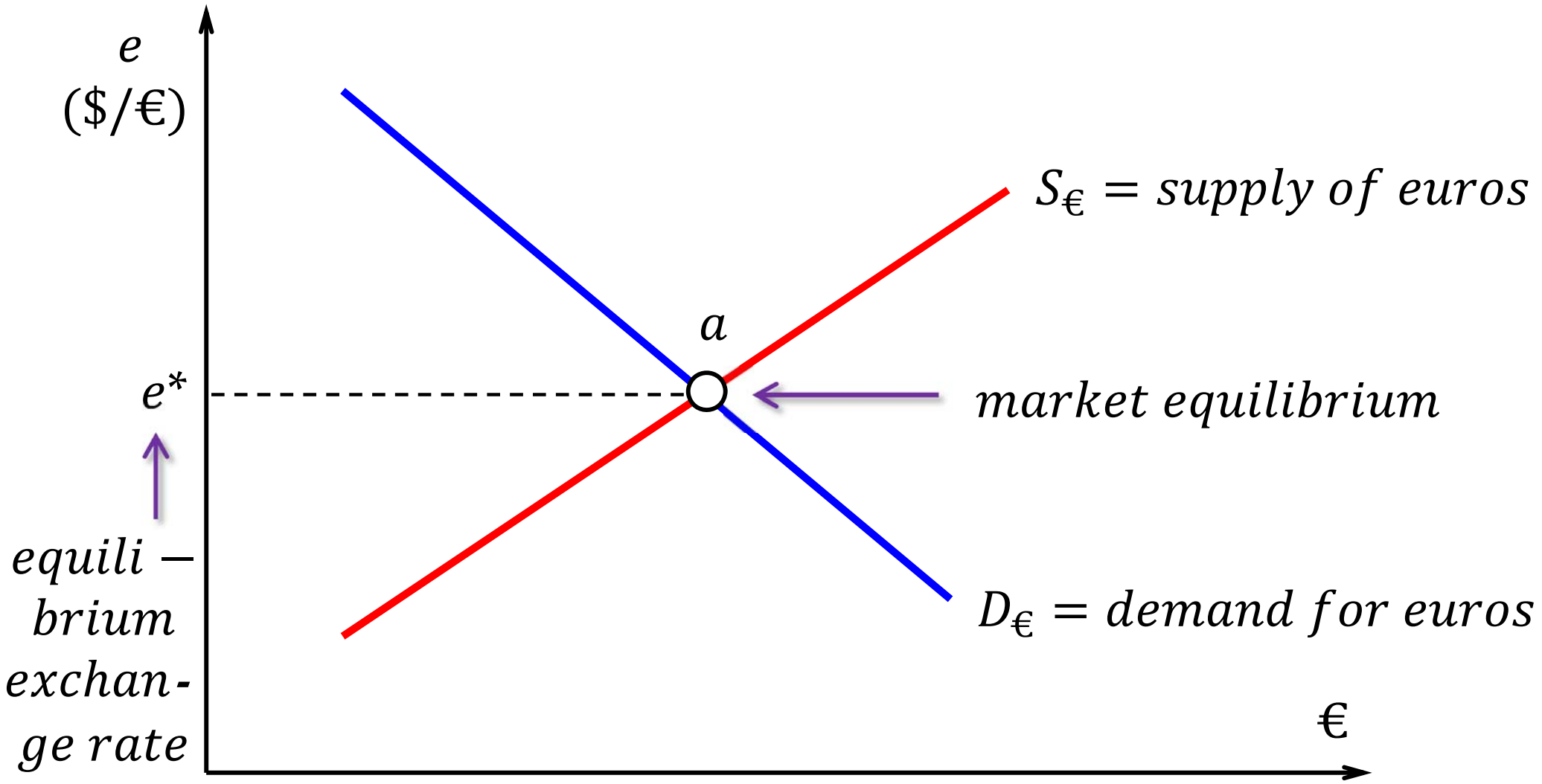

$q_\$$
US
a
$q_\$^a$
$q_€$
$q_€^a$


$q_\$$
$q^*_\$$
$q^2_\$$
$q^1_\$$
$q^0_\$$
$q^z_\$$
EU
e^*
US
e
g
c
d
a
b
z
$q_€$
$q^0_€$
$q^1_€$
$q^2_€$
$q^*_€$

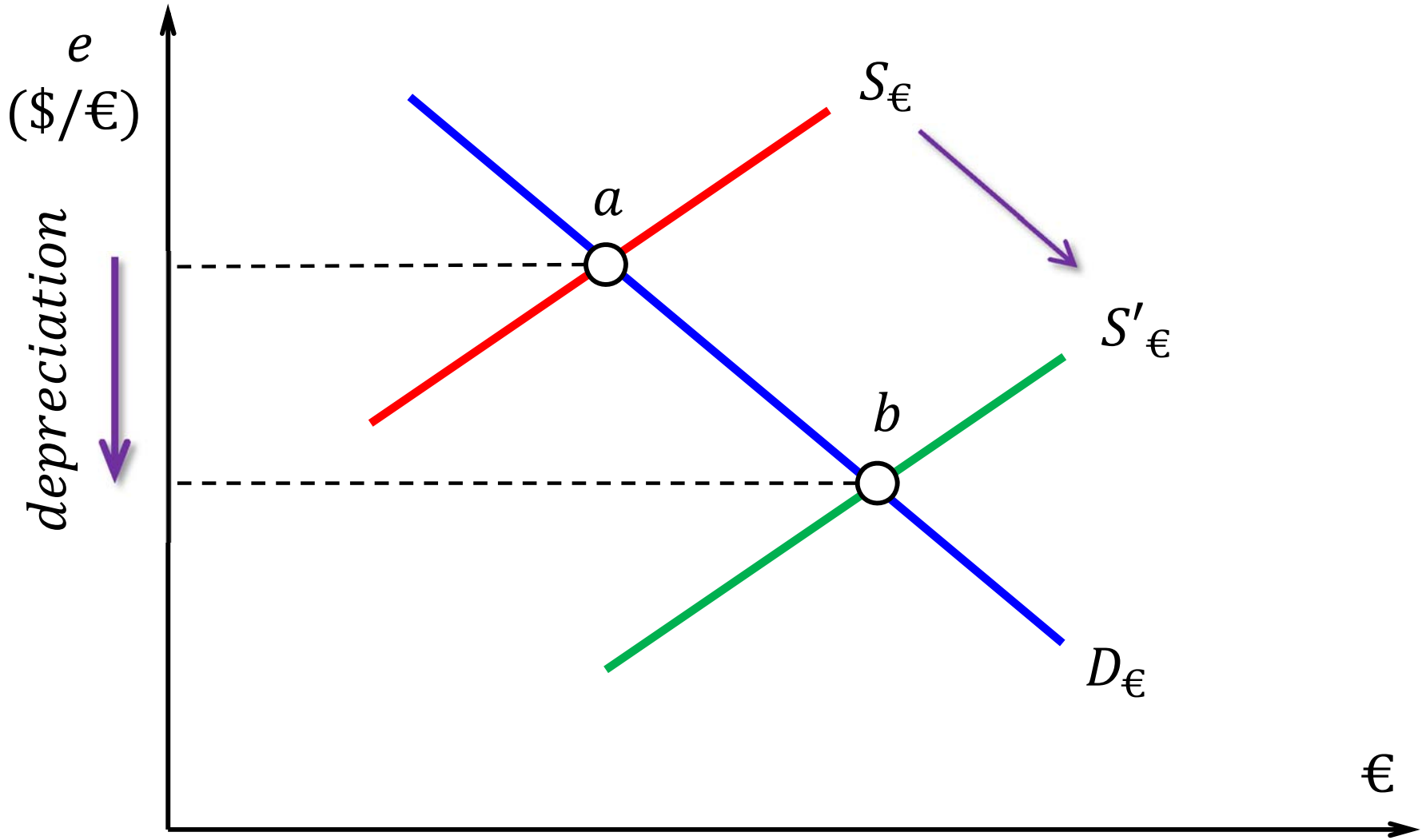

$q_\$$
$q_\$^0$
$q_\$^1$
$q_\$^2$
$q_\$^*$
EU
US
a
b
c
d
e^*
g
$q_€$
$q_€^*$
$q_€^1$
$q_€^0$


$q_\$$
EU
e'^*
US′
$q_\$^b$
b
e^*
a
US
$q_\$^a$
$q_€$
$q_€^a$
$q_€^b$

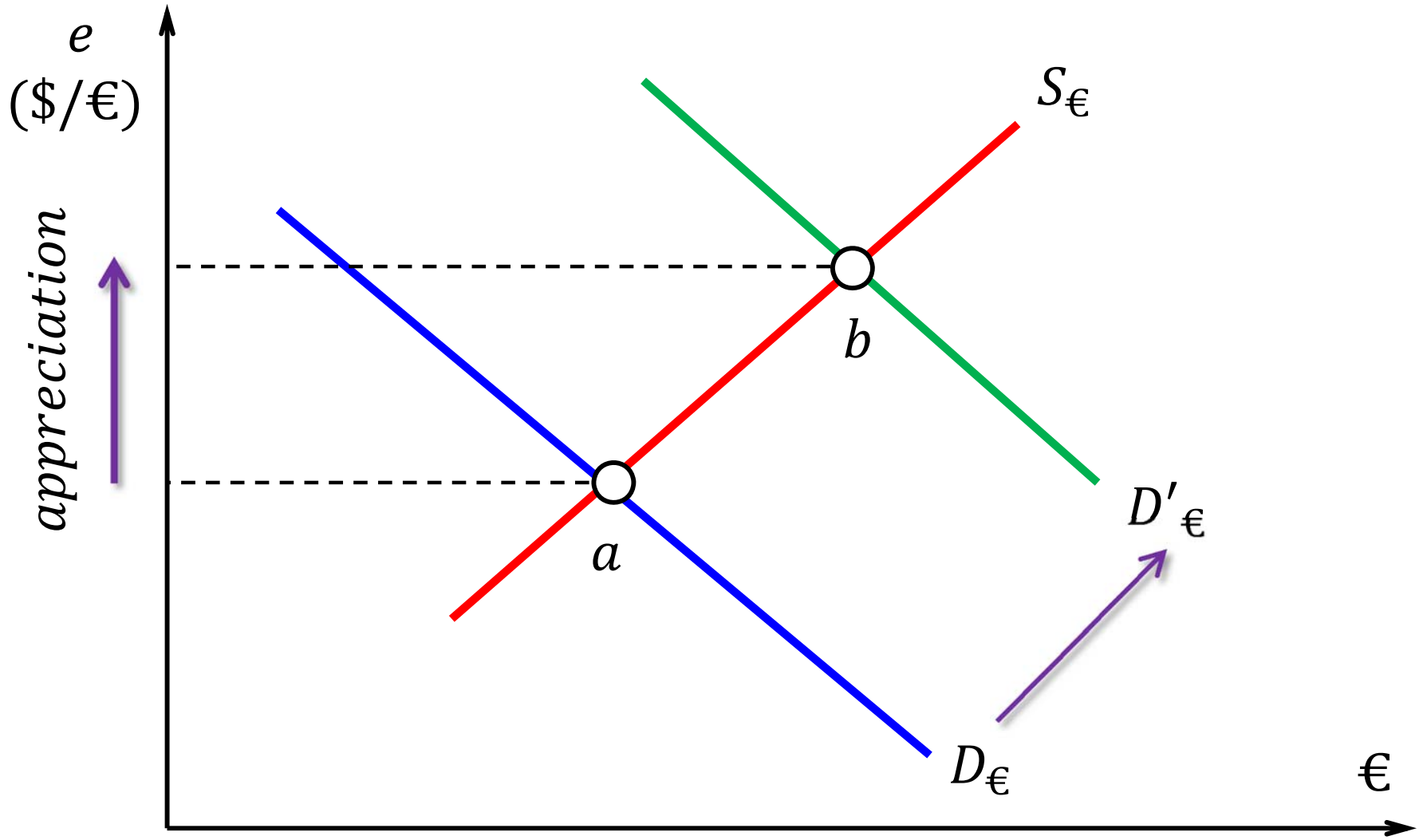

$q_\$$
EU
EU′
e^*
a
US
$q_\$^a$
e'^*
b
$q_\$^b$
$q_€$
$q_€^b$
$q_€^a$


e
($/€)
$S_€ = supply\ of\ euros$
a
e*
market equilibrium
equili −
brium
exchan-
ge rate
$D_€ = demand\ for\ euros$
€

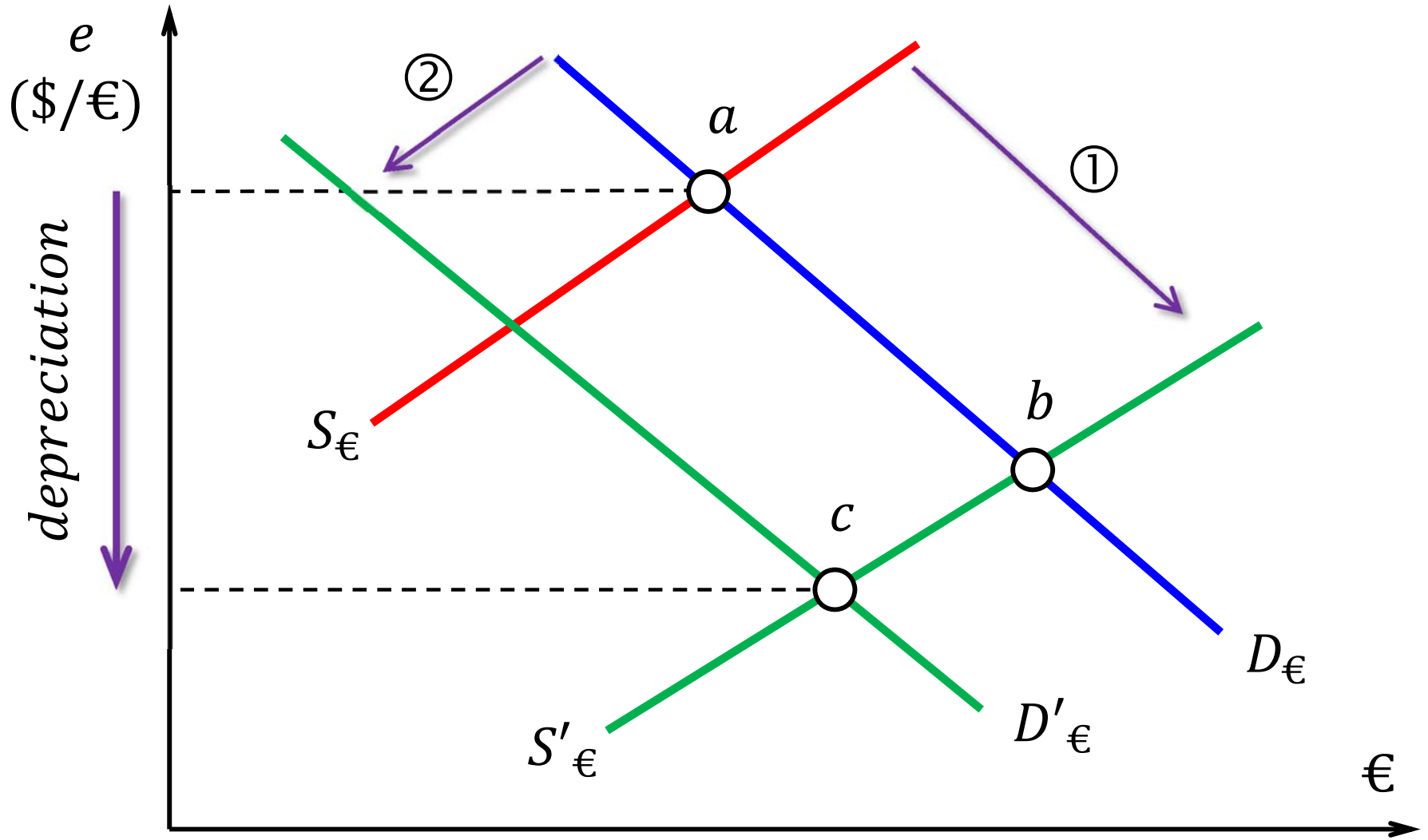
$$\uparrow \mathrm{GDP_{EU}} \Rightarrow \uparrow \mathrm{IM_{EU}} \Rightarrow \uparrow D_{\$} \Rightarrow \uparrow S_{€} \Rightarrow \downarrow e$$



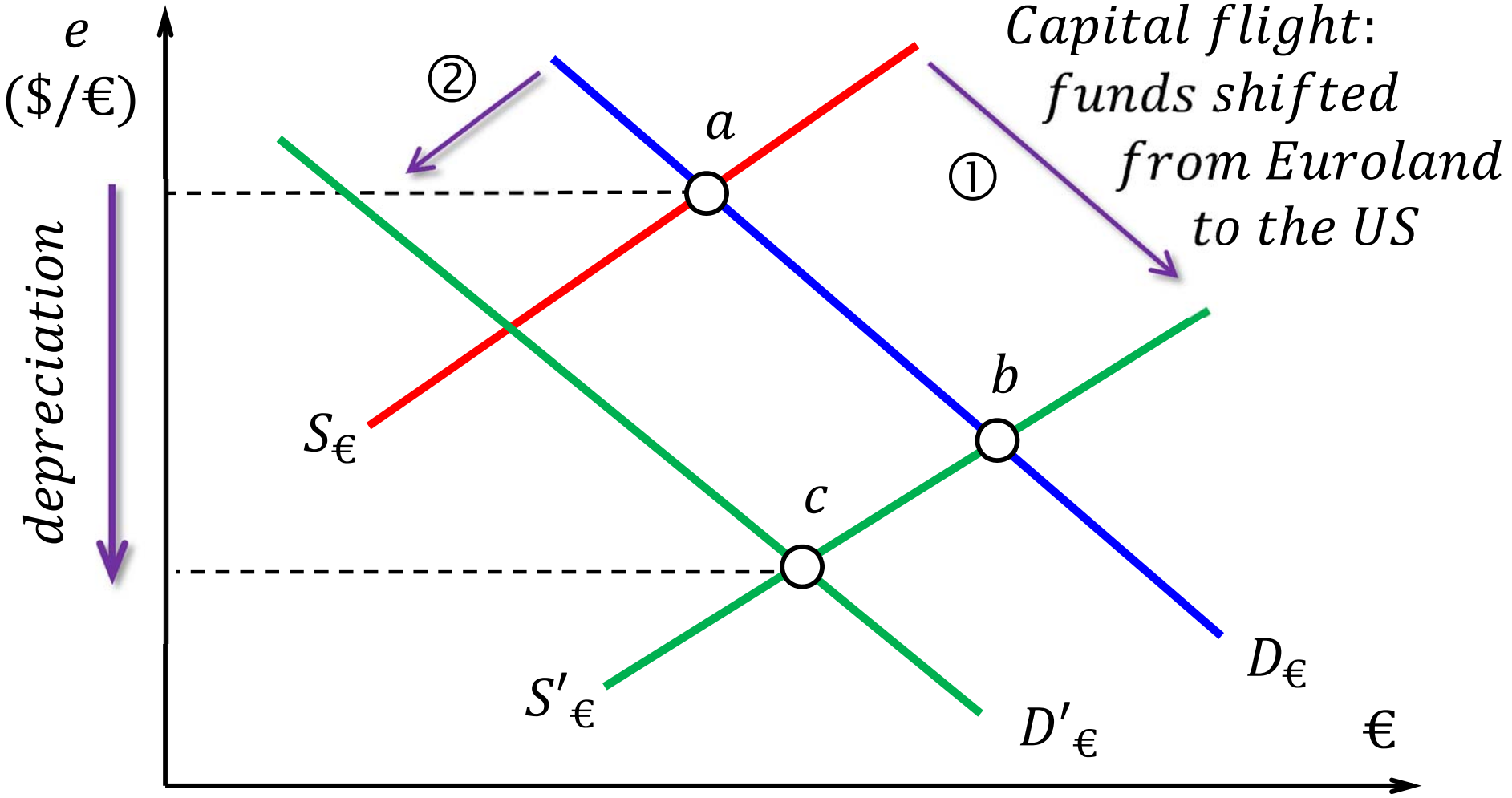
$$\uparrow \mathrm{GDP_{US}} \Rightarrow \uparrow \mathrm{IM_{US}} \Rightarrow \uparrow D_{€} \Rightarrow \uparrow e$$



$$\uparrow \pi_{EU} \Rightarrow \begin{cases} ① \uparrow IM_{EU} \Rightarrow \uparrow D_{\$} \Rightarrow \uparrow S_{€} \Rightarrow \downarrow e \\ ② \downarrow IM_{US} \Rightarrow \downarrow D_{€} \Rightarrow \downarrow e \end{cases}$$



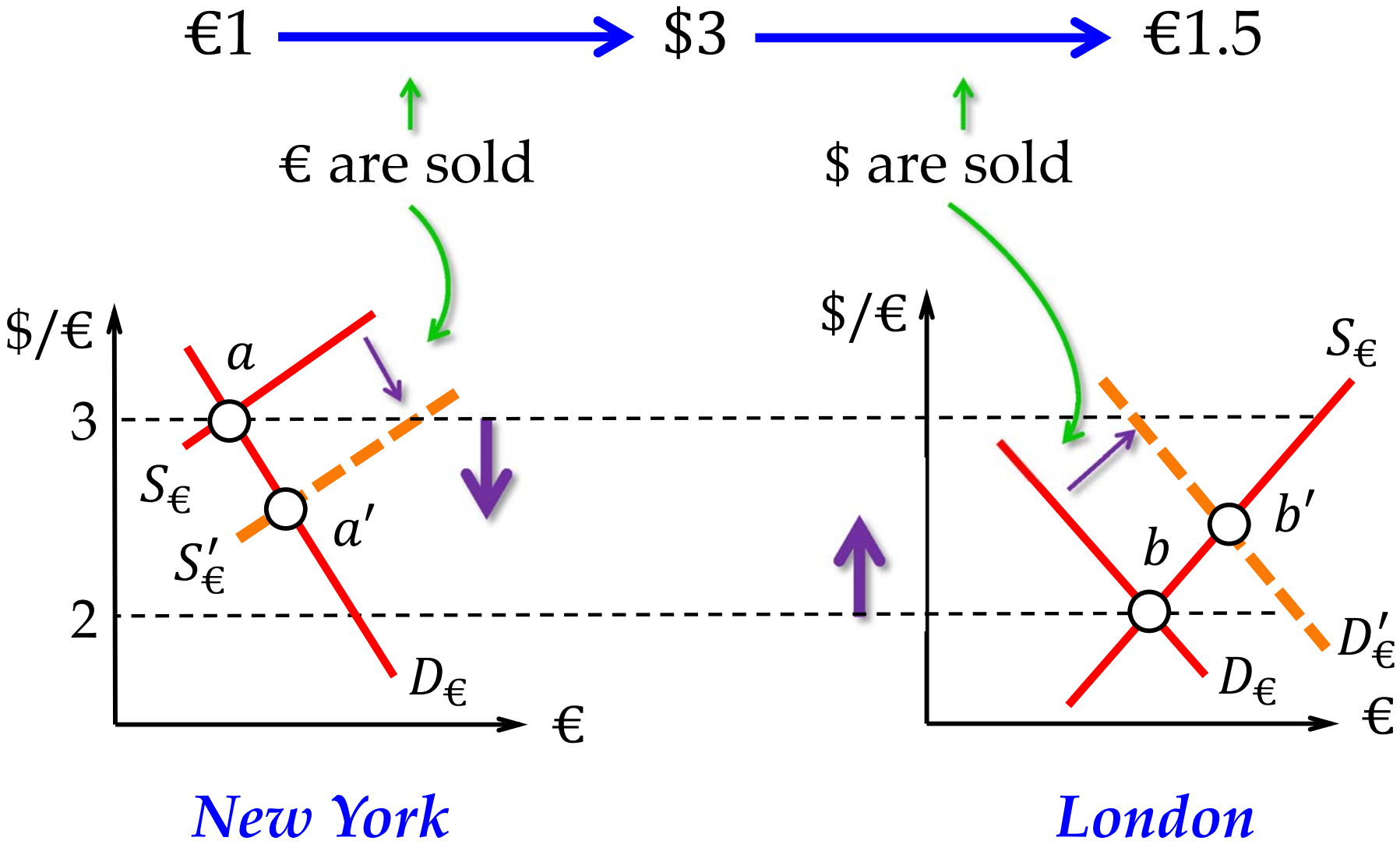
$$\uparrow i_{\text{US}} \Rightarrow \begin{cases} ① \nearrow \uparrow D^{\text{BY EUROPEANS}}_{\text{US-securities}} \Rightarrow \uparrow D_{\$} \Rightarrow \uparrow S_{€} \Rightarrow \downarrow e \\ ② \searrow \downarrow D^{\text{BY AMERICANS}}_{\text{EU-securities}} \Rightarrow \downarrow D_{€} \Rightarrow \downarrow e \end{cases}$$



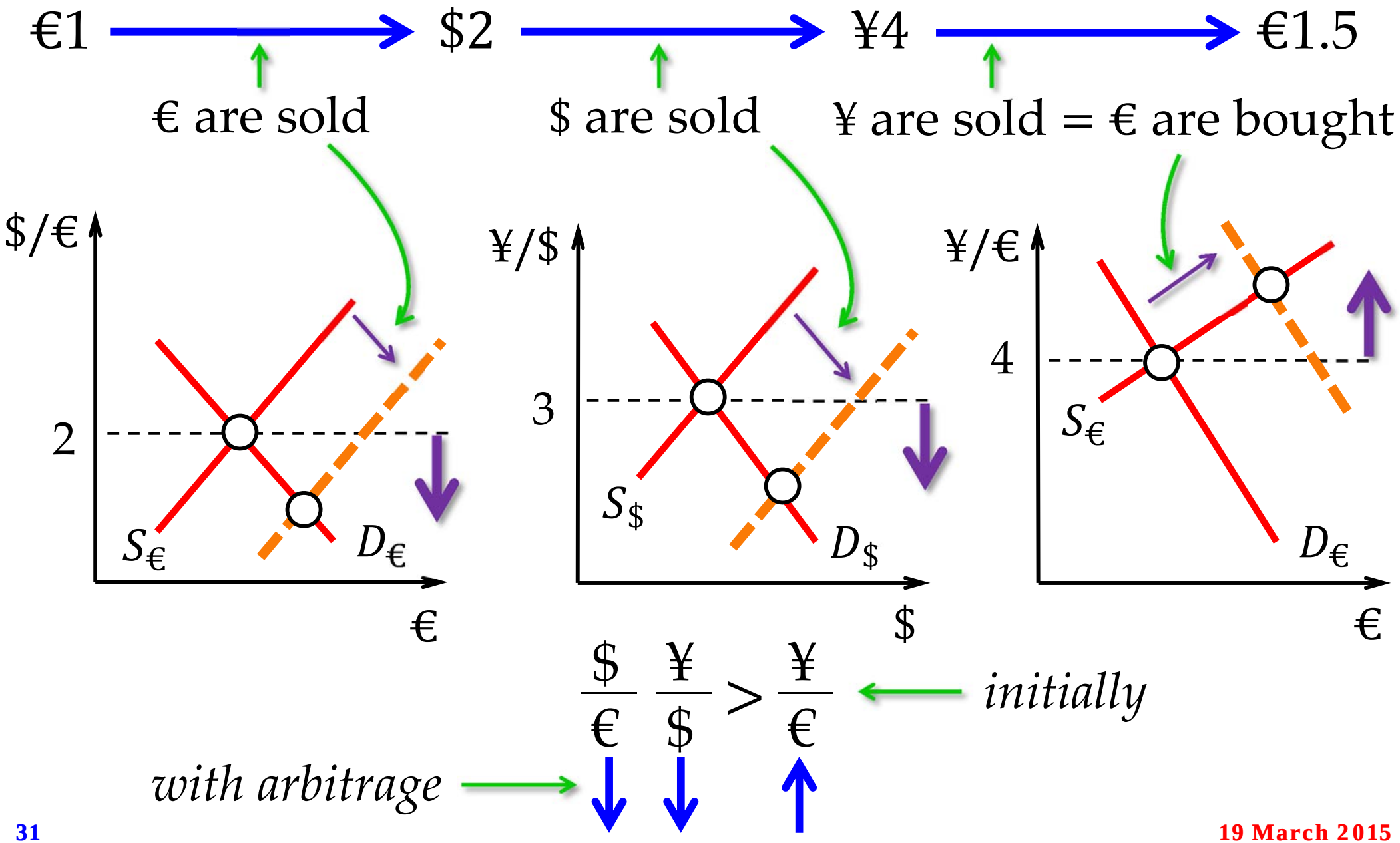
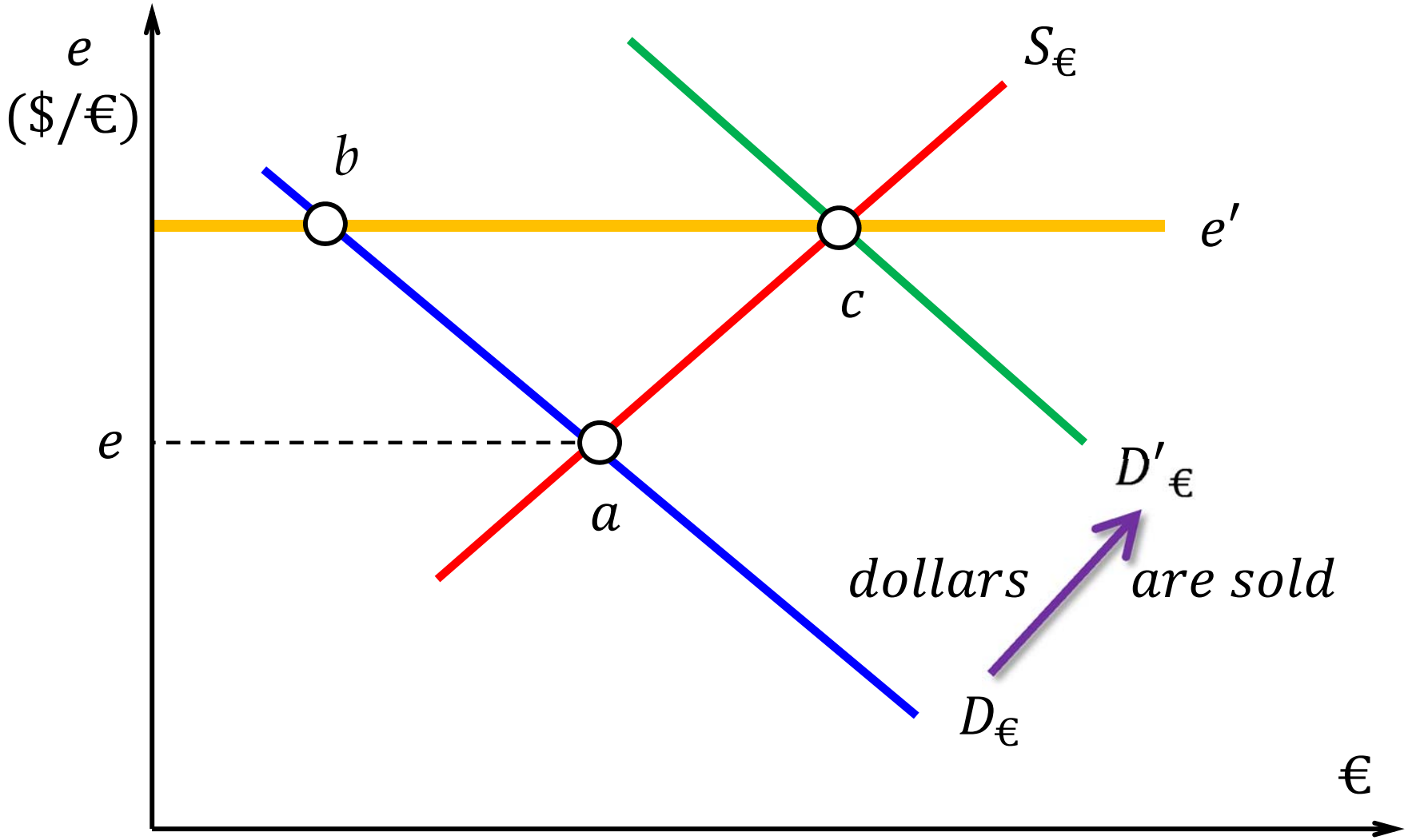
4. Arbitrage and speculation

- Spatial arbitrage – integrates currency markets geographically
- Triangular arbitrage – integrates different currency markets
- Speculation
  - going short – you buy expecting a price fall
  - going long – you buy expecting a price rise

Spatial arbitrage



Triangular arbitrage



Intervention in the currency market