



# Bank leverage and flow data: an early warning tool of risk-taking

**3<sup>rd</sup> EBA Policy Research Workshop**

***"How to measure the riskiness of banks"***

**London, November 2014**

**Javier Villar Burke**

**European Commission**



# Motivation

## Eurostoxx 50 Index



Source: Bloomberg

## Leverage of EA banks



Source: ECB and own calculations

"One of the underlying features of the crisis was the **build-up of excessive leverage** in the banking system. [...] During the most severe part of the crisis, the **banking sector was forced by the market to reduce its leverage** in a manner that amplified downward pressure on asset prices, further exacerbating the positive feedback loop between losses, declines in bank capital, and the contraction in credit availability" Basel III, paragraph 152



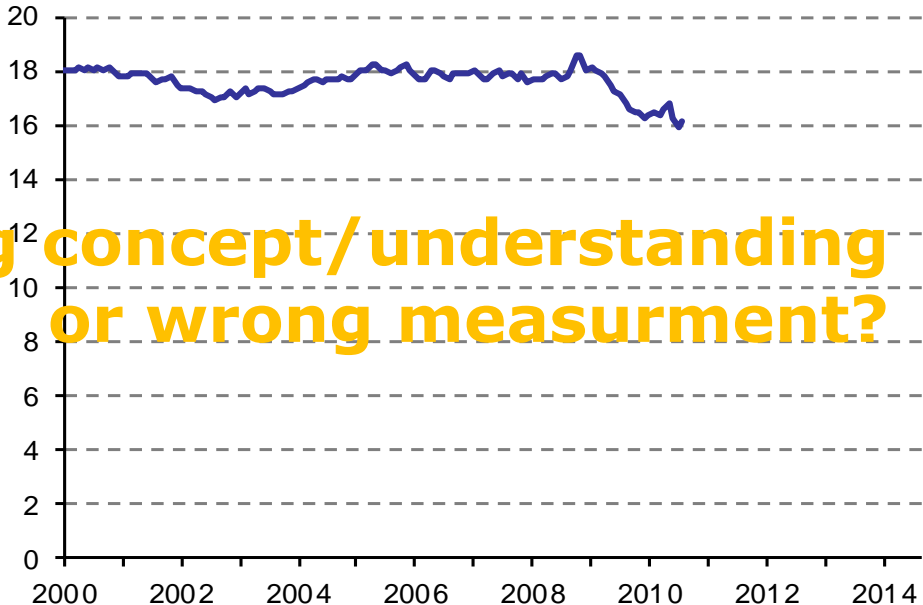
# Motivation

## Eurostoxx 50 Index



Source: Bloomberg

## Leverage of EA banks



Source: ECB and own calculations

Wrong concept/understanding or wrong measurement?

"One of the underlying features of the crisis was the **build-up of excessive leverage** in the banking system. [...] During the most severe part of the crisis, the **banking sector was forced by the market to reduce its leverage** in a manner that amplified downward pressure on asset prices, further exacerbating the positive feedback loop between losses, declines in bank capital, and the contraction in credit availability" Basel III, paragraph 152

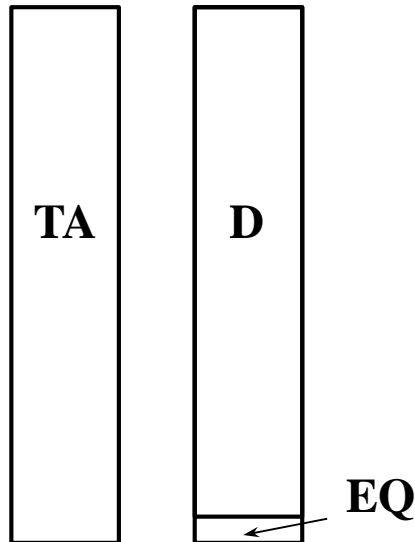


## Outline

- Basics: **definition** of leverage
  - Exercises
- Components: total assets and equity
- Marginal leverage ratio and its drivers
- Conclusions

# Basics: definition of leverage

## Balance sheet



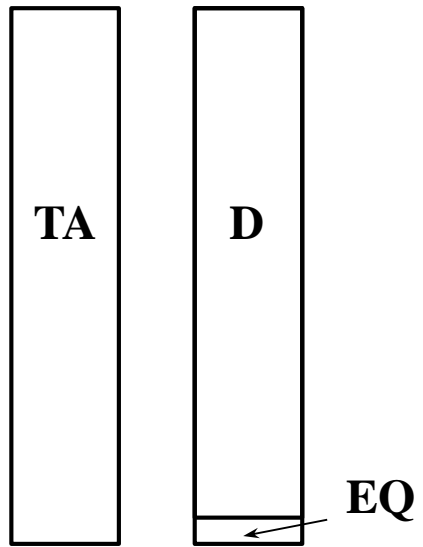
- Leverage: relative measure of debt

$$\frac{TA}{D} \quad \frac{D}{TA} \quad \frac{TA}{EQ} \quad \frac{EQ}{TA} \quad \frac{EQ}{D} \quad \frac{D}{EQ}$$



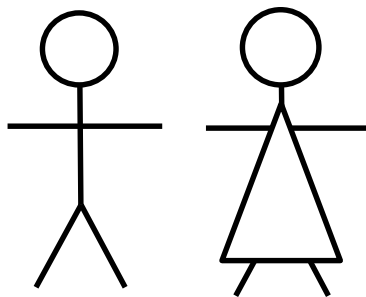
# Basics: definition of leverage

## Balance sheet



- Leverage: relative measure of debt

$$\frac{TA}{D} \quad \frac{D}{TA} \quad \frac{TA}{EQ} \quad \frac{EQ}{TA} \quad \frac{EQ}{D} \quad \frac{D}{EQ}$$



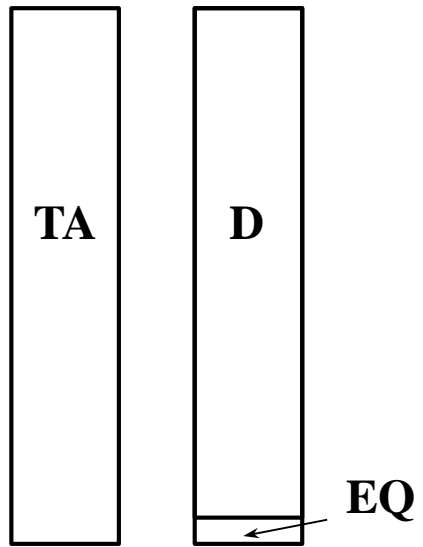
Subset1 vs. Subset2  
 Subset1 vs. Total

40      60      => 66% or 40% men?



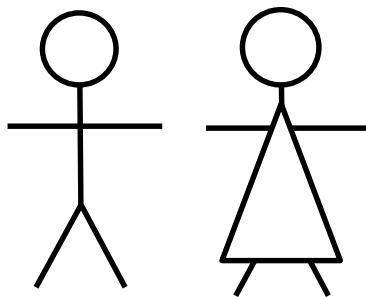
# Basics: definition of leverage

## Balance sheet



- Leverage: relative measure of debt

$$\frac{TA}{D} \quad \frac{D}{TA} \quad \frac{TA}{EQ} \quad \frac{EQ}{TA} \quad \frac{EQ}{D} \quad \frac{D}{EQ}$$

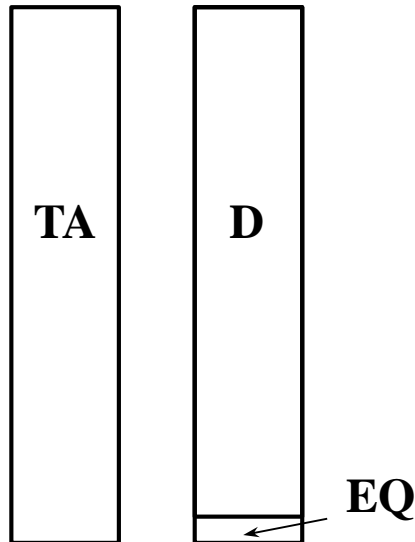


40      60      => 66% or 40% men?

Subset1 vs. Subset2  
 Subset1 vs. Total

# Basics: definition of leverage

## Balance sheet



- Leverage: relative measure of debt

$$\frac{TA}{D}$$

$$\frac{D}{TA}$$

$$\frac{TA}{EQ}$$

$$\frac{EQ}{TA}$$

~~$$\frac{EQ}{D}$$~~

~~$$\frac{D}{EQ}$$~~







## Exercise 1

- Avian influenza: Type A and Type B
  - Type A: **24% mortality rate** in birds
  - Type B: **500 dead animals** per 10,000 infected
- There is a risk of human infection
- Vaccinations are available but incompatible
- **Which one will you choose to receive, A or B?**



## Exercise 2

- Two car owners seek to reduce their costs
  - Tom: **12** km-per-litre => **14** km-per-litre
  - María: **30** km-per-litre => **40** km-per-litre
- Both drivers travel **equal distances** over a year
- **Who will save more** by switching, **Tom or María?**



# Results?

Exercise 1: Type A or Type B?

Exercise 2: Tom or María?



## Exercise 1

- Type A: **24% mortality** = 2,400 dead/10,000
- Type B: 5% mortality = **500 dead/10,000**
  
- **Denominator neglect:** Only the headline figure of the numerator is taken into consideration in quick assessments
- The image of a number of animals is more vivid than a percentage and has more psychological influence

Source: Adapted from Kahneman (2011): *Thinking fast and slow*.



## Exercise 2

- Tom: **12** km-per-litre => **14** km-per-litre
  - **16.7% increase in distance**
- María: **30** km-per-litre => **40** km-per-litre
  - **33.3% increase in distance**
- Distance vs. Consumption
- Tom: **8.3** litres / 100 km => **7.1** litres / 100 km
  - **1.2 litres saved** every 100 km
- María: **3.3** litres / 100 km => **2.5** litres / 100 km
  - **0.8 litres saved** every 100 km



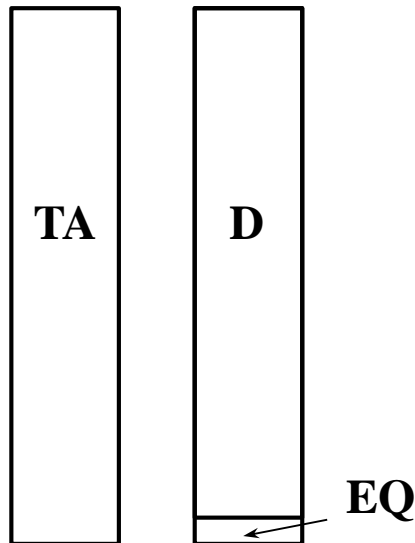
## Exercise 2

- **Wrong framing:** The misleading intuitions fostered by the km/l are likely to mislead decisions makers as well as car buyers
- **Right framing:** What we are interested in should appear on the numerator

Source: Adapted from Kahneman (2011): *Thinking fast and slow*.

## Basics: definition of leverage

### Balance sheet



- Leverage: relative measure of **debt**

$$\frac{TA}{D}$$

$$\frac{D}{TA}$$

$$\frac{TA}{EQ}$$

$$\frac{EQ}{TA}$$

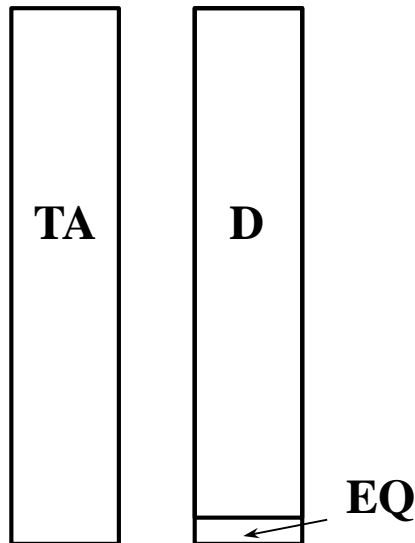
$$\frac{EQ}{D}$$

$$\frac{D}{EQ}$$

- **Right framing:** What we are interested in should appear on the **numerator**

## Basics: definition of leverage

### Balance sheet



- Leverage: relative measure of **debt**

$$\cancel{\frac{TA}{D}} \quad \frac{D}{TA} \quad \frac{TA}{EQ} \quad \frac{EQ}{TA} \quad \cancel{\frac{EQ}{D}} \quad \cancel{\frac{D}{EQ}}$$

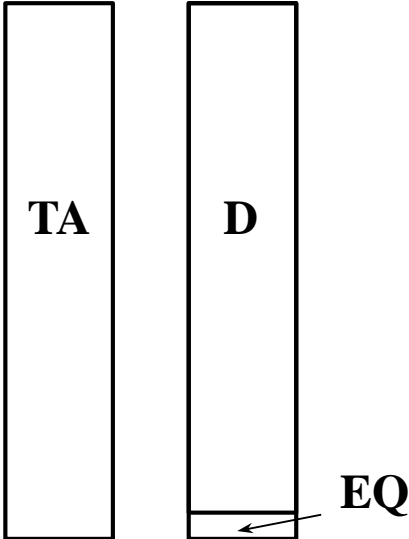

- **Right framing:** What we are interested in should appear on the **numerator**





# Basics: definition of leverage

## Balance sheet



- Leverage: relative measure of **debt**

$$\begin{array}{ccccccc}
 \cancel{\frac{TA}{D}} & \frac{D}{TA} & \frac{TA}{EQ} & \frac{EQ}{TA} & \cancel{\frac{EQ}{D}} & \cancel{\frac{D}{EQ}} & \\
 & & \frac{EQ}{D + EQ} & & & & 
 \end{array}$$

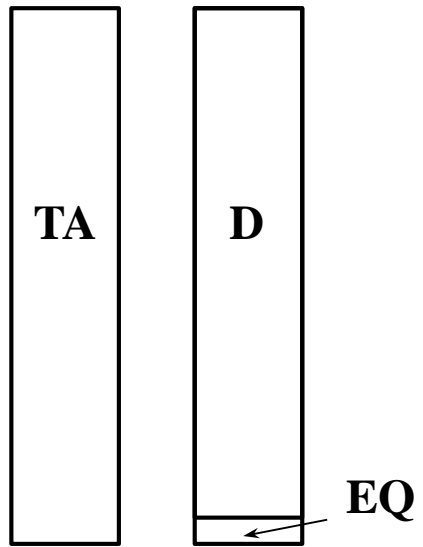
The diagram shows several mathematical expressions. The first two are  $\frac{TA}{D}$  (crossed out) and  $\frac{D}{TA}$ . The next two are  $\frac{TA}{EQ}$  and  $\frac{EQ}{TA}$ , both circled in yellow. The last two are  $\frac{EQ}{D}$  (crossed out) and  $\frac{D}{EQ}$  (crossed out). Below these is the expression  $\frac{EQ}{D + EQ}$ . A blue arrow points from the circled  $\frac{EQ}{TA}$  term towards the 'Right framing' bullet point below.

- **Right framing:** What we are interested in should appear on the **numerator**

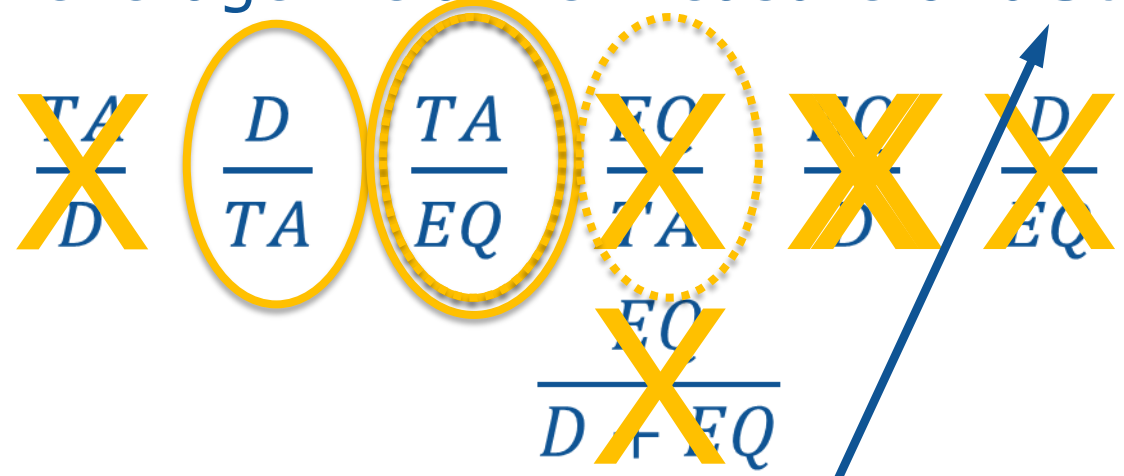


# Basics: definition of leverage

## Balance sheet



- Leverage: relative measure of **debt**



- **Right framing:** What we are interested in should appear on the **numerator**



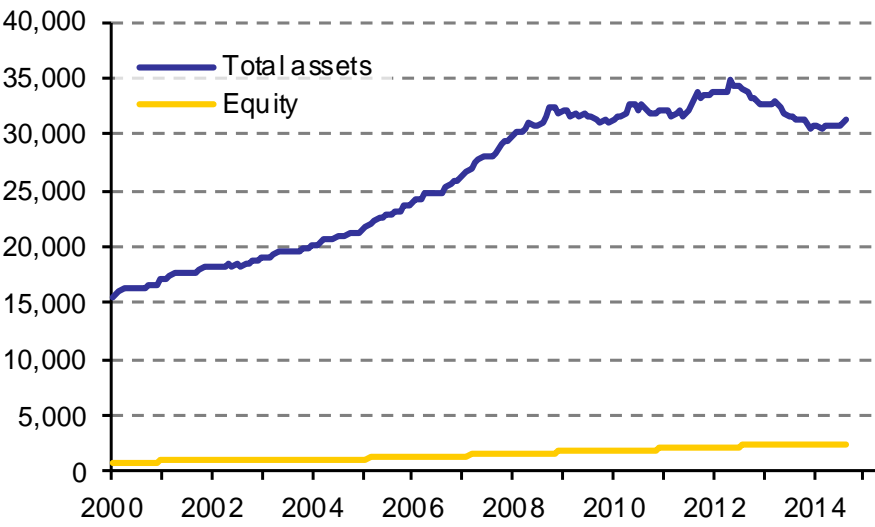
## Outline

- Basics: definition of leverage
- **Components: total assets and equity**
  - Volumes
  - Growth rates
  - Flows
- Marginal leverage ratio and its drivers
- Conclusions



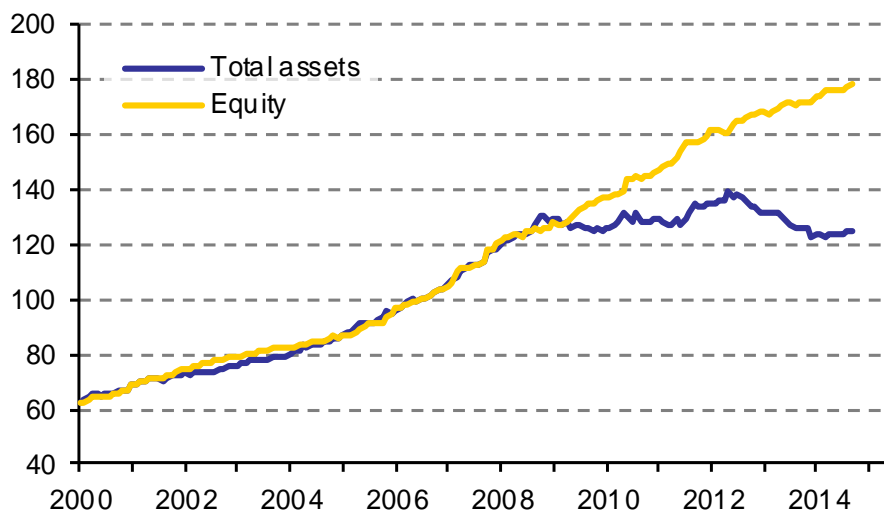
# Leverage components

EA banks, € billion



Source: ECB

EA banks, Index: 2006 = 100



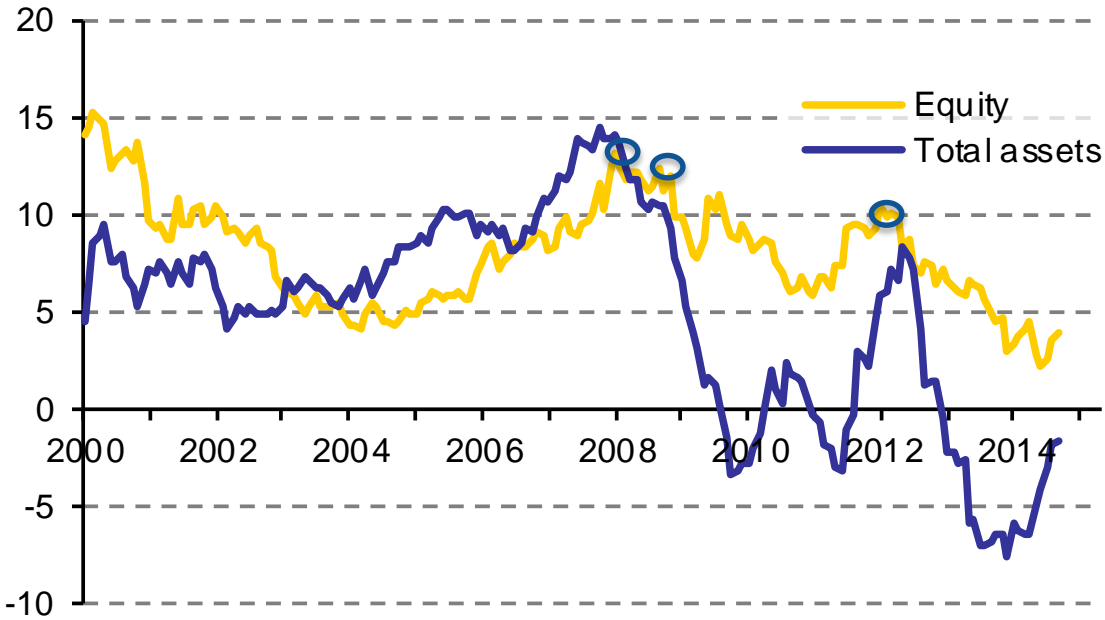
Source: ECB and own calculations





# Annual growth rates

EA banks, %



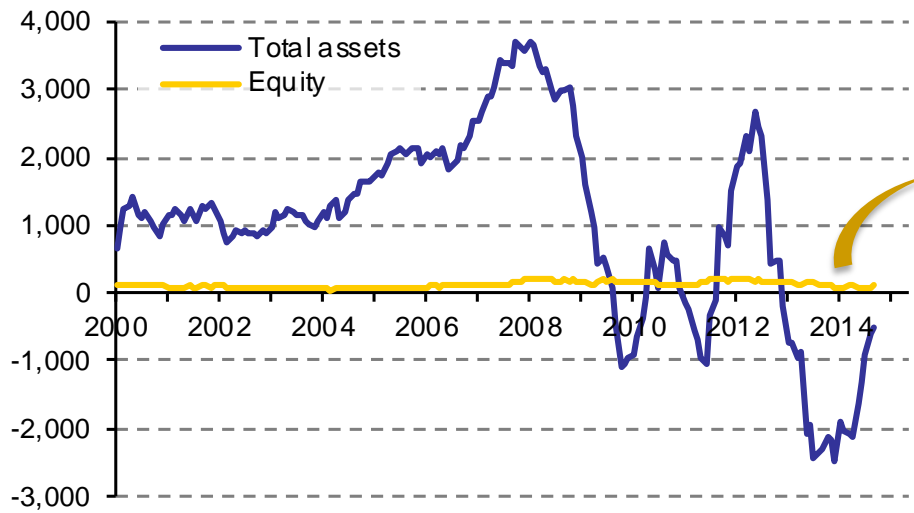
Source: ECB





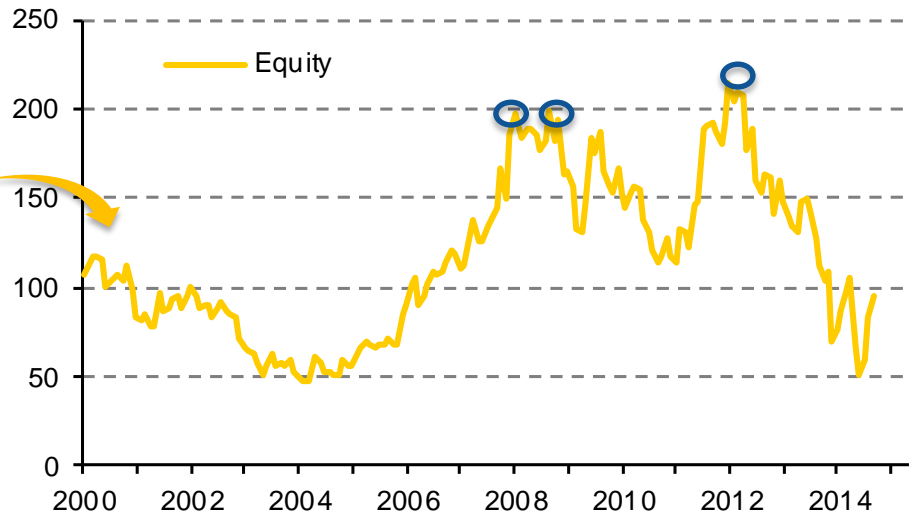
# Net annual flows

EA banks, € billion



Source: ECB and own calculations

EA banks, € billion



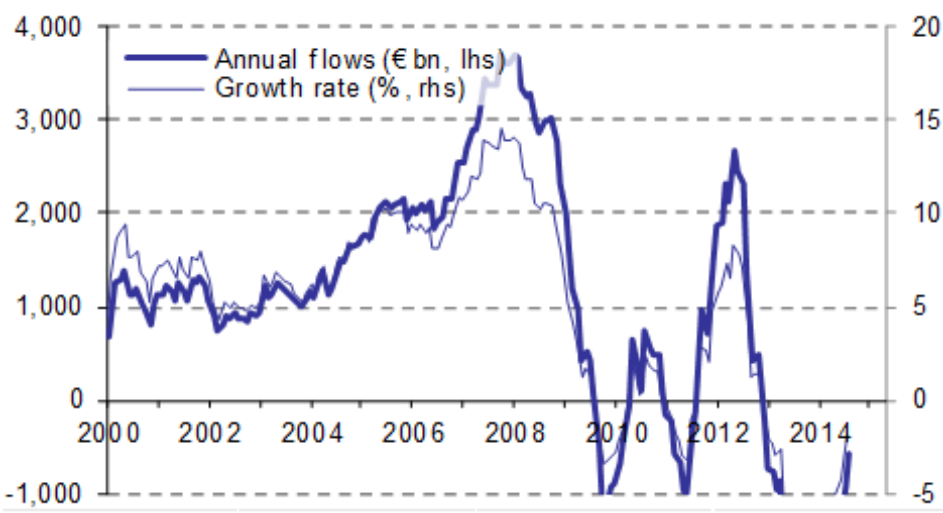
Source: ECB and own calculations





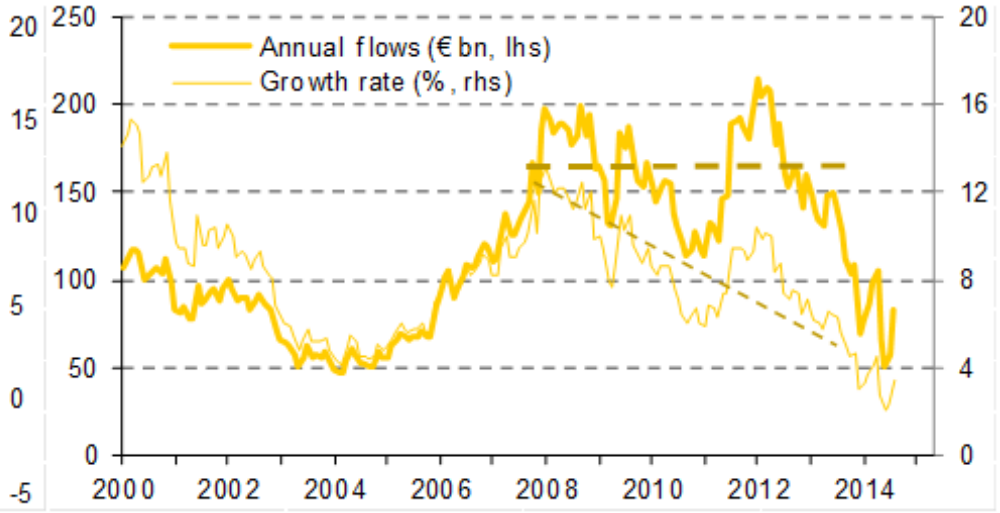
# Growth rates vs. net annual flows

**Total assets, EA banks**



Source: ECB and own calculations

**Equity, EA banks**



Source: ECB and own calculations





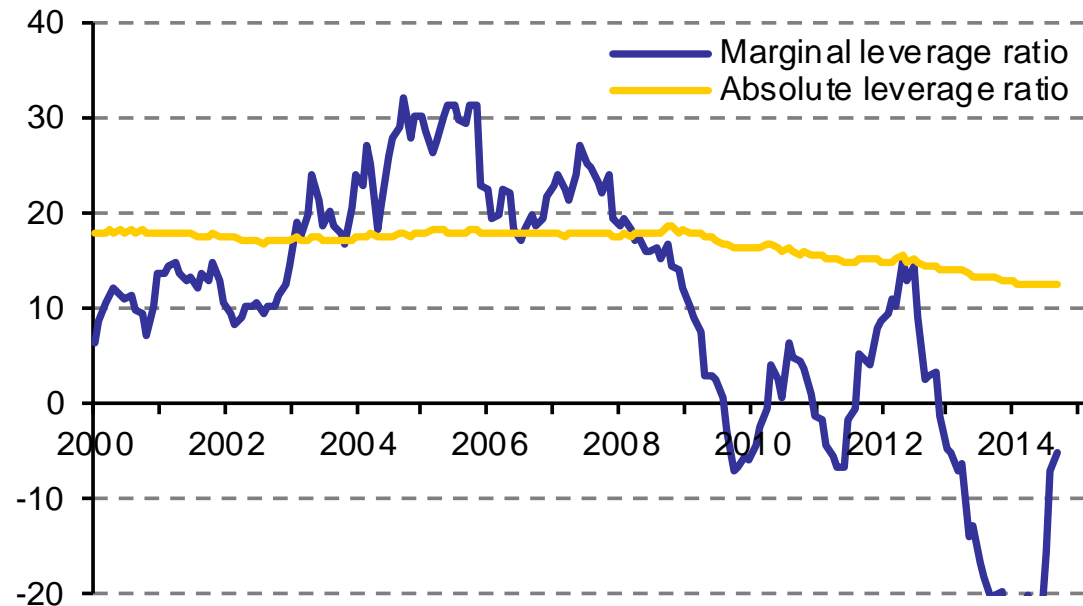
## Outline

- Basics: definition of leverage
- Components: total assets and equity
- **Marginal leverage ratio and its drivers**
  - Expansion of assets and funding
  - Some country data
- Conclusions



# Marginal leverage ratio

EA banks, number of times



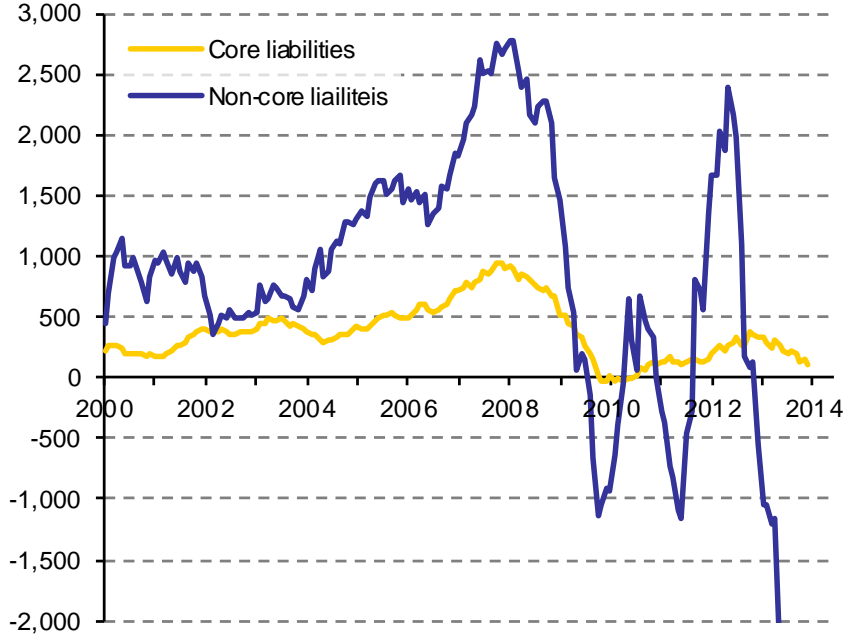
Source: ECB and own calculations

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# Stability of funding sources

## Funding of banks, EA banks Net annual flows, € billion

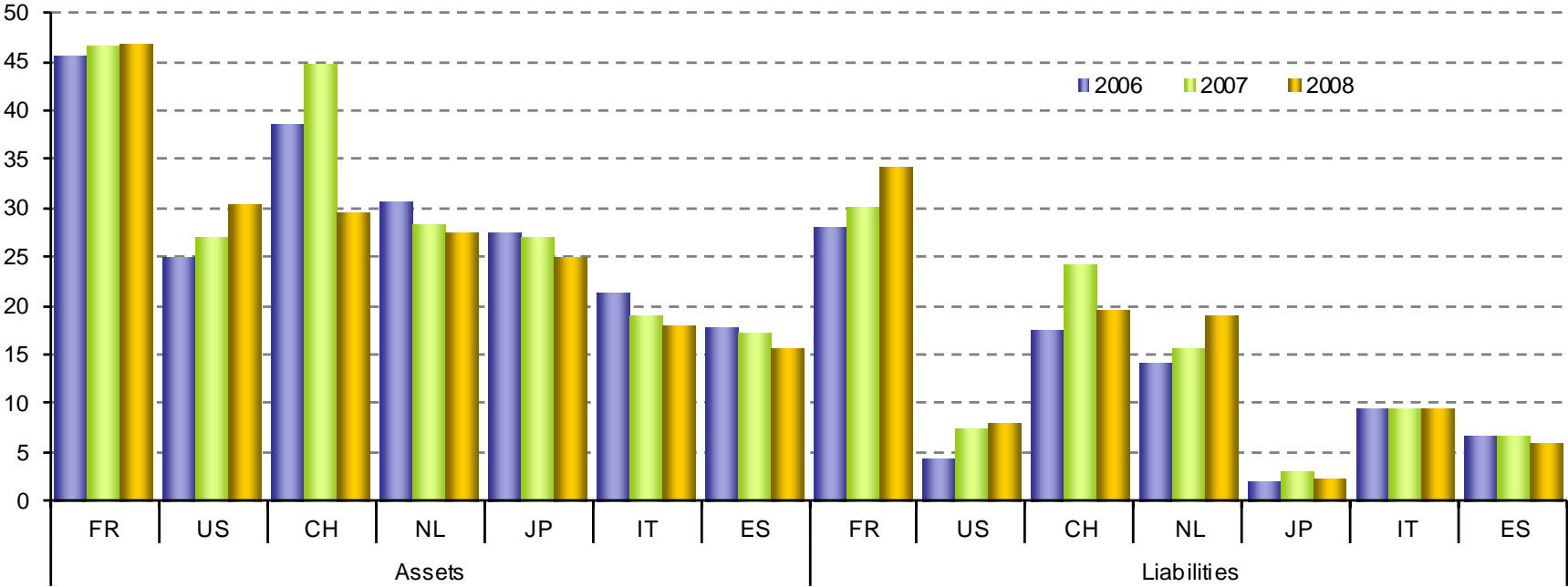


Source: ECB and own calculations



# Market value of assets and liabilities

## Share of fair value assets and liabilities, %

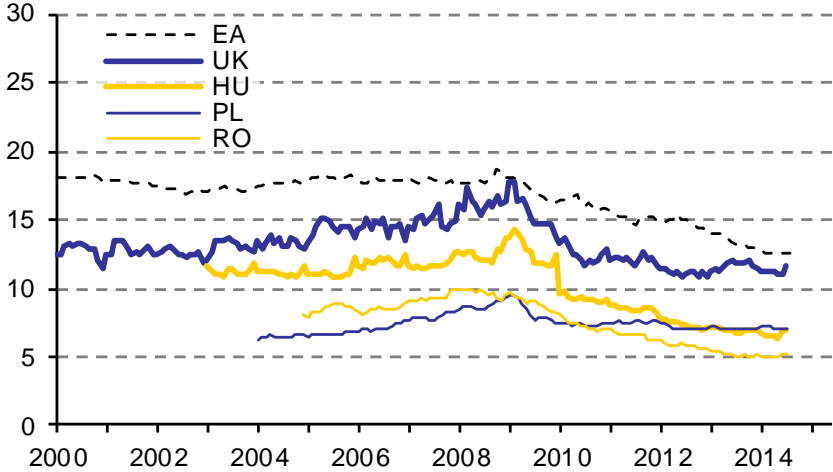
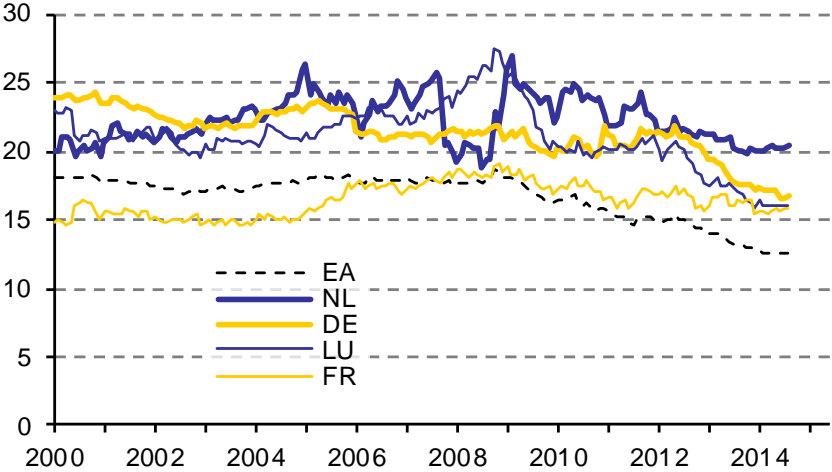
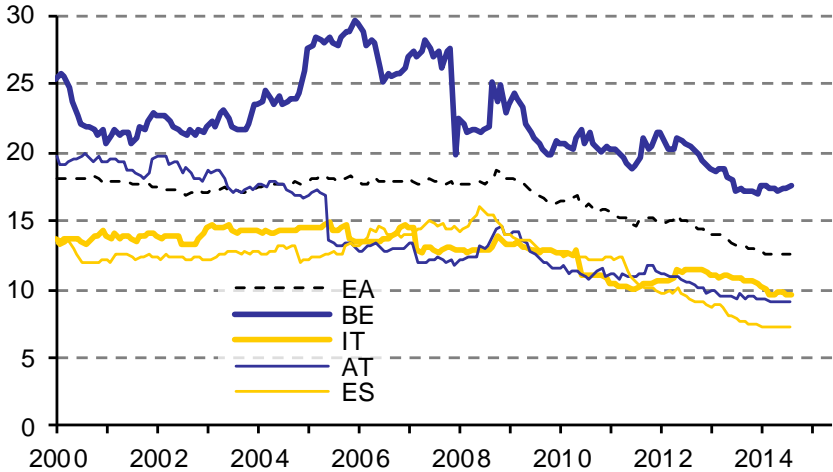
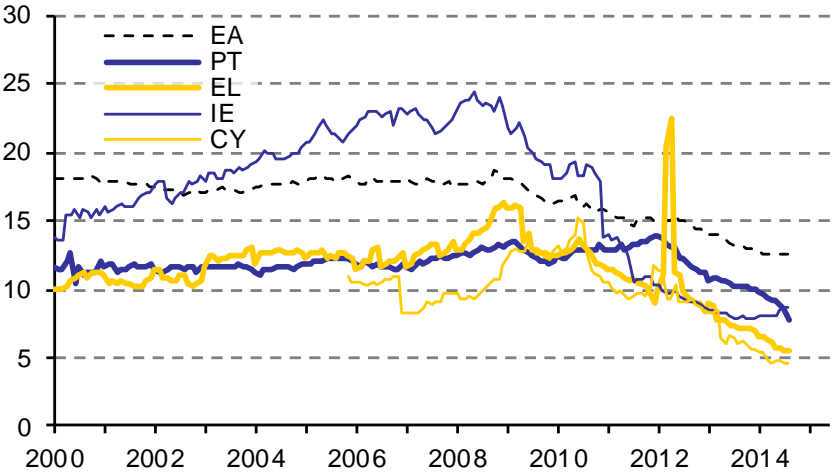


Source: BIS



# Country data

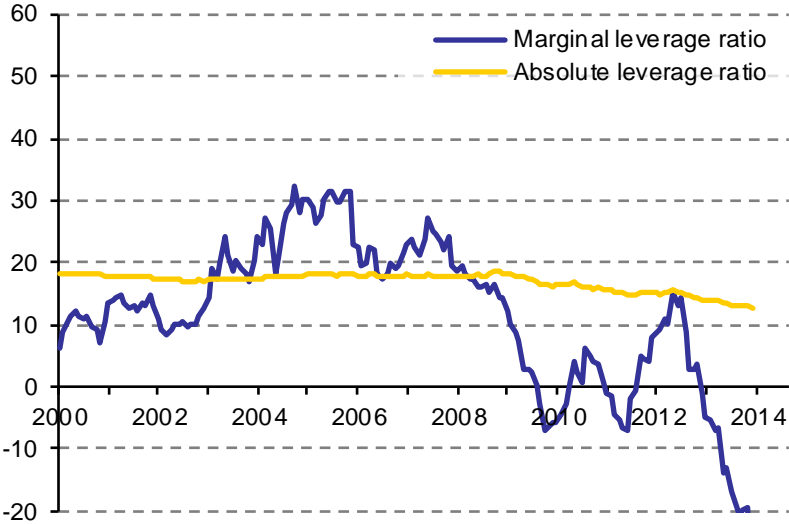
## Absolute leverage ratio, number of times



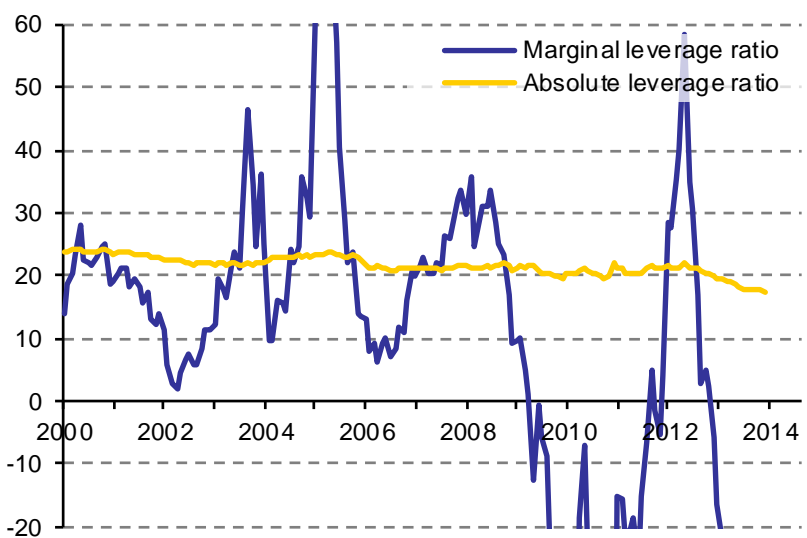


European Commission

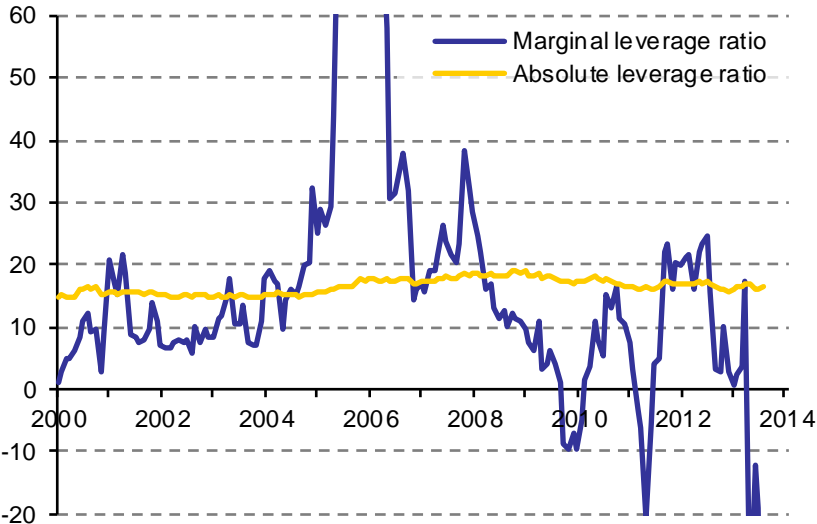
### Euro Area



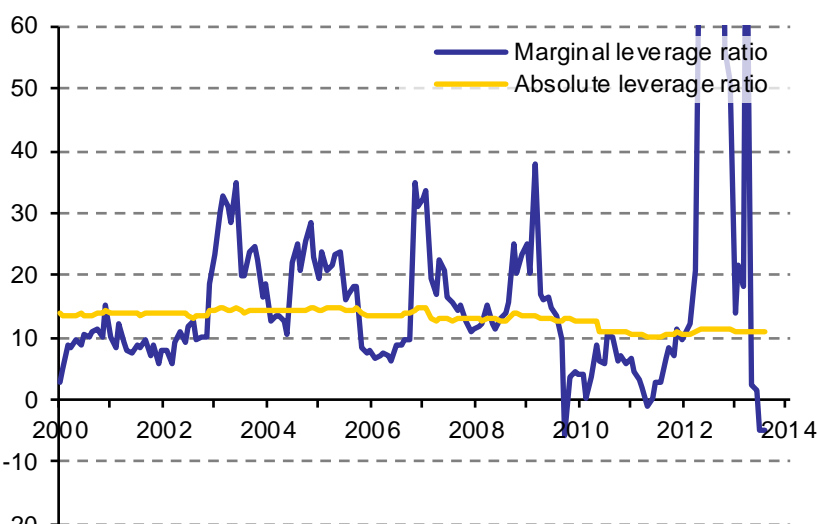
### Germany



### France



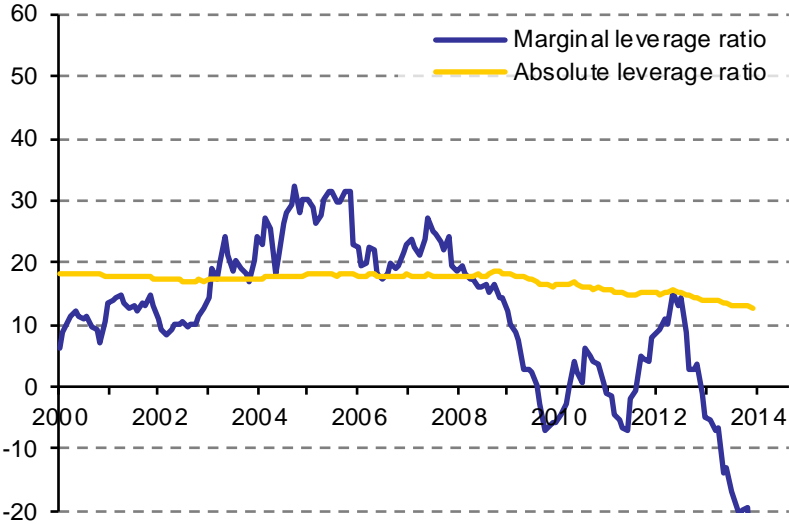
### Italy



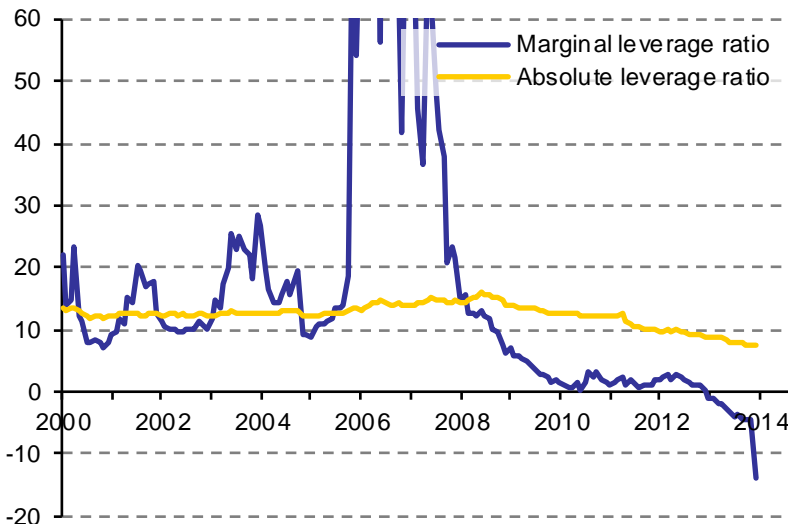


European Commission

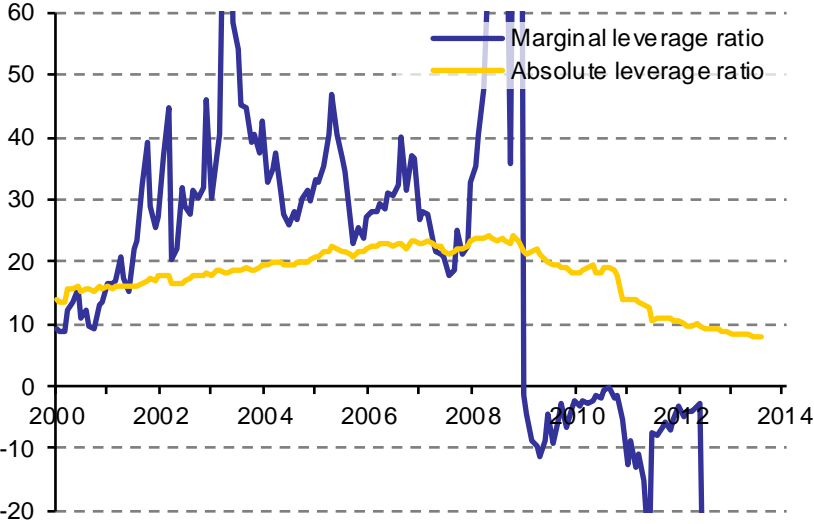
### Euro Area



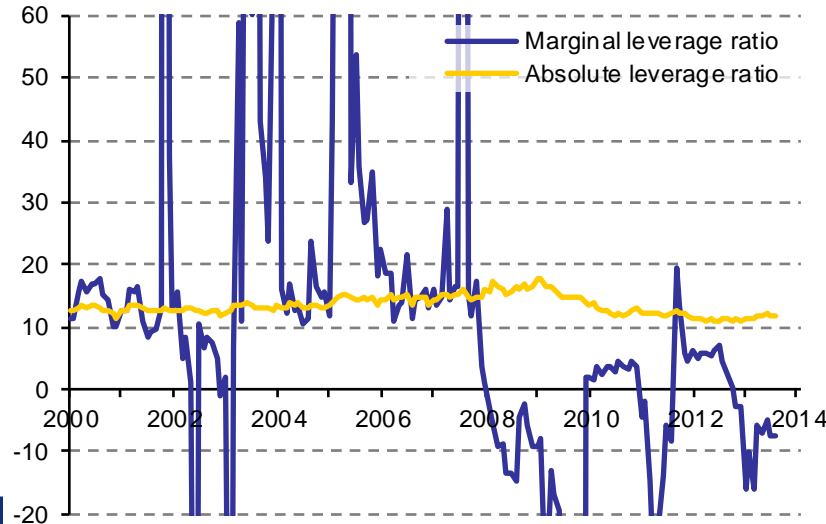
### Spain



### Ireland



### The UK





## Conclusions

- Traditional leverage ratio conceals developments
- Leverage = debt in relative terms
  - Avoid denominator neglect => Debt in numerator
  - Use the right frame => Debt in numerator
- Flows => Marginal leverage ratio
  - Early warning for in-depth analysis
  - Flows: useful tool in other areas (beyond leverage analysis)
- Drivers
  - (Non) stability of funding sources
  - Financial assets => influence of market valuation



# Bank leverage and flow data: an early warning tool of risk-taking

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