Credit Risk and Capital Requirements under Basel II

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Outline of the talk

1. An overview of capital requirements
2. Basel I *vs* Basel II
3. An application to the Portuguese banking system
4. Conclusions

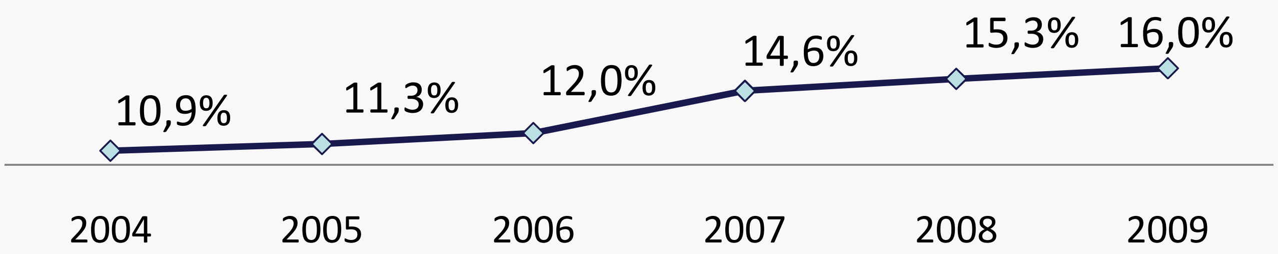
Capital requirements (CR)

• Capital Requirements: Banks have to be financed by the shareholders, not solely relying on deposits and other debt

• CR are important in terms of

+ financial stability
- banks profitability

• CR account for a big value in economy (as a % of GDP)



Basel Capital Accords

- How capital requirements are determined?

$$\frac{\text{Capital Requirements}}{\text{Risk weighted assets (RWA)}} = 8\%$$

- Under **Basel I** (1988) the weights only depend on the type of credit (e.g. sovereign 0%; mortgage 50% and corporate 100%)

- Example: 100 million euros exposure

Corporate		*Mortgage*	
Loans =100	*CR =**8***	*Loans =100*	*CR =**4***
	*Deposits =**92***		*Deposits =**96***

The Basel II in place...

- Under **Basel II** (2004) the RWA depend on the **credit risk drivers of each exposure**.

Risk drivers

- Probability of Default (PD)
- Loss Given Default (LGD)
- Exposure at Default (EAD)
- Maturity (M)

\+ Risk weight function [K] = Risk Weighted Assets (RWA)

Provided by the Commitee

- Under Basel II $\rightarrow$ **CR = K $\times$EAD**
- Under Basel I $\rightarrow$ **CR = 8% $\times$EAD**

About the risk weight function

- Basel II distinguishes exposures to small and medium size firms (SME) from those to large firms.
- Two different functional forms for the risk weight function are provided:
  - the corporate (Kc) : **large firms** and **SMEs with loans > 1 million euros**
  - the retail (Kr) : **Other loans to SMEs**

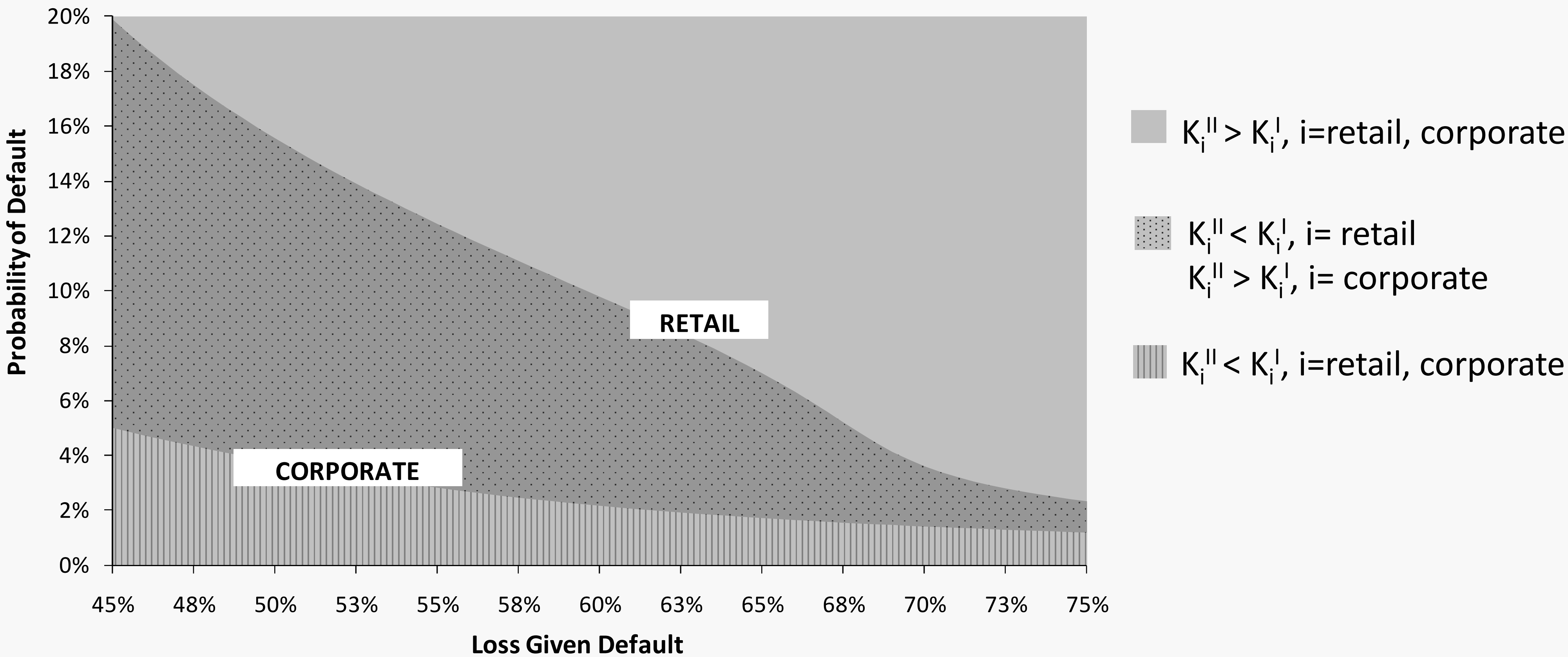
		Exposure size	
		< € 1 million	> € 1 million
Sales	> 50 million	Corporate	
	5 m - 50	SME_retail	SME_1
	< 5 million		SME_2

Issues addressed

- Assess if CR under Basel II are smaller or higher than CR under Basel I.
  - Risk drivers are internally estimated by banks under the IRB (internal ratings-based) approach.
- The different sensitivity of CR under Basel II to the risk drivers
  - pro-cyclical effect.
  - Homogeneous groups for estimation purposes.
- The use of different risk-weight functions may have an impact

Basel I vs Basel II

- **Retail:** CR under Basel II < CR under Basel I
- **Corporate:** the conclusion is not obvious....

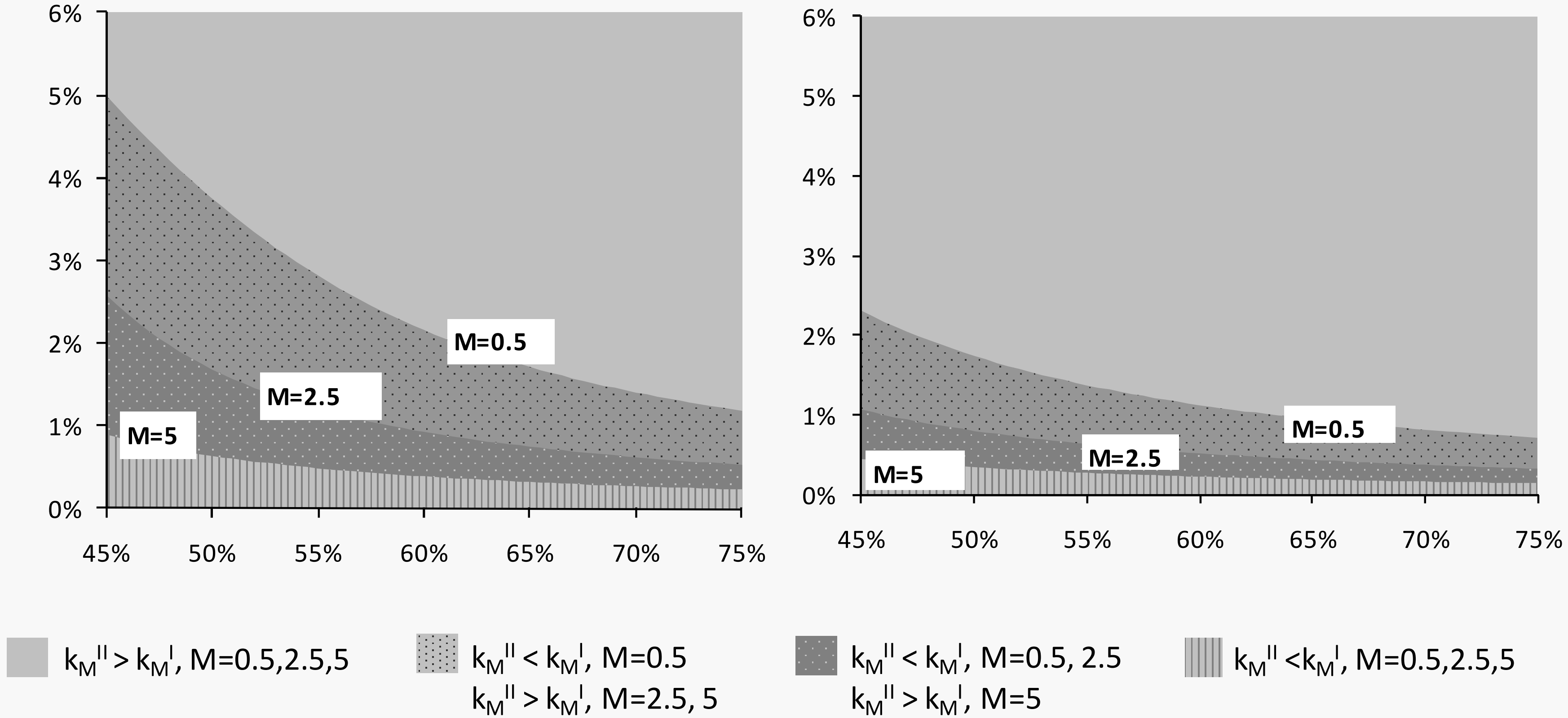


Basel I vs Basel II

- For small maturities, CR under Basel II < CR under Basel I
- CR are higher for firms with a higher level of sales

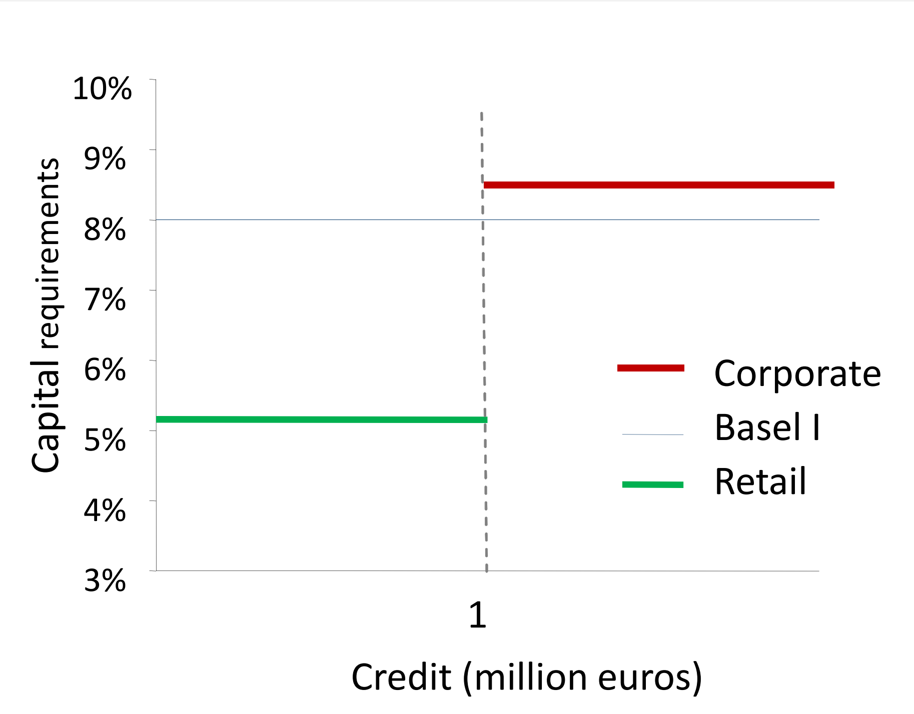
Firms reporting sales ≤ € 5 million

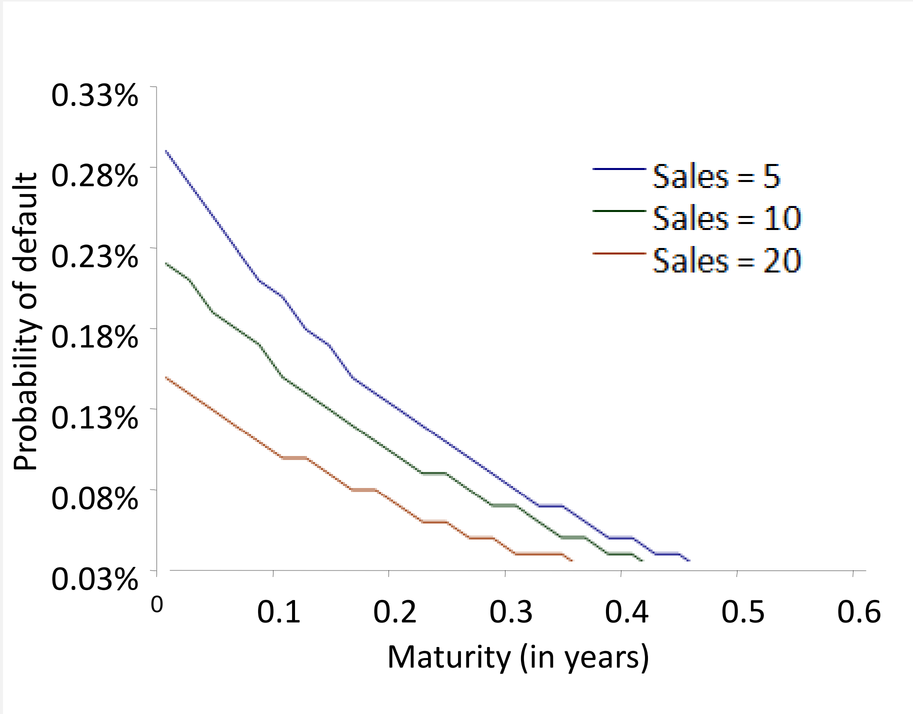
Firms reporting sales ≥ € 50 million



Basel I vs Basel II

- Discontinuity of CR in 1 million euros
  → banks may have an incentive to grant smaller loans

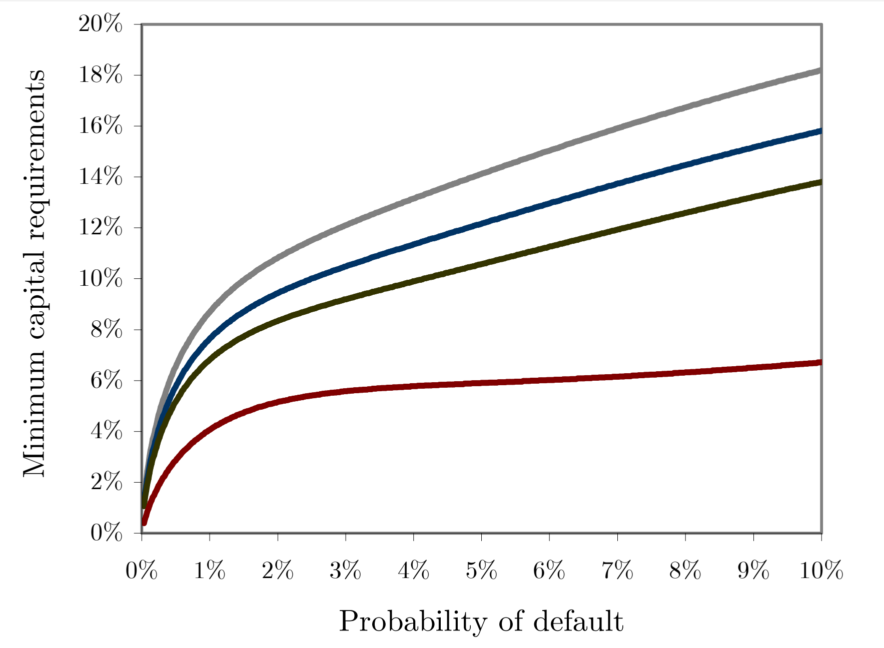




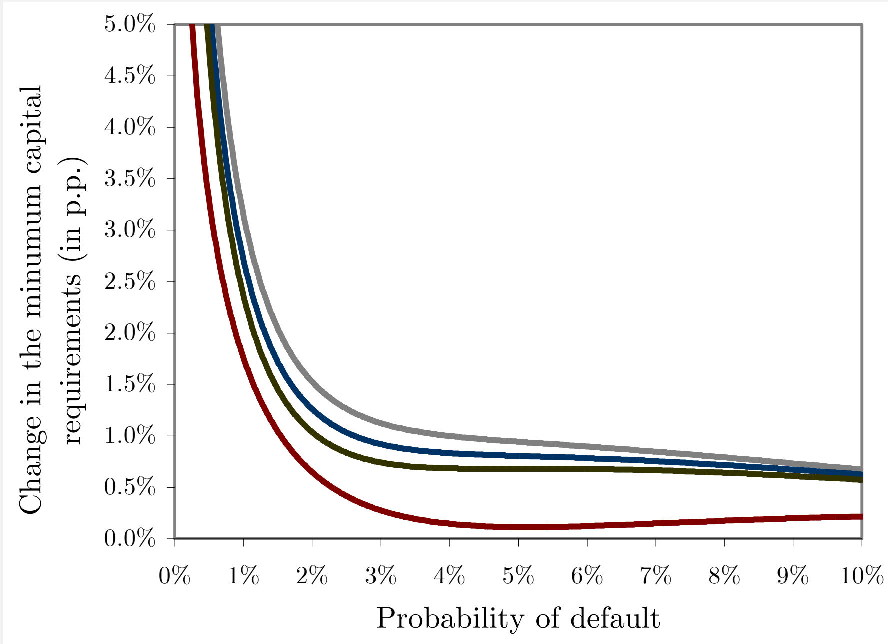
Risk sensitiveness under Basel II

- Retail class is much less sensitive than the corporate class

CR



Change in CR for a 1 p.p change on PD



Corporate, sales = 50 — Corporate, sales = 25 — Corporate, sales = 5 — Retail

Notes: It is assumed a maturity of 2.5 years and an LGD of 50%.

Portuguese Case

- Capital requirements on December 2007 if Basel II were implemented
- Sales = observed sales
- Probability of default = Default rate on 2008 (grouped by economic sector and credit class)

> **Default event**: *the obligor is past due more than 90 days on any material credit obligation to the banking group* - Basel II accord

- LGD = several simulated values
  - Fernandes (2006): 51,4%
  - Dermine & Neto de Carvalho (2006): 29%
  - Antunes (2005): 46%
  - Fifth Quantitative Impact Study (2006): 39.8% / 35% .
- Maturity: different values to be considered (0.2 – 4.5)

Data Description

- Central Credit Register

  Data on granted loans by the Portuguese banking system

- Central Balance Sheet Database

  Data on *sales* and *economic sector*.

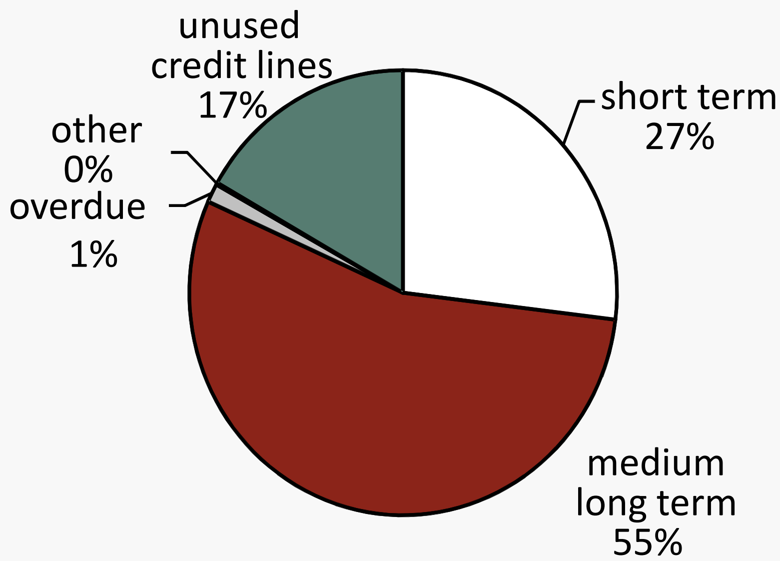
- Data:

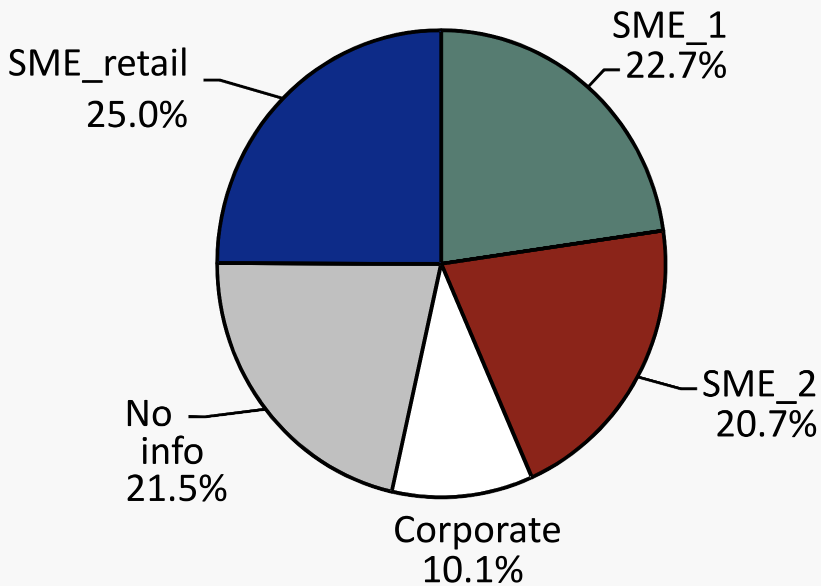
  - 390 000 exposures (corresponding to 220 000 firms)
  - 77 *financial institutions*

    (22 financial groups + 55 financial institutions that do not belong to any group)

Credit Characterization

- The majority of the credit is medium and long-term credit.
- Retail has the largest share in terms of credit.





Credit Characterization

- The real estate and construction sectors are the economic sectors where the credit is more concentrated

	SME_retail	SME_1	SME_2	Corporate	No information	Total
Construction	4.3%	6.4%	3.6%	1.9%	3.3%	19.5%
Real estate	1.9%	6.9%	4.6%	0.7%	5.3%	19.4%
Whol. retail trade	7.5%	1.2%	2.4%	1.7%	2.2%	14.9%
Other services provided to firms	1.4%	4.3%	0.8%	0.9%	7.0%	14.4%
Manufacturing	5.4%	1.0%	3.5%	1.9%	1.4%	13.2%
Other services	1.5%	0.8%	1.6%	0.9%	1.1%	5.8%
Transport	1.0%	0.4%	2.3%	1.7%	0.2%	5.6%
Other economic sectors	1.8%	1.8%	1.9%	0.5%	1.2%	7.3%
No economic sector	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%

"a significant concentration of banks' exposure across sectors (especially real estate) (...) may become an important potential risk factor".

Financial System Stability Assessment (2006) conducted by the IMF to the Portuguese financial system

Default Rate

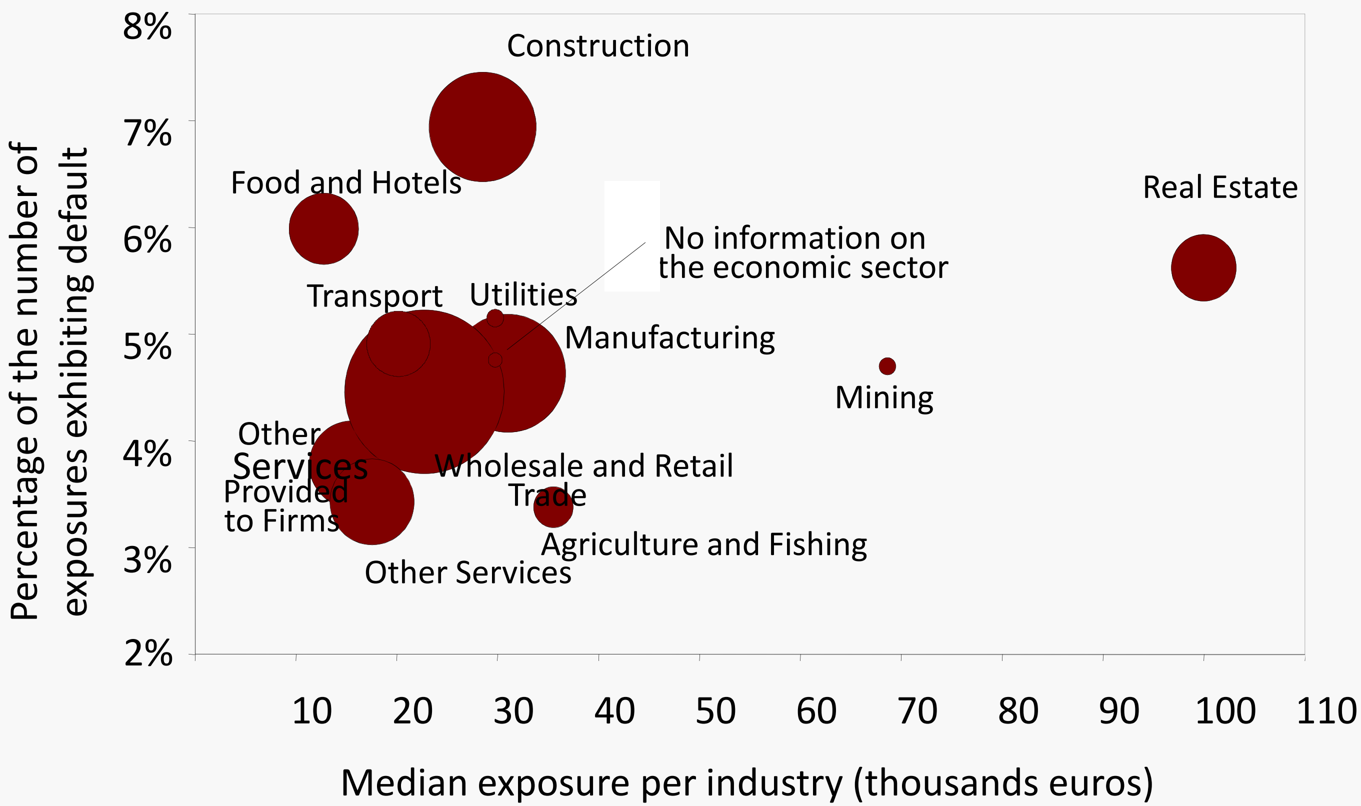
- For the banking sector in 2008 the non-defaulting companies on 2007 present the following default rates
  - 3.6% exposures in default
  - 3.6% proportion of credit in default

- For the credit classes defined in Basel II

	SME_retail	SME_1	SME_2	Corporate
Exposure	**<1M**	**>1M**	**>1M**	
Sales	**< 50M**	**< 5M**	**5M - 50M**	**> 50M**
Default rate	**3.6%**	**6.5%**	**2.3%**	**0.6%**
% exposures	95.8%	2.0%	1.4%	0.8%
% loans	31.7%	28.3%	26.7%	13.3%

Default Rate

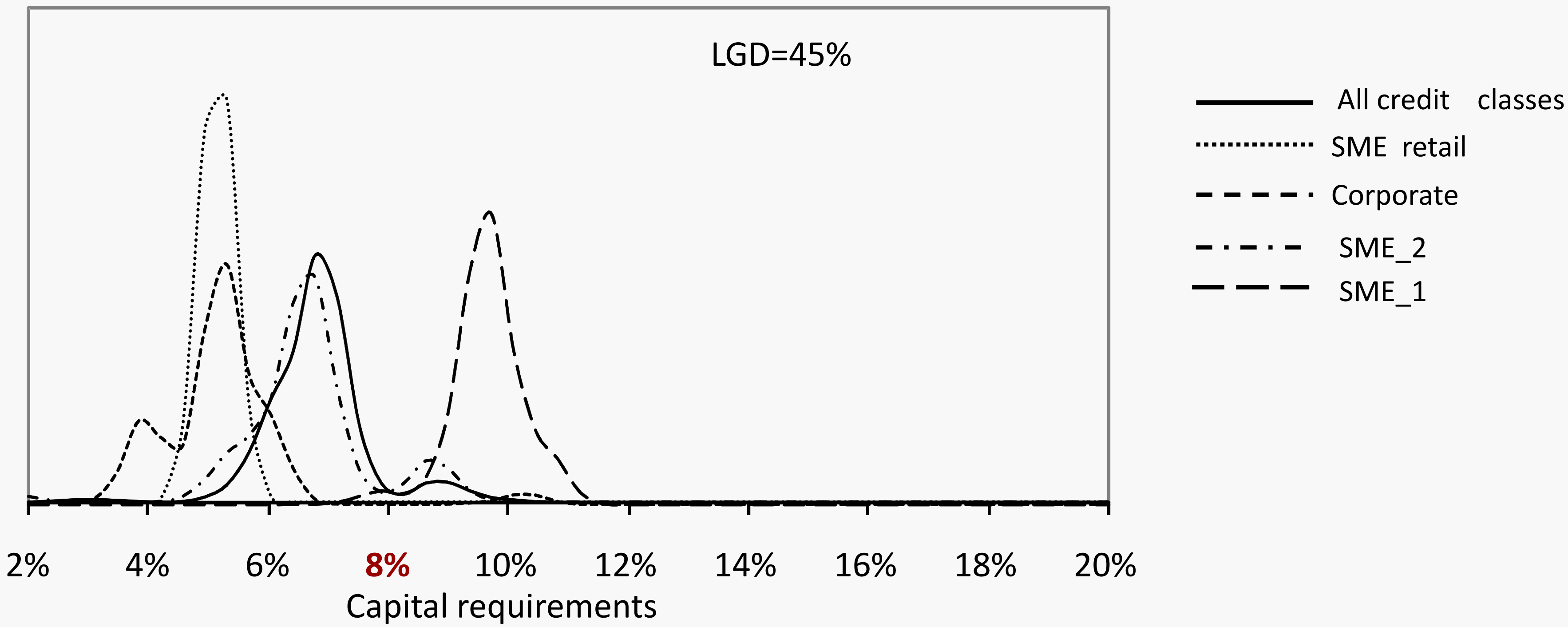
- Heterogeneity across economic sectors



Portuguese capital requirements

- For accepted levels of LGD and for the generality of the banks CR under Basel II are smaller than CR under Basel I. An LGD <52% assures that for the banking system CR under Basel II < 8%.

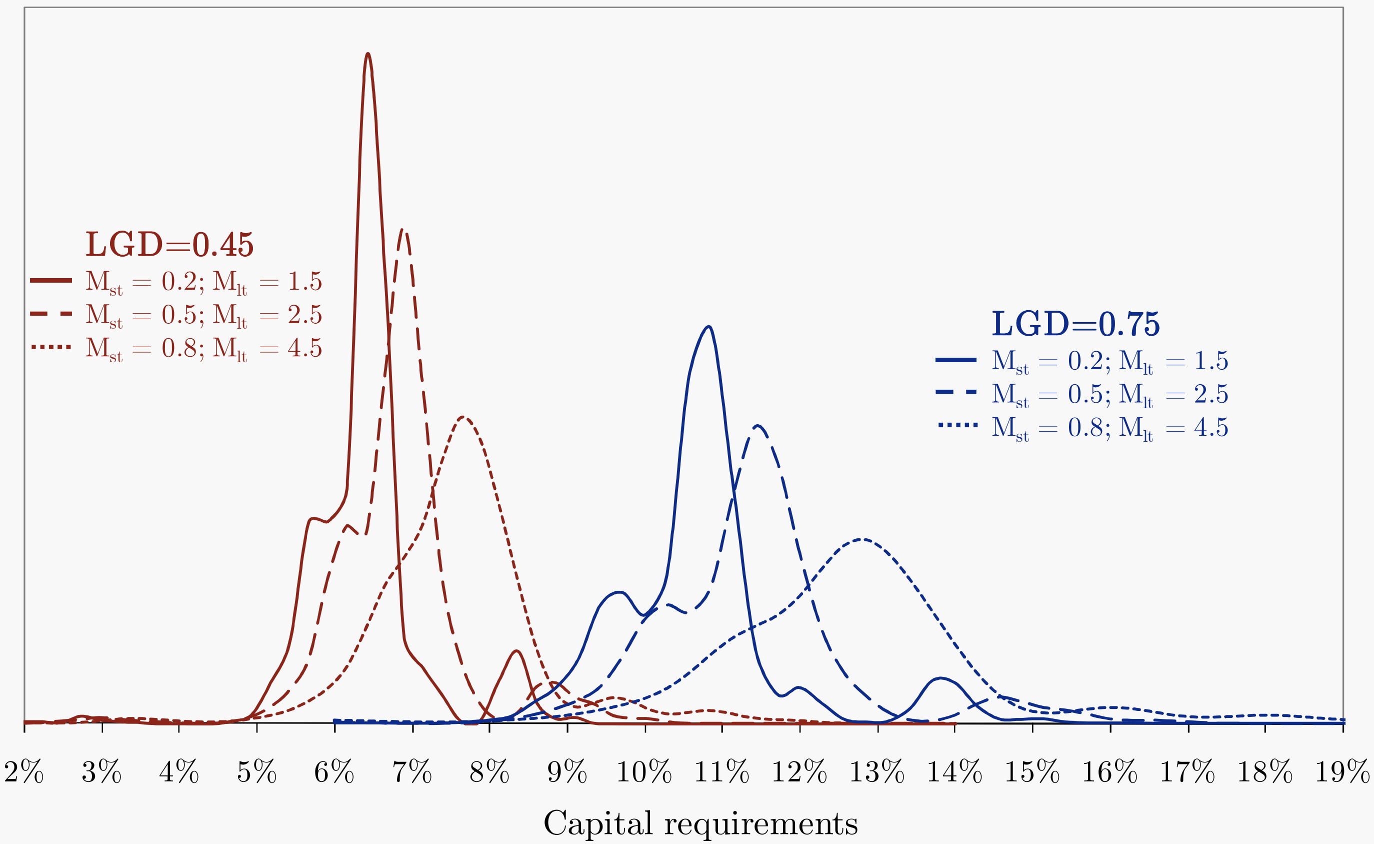
  - **Retail**: due to the risk weight function
  - **Corporate**: due to the very low PD
  - **SME_1**: due to the high PD



Portuguese capital requirements

Robustness check on maturity

- Even for higher values of the maturity, the majority of the banks presents CR lower than 8% (for accepted values of the LGD)



Portuguese capital requirements

Robustness check on PD's assessment

- The assessment of the PD considering different homogeneous groups leads to non-negligible changes in CR.

    i. A unique PD for all exposures

    → Change in CR around 1 p.p. (for an LGD=45%)

    ii. Per economic sector and exposure size

    iii. Per sales level and exposure size

    iv. Per credit class

    → Change in CR around 0.6 p.p. (for an LGD=45%)

- An LGD smaller than 46% assures that for the banking system

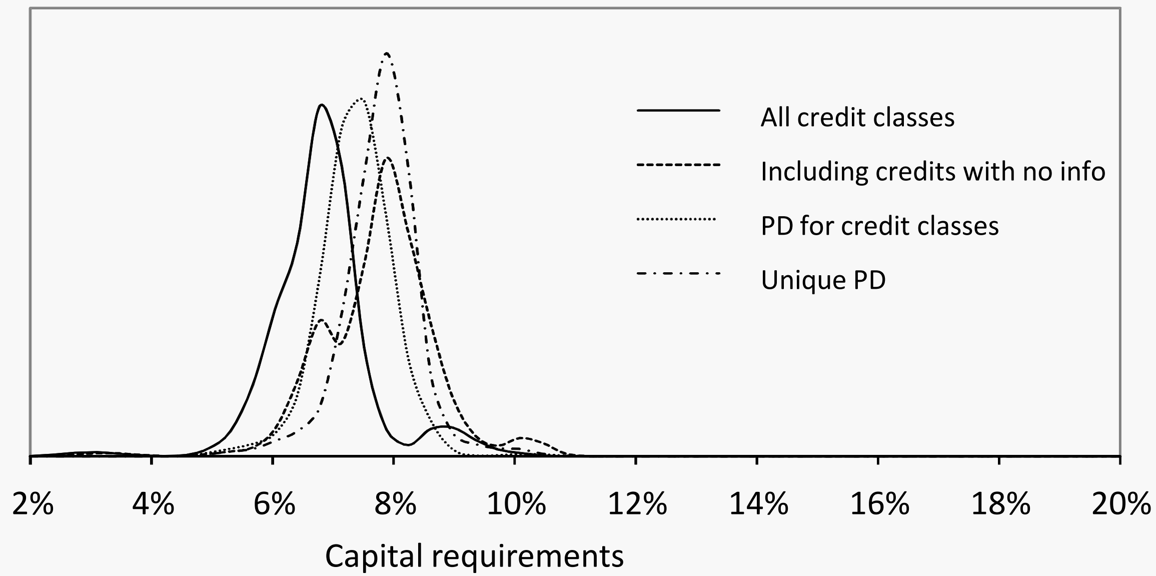
    CR under Basel II < CR under Basel I

Portuguese capital requirements

Robustness check on excluded observations due to the non-existence of info on sales

- CR increase, some banks will have CR higher than 8%
- An LGD smaller than 46% assures that for the banking system

CR under Basel II < CR under Basel I



Conclusions

- Relation between CR under Basel I and Basel II depends on the type of credit
  - Retail : CR under Basel II < CR under Basel I
  - Corporate : Conclusion depends on the risk drivers
- Importance of an exposure's classification as retail or corporate
- Lower sensitivity on the PD to the retail exposures
- Portuguese capital requirements will be lower under Basel II,
  - Retail and corporate are smaller than 8% (due to K and PD, respectively)
  - SME_1 are higher than 8% (due to the PD)
  - Under all robustness checks if LGD<46% CR under Basel II < Basel I.

Limitations of the analysis

- Only credit risk was considered. Market risk and operational risk were note considered.

- Only loan granted to non-financial corportaions were considered.

Related literature

- On the procyclical effect of Basel II
  - Benford and Nier (2007)
  - Heid (2007)
  - Kashyap and Stein (2004)

- On SMEs' differentiated treatment
  - Dietsch and Petey (2004)
  - Jacobson et al. (2005)

- On minimum capital requirements
  - Saurina and Trucharte (2004)
  - Fabi et al. (2005)

Thanks for your attention!