EL validation DB unsecured Basel model

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Characteristics of unsecured lending portfolio

- **Scope - customers**
  - Over 4.5 mln. customers

- **Scope – products**
  - Consumer loans
  - Credit cards
  - Overdraft limits
  - Current accounts with unauthorized balance

- **Scope – outstanding**
  - Large number of relatively small outstanding

The problem

- **PD/EAD/LGD are developed separately**
- **PD at customer level**
- **EAD/LGD at facility level**
  - *Facility = current account + related credit products*
- **Combined in EL calculation**
- **EL = PD * EAD * LGD**
- **Independence assumption**
- **True?**
- **Effect on EL?**

Validate!

Simulation example

“A good simulation gives more insight than a bad research”

Theoretical example: the portfolio

- 300 customers
- 1 facility per customer
- OS per facility constant = 50
- Limit per facility constant = 100
- 2 PD classes, 2 EAD classes, 2 LGD classes
- Total limit = 30,000
- Total OS = 15,000

Theoretical example: the model

- PD classes
  - 0.01 and 0.05
- EAD segments
  - Segment 1: EAD = 1.0 * OS
  - Segment 2: EAD = 1.5 * OS
- LGD segments
  - Segment 1: Standard LGD = 0.3
  - Segment 2: Standard LGD = 0.6

Theoretical example: PD

PD class	# Customers	# Facilities	Exposure (EAO)	# bad customers
1	100	100	5,000	1
2	200	200	10,000	10
Total	300	300	15,000	11

Exposure weighted PD = number weighted PD = observed bad rate = 3.67%

So perfect calibration!

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Theoretical example: EAD/LGD distributions bads

PD segment	EAD segment	LGD segment	# bad customers	Exposure (EAO)	Observed EAD	Observed loss
1	1	1	0	0	0	0
1	2	2	1	50	75	45
2	1	1	2	100	100	30
2	2	2	8	400	600	360
Total			11	550	775	435

Predicted EAD = observed EAD = 775

Predicted loss = observed loss = 435

Perfect calibration!

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Theoretical example: what about calibration of EL?

- Depends on distribution of 'goods' over EAD/LGD segments!

PD segment	EAD/LGD segment	Case 1: Underestimation	Case 2: Correct estimation	Case 3: Overestimation
1	1	20	15	19
1	2	79	84	80
2	1	138	35	5
2	2	52	155	185
EL		279	435	479

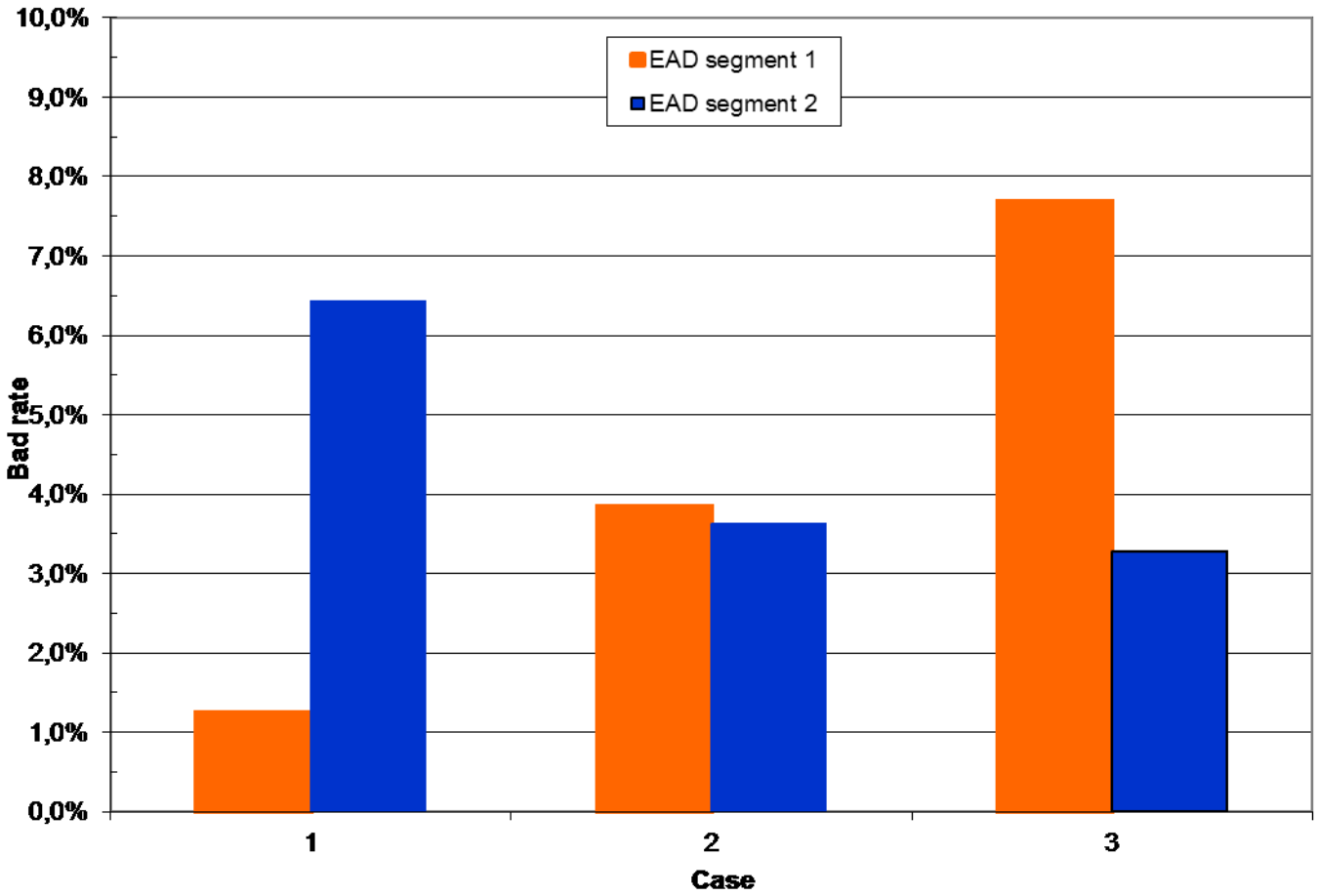
Case 1: EL is underestimated with 36%

Case 2: EL is correctly estimated

Case 3: EL is overestimated with 10%

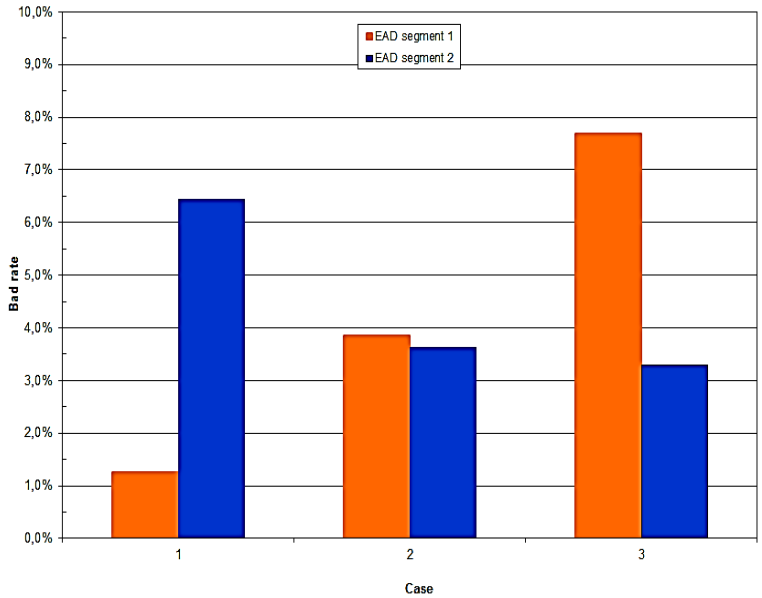
Question: Why?

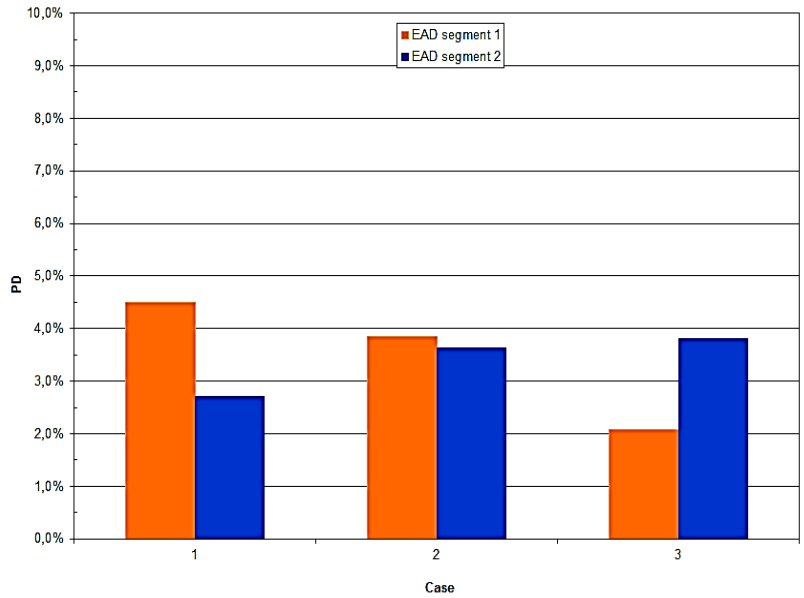
Bad rate per EAD segment differs for these three cases



Case 1: underestimation Case 2: correct estimation Case 3: overestimation

And PD is not calibrated on EAD segment level





Conclusions:

- **Independence assumption not true for case 1 and 3**
- **Can result in upward/downward bias of EL**

The real case

The data

- **Data from 2004 – 2009**
- **Data split in 'bads' and 'goods'**
- **'Bads':**
  - Take all facilities in EAD dataset (the 'bads')
  - Enrich with new PD and observed loss (from LGD dataset)
- **'Goods':**
  - Take all facilities
  - Enrich with new PD and apply EAD/LGD model
- **Combine data of 'goods' and 'bads'**
- **Key figures:**

# Customers	> 400,000
# current accounts	> 500,000
Total O/S	> 300 million
Total EAD	> 12 million
Total loss	> 5 million
% bads	< 1%

The Basel model

- **PD model**
  - 17 dedicated risk pools
- **EAD model**
  - 6 segments

EAD Segments	Compensation effect	Negative parameters
Segment 1	Yes	No
Segment 2	Yes	Yes
Segment 3	No	No
Segment 4	Yes	Yes
Segment 5	No	No
Segment 6	Yes	Yes

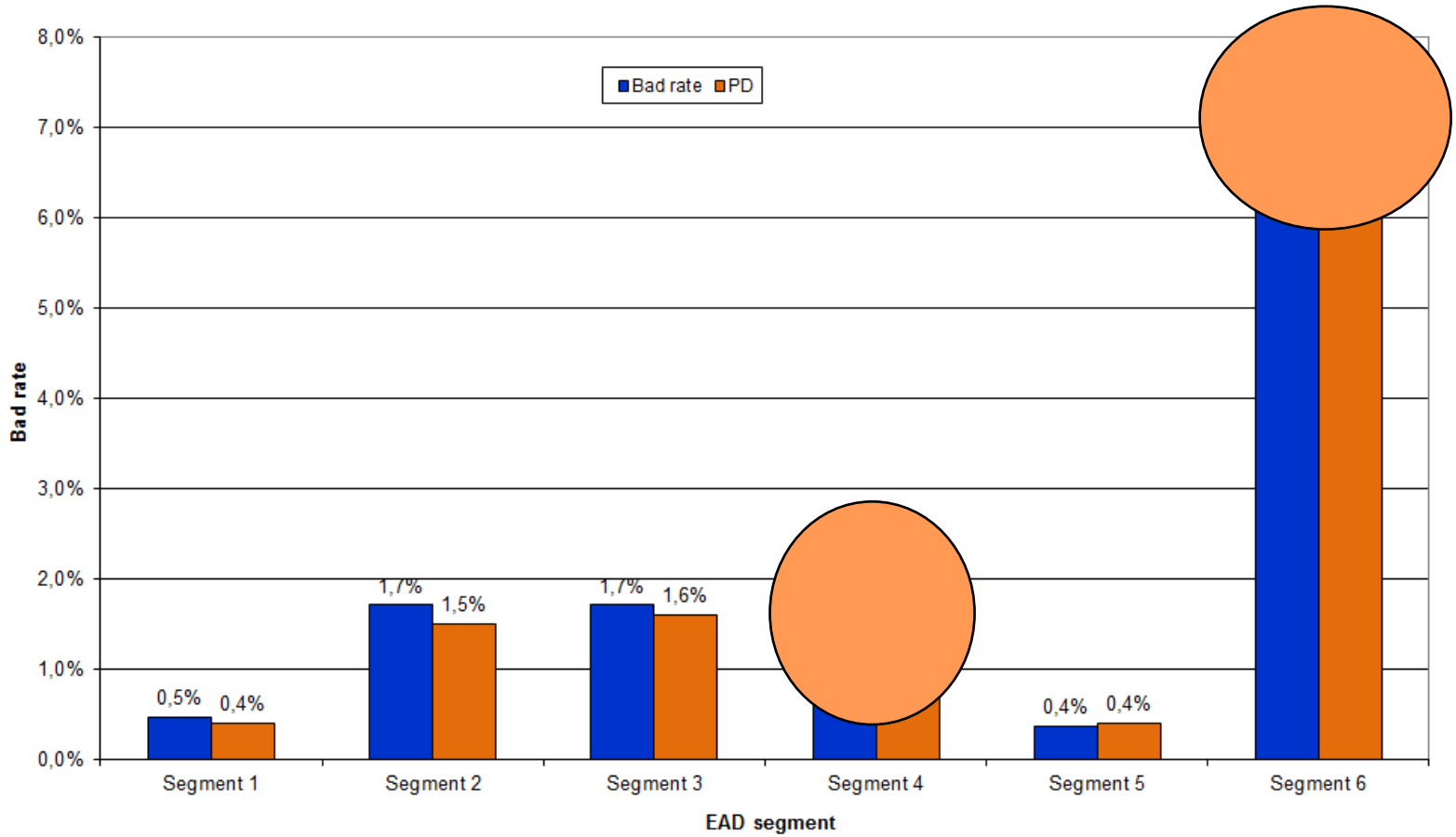
- **LGD model**
  - 3 segments

The loss on portfolio level is overestimated with 7%

- **Overestimation smaller on whole portfolio than on 'bads'**
- **Not LGD effect but PD-EAD effect**
    - Overestimation in segments 2, 4 and 6.
        - Due to negative parameters set to zero
        - Highly correlated with O/S
    - Underestimation in other sub segments
        - Due to compensation effects

	% Overestimation loss	% Overestimation EAD
Bads	9%	8%
All	7%	7%

Bad rate varies between EAD segments: underestimation in Segment 6 and overestimation in Segment 4



Conclusions and recommendations

- **Overestimation of loss mainly due to EAD model**
  - *Negative parameters set to zero*
  - *Partially damped* by *PD-EAD correlation*

- **EL should only be analyzed at portfolio level**
  - *Unless calibration has been done on lower level*

- **EL validation should be part of model development (if possible)**

- **Data collection should be set up to make this possible**

- **Pitfall: inconsistency in EAD/LGD data collection!**

Questions?