SOCIETE
GENERALE
GROUP

KB

CREDIT RISK COSTS

OBJECTIVES

SOCIETE GENERALE GROUP KB

TARGET

- RISK BASED PRICING
- FIXED RATE TO ALL
- INSURANCE

METHOD

- CREDIT RISK COSTS – DEFINITION AND PREDICTION
- CALCULATION VIA BASEL CHARACTERISTICS
- CALCULATION VIA COST OF RISK
- COMPARISON OF METHODS
- OTHER CONSEQUENCES

CASE STUDY

- CONSUMER LOANS
- MORTGAGES

TARGET 1 – RISK BASED PRICING

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INTERNAL BANK RATE
+ CREDIT RISK MARGIN
+ OTHER BANK COSTS (OPEX, LIQUIDITY,…)
+ BANK MARGIN

= INTEREST RATE

Benefit:

- **possibility to offer better rates for good clients**
  - **good client in x bad client out**
  - **better risk profile in long term horizon**
  - **better interest rates in long term horizon**

Threat:

- **too high interest rates for clients with bad risk profile**
  - **e.g. new clients have higher interest rates**
  - **not good for acquisitions of new clients**

TARGET 2 – FIXED RATE TO ALL

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CUT-OFFS SET UP TO HAVE PROFITABLE PRODUCTION:

INTEREST RATE $\geq$ INTERNAL BANK RATE + CREDIT RISK MARGIN + INTERNAL BANK COSTS

IF NOT:

- DEAL IS NOT PROFITABLE => SHOULD NOT BE GRANTED

Benefit:

- clear interest rate for clients

Threat:

- interest rate is NOT diversified for good and for bad clients
- may lead to more risky portfolio

INTRA BANK INSURANCE

- **ALOCATION OF COLLECTION FROM CREDIT RISK MARGIN FROM BRANCHES TO SPECIAL ACCOUNT IN INTRA BANK ACCOUNTING**

- **insurance should cover created losses**
- **monitoring of balance on central account**

SOCIETE GENERALE GROUP KB

COMMUNICATION

COOPERATION

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CREDIT RISK COST - DEFINITION

CREDIT RISK

= risk that a borrower will not repay his debt in full because

HE IS NOT ABLE TO PAY or

HE DOES NOT WANT TO PAY

CREDIT RISK COST includes:

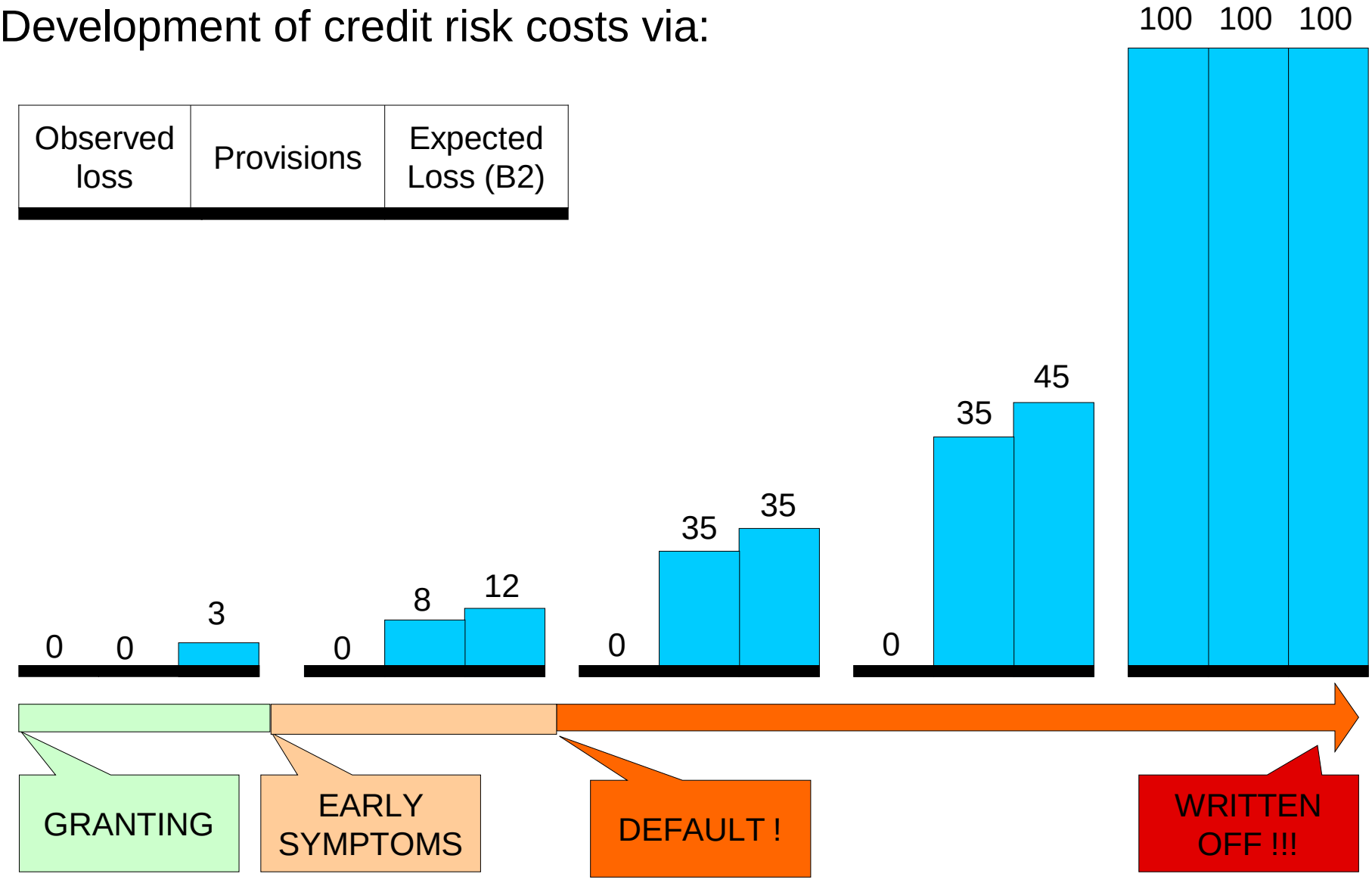
1) lost principal, interest, fees

2) discount of cash flows

3) collection costs

CREDIT RISK COST - PREDICTION

Development of credit risk costs via:



BALANCE FORMULA

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CREDIT RISK MARGIN (p.a.) covers expected credit risk:

COLLECTION from credit risk margin

CREDIT RISK COSTS

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CALCULATION VIA BASEL 2

BASED ON B2 INDICATORS:

PD – probability of default in time t / on condition that non-default in time t-1
LGD – loss given default in time t
EAD – exposure at default in time t

These characteristics
- are calculated for each time *t* from loan granting to loan maturity (M) and
- are incorporated into general balance formula:

EXPECTED COLLECTION

$$\sum_{t=1}^{M} \text{Risk margin} \cdot \left(1 - {}_{\text{KUM}}\text{PD}_t\right) \cdot \text{Exposure}_t$$

=

EXPECTED LOSS

$$\sum_{t=1}^{M} PD_t \cdot LGD_t \cdot EAD_t$$

Also general formula is:

$$RISK\ MARGIN = f \cdot \frac{\sum_{t=1}^{M} PD_t \cdot LGD_t \cdot EAD_t}{\sum_{t=1}^{M} \left(1 - \sum_{u=1}^{t} PD_u\right) \cdot Exposure_t}$$

[in % p.a.]

where
f = number of the repayments per one year (repayment frequency)

CALCULATION VIA BASEL 2

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$$RISK\ MARGIN = f \cdot \frac{\sum_{t=1}^{M} PD_t \cdot LGD_t \cdot EAD_t}{\sum_{t=1}^{M} \left(1 - \sum_{u=1}^{t} PD_u\right) \cdot Exposure_t}$$

1) **PD curve**
For each month of transaction life, PD is estimated using of Kaplan-Maier method.
(http://en.wikipedia.org/wiki/Kaplan%E2%80%93Meier_estimator)

2) **LGD curve**
LGD is predicted for each month of transaction life.

3) **EAD curve**
EAD is predicted for each month of transaction life as:

$$EAD_t = TVE * ON\_Balance_t + CCF * OFF\_Balance_t$$

CCF is Credit Conversion Factor,
TVE is correction for overdrawn cases)

CONSUMER LOANS – CASE STUDY

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Granted value	20 000 CZK
Interest rate	12%
Annuity	842 CZK
Repayment period	1 month
Interest rate	Fix or Diversified

Months	Principal (CZK)	PD (%)	LGD (%)	Months	Principal (CZK)	PD (%)	LGD (%)
1	20 000	0.30	80	13	10 590	0.59	40
2	19 258	0.15	80	14	9 753	0.44	40
3	18 509	0.19	80	15	8 909	0.29	40
4	17 752	0.23	80	16	8 056	0.14	40
5	16 987	0.27	80	17	7 195	0.14	40
6	16 215	0.31	80	18	6 325	0.14	40
7	15 435	0.35	40	19	5 446	0.14	40
8	14 648	0.39	40	20	4 558	0.14	40
9	13 852	0.43	40	21	3 662	0.14	40
10	13 049	0.47	40	22	2 757	0.14	40
11	12 237	0.51	40	23	1 842	0.14	40
12	11 417	0.55	40	24	919	0.14	40

CONSUMER LOANS – CASE STUDY

Month	Principal (CZK)	PD (%)	ΣPD (%)	LGD (%)	Expected loss	Basis for collection
1	20 000	0.30	0.30	80	48	19 940
2	19 258	0.15	0.45	80	23	19 171
3	18 509	0.19	0.64	80	26	18 390
…	…	…	…	…	…	…
…	…	…	…	…	…	…
24	918	0.14	6.73	20	1	857
Total	**x**	**6.73**	**x**	**x**	**431**	**252 307**

Credit Risk Margin = 12 * 431 / 252 307 = 2,45 %

$$RISK\ MARGIN = f \cdot \frac{\sum_{t=1}^{M} PD_t \cdot LGD_t \cdot EAD_t}{\sum_{t=1}^{M} \left(1 - \sum_{u=1}^{t} PD_u\right) \cdot Exposure_t}$$

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MONITORING
(DAFAULT RATES, OBSERVED LOSS)

BACK-TESTING
(PD, LGD, EAD)

UPDATE

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CALCULATION VIA COST OF RISK

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COST OF RISK =

- **OBSERVED LOSS** when recovery process is finished
- **PROVISIONS/RESERVES** for the other cases

Cost of risk is
- calculated for each time *t* from loan granting to loan maturity (M) and
- incorporated into general balance formula:

EXPECTED COLLECTION

$$\sum_{t=1}^{M} \text{Risk margin} \cdot \text{Non defaulted Exposure}_t$$

=

EXPECTED LOSS

$$\sum_{t=1}^{NOW} \text{COST OF RISK}_t$$

Also general formula is:

$$\text{Risk margin} = f \cdot \frac{\sum_{t=1}^{NOW} \text{COST OF RISK}_t}{\sum_{t=1}^{M} \text{Non defaulted Exposure}_t}$$

where
f = number of the repayments per one year (repayment frequency)
** both denominator and dominator should be discounted, but low impact into credit risk margin*

CONSUMER LOANS – CASE STUDY

Number of cases	1 000
Total exposure	20 M CZK
Repayment period	1 month
Provisions	25% from defaulted exposure
Interest rate	Fix or Diversified

Month	Non defaulted exposure (K CZK)	Defaulted Exposure (K CZK)	Creating / releasing of Provisions (K CZK)	Observed loss (K CZK)	Cost of Risk (K CZK)
1	19 900	60	15	0	15
2	19 200	90	8	0	8
3	18 400	130	9	0	9
4	17 600	180	11	0	11
5	16 800	230	14	0	14
6	16 000	290	16	0	16
7	15 200	360	18	2	20
8	14 300	440	20	3	23
…	…	…	…	…	…
24	800	1 350	7	8	15
Subtotal	**252 300**	**x**	**336**	**99**	**435**

CONSUMER LOANS – CASE STUDY

SOCIETE GENERALE GROUP KB

Month	Non defaulted exposure (K CZK)	Defaulted Exposure (K CZK)	Creating / releasing of Provisions (K CZK)	Observed loss (K CZK)	Cost of Risk (K CZK)
25	0	1 350	-12	7	-5
26	0	1 300	-10	7	-3
27	0	1 220	-8	9	1
28	0	1 180	-9	12	3
29	0	1 140	-10	15	5
30	0	1 100	-10	20	10
31	0	1 000	-5	18	13
…	…	…	…	…	…
48	0	400	-10	10	0
Total	**252 300**	**X**	**99**	**349**	**448**

Credit Risk Margin = 12 * 448 / 252 300 = 2,1 %

$$\text{Risk margin} = f \cdot \frac{\sum_{t=1}^{NOW} \text{COST OF RISK}_t}{\sum_{t=1}^{M} \text{Non defaulted Exposure}_t}$$

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MONITORING
(DAFAULT RATES, OBSERVED LOSS)

BACK-TESTING
(PROVISIONS)

UPDATE

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COMPARISON OF METHODS

SOCIETE GENERALE GROUP KB

BASEL

+ SOME INPUTS ALREADY PREPARED

+ IN LINE WITH REGULATION

- CORRELATION PD x LGD

COST OF RISK

+ BETTER INTERPRETATION

+ LOWER NUMBER OF INPUTS

- ASSUMES GOOD PROVISIONS SET UP

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OTHER CONSEQUENCES

COLLECTION = exposure * credit risk margin

What is exposure?

Limit or Drawing of limit?

GRACE PERIOD should be considered for credit cards.

DRIVERS – PD classes, unsecured/secured, age, …

PREDICTION HORIZON vs. **DATA SAMPLE**

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- **MORTGAGES**

MORTGAGES – CASE STUDY

Granted value	2 000 000 CZK
Interest rate	5 %
Repayment period	1 month
Maturity	20 year
Refix period	5 year

MORTGAGES – CASE STUDY

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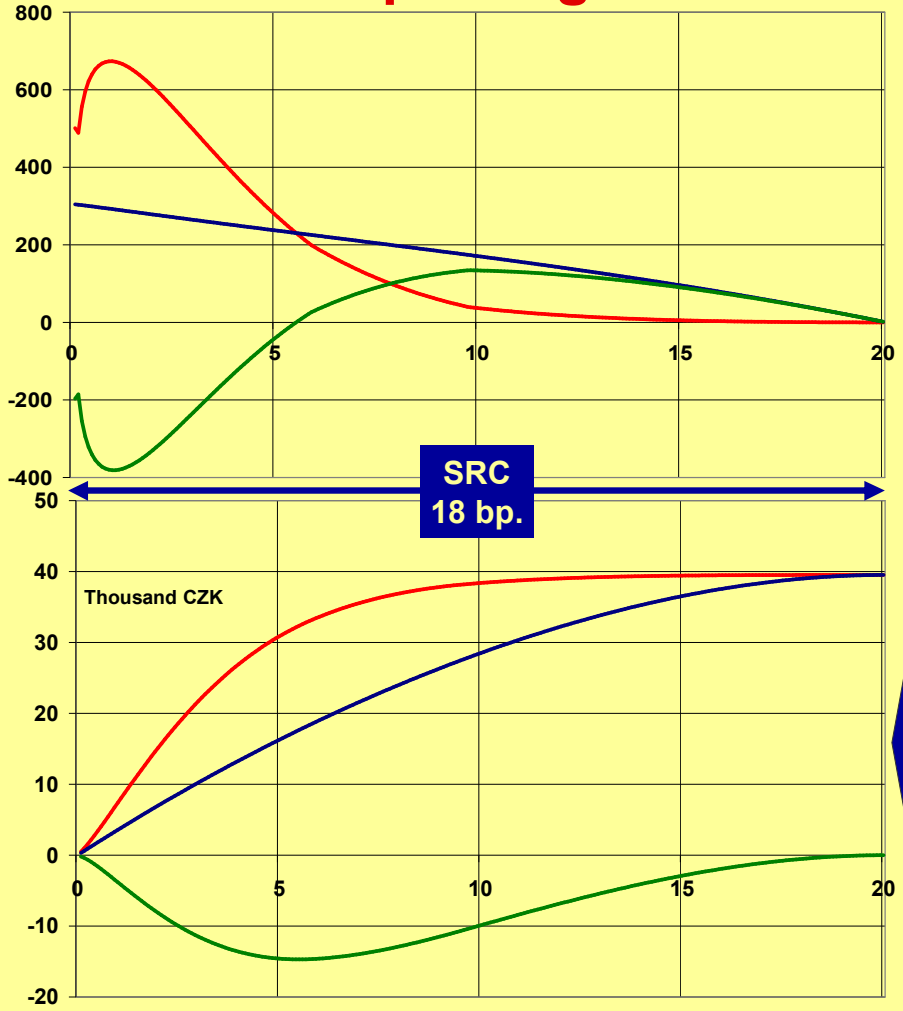
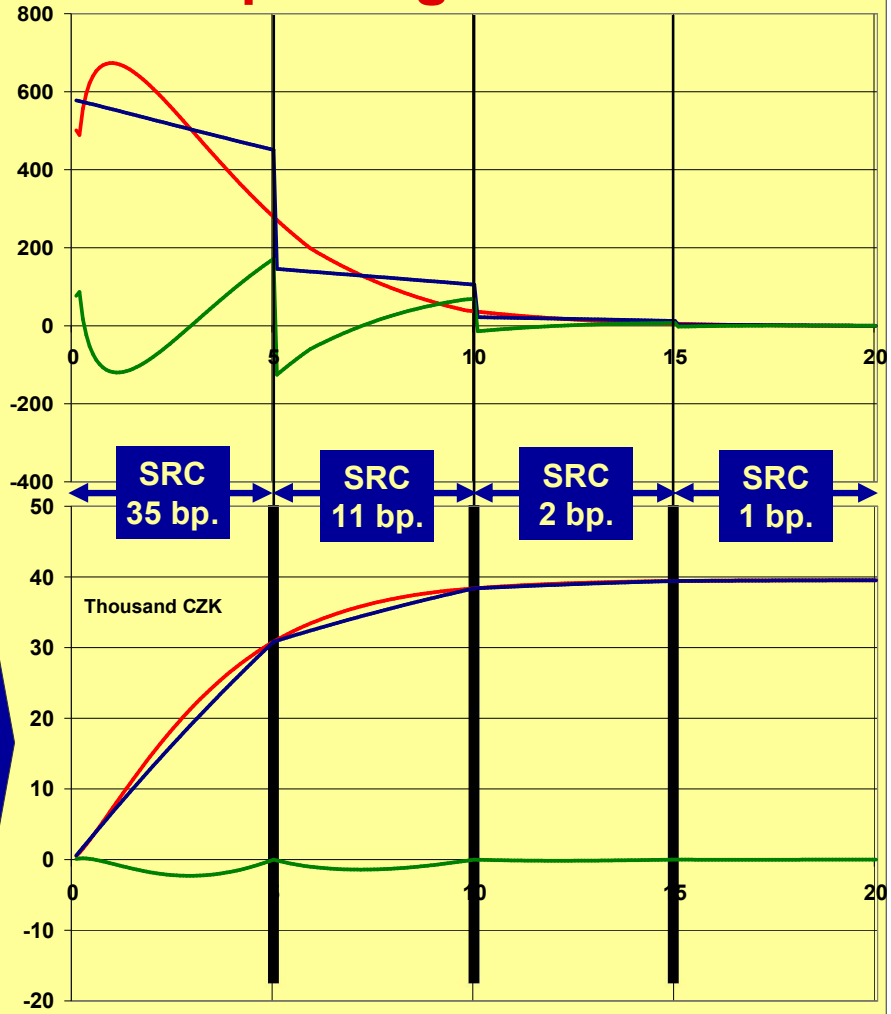
Without respecting refix time



Cumulative

Respecting refix time



Expected collection of SRC — Expected loss — Difference „collection – loss“