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CONTRIBUTIONS TO BOOKS

- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

JOURNAL AND OTHER ARTICLES

- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

CONFERENCE PAPERS

- Garg Sambhav (2011): "Business Ethics" Paper presented at the Annual International Conference for the All India Management Association, New Delhi, India, 19–22 June.

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- Kumar S. (2011): "Customer Value: A Comparative Study of Rural and Urban Customers," Thesis, Kurukshetra University, Kurukshetra.

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- Garg, Bhavet (2011): Towards a New Natural Gas Policy, Economic and Political Weekly, Viewed on July 05, 2011 http://epw.in/user/viewabstract.jsp

CREDIT RISK OF THE OFF-BALANCE SHEET ACTIVITIES IN CONTEXT OF COMMERCIAL BANKING SECTOR IN THE CZECH REPUBLIC: PRACTICAL EXAMPLE

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ABSTRACT

The paper focuses on the off-balance sheet activities of commercial banking sector in the Czech Republic. The purpose is to assess the credit risk resulting from these activities. For this reason, closer attention will be paid to bank guarantees - specifically, guarantees given by a certain commercial bank in the Czech banking sector for its clients. The guarantee is a type of an off-balance sheet instrument which represents a potential obligation of a bank to pay a certain amount if the client fails to comply with his commitment. Thank to this, by giving a guarantee, the bank faces several kinds of risks. The given guarantee may threaten the liquidity and even stability of a bank. One of the most important risks is the credit risk resulting from the uncertainty that the client will not meet his obligation against the bank. The default of the client may cause losses with negative impact on the economic results of the bank. The aim of the article is to quantify the credit risk resulting from given guarantees by a commercial bank and to asses the impact of the risk on the bank management. The goal is achieved by calculation of the expected loss from given guarantees on the practical example of a certain commercial bank in the Czech Republic using a modification of the Build-Up method for the determination of the probability of default.

KEYWORDS

Bank guarantees, Built-Up method, Credit risk, Off-balance sheet, Risk management.

INTRODUCTION

The Czech banking sector can be characterized as a two-level banking sector with one central bank and several commercial banks. The central bank is called the Czech National Bank and acts as a regulator of the banking sector. The commercial banks are mostly universal banks offering a wide range of bank services. The number of the banks operating on the market exceeds 40[1]. The Czech banking sector is highly concentrated, the majority of the market belongs to four banks only. Another characteristic feature of the Czech banking sector is the foreign ownership of the banks, almost all banks are owned by a foreign owner (especially by a bank institution from another European country).

The commercial banks perform various balance-sheet operations – credit loans or deposits, operations with securities etc. Except these operations, the banks perform off-balance sheet operations that do not represent immediate obligations or claims of the banks. Among these services belongs, for example, asset management, credit commitments, open credit lines or guarantees.

In the Czech Republic, the bank guarantees are regulated by the commercial Code (Act No. 513/1991 Coll.) and by the uniform rules stated by the International Chamber of Commerce.

The bank guarantee is created by a written declaration by the bank in a letter of guarantee. The bank declares it will satisfy the beneficiary up to the level of an agreed financial amount if the debtor (client of a bank) fails to fulfill its commitment or another conditions are met (according to the letter of guarantee).

According to the form of the debtor's commitment, there are several types of bank guarantees – payment guarantees, non-payment guarantees, customs guarantees and other types of guarantees.

The guaranteeing bank is obliged to satisfy the beneficiary only if the beneficiary delivers to the bank a written claim to pay. This fact may bring several problems. The beneficiary may deliver its claim even though he does not have a right to be satisfied by the guaranteeing bank (the debtor has already met its obligation). Usually, the bank does not have a possibility to verify the righteousness of the claim of the beneficiary. This fact may increase the credit risk of the bank guarantee. It is highly probable that the debtor will not be willing to repay the bank debt if he has properly fulfilled his commitment to the beneficiary.

The credit risk resulting from given guarantees is related the probability of meeting the commitment of the debtor to the beneficiary. The unwillingness to fulfill the obligation of the debtor to the beneficiary can predict the future unwillingness to repay his debt to the bank. In other words, the probability of default of the debtor in the meeting the commitment to the bank is highly correlated with the probability of default of the debtor in meeting the (previous) commitment to the beneficiary.

MODELLING OF CREDIT RISK

In modelling credit risk of guarantees given by a bank, it is necessary to treat the given guarantees as a future potential receivable of a bank. In principle, giving guarantees means future granting credit which will be realized if certain conditions are met. If these conditions are met, the guarantee given becomes a credit granted by the bank to the client (debtor).

According to the New Basel Capital Accord (also known as Basel II), the banks use one of three methods for calculating the credit risk capital requirements:

- *Standardized Approach (SA)*,
- *Foundation Internal Ratings-Based Approach (FIRBA)*,
- *Advanced Internal Ratings-Based Approach (IRBA)*.

While calculating the credit risk of a credit receivable, we have to asses the expected loss of this receivable. In case of IRB approach, the expected loss of a credit receivable can be calculated as follows:

$$EL = PD \cdot LGD \cdot EAD \qquad (1)$$

where:

EL	Expected Loss
PD	Probability of Default
LGD	Loss Given Default
EAD	Exposure at Default.

[1] On March 31, 2011 it was 41 banks.

Expected Loss (EL) reflects the percentage of credit receivable that will not be repaid as a consequence of debtor's default. EL depends on the Probability of Default (PD) and other two parameters which determine the value of the receivable in time of default – namely Loss Given Default (LGD) and Exposure at Default (EAD).

Probability of Default (PD) expresses the probability of default of the debtor, i.e. the probability that the debtor will fail in his obligation. In practice, the debtor defaults when the payment is delayed more than several days (for example more than 30 days).

Loss Given Default (LGD) represents the amount of receivable that the bank will loose when the debtor defaults. It is expressed as a percentage of the exposure. Usually, the loss of the bank does not reach the full amount of the receivable. LGD is determined by the recovery rate which means what amount of the receivable will be repaid in case of default – recovery rate is increased by various types of collateral or contractual clauses. Then, LGD can be expressed as follows:

LGD = 100 – recovery rate (2)

Banks usually do not calculate LGD. They calculate with the standard value of LGD.

Exposure at Default (EAD) expresses the value of exposure at the time of default. The calculation of EAD is done by multiplying the credit receivable by an appropriate percentage.

So far, we calculated the EL of a credit receivable. If the credit receivable is originated from the guarantee given to a debtor, it is necessary to multiply the formula (1) by another parameter expressing the probability with which the bank will have to pay under the guarantee.

This means that banks have to estimate the probability of debtor's failure in meeting the obligation which the guarantee relates to. In practice, banks usually do not estimate this parameter. They work with the credit conversion factors (CCF) stated by the Basel Committee. Generally, CCFs express the probability that the off-balance sheet item becomes the balance sheet asset or liability. According to the standardized approach, the value of CCF is 20 % in case of commitments with an original maturity up to one year and 50 % in case of commitments with an original maturity over one year.[2]

The EL for guarantees given can be calculated as follows:

$$EL = PD \cdot LGD \cdot EAD \cdot CCF \quad (3)$$

where: CCF Credit Conversion Factor (CCF)

If the CCF was calculated by the bank, it should be taken into account the correlation between the CCF and PD. In my opinion, there exists a positive correlation between the CCF and PD. In other words, if the debtor fails in meeting his obligation which is guaranteed by the bank, it is highly probable that the debtor will also fail in meeting his obligation to the bank. It can be assumed that the correlation is highly positive (near 1).

If the correlation were highly positive (or even equal to 1), it would mean that the future credit receivable would not be repaid. On the contrary, if the correlation were negative (or equal to -1), the future receivable would be repaid in each case.

Thus, the correlation should be taken into account while calculating the EL. However, in the following model example the correlation would not be included because there are not available all relevant data (historical data on defaults of the potential debtors).

EL CALCULATION OF GIVEN GUARANTEES

This part of the article is devoted to the calculation of EL in case of one of the largest and most important commercial bank in the Czech Republic – Komerční banka (KB). KB can be characterized as a universal bank providing services for retail, SME[3] and corporate clients. The bank is a member of the Société Générale Group (France). Bank guarantee is one of the basic services provided by this bank. KB provides two types of bank guarantees – payment guarantees and non-payment guarantees.

The following model will calculate EL bank guarantees given by KB at the end of 2010. The bank guarantees will be in sector diversification. EL will be calculated for each sector for one year time horizon. The calculation will be based on the formula (3).

INPUT PARAMETERS

LGD

The LGD will not be estimated. The following calculations will work the value LGD which is used by Moody's. This rating agency use LGD of 50 % if the debtor has a low PD.[4]

EAD

On 31 December, 2010, the value of guarantees given by KB was 47.432 millions of CZK. The sector diversification of given guarantees is contained in the next table.

TAB. 1: SECTOR DIVERSIFICATION OF GIVEN GUARANTEES BY KB ON 31 DECEMBER, 2010 (IN CZK MILLIONS)

Sector	Amount
Food industry and agriculture	1 906,77
Chemical and pharmaceutical industry	1 109,91
Mining and extraction	1 565,26
Automotive industry	317,79
Manufacturing of other machinery	3 917,88
Manufacturing of electrical and electronic equipment	535,98
Other processing industry	3 917,88
Power plants, gas plants and waterworks	4 136,07
Construction industry	12 246,94
Retail	1 764,47
Wholesale	3 913,14
Transportation, telecommunication and warehouses	2 158,16
Banking and insurance industry	4 325,80
Public administration	2 689,39
Other industries	5 421,48
Total	*47 432,00*

Source: KB Annual Report 2010 (after adjustments)

[2] BASEL COMMITTEE ON BANKING SUPERVISION. *International Convergence of Capital Measurement and Capital Standards. A Revised Framework*. 1st ed. 2004. ISBN print: 92-9131-669-5. Pg. 22.

[3] SME = Small and Medium Enterprises.

[4] MOODY'S. *Rating Methodology. Probability of Default Ratings and Loss Given Default Assessments*. [online]. (Viewed on 31.1.2011). Available from: <http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_114187>.

CCF

The CCF will not be estimated. In calculation of EL, it will be worked with CCF of 20 % This value of CCF is determined for commitments with an original maturity up to one year – in accordance with the standardized approach. The standard maturity of bank guarantees is 1 year.

PD

There are several methods for estimation of PD. They are based on the assessment of the customer's credit quality (bonity). There are many methods (models) used for this purpose (see Bessis[5]).

In order to calculate PD, it can be used a modification of Build-Up method for calculation of equity costs by Mařík[6].

Build-Up method is one of the important tools for business valuation. In principle, the Build-Up method consists in calculation of risk premium and adding this risk premium to a certain risk-free rate. The risk premium is the sum of partial risk premiums.

Build-Up method consists of these steps:

1. definition of risk factors,
2. valuation of risk factors,
3. transformation of risk factors to risk premiums.

These steps are the basis for this model example.

PD will be calculated for each of 14 sectors that are listed in the Table 1.

Step 1: Definition of risk factors

First of all, risk factors have to be defined for each sector. There are two types of risk factors:

- economic environment risks (i.e. systematic risk),
- sector risks (i.e. unsystematic risk).

Partial risk factors of systematic risk are following:

- expected development of GDP in next 12 months,
- expected development of interest rate (repo) in next 12 months,
- expected development of consumer prices (inflation) in next 12 months,
- expected development of exchange rate CZK/EUR in next 12 months,
- expected development of unemployment in next 12 months.

Partial risk factors of unsystematic risk are following:

- sector dynamics,
- sector sensitivity to economic cycle,
- sector sensitivity to changes of consumer prices (inflation),
- innovation potential,
- market capacity,
- sector regulation,
- foreign markets orientation.

Step 2: Valuation of risk factors

After the specification of risk factors, the valuation of risk factors has to be done. For this purpose, the scale of four grades can be used.

TAB. 2: RISK SCALE

Risk grade
1 – Low
2 – Moderate
3 – Middle
4 – High

Source: Author's construction

Step 3: Transformation of risk factors to risk premiums

Finally, risk grades have to be assigned to each risk factor. Each grade represents a certain value of risk premium.

The risk premium is calculated by this formula:

$$r = r_{\min} + RP \tag{4}$$

where:

r risk weight

r_{min} minimal risk weight

RP risk premium.

Furthermore:

$$r = r_{\min} \cdot a^{x} \tag{5}$$

where:

a invariable parameter (constant)

x risk grade.

Then, the risk premium can be determined as follows:

$$RP = r - r_{\min} \tag{6}$$

$$RP = r_{\min} \cdot a^{x} - r_{\min} \tag{7}$$

$$RP = r_{\min} \cdot (a^{x} - 1) \tag{8}$$

where:

(a^x-1) risk premium coefficient

Further:

$$a^{x} = \frac{r}{r_{\min}} \tag{9}$$

[5] BESSIS, J. *Risk Management in Banking*. 2nd edition. Hoboken: N.J.: Wiley, 2002. 792 p. ISBN 0-471-49977-3 (HB), 0-471-89336-6 (PB).

[6] MAŘÍK, M. *Metody oceňování podniku. Proces ocenění – základní metody a postupy*. 2nd edition. Prague: Ekopress, 2007. 492 p. ISBN 978-86929-32-3. Pp. 236 – 25.

and

$$a = \left(\frac{r}{r_{\min}} \right)^{\left(\frac{1}{x}\right)} \quad (10)$$

So as to establish the invariable parameter (a), it is necessary to enter the input parameters – minimal risk weight (r_{min}) and expected maximal risk weight (r).
The input parameters were entered as follows:
r = 5.263 % r_{min} = 0.03 % x = 4
Minimal risk weight was set on 0.03 %. According to Basel II rules, PD should not be lower than 0.03 %.[7]
Expected maximal risk weight was set on 5.263 % with regard to the migration matrix of Moody's.[8] For original ratings from Aaa to B3, average annual default rates of European subjects moved in range from 0 % to 5.263 %.[9]
Based on the input parameters, the invariable parameter (a) is:

$$a = \left(\frac{5.263}{0.03} \right)^{\left(\frac{1}{4}\right)}$$

and then

$$a = 6.38943$$

Then, the values of risk for each risk grade are contained in Fig. 3.

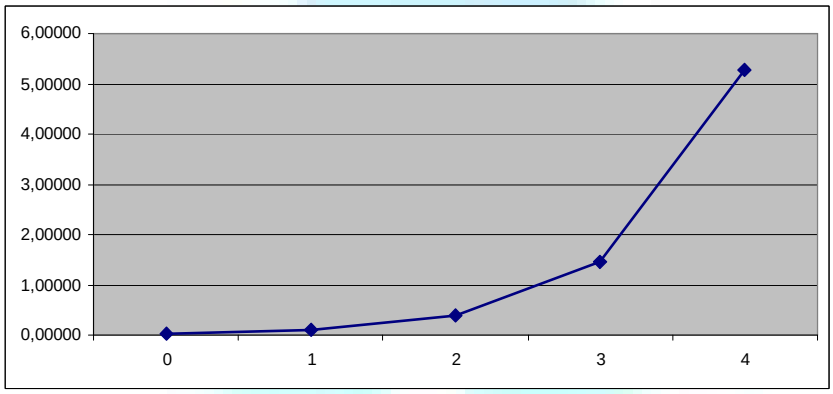
TAB. 3: RISK VALUES FOR EACH RISK GRADE

Risk grade (x)	$k = (a^x - 1)$	$RP = k.r_{min}$	$r = r_{min} + RP$
0	0.00000	0.00000	0.03000
1	2.63939	0.07918	0.10918
2	12.24512	0.36735	0.39735
3	47.20411	1.41612	1.44612
4	174.43333	5.23300	5.26300

Source: Author's construction

In graphic terms:

FIG. 1: RISK VALUES FOR EACH RISK GRADE



Source: Author's construction

So far, it was worked just with one risk factor. Our model, however, works with several risk factors. Thanks to this, the calculation of risk premium has to be modified so as to suit for more risk factors.
If there were 20 factors, for example, the risk premium for one factor would be set as RP / 20.
Before dividing the risk premium by the number of factors, it is needed to establish the weight of each risk factor.
Assessment of risk factors was done separately for each sector. This means that each sector has assigned its own weight of risk factors of systematic risk and its own grades of risk factors of systematic and unsystematic risk.
All sectors have assigned the same weight of risk factors of unsystematic risk. The weight reflects the importance of each risk factor and its impact on business activity. Grades of risk factor differed.
On contrary, the risk factor weights of systematic risk were variable. In my opinion, every risk factor of systematic risk has different impact on business activity. For example, the development of GDP has a great impact on the development of construction activity and a relatively small impact on the power plant sector.
The grades of systematic risk factors were established equally for each sector. The reason is simple – systematic risk has the same impact on every sector. The grades were determined by the expected development of the particular factors.
The grades of systematic risk factors are listed in the table below. The chosen grade is bold highlighted.

[7] In Czech Republic, the minimal value of PD is stated in the Annex No. 13 in Decree No. 123/2007 Coll., stipulating the prudential rules for banks, credit unions and investment firms.
[8] MOODY'S INVESTORS SERVICE. *European Corporate Default and Recovery Rates, 1985-2009*. [online]. (Viewed on 8.3.2011). Available from: <http://www.moodys.com/researchdocumentcontentpage.aspx?docid=PBC_12391>. Pg. 21.
[9] In my opinion, subjects with worse credit rating are highly risky for a bank and that's why I do not suppose that banks conduct credit transactions with them to a significant extent.

TAB. 4: GRADES OF SYSTEMATIC RISK FACTORS

Risk factors		Risk grade
1. Expected development of GDP in next 12 months	1. GDP growth over 3 % 2. GDP growth 1 - 3 % 3. GDP growth 0 - 1 % 4. GDP decline	1 – Low **2 – Moderate** 3 – Middle 4 – High
2. Expected development of interest rate (repo) in next 12 months	1. repo rate 0 - 0,75 % 2. repo rate 0,75 - 1,75 % 3. repo rate 1,75 - 2,75 % 4. repo rate 2,75 - 3,75 %	1 – Low **2 – Moderate** 3 – Middle 4 – High
3. Expected development of consumer prices (inflation) in next 12 months	1. inflation up to 2 % 2. inflation 2 - 4 % 3. inflation 4 - 6 % 4. inflation over 6 %	**1 – Low** 2 – Moderate 3 – Middle 4 – High
4. Expected development of exchange rate CZK/EUR in next 12 months	1. CZK/EUR 25 and more 2. CZK/EUR 23 - 25 3. CZK/EUR 20 - 23 4. CZK/EUR 20 and less	1 – Low **2 – Moderate** 3 – Middle 4 – High
5. Expected development of unemployment in next 12 months	1. unemployment up to 7 % 2. unemployment 7 - 9 % 3. unemployment 9 - 11 % 4. unemployment over 11 %	1 – Low 2 – Moderate **3 – Middle** 4 – High

Source: Author's construction

The risk grades express expected development of macroeconomic variables. They were determined mainly by the expected scenario published by the Czech National Bank[10]. To a lesser extent it was a subjective assessment.

The risk grades of unsystematic risk factors are listed in Annex 2 together with the weights of systematic and unsystematic risk factors.

The results of the calculation were PDs of each sector. PDs were the sum of the minimal risk weight (r_{min}) and total risk premium (total risk premium is the sum of partial risk premiums of systematic and unsystematic risk).

So:

minimal risk weight (r_{min})

+ partial risk premium of systematic risks

+ partial risk premium of unsystematic risks

= probability of default (PD)

The resulting PDs are as follows:

TAB.5: PROBABILITIES OF DEFAULT (IN %)

	Construction	PGW	Wholesale	BII	TTW	MOM	PA
PD	1,657	0,433	1,548	0,430	1,504	1,216	0,208
	FIA	CPI	ME	OPI	Retail	AI	MEEE
PD	0,690	0,523	0,456	1,029	1,502	1,860	1,552

Source: Author's construction

Abbreviations:

PGW *Power plants, gas plants and waterworks*
CPI *Chemical and pharmaceutical industry*
BII *Banking and insurance industry*
ME *Mining and extraction*
TTW *Transportation, telecommunication and warehouses*
OPI *Other processing industry*
MOM *Manufacturing of other machinery (i.e. except of automotive vehicles)*
AI *Automotive industry*
PA *Public administration*
MEEE *Manufacturing of electrical and electronic equipment*
FIA *Food industry and agriculture*

RESULTS

Now, we have all input parameters and we can calculate the EL of guarantees given by KB.

The EL will be calculated for three portfolios of given guarantees. The first portfolio (Portfolio No. 1) is the real portfolio of KB as at December 31, 2010. The others are fictive portfolios. Portfolio No. 2 is less risky (each sector with PD over 1 % shares no more than 5 % of the portfolio, each sector with PD up to 1 % shares more than 5 % of the portfolio). Portfolio No. 3 is more risky (each sector with PD over 1 % shares more than 8 % of the portfolio, each sector with PD up to 1 % shares no more than 5 % of the portfolio).

The results are contained in the following tables. The PD of the item "others" is calculated as an simple (unweighted) average of the sectors PDs. The EAD for each sector was determined by the sector's share.

[10] The Czech National Bank is the central bank of the Czech Republic and acts as a regulator of the banking sector.

TAB. 6: EL CALCULATION OF PORTFOLIO NO. 1 (IN MILLIONS OF CZK, IN %)

	Share	PD	EAD	LGD	CCF	EL
Construction	25.82 %	1.657 %	12,246.94	50 %	20 %	20.29645
PGS	8.72 %	0.433 %	4,136.07	50 %	20 %	1.79277
Wholesale	8.25 %	1.548 %	3,913.14	50 %	20 %	6.059384
BII	9.12 %	0.430 %	4,325.80	50 %	20 %	1.85963
TTW	4.55 %	1.504 %	2,158.16	50 %	20 %	3.245537
MOM	8.26 %	1.216 %	3,917.88	50 %	20 %	4.763352
PA	5.67 %	0.208 %	2,689.39	50 %	20 %	0.560489
FIA	4.02 %	0.690 %	1,906.77	50 %	20 %	1.315153
CPI	2.34 %	0.523 %	1,109.91	50 %	20 %	0.580463
ME	3.30 %	0.456 %	1,565.26	50 %	20 %	0.714394
OPI	3.00 %	1.029 %	1,422.96	50 %	20 %	1.464406
Retail	3.72 %	1.502 %	1,764.47	50 %	20 %	2.649577
AI	0.67 %	1.860 %	317.79	50 %	20 %	0.59103
MEEE	1.13 %	1.552 %	535.98	50 %	20 %	0.831774
Others	11.43 %	1.043 %	5,421.48	50 %	20 %	5.65718
Total	*100.00 %*	-	*47,432.00*	-	-	*52.38159*

Source: Author's construction

The total EL of the Portfolio No. 1 is 52.38 millions of CZK. This represents 0.11 % of the total volume of given guarantees.

TAB. 7: EL CALCULATION OF PORTFOLIO NO. 2 (IN MILLIONS OF CZK, IN %)

	Share	PD	EAD	LGD	CCF	EL
Construction	5.0 %	1.657 %	2,371.60	50 %	20 %	3.930373
PGS	12.5 %	0.433 %	5,929.00	50 %	20 %	2.569911
Wholesale	4.0 %	1.548 %	1,897.28	50 %	20 %	2.937883
BII	10.0 %	0.430 %	4,743.20	50 %	20 %	2.039068
TTW	4.0 %	1.504 %	1,897.28	50 %	20 %	2.853219
MOM	4.0 %	1.216 %	1,897.28	50 %	20 %	2.306708
PA	12.0 %	0.208 %	5,691.84	50 %	20 %	1.186221
FIA	7.0 %	0.690 %	3,320.24	50 %	20 %	2.290068
CPI	11.5 %	0.523 %	5,454.68	50 %	20 %	2.852703
ME	7.0 %	0.456 %	3,320.24	50 %	20 %	1.51538
OPI	3.0 %	1.029 %	1,422.96	50 %	20 %	1.464406
Retail	3.0 %	1.502 %	1,422.96	50 %	20 %	2.136756
AI	1.0 %	1.860 %	474.32	50 %	20 %	0.882134
MEEE	1.0 %	1.552 %	474.32	50 %	20 %	0.736083
Others	15.0 %	1.043 %	7,114.80	50 %	20 %	7.424121
Total	*100.0 %*	-	*47,432.00*	-	-	*37.12504*

Source: Author's construction

TAB. 8: EL CALCULATION OF PORTFOLIO NO. 3 (IN MILLIONS OF CZK, IN %)

	Share	PD	EAD	LGD	CCF	EL
Construction	13.0 %	1.657 %	6,166.16	50 %	20 %	10.21897
PGS	2.5 %	0.433 %	1,185.80	50 %	20 %	0.513982
Wholesale	9.0 %	1.548 %	4,268.88	50 %	20 %	6.610237
BII	2.0 %	0.430 %	948.64	50 %	20 %	0.407814
TTW	9.0 %	1.504 %	4,268.88	50 %	20 %	6.419743
MOM	8.0 %	1.216 %	3,794.56	50 %	20 %	4.613416
PA	3.0 %	0.208 %	1,422.96	50 %	20 %	0.296555
FIA	1.0 %	0.690 %	474.32	50 %	20 %	0.327153
CPI	2.0 %	0.523 %	948.64	50 %	20 %	0.496122
ME	1.0 %	0.456 %	474.32	50 %	20 %	0.216483
OPI	9.0 %	1.029 %	4,268.88	50 %	20 %	4.393219
Retail	8.0 %	1.502 %	3,794.56	50 %	20 %	5.698015
AI	11.0 %	1.860 %	5,217.52	50 %	20 %	9.703474
MEEE	9.5 %	1.552 %	4,506.04	50 %	20 %	6.992792
Others	12.0 %	1.043 %	5,691.84	50 %	20 %	5.939297
Total	*100.0 %*	-	*47,432.00*	-	-	*62.84727*

Source: Author's construction

The EL of Portfolio No. 2 is lower than in the previous portfolio. The total EL is 37.13 millions of CZK, which represents 0.08 % of the total volume of given guarantees.

In the last case, the EL is the higher. The total EL of Portfolio No. 3 is 62.85 millions of CZK and that means 0.13 % of the total volume of guarantees given.

The resulting ELs can be compared with the profit of KB or with the provision for off-balance sheet[11] commitments of KB.[12] In the case of the Portfolio No. 1, the EL represents 0.43 % of the profit and 11.36 % of the provision for OBS commitments. The EL of the Portfolio No. 2 reaches 0.3 % of the profit and 4.29 % of the provision. And the EL of the Portfolio No. 3 reaches 0.52 % of the profit and 13.63 % of the provision.

[11] Shortly „OBS".

DISCUSSION TO THE MODEL EXAMPLE

The resulting ELs and their share in the bank's profit are not high in absolute terms. For better assessment, it should be taken into account relatively small share of given guarantees in the banking transactions (from the volume point of view).

Moreover, the CCF plays an important role. In this model example, the CCF had the value of 20 %. So, if the bank grants a credit and gives a guarantee both of the same parameters (EAD, PD and LGD) the EL of the guarantee would reach 20 % of the EL of the credit receivable.

While assessing the EL in relation with the provision for off-balance sheet commitments, it is not possible to conclude that the provision is sufficient or not. The purpose of the provision is to cover credit risk resulting from all off-balance sheet commitments. Thanks to this, the share of the given guarantees in the OBS commitments would be necessary. However, KB does not publish data of all its OBS commitments. The only possibility is to have a look at the aggregated data of the whole banking sector (published by CNB). At the end of 2010, the given guarantees took share of 3 % in the aggregated OBS commitments. From this point of view, the EL is relatively high (while comparing with the provision) – mainly in the case of the Portfolio No. 3. This portfolio has a significant proportion of sectors with high sensitivity to the development of GDP (and others macroeconomic variables). If the economy was in the crisis, it would be highly probable that the debtors from these sectors would get into default.

CONCLUSION

In the case of given guarantees by a bank, the credit risk results from the uncertainty that the potential future credit receivable would be repaid (i.e. the debtor properly meets his obligation). Credit risk can be quantified as an "expected loss" (EL) which the bank suffers from the credit operation. The base of the EL calculation in case of given guarantees is the same as in case of credit receivables. It is not sure, however, that the given guarantee will result into the credit receivable. It depends on the future meeting conditions of the guarantee. This uncertainty has to be included in the calculation. The calculation of EL has to be enhanced by a factor representing probability with which the conditions of the guarantee will be met. This probability is expressed by the "credit conversion factor" (CCF).

In practice, the banks usually do not calculate CCF. They take the standardized CCF stated by Basel Committee (BCBS).

In my opinion, the correct determination of conversion factors while calculating EL of given guarantees is essential. The question is how the estimation of the probability, with which the bank will have to pay under the guarantee, should be done. The bank will pay under guarantee only if the conditions of the guarantee will be met, i.e. the debtor will fail in meeting his obligation which is guaranteed. In estimation of this probability (CCF) we can proceed in one of these two ways:

- to take into account the past experience with the debtor – if the debtor had problems with meeting his obligations in the past, it can be expected he will not meet them in the future.
- to determine the credit bonity of the debtor – the highest bonity of the debtor, the lower probability of default of the debtor in meeting his obligation (which is guaranteed by the bank). And vice versa.

Moreover, it should be taken into account the correlation between debtor's PD and CCF. According to my opinion, it can be assumed that the debtor's failure in meeting his first obligation signify his future failure in meeting his obligation to the bank (repaying the loan from the guarantee). The correlation between PD and CCF should be included in the calculation of EL.

In accordance with practical experience, there exists a highly positive correlation between PD and CCF in the case of given guarantees. If the debtor failed in meeting his guaranteed obligation, it would be highly probable he would also fail in repayment the loan from the guarantee. For this reason, the given guarantees can be considered as risky operations – with high credit risk for the bank.

While managing credit risk of given guarantees, the bank should not ignore some instruments for hedging the credit risk. First of all, the bank should state a minimal level of debtor's bonity. For determining the bonity, the bank can use its past experiences with the debtor (from the repayment of loans point of view). Moreover, some relevant data of external credit bureaux can be used. Except bonity, other instruments should be taken into account – for example pledge etc.

The KB given guarantees seems to be transactions with high level of credit risk. The main reason is their sector diversification. The construction sector has the largest proportion of all OBS receivables. The construction is considered as a risky sector with relatively high sensitivity to the development of GDP. In times of economic crisis, the quality of the banks guarantee portfolio significantly worsens. According to my calculation of PDs, the construction sector has one of the highest levels of credit default risk.

The calculated ELs were not high in relation to the KB's profit. In fact, this is not surprising as the bank guarantees are only marginal operations representing small proportion of the bank commitments in nominal value. Furthermore, these operations are of potential character and so it is necessary to use CCF while calculating EL. Thanks to this, it is not reasonable to compare them with EL of balance sheet credit transactions. Thus, ELs of off-balance sheet transactions are generally lower than their balance sheet counterparts.

The calculated ELs in relation to the provision signify that the provision would not be sufficient if the bank had given guarantees to debtors from sectors with high sensitivity to development of GDP. If the economic conditions worsened and the economy fell to recession, the provision would not be able to cover all losses resulting from credit risk of given guarantees.

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[12] In 2010, the profit of KB was 12.035 billions of CZK and the provision for off-balance sheet commitments of the bank was 461 millions of CZK.

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ANNEXURES

ANNEXURE 1: WEIGHTS OF SYSTEMATIC RISK FACTORS IN SECTOR DIVERSIFICATION

TABLE: WEIGHTS OF SYSTEMATIC RISK FACTORS IN SECTOR DIVERSIFICATION

Risk factors	Construction	PGW	Wholesale	BII	TTW	MOM	PA	FIA	CPI	ME	OPI	Retail	AI	MEEE
1.	1.0	0.4	0.9	0.7	0.8	0.8	0.2	0.5	0.7	0.6	0.7	0.8	1.0	0.9
2.	0.7	0.7	0.7	0.7	0.7	0.7	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7
3.	0.8	0.4	0.8	0.5	0.6	0.7	0.2	0.9	0.7	0.7	0.8	0.8	0.9	0.8
4.	0.5	0.6	0.7	0.6	0.7	0.7	0.1	0.5	0.6	0.6	0.6	0.6	0.9	0.8
5.	0.6	0.5	0.6	0.6	0.6	0.6	0.3	0.5	0.5	0.5	0.6	0.5	0.6	0.5

Source: Author's construction

Risk factors:
1. Expected development of GDP in next 12 months
2. Expected development of interest rate (repo) in next 12 months
3. Expected development of consumer prices (inflation) in next 12 months
4. Expected development of exchange rate CZK/EUR in next 12 months
5. Expected development of unemployment in next 12 months

ANNEXURE 2: UNSYSTEMATIC RISK FACTORS

TABLE: UNSYSTEMATIC RISK FACTORS

Risk factors		Risk grade
1. Sector dynamics	1. stable sector 2. moderately growing sector 3. very fast growing sector 4. sector in crisis	1 – Low 2 – Moderate 3 – Middle 4 – High
2. Sector sensitivity to economic cycle	1. minimal sensitivity 2. moderate sensitivity 3. significant sensitivity 4. cyclical sector	1 – Low 2 – Moderate 3 – Middle 4 – High
3. Sector sensitivity to changes of consumer prices (inflation)	1. minimal sensitivity 2. moderate sensitivity 3. middle sensitivity 4. high sensitivity	1 – Low 2 – Moderate 3 – Middle 4 – High
4. Innovation potential	1. significant technological growth 2. moderate technological changes 3. minimal technological changes 4. loss of technological innovations in sector	1 – Low 2 – Moderate 3 – Middle 4 – High
5. Market capacity	1. dominant market 2. comparable market share to competitors 3. saturated market 4. need to seek for new foreign markets	1 – Low 2 – Moderate 3 – Middle 4 – High
6. Sector regulation	1. highly regulated sector 2. middle regulated sector 3. moderately regulated sector 4. unregulated sector	1 – Low 2 – Moderate 3 – Middle 4 – High
7. Foreign markets orientation	1. no foreign markets orientation 2. moderate foreign markets orientation 3. middle foreign markets orientation 4. high foreign markets orientation	1 – Low 2 – Moderate 3 – Middle 4 – High

Source: Author's construction

ANNEXURE 3: GRADES OF UNSYSTEMATIC RISK FACTORS

TABLE: GRADES OF UNSYSTEMATIC RISK FACTORS

Risk factors	Construction	PGW	Wholesale	BII	TTW	MOM	PA	FIA	CPI	ME	OPI	Retail	AI	MEEE
1.	1	1	2	2	2	2	1	1	3	1	2	2	2	2
2.	4	1	3	2	3	3	1	1	2	2	3	3	4	4
3.	4	2	4	1	4	3	1	3	2	2	3	4	4	3
4.	3	3	2	1	1	2	2	3	1	3	2	2	1	2
5.	3	1	3	3	3	3	1	3	2	1	3	3	3	3
6.	3	2	4	1	4	4	1	3	2	2	4	4	3	4
7.	2	2	3	1	2	3	1	2	2	2	2	2	4	2

Source: Author's construction

Risk factors:
1. Sector dynamics
2. Sector sensitivity to economic cycle
3. Sector sensitivity to changes of consumer prices (inflation)
4. Innovation potential
5. Market capacity
6. Sector regulation
7. Foreign markets orientation

TABLE: WEIGHTS OF UNSYSTEMATIC RISK FACTORS

Risk factors	Weight	Risk factors	Weight
1. Sector dynamics	0.8	5. Market capacity	0.5
2. Sector sensitivity to economic cycle	1.0	6. Sector regulation	0.7
3. Sector sensitivity to changes of consumer prices (inflation)	0.8	7. Foreign markets orientation	0.6
4. Innovation potential	0.5		

Source: Author's construction

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