

# BASEL II APPROACHES FOR THE CALCULATION OF THE REGULATORY CAPITAL FOR OPERATIONAL RISK

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**Abstract:** The final version of the New Capital Accord, which includes operational risk, was released by the Basel Committee on Banking Supervision in June 2004. The article “Basel II approaches for the calculation of the regulatory capital for operational risk” is devoted to the issue of operational risk of credit financial institutions. The paper talks about methods of operational risk calculation, advantages and disadvantages of particular methods.

**Keywords:** Operational risk; Advanced Measurement Approach (AMA); Standardized Approach (TSA); Basic Indicator Approach (BIA).

**JEL Classification:** G21, G28, G 32.

## Introduction

The Basel Committee on Banking Supervision (hereinafter only “BCBS”) was established in 1975 by the central bank governors of the G-10<sup>1</sup> and Luxembourg. The original mission of the BCBS was to coordinate the national schemes of banking supervision. Since the 1980s, the BCBS deals with the issue of banking risks and their management.

In 1988, the BCBS approved a regulatory directive, known as “Basel I”. This directive established the standard of capital adequacy for international banks in the form of capital requirements for credit risk. In 1993, the BCBS added the capital requirements for market risks to Basel I.

The development of markets and global trends caused that Basel I became outdated in 1999. The BCBS prepared the first draft of new rules for the determination of the capital requirements. The final version of the new capital adequacy concept was published by the BCBS on 26<sup>th</sup> June 2004. This concept, known as “Basel II”, also included the capital requirements for operational risk.

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<sup>1</sup> Belgium, France, Italy, Japan, Canada, the Netherlands, Sweden, Switzerland, UK and USA.

## **Capital Requirements Directives**

Basel II framework for the prudential supervision of credit institutions and investment firms has been implemented to European legislation in Directive 2006/48/EC<sup>2</sup> (an amendment to the European Directive 2000/12/EC) and Directive 2006/49/EC<sup>3</sup> (an amendment to the European Directive 93/6/EEC). The Directives are referred to as the Capital Requirements Directives, known as “CRD”, and contain more than just capital requirements for credit, market and operational risk. The CRD set how Member States should arrange for the supervision of banks and investment firms. The Directive came into force on 1<sup>st</sup> January 2007. On that date the new concept was implemented into national laws. In the Czech Republic the CRD was entered in the Decree No. 123/2007 Coll. stipulating the prudential rules for banks, credit unions and investment firms, as amended by Decree No. 282/2008 Coll., which came into force on 1<sup>st</sup> July 2007.

In October 2008 the EC adopted the CRD II and in July 2009 the EC adopted the CRD III.

The objective of the **CRD II** is to reinforce financial stability. The main changes are: improving the management of large exposures, supervision of cross-border banking groups, the quality of banks' capital, liquidity risk management and risk management for securitised products.

The objective of the **CRD III** is to strengthen rules on bank capital and on remuneration in the banking sector. The main changes are in areas: capital requirements for re-securitisations, disclosure of securitisation exposures, capital requirements for the trading book and remuneration policies and practices within banks.

In the Czech Republic the CRD amendments are being transposed during 2010 with effect from 31<sup>st</sup> December 2010.<sup>4</sup> The rules of CRD III must come into effect on 1<sup>st</sup> January 2011.

At the beginning of 2010, a public consultation on further possible changes to the CRD by the European Commission (hereinafter only “EC”) was launched. The proposed changes (known as “**CRD IV**”) are the financial crisis response and relate to seven specific areas:

- Liquidity standards (introducing liquidity standards, introducing a liquidity coverage ratio requirement).
- Definition of capital (raising the quality and transparency of the capital base).
- Leverage ratio (introducing a leverage ratio).
- Counterparty credit risk (strengthening the capital requirements for counterparty credit risk exposures arising from derivatives, repos and securities financing activities).
- Countercyclical measures (a countercyclical capital framework).

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<sup>2</sup> *Directive 2006/48/EC* of the European Parliament and of the Council of 14 June 2006 relating to the taking up and pursuit of the business of credit institutions.

<sup>3</sup> *Directive 2006/49/EC* of the European Parliament and of the Council of 14 June 2006 on the capital adequacy of investment firm and credit institutions.

<sup>4</sup> Processed according to the CNB “Zpráva o výkonu dohledu nad finančním trhem 2009“: <http://www.cnb.cz>.

- Systemically important financial institutions.
- Single rule book in banking.

The paper deals with operational risk, namely the problem of measurement methodologies for the calculation of the operational risk capital charges. It defines the term "operational risk", analyzes three methods for the calculation of the capital requirement for operational risk and mentions the differences of these three methods and the advantages and weaknesses of the approaches.

### Definition and categorization of operational risk

The term "operational risk" has undergone a certain evolution and its contents may be different according to different interpretations and uses. To work effectively with operational risk it was necessary to ensure the accuracy, completeness and consistency of this concept for all financial entities.

The BCBS defines operational risk as follows: "Operational risk is the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk. Legal risk includes, but is not limited to, exposure to fines, penalties, or punitive damages resulting from supervisory actions, as well as private settlements."<sup>5</sup>

Basel II defined seven types of events (level 1) and twenty categories of operational risk events (level 2). Types and categories of operational risk events show the following summary.

**Fig. 1 Detailed Loss Event Type classification**

Event-Type Category (Level 1):	Categories (Level 2)
Internal fraud	Unauthorised Activity Theft and Fraud
External fraud	Theft and Fraud Systems Security
Employment Practices and Workplace Safety	Employee Relations Sale Environment Diversity and Discrimination
Clients, Products and Business Practices	Suitability, Disclosure and Fiduciary Improper Business or Market Practices Product Flaws Selection, Sponsorship and Exposure Advisory Activities

<sup>5</sup> BCBS: *International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version*. June 2004. P. 144.

Damage to Physical Assets	Disasters and other events
Business disruption and system failures	Systems
Execution, Delivery and Process Management	Transaction Capture, Execution and Maintenance Monitoring and Reporting Customer Intake and Documentation Customer/Client Account Management Trade Counterparties Vendors and Suppliers

Source: Processed according to the BCBS: *International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version*. June 2004. Annex 9.

### Methods for the calculation of the capital requirement for operational risk

In order to meet the needs of financial institutions, the BCBS developed three methods for determining the capital requirement for operational risk. The BCBS left financial institutions a considerable flexibility to choose the method. So each bank can decide for the best method with respect to its activities and risk profile, but the bank has to meet the condition and in some cases obtain permission from supervisor.

#### The Basic Indicator Approach

Banks using the Basic Indicator Approach (hereinafter BIA) must hold capital for operational risk equal to the average over the previous three years of a fixed percentage of positive annual gross income.<sup>6</sup> If the annual gross income is negative or zero, figures for the year should be excluded from both the numerator and denominator when calculating the average.

The BIA method for the calculation of the capital requirement is defined as follows:

$$CR_{BIA} = [\sum(GI_{Bi} \cdot \alpha)] / n \quad (1)$$

where  $CR_{BIA}$  – the capital requirement for operational risk under BIA,  
 $GI_{Bi}$  – annual gross income of the bank  $i$ ,  
 $\alpha$  – 15% established by the regulator (currently  $\alpha = 15\%$ ).  
 $n$  – number of the previous three years, where gross income is positive

The value of the gross income is defined as the bank's three-year average of the sum of net interest income and net non-interest income, based on the data from the financial results for the last three seasons. *Using the average gross income should mitigate the impact of volatility and consequently the volatility of the capital requirement.*

<sup>6</sup> BCBS: *International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version*. June 2004. P. 144.

**Fig. 2 Gross income**

Gross income =	
=	gross of any provisions
+	gross of operating expenses
-	realised profits/losses from the sale of securities in the banking book
-	extraordinary or irregular items

Source: Processed according to BCBS: *International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version*. June 2004. P. 145.

If the indicator of exposure is zero or negative, then the capital requirement is zero. If the bank does not have the required information, because its activity operates for less than three years, it is used instead of the missing data values assumed in the plan of financial institutions.

*The BIA is the simplest method and can be used by all banks. Due to its easy construction the method is particularly suitable for smaller banks with simple risk management systems, which do not result in excessive costs of the construction of the capital requirement for operational risk.*

### The Standardised Approach

Standardized method (Standardised Approach, hereinafter STA) is similar to the BIA, but *eliminates deficiencies of the BIA, because considers operational risk separately for each type of activities*. The activities of banks are in this approach divided according to their nature into business lines.

**Fig. 3 Values of the betas**

Business Lines	Beta Factors
Corporate finance ( $\beta_1$ )	18%
Trading and sales ( $\beta_2$ )	18%
Retail banking ( $\beta_3$ )	12%
Commercial banking ( $\beta_4$ )	15%
Payment and settlement ( $\beta_5$ )	18%
Agency services ( $\beta_6$ )	15%
Asset management ( $\beta_7$ )	12%
Retail brokerage ( $\beta_8$ )	12%

Source: BCBS: *International Convergence of Capital Measurement and Capital Standards: A Revised Framework - Comprehensive Version*. June 2004. P. 147.

The distribution of banking services to individual business lines is provided so that it could be applied to a wide range of banks. For individual business lines different coefficients  $\beta$  are set. The assigned percentage reflects the risk activities. The capital requirement is calculated by multiplying the gross income by a beta assigned to the bank's

business line. The total capital requirement for operational risk is the sum of capital requirements for individual business lines. If an indicator of exposure is zero or negative, then  $CR_{TSA} = 0$ .

The TSA method for the calculation of the capital requirement is defined as follows:

$$CR_{TSA} = \{\sum_{\text{years}1-3} \max[\sum(GI_{Bi\ 1-8} \cdot \beta_{1-8})]\}/3 \quad (2)$$

where  $CR_{TSA}$  – the capital requirement for operational risk under TSA,  
 $GI_{Bi\ 1-8}$  – annual gross income of the bank for each business line,  
 $\beta_{1-8}$  – risk multiplier value for each business line.

*In comparison with the BIA the TSA is more exact. A bank that wants to use the TSA has to meet qualitative requirements. Furthermore, banks must have a procedure and criteria for monitoring of the gross income in each business line. Using the TSA has to be allowed by a regulator.*

### **Advanced Measurement Approaches**

*The advanced method for operational risk measurement (Advanced Measurement Approach, hereinafter AMA) is fundamentally different from the BIA or the TSA. In case of the BIA and the TSA, all the parameters are determined by a regulator when the capital requirement for operational risk is calculated. In case of advanced methods, the bank's calculations and its real history of losses are taken into account. According to the latest version of Basel II, models creation is on the bank, but the model must meet the specified requirements. The requirements relate to internal and external data, scenario analysis, taking the factors underpinning the business environment and internal control. The qualitative criteria include the requirement to establish a precise documentation of operational risk management system, which must include procedures for identifying, measuring, monitoring and mitigating operational risk. Its components must also be a system of reporting on operational risk to managers of business lines, senior management and the board. The method the bank has chosen should reflect the risk which it is exposed to in the best way. A detailed description and analysis of qualitative and quantitative requirements for using the own bank's models is given in Annex of Decree No. 123/2007 Coll.*

Elements of AMA are internal and external data, scenario analysis, business environment and internal control factors.

Internal data: Data collection system is based on workers of financial institutions who are responsible for collecting information on internal operational risk events. The second way is based on the use and analysis of accounting records. In the Czech Republic the data collection system based on correspondents with checks of recorded events with data in the accounting system of financial institutions is preferred.

External data: The system includes providing additional information. The data are obtained from other institutions.

Scenario analysis: The objective of scenario analysis is similar as of external data – to capture extraordinary events with very severe losses.

Business environment and internal control factors: The methods allow to adjust the capital charge and to eliminate the shortcomings inherent in the internal data.

Within the AMA three advanced approaches/methods were identified for operational risk measuring:

1. Internal Measure (International Measurement Approaches - IMA),
2. Distribution (distribution) losses (Loss Distribution Approaches - LDA),
3. Systems Indicators (Scorecard Approaches - SCA).

The IMA assumes from presumption a linear relationship between expected losses and unexpected losses. For the purposes of Basel II, banks use the allocation to individual business lines (likewise as in the case of the TSA). To increase the sensitivity to operational risk seven types of operational risk losses are defined in addition to eight business lines.

**Fig. 4 Combination of business lines and operational risk losses**

Business lines		Operational risk losses	
1.	Corporate finance	1.	Inside unfair practices
2.	Trading and sales	2.	Outside unfair practices
3.	Payment and settlement	3.	Labour-law relations, events and battles
4.	Commercial banking	4.	Infringement of the business proceeding
5.	Agency services	5.	Depreciation of real assets
6.	Retail banking	6.	Failure of systems or infrastructure
7.	Asset management	7.	Failure under management, supplies of goods or services
8.	Retail brokerage	-	-

There is a matrix of  $8 \times 7$ , and for each combination of business lines and the types of loss capital requirement is calculated separately. In the case of using the IMA banks use external but also internal data.

The IMA takes into account the degree of exposure to operational risk in the business line by means of the value of an indicator of exposure. This indicator may be gross income, number of transactions, trading volume, etc. The components of the method can be defined in different ways.

The capital requirement for various combinations of the AMA methods is determined as follows:

$$CR_{IMAij} = \gamma_{ij} * EL_{ij} * PE_{ij} * LGE_{ij} = \gamma_{ij} * EL_{ij}, \quad (3)$$

where  $CR_{IMAij}$  – the capital requirement for operational risk for the business line "i" and type of operating loss and "j",  
 $\gamma_{ij}$  – gamma factor applied for an estimate of unexpected losses converting from an estimate of expected losses,  
 $EL_{ij}$  – an indicator of exposure for the business line "i" and the type of operating loss "j",  
 $PE_{ij}$  – probability of loss events in one year horizon for the business line "i" and the type of operating loss "j",  
 $LGE_{ij}$  – the average amount of loss for business line "i" and the type of operating loss and "j" when the event occurs,  
 $EL_{ij}$  – the average annual loss for the business line "i" and type of operating loss and "j".

The total capital requirement for operational risk equals the sum of incremental capital requirements of each combination of business lines and loss types. (Note: The formula assumes that the unexpected loss is a constant multiple of expected losses.)

When using the LDA, the unexpected losses from operational risk are derived from compound probability distributions. The approach assumes that a bank knows the distribution of its losses and accordingly can estimate the unexpected loss, so that the likelihood of catastrophic losses does not exceed a given threshold.

The estimate of the probability distribution of losses is divided into three steps: an estimate of the frequency distribution of losses, an estimate of the size distribution of losses and finally the calculation of the probability distribution of total losses from the above mentioned estimates. The bank must first estimate the distribution function for each combination of business lines and risk types. Furthermore, the bank establishes the unexpected loss determined as the difference between the value of such a quantile so that the probability of catastrophic loss cannot exceed the specified value, and the value of the quantile within which the expected losses fall.

The total capital requirement is then determined by the sum of capital requirements for different combinations of business lines and operating losses.

$$CR_{LDA} = \sum \sum (L(p)_{ij} - EL_{ij}), \quad (4)$$

where  $CR_{LDA}$  – the capital requirement for operational risk,  
 $L(p)_{ij}$  – 99.9% fractile value for the business line 'i' and type of expected loss "j",  
 $EL_{ij}$  – the expected loss for the business line "i" and type of operating loss "j".



*The LDA is quite input data-intensive. The bank must combine both internal and external data, but here experience difficulties arise. In the case of internal data there is the problem of insufficient quantities of its own information on unexpected or catastrophic losses. Therefore, the bank often uses estimates of experts. When the bank uses external data and estimates, it is necessary to assess whether the risks match the situation in the bank and choose only the relevant data.*

The last option of the advanced approaches is the SCA. If the bank decides to use this approach, it sets the initial level of capital for operational risk for each business line or as a whole. The bank then corrects the specified level in time, based on the achieved values of the set indicators, called Scorecard. Indicators are focused on the evaluation of the bank's risk profile and the environment for managing operational risk across business lines.

$$CR_{SCA} = \sum \sum (EL_{ij} * \omega_{ij} * RS_{ij}), \quad (5)$$

where

- $CR_{SCA}$  – the capital requirement for operational risk,
- $EL$  – an indicator of exposure chosen for each combination of business lines "i" and the type of operational risk "j" in the best way to be positively correlated with the development of operational risk losses in the combined business lines "i"/type of operational risk "j",
- $\omega$  – a sector factor determined by a regulator on the basis of the total data, the factor reflects the amount of capital per unit of the indicator of exposure for the average financial institution,
- $RS$  – risk factors - risk scores.

Individual Scorecards should be chosen so as to enrich the calculation of the capital requirement for operational risk by a factor that takes into account the improvement or deterioration of the environment for risk management which in the future will probably lead to the reduction or increase in the frequency and importance of operational risk events. In practice, the indicators are updated at regular intervals (yearly, quarterly, and some even monthly), and presented for examination to the central bank risk management department.

Mitigation techniques of operational risk include not only ensuring adequate capital coverage but taking out commercial insurance as well. When a bank uses the AMA and some specified conditions are met, the operational risk capital charge can be reduced by up to 20%. The impact of insurance is relatively insignificant in the Czech Republic. Achieved savings of the operational risk capital charge are low.<sup>7</sup>

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<sup>7</sup> *Processed according to the CNB "Operační riziko a jeho dopady do finanční stability: <http://www.cnb.cz>.*

### Core Principles for Effective Banking Supervision

“The Basel Core Principles for Effective Banking Supervision”<sup>8</sup> contains 25 principles that establish globally agreed minimum standards for banking regulation and supervision. The 15<sup>th</sup> principle deals with operational risk. According to the principle supervisors it must be insured that financial institutions have in place risk management policies and processes to identify, assess, monitor and mitigate operational risk. Reference documents for the area are: “Sound practices for the management and supervision of operational risk” (BCBS, February 2003) and “Outsourcing in financial services” (Joint Forum, February 2005).

### Regulation of operational risk in the Czech banking sector

Operational risk events can significantly affect the reputation, risk profile and financial standing of a financial institution.

**Fig. 5 Selected operational risk events around the world and in the Czech Republic<sup>9</sup>**

Cause	Financial institution	Impact (mil. USD)	Year
Cheque fraud	Retail banks (US)	12 000	1993
Failure to ensure segregation of operations	Barings	1 600	1995
Insider trading	Merrill Lynch	100	1997
Inadequate trading limits and controls	Nomura Securities	48 000	1998
Misuse of client accounts by bank employees	ABN AMRO	140	1998
Rogue trading	Société Générale	7 300	2008
Credit fraud	KB (CZ)	180	1999
Non-compliance with dealing procedures	ČSOB (CZ)	35	2001
Sporo-service failure	ČS (CZ)	40	2006
Fee rounding errors in IT system	KB (CZ)	10	2007

Source: Processed according to the CNB “Operační riziko a jeho dopady do finanční stability: <http://www.cnb.cz>.”

<sup>8</sup> BCBS: “The Basel Core Principles for Effective Banking Supervision” – Revised Framework, October 2006 [online] available at [www.bis.org](http://www.bis.org).

<sup>9</sup> Processed according to the CNB “Operační riziko a jeho dopady do finanční stability: [http://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/financni\\_stabilita/zpravy\\_fs/fs\\_2007/FS\\_2007\\_clanek\\_4.pdf](http://www.cnb.cz/miranda2/export/sites/www.cnb.cz/cs/financni_stabilita/zpravy_fs/fs_2007/FS_2007_clanek_4.pdf).”

The events of operational risk have encouraged more comprehensive awareness and analysis. Maintaining adequate capital coverage for unexpected losses due to operational risk is one of the key operational risk management tools. Operational risk is one of the three risks with mandatory capital regulation.

In 2005, the impact of Basel II on the Czech banking sector has been ascertained by an estimate. According to the QIS 5,<sup>10</sup> the ratio of the operational risk capital to the total capital charges was expected to be around 8%.

Since 2007, real capital requirements for operational risk have been calculated. Real data from the start of 2008 showed the ratio is around 2 percentage points higher. The reason is probably real usage of the simplest approach by financial institutions compared to the proportion in the QIS 5.<sup>11</sup>

**Fig. 6 Capital requirements for operational risk in the Czech banking sector (in CZK billions)**

	2007	2008	2009
Total capital requirements	146.8	149.9	150.0
Total capital requirements for operational risk	7.7	14.0	14.7
BIA	0.5	1.1	1.1
TSA	7.2	8.7	4.6
ASA	0.0	0.8	0.8
AMA	0.0	3.4	8.1

Source: Processed according to the CNB "Zpráva o výkonu dohledu nad finančním trhem 2007, 2008 a 2009", <http://www.cnb.cz>

In 2009, capital requirements for operational risk account for 9.80% of the total capital requirements of the banking sector. The main risk the Czech banking sector faces is credit risk. The capital requirement for credit risk is almost 88.00% of the total capital requirements of the banking sector.

### Implementation of advanced methods

**Fig. 7 Implementation of advanced methods for determining capital requirements for operational risk**

	2006	2007	2008	2009
Validation process for ASA	-	1 + 1*	1 + 1*	2
Authorisation to use the ASA approach	-	-	1 + 1*	1

<sup>10</sup> QIS 5 is a study which estimated the impact of Basel II on the Czech banking sector, conducted in 2005.

<sup>11</sup> Processed according to the CNB "Operační riziko a jeho dopady do finanční stability: <http://www.cnb.cz>.

Validation process for AMA	3	3	3	2
Authorisation to use the AMA approach	-	1	-	1

Source: Processed according to the CNB "Zpráva o výkonu dohledu nad finančním trhem 2006, 2007, 2008 a 2009", <http://www.cnb.cz>.

\* A credit union.

In 2009, an authorisation to use the AMA approach to one bank in the Czech Republic was granted. The validation process for the AMA approach was conducted by the Czech national bank in two banking groups in the Czech Republic.

## Discussion

For determining the capital adequacy, but especially for a proper and effective operational risk management, accuracy and completeness of the definition of "operational risk" is essential. As already mentioned, the BCBS defines operational risk as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events.

However, this definition of operational risk has its weaknesses. The definition does not include strategic risk, reputation and legal risk, despite the fact that these risks meet the characteristics of operational risk. The risks are non-financial risks and extend to all the bank's activities. In practice they are clearly regarded as operational risk. *The reason is probably that it is difficult to identify all risk factors, and thus the extent of the risks and potential impacts. Existing or potential client's opinion of a particular bank is featured by various influences and circumstances that cannot be always recognized. It is then impossible to quantify reputational risk because a possible loss of business with existing customers under the influence of reputation risk or lost profits from potential clients who have opted for another company after losing the bank's reputation would have to be established.* Implementation of these risks could have a major impact on the bank, and therefore I think the definition of operational risk in Basel II should not be omitted.

The definition embodied in Basel II does not include all operational risks, which daily threaten financial institutions. It is estimated that the definition in Basel II reduces operational risk to about half of the actual size.

*The quantification of operational risk is difficult, however, necessary for determining the capital requirement.* There are several methods that can be used for operational risk measurement. In order to meet the requirements of banking institutions, BCBS developed three basic methods for operational risk measurement, which may be used by financial institutions (BIA, TSA and AMA).

*The least complex structure for the calculation of the capital requirement for operational risk is the BIA. Its application requires no complicated calculations and it is not difficult to date. The BIA approach is suitable for banks which have a simple system of risk management. The advantage of the BIA approach is a low cost for the design requirement. On the other hand, the simplicity of the model is compensated by the risk that the capital requirement calculated does not measure the actual operational risks of the financial institution.*

The TSA approach is similar to the BIA, but if the TSA approach is used, the activities of the financial institutions are divided according to their nature into business lines. The breakdown of financial institution's activities into business lines allows for a more efficient operational risk management than the BIA. Moreover, no excessive regulatory requirements are placed on the process of business lines creation and allocation of the relevant indicator between the lines. But a more sophisticated operational risk management system is required from the regulator, which may discourage smaller financial institutions.

In the case of the BIA and the TSA, on the basis of the requirement for different approaches, financial institutions alone will decide which approach is applied without the need for prior approval by the responsible supervisor (there are only a few exceptions, relating to the transition from one system to another and use of the BIA or the TSA in the special approaches).

The procedure for the capital requirement for the operational risk calculation is not determined by the supervisor in case of the AMA approach. The Czech National Bank defines the so-called quantitative requirements of the framework conditions for operational risk measuring, under which financial institutions develop their own methodology. Banks have to use five-year, at the commencement of the AMA use at least three-year, historical time series data, banks breakdown their historic losses in the same business lines as the TSA and also by types of events.

Financial institutions use internal and external data, and a scenario analysis based on estimates of experts for the capital requirement calculation, and they must take into account the factors that affect the internal control of financial institutions or the business environment in which they are located. The capital requirement has to capture the expected and the unexpected losses.

*Of course, the bank should give the highest weight to its own internal information, which reflects more precisely the level of operational risk management in banks and thus the level of its risk exposure.*

*If you look closely at the SCA, we can state that its advantage is partially that it reduces the impact of the historical development of operational risk losses and looks into the future. Due to this method, the executive staff and management of single business lines have a survey about the real exposure of business lines and the level of operational risk management, respectively diversifications. The information allows them to focus risk management on problem areas.*

*The disadvantage of this approach is a major influence of the executive staff and management of single business lines on assessment coefficient for modification of quantitative method to calculate the capital requirement. Management may have the tendency to overestimate the quality of its management.*

Compared to the basic approaches the bank can under certain conditions deduct insurance of operational risk up to 20% of capital requirement, as well as other items, if it is able to justify the legitimacy of the deduction.<sup>12</sup>

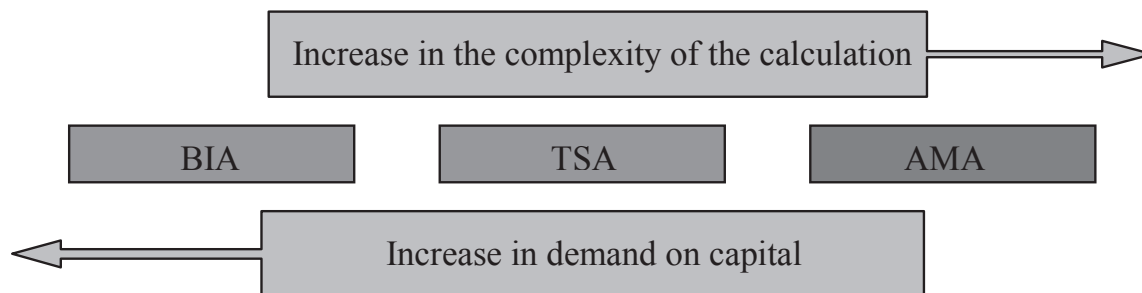
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<sup>12</sup> 123/2007

If a financial institution wants to use the advanced approach it must meet the quality requirements for the operational risk management system and to get permission of the Czech National Bank, which approve of using the AMA.

Already in Basel II, the parameters of each of methods are set in such a way that banks are motivated to use advanced approaches. More advanced methods take into account the risk profile of banks and reduce the capital requirement for operational risk. *As the use of sophisticated methods is connected with high costs, these methods are usually used by large banks.*

**Fig. 8 Comparison of methods for the calculation of the capital requirement for operational risk**



Source: Author's table.

The bank has the option to choose an approach for the calculation of the capital requirement of operational risk. If the bank has already used one of the advanced approaches, it cannot return to a less advanced approach without the consent of the regulator. The regulatory authority permits that only if the bank does not meet the criteria for that approach.

### Conclusions

In June 2004 the BCBS published the final version of the second concept of capital adequacy. This concept includes the capital requirements in addition to credit and market risk and newly the operational risk. The Basel II amendments were received to the legislation of European Union countries through European directives on capital adequacy. The Czech Republic implemented the Directive by Decree No. 123/2007 Coll. that came into force on 1<sup>st</sup> July 2007.

The definition of operational risk set out in Basel II does not include all the components of operational risk as known from the practice. In particular, the definition lacks strategic or reputational risk. The reason is probably it is very difficult to identify and quantify these risks.

For the calculation of the capital requirement for operational risk, banks may choose one of three methods: the Basic Indicators Approach, the Standardized and the Advanced Measurement Approaches, known under the acronyms BIA, TSA and AMA. There are differences in the ways these approaches calculate the capital requirements for operational risk (for the basic differences see list below).

**Fig. 9 Differences in the ways the approaches calculate the capital requirements for operational risk**

Indicators	Approach		
	BIA	TSA	AMA
Procedure for the calculation of the capital requirement:	It is given by the Czech National Bank.	It is given by the Czech National Bank.	It is made by terms of quantitative requirements for AMA by a bank.
For the calculation of the capital requirement are used:	all sector data and information	all sector data and information	both internal and external data
Breakdown by business lines	No	Yes	Yes
Possibility of decreasing the capital requirement by insurance:	No	No	Yes (under certain conditions)
The risk of inadequate calculation of the capital requirement with respect to the risk profile of a bank:	High-risk	Middle-risk	Low-risk

Source: Author's table.

*Compared to other methods the BIA stands out by its simplicity of application, but the capital requirement may not be precise for financial institutions. The TSA model is thanks to the breakdown of the bank's activities into business lines unquestionably more accurate. Most of the risk profile of the bank corresponds to the capital requirement calculated using the AMA. The AMA is difficult for the database and is intended for financial institutions that have quality, developed and integrated (into everyday processes) system of ORM.<sup>13</sup> In principle, the banks make the decision between the simplicity of the calculation of the capital requirement and its accuracy.*

Despite all criticism of Basel II, the advantages and disadvantages of each method, the incorporation of operational risk into capital adequacy concept is another step forward for the effective risk management.

<sup>13</sup> ORM - Operational risk management.

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