Dániel Homolya: The impact of the capital requirements for operational risk in the Hungarian banking system[1]

The capital adequacy regulation which came into force on 1 January 2008 for the Hungarian banking sector, in line with the Basel II directives and generally applied in the European Union, brought the novelty of distinct management of operational risk. Operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, personnel and systems or from external events, which, similarly to financial risk, may result in substantial losses. The regulation allows for various methods of calculating the capital requirement. Financial institutions may opt for simpler approaches based on income indicators, or for more complex ones based on actual measures of risk. Based on the past one-year period, it appears that the Hungarian banking system's operational risk capital charge is significant compared to the total capital charge, with the operational risk capital charge for 2009 Q1 amounting to HUF 120 billion, equivalent to nearly 8% of the total capital requirements. The reported realised losses are lower than the capital requirement (approximately HUF 13 billion in 2008), but the capital charge must provide a buffer in extreme, unexpected situations, and conclusions on extreme values cannot be drawn based merely on one year of observation, therefore this discrepancy could be completely justified. Regarding institutions' choice of approach, it can be established that larger institutions prefer more complex methods in both foreign and Hungarian practice. This is due to the fact that the introduction of more advanced approaches comes with a higher fixed cost, which larger institutions can absorb more easily over the short term, and moreover, they can take better advantage of the benefits offered. Overall, the conscious management of operational risk and application of more developed methods aimed at managing such risks can contribute to the stability of the financial system.

INTRODUCTION

The European Union Capital Requirements Directive (CRD, Directives 2006/48 and 2006/49), implemented in the Hungarian legal order in 2008, introduced the so-called Basel II-based definition of banks' capital requirement[2] (BIS, 2004) to the Hungarian banking system. One of the main novelties of the regulatory change is the consideration of operational risk in the course of capital requirement allocation. Operational risk refers to the risk of loss resulting from inadequate or failed internal processes, personnel and systems or from external events (e.g. fraud, business disruption, execution and transaction errors, etc.) (BIS, 2004). The definition of this risk clearly illustrates that this type of risk goes beyond the scope of financial risks (credit and market risk) previously encompassing a capital requirement allocation obligation.

Management of operational risks has become one of the new central issues in both Hungarian and international financial institutional practice in the recent past. Substantial losses stemming from operational risk events (for instance the recently exposed cases of fraud (e.g. the fictitious transactions carried out by Jérôme Kerviel, incurring losses of several billion euros for Société Générale, or Bernard Madoff's embezzlement of clients' wealth worth tens of billions of dollars), inadequate compliance with lending standards on the subprime mortgage market, the fraud perpetrated by Nick Leeson at Barings Bank in the mid-1990s (for details on the case, see Jorion, 1999) or the 9/11 terrorist attacks against the WTC in 2001) have contributed to increased attention being focused on this topic. It is important to underline that the definition of operational risk includes legal risk, the role of which has also gained significance. On the other hand, this increased interest has

[2] Capital requirement signifies the level of regulatory capital providing adequate safety for a bank to be able to withstand possible losses while being able to fulfil its payment obligations, in other words the losses should affect those providing regulatory capital (primarily owners). Regulatory capital, a special term used by banking literature and regulation, is defined as the total of equity and Tier 2 capital.

been determined by changes in regulation, the so-called Basel II process. In Hungary, financial institutions and the groups managed by such institutions must comply with the Basel II regulation based on the new Act on Credit Institutions and Financial Enterprises (Act CXII of 1996 on Credit Institutions and Financial Enterprises), while investment companies and the groups managed by such companies must comply with the new Act on Investment Companies and Commodity Brokers (Act CXXXVIII of 2007 on Investment Companies, Commodity Brokers and the Regulations Governing their Activities). In contrast to previous practice, the new regulatory framework requires institutions to allocate capital to operational risk, in addition to credit and market risk,[3] forming a sort of "buffer" against such risks and reflecting the fact that a larger operational risk event can be fatal for an institution. The two main categories of operational risk are, on the one hand, frequent events with low impact, and rare events with extremely high impact on the other hand. The latter type of event and the combination of risks are especially dangerous. In international practice, the case of Barings bank mentioned above can be brought up as a basic case of financial and operational risks forming a fatal combination. In the case of Barings bank, a rogue trader concluded transactions considered fraudulent, then a negative turn ensued on the market which would have triggered big losses in and of itself, but coupled with the fraud, led to the collapse of Barings. Of course, operational risk may also cause damage when it is combined with credit risk, generating cases where loose lending policy is exacerbated by inadequate compliance with internal rules.

Regulation based on Basel II defines three broad methods for calculating the operational risk capital requirement:

• Basic indicator approach (BIA) – the capital charge is 15% of the average gross income of the previous three years. This method can be used without adhering to separate, precise operational risk management requirements. Gross income is defined as net interest income, net non-interest income, net profit realised on financial transactions and other incomes.

• The standardised approach (TSA) – the capital charge is 12-18% of the average gross income of the previous three years, according to business line. Data collection and risk management requirements must be fulfilled, i.e. banks must

have an operational risk management function which exposes, analyses, measures, reports and manages operational risk factors.[4]

• Advanced measurement approach (AMA) – in this case, the capital charge is based on actual risk measurement: the extent of one-year 99.9% VaR[5] must be determined. Institutions authorised to use this method have to satisfy strong risk identification, risk assessment, monitoring and risk management requirements. Measurements for estimating risk are not simply based on historical data; internal controls and the business environment must also be captured, using external data as well. The capital charge of the advanced measurement approach, similar in complexity to the ratings-based approach (IRB) applying to credit risk, is the one-year 99.9% VaR. In other words, capital which is capable of covering the losses of all years, the losses of which are only exceeded every 1,000 years must be allocated, with these parameters

Due to their nature, the basic indicator and standardised approaches are considered "simpler methods". The AMA allows sophisticated risk assessment, determining a capital charge based on the actual risk profile. The method of capital requirement calculation based on gross income was determined based on the significant relationship between gross income and annual losses stemming from operational risk, demonstrated by certain studies (of which the most frequently cited is Shih et al., 2000). However, upon more careful reflection, the simpler methods do not necessarily reflect the profile of operational risk to financial institutions. Although it is logical that if an institution's gross income is higher, then the institution itself is bigger, if an institution suffers a greater loss precisely because of its greater operational risk losses, then its capital charge decreases in the opposite direction of risks. Of course, it may also decrease the available regulatory capital remaining after the appropriate accounting settlements following the claiming of losses and other items, thereby decreasing the overall level of capital adequacy. Recognising this effect, which materialises perceptibly in the current crisis environment due to falls in profitability, the authorities responsible for creating capital requirement regulations have begun to consider devising alternative indicators in order to determine capital requirement levels which reflect risks better, even under the simpler methods.

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[3] The literature on risk management defines credit risk as the risk of loss stemming from a debtor's non-payment, while market risk is defined as the risk of loss stemming from a change in the market price of financial assets.

[4] The regulation enables banks with large retail and commercial banking activities to use the so-called alternative standardised approach (ASA). In this case, the authorised institution may use 3.5% of the business line's previous three years' average exposure instead of gross income in the two aforementioned business lines.

[5] VaR is the abbreviation for "value-at-risk". For example, a one-year VaR figure of 99.9% reflects the value which we cannot lose more than with a 99.9% probability in one year.

The hierarchy between the various methods for determining the capital requirement is not only reflected in the increased requirements and the one-way direction of switching method (by default, one can only progress along the spectrum of approaches from simpler methods towards the more advanced ones, and not vice versa), but also in the amount of the capital charge. The findings of impact studies introducing the new regulation (see for example CEBS, 2006) show that based on general tendencies, the observed banks are better off switching from the basic indicator approach to the standardised approach, and from the standardised approach to the advanced measurement approach, as the amount of capital charge decreases in parallel with the increasing complexity of the method chosen. In the case of certain banks, nevertheless, the capital requirement – which generally decreases as a given method's complexity increases – may show opposing change.

In the following section, I will first examine the operational risk capital charges and the available data on the operational risk losses of the Hungarian banking system, followed by an analysis of the driving forces of the choice of capital requirement method, comparing Hungarian tendencies with an overview of the operational risk method selection of large international banks.

THE OPERATIONAL RISK CAPITAL CHARGES OF THE HUNGARIAN BANKING SYSTEM AND THE SIZE OF RECENT LOSSES

At the end of 2009 Q1, the banking sector's total operational risk capital charge was HUF 120 billion, which is 8.96% of the previous (year-end 2007) credit and market risk "Basel I conform" capital charge. The change in capital requirement calculation regime led to a decrease in the credit risk capital requirement, which was partly offset by the introduction of the operational risk capital requirement. The intention of regulators of maintaining the overall capital requirement at the same level, but distributing it differently among the various risks to better reflect financial institutions' risk profile is thus fulfilled. Over the past year, the proportion of the operational risk capital charge within the Basel II-based capital requirement was around 9%. Based on end-March 2009 data, this proportion has dropped to around 8% (in line with the lower level of profits compared to previous years at the end of 2008). The banking system's operational risk capital charges account for approximately 6% of the regulatory capital available for covering risks (Chart 1).

From the perspective of their choice of method, Hungarian commercial banks began to use the simpler methods in the course of implementation in 2008. Although the BIA was the

Chart 1

Proportion of the Hungarian banking sector's operational risk capital charge compared to the banking system's minimal capital charge and own funds available for risk purposes
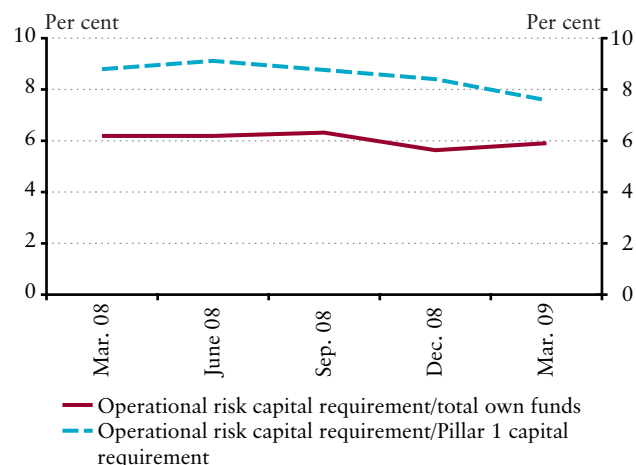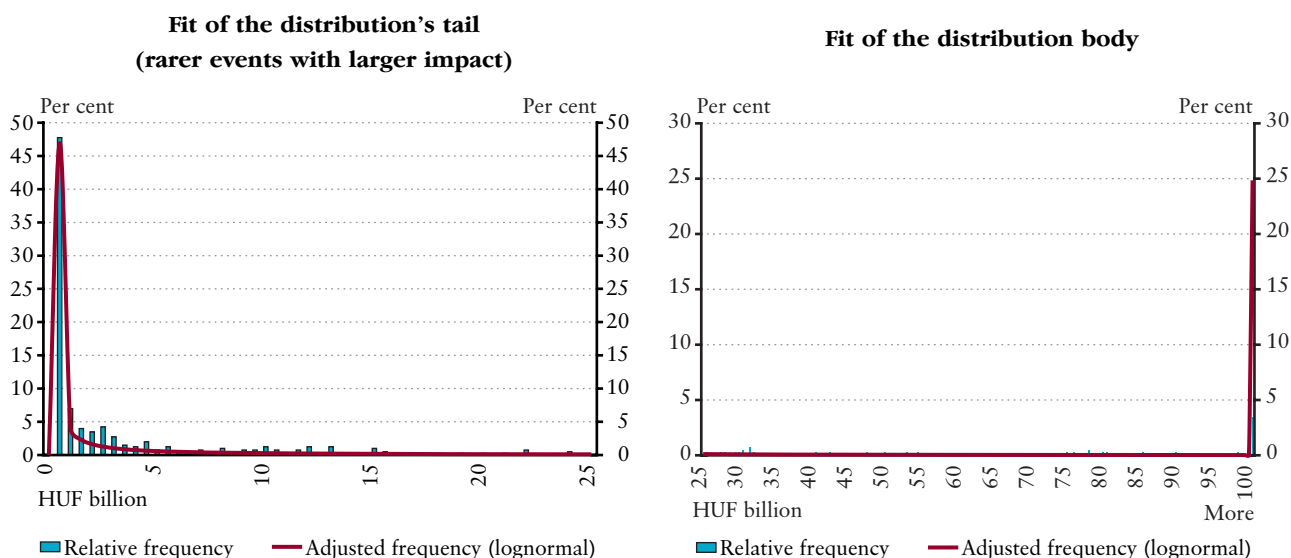

Source: MNB.

most popular (60%) considering simply the number of institutions opting for it, based on the own funds available for solvency purposes, 18% of institutions introduced the BIA, 82% chose the standardised method, while the sole institution which employs the AMA accounts for 0.2%. Some of the 13 institutions which use the standardised method may switch in the future to the advanced measurement approach after acquiring sufficient experience.

The Hungarian banking system's level of operational risk capital charge (HUF 120 billion at the end of March 2009) provides an approximation of exposure to operational risk, hence although this figure can be considered relatively low, we cannot adequately assess its level. The Hungarian banking system's operational risk potential should be assessed based on the timeline of actual losses and on scenario analyses, calculations based on international comparisons and on the basis of the extent of estimated potential losses, but there is not enough information available as yet on operational risk losses in the Hungarian banking system at the system-wide level due to a lack of systematic data collection in the past.

At the same time, the extent of operational risk can be determined based on so-called COREP reporting, based on Basel II. According to year-end 2008 data, the number of operational risk losses which affect previous years but have not yet been closed or which were recorded in the previous four quarters was 5,274 in case of banks using the standardised or advanced measurement approach, with total losses amounting to HUF 13 billion, thus the average loss was HUF 2.5 million. This level of loss accounts for 3-4% of the

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Distribution of the main operational risk loss events of the Hungarian banking system in 2008

Note: data of banks using the standardised or advanced measurement approach. Loss events registered in 2008 or not yet closed.
Source: MNB.

entire banking system's pre-tax profits for 2008. However, when assessing significance, it must be taken into account that not every bank reports operational risk loss data based on the standardised method; furthermore, reporting biases stemming from insufficiently thorough disclosure of risk events may occur, in turn related to the fact that the practical implementation of the operational risk framework is still in its initial phase. Nearly 75% of the value of reported losses falls into the category of execution and processing errors, with the retail business line coming out on top (68%) in a business line breakdown. Examining the reported operational risk loss events which affected the previous years but have not yet been closed, or which were recorded in the preceding four quarters by quarter reveals diversity. Although the order of magnitude of aggregate losses is quasi unchanged, the internal distribution by type of event and business line varies, which is linked to the fact that the addition of one quarter can cause significant changes in short, less robust timelines. Banks only report individual loss data to the COREP database to a limited extent, reporting only 10% of the events causing the highest losses, but at least 10 events. Only limited conclusions can be drawn on the events from this censored, selected database. In any case, the analysis of the data revealed that the distribution of loss events has a fat tail, in other words the probability of losses substantially higher than the average loss is relatively high. Chart 2 shows the fat tail and that the loss distribution calculated based on the data set containing the truncated, censored data is well fitted to the lognormal distribution on the body of the distribution, although the lognormal distribution often used for operational risks which can be

fitted to these same data has a slightly fatter tail. Of course, the complete distribution function could be drawn based on all the loss data, which may possibly yield a more precise fit, and a larger sample size would allow more extreme events to be included in the sample.

Stemming from the characteristics of operational risk, an institution's internal data often do not give an accurate picture of its full operational risk profile. This is why the advanced measurement approach prescribes the use of external data to disclose rare events which have a strong impact (so-called tail events). An important initiative launched by the members of the Hungarian banking system is the HunOR Hungarian Operational Risk Database, which began operation in 2007 under the auspices of the Hungarian Banking Association. Twelve banks, representing over 50% of the entire banking sector's asset portfolio, anonymously share individual loss events with a booked impact of over HUF 50,000 in the framework of the data consortium. This initiative represents a great advantage for the participating banks, allowing the disclosure of Hungary-specific operational risk events and comparison with institutions of presumably similar operational risk profile. The HunOR database began operating by registering operational risk loss events booked after 1 January 2007 in the database. A cooperation agreement was concluded between the Magyar Nemzeti Bank and the Hungarian Banking Association, pursuant to which the MNB receives data containing data aggregated from the HunOR database. The database's significance can be reinforced based on the data thus made

available, as nearly four thousand events with booking dates until end of 2009 Q1 were shared by the participating institutions, and the total registered loss for this period reached HUF 13 billion (Source: Hungarian Banking Association HunOR Hungarian Operational Risk Database).

All of this shows that recent operational risk loss events are not of determining significance in and of themselves. At the same time, an unchanged level of operational risk can, with the increased financial risks in the current crisis, further deteriorate the position of financial institutions, moreover financial institutions' employees may be more prone to error under stress. As a result, the interaction of various types of risk has intensified, with operational risk events triggering credit risk events, and vice versa (through a sort of endogeneity). Furthermore, legal risk also plays a more important role in the current environment, as clients become more sensitive in the dire economic climate, so potential legal proceedings stemming from non-compliance with the norms of fair market behaviour (for instance selling overly risky products to clients without providing them appropriate information) may lead to substantial financial losses and dent reputation, deteriorating already gloomy bank profitability prospects.

DRIVERS FOR CHOICE OF OPERATIONAL RISK APPROACH

The choice of risk management approach may be determined by several factors. A part of these factors may be related to the nature of the financial institution's activities (size, efficiency, risk exposure), while other factors – impossible or difficult to measure accurately – (organisational culture, managers' risk consciousness) may also come into play. The common traits of financial institutions using the more advanced operational risk approaches is also worth examining, i.e. whether it is attributes related to size or profitability which co-vary with the choice of method. In the following section, I will first present the data pertaining to foreign institutions, before moving on to Hungarian institutions' practices in terms of method selection.

Operational risk method selection practice of large, foreign institutions

I founded my analysis on data pertaining to financial institutions' choice of operational risk approach on the one hand, and on financial institutions' profitability and balance sheet data on the other. Data pertaining to the choice of operational risk approach pose the biggest problem at present, as in countries where capital allocation for operational risk has been compulsory since 1 January 2008, data on operational risk are only included in annual reports for 2008, which would have to be compiled one by one. Of course, larger institutions are much more transparent due to the reputational requirements imposed by their presence on the stock exchange and their size, so I will use operational risk data gleaned from a secondary data source containing the world's 100 largest institutions according to the banks' or bank groups' equity capital.

I used two data sources for the analysis.

- The data source for operational risk data was the article published in the October 2008 issue of the OpRisk & Compliance (OR&C) journal (OpRisk & Compliance, 2008). The referenced article obtained its data from several sources: data on equity capital from annual reports, announcements in written and non-written media, articles (e.g. The Banker magazine), the other data compiled from annual reports, supervisory publications, software company reports, while loss data was gleaned from the database containing public operational risk loss data, operated by the software company SAS. In light of the fact that OR&C magazine is the leading journal of the operational risk management profession, I considered the data published in it to be sufficiently reliable.

- Data pertaining to profitability, size and liquidity were obtained from the Bureau van Dijk "BankScope" database. BankScope is a database containing micro-level bank data, often used in academic circles and by financial institutions and central banks for comparing countries or preparing analyses based on individual bank data (Bhattacharya, 2003).

- Based on BankScope's brochure, the database contains information on 23,000 banks, with all of the relevant banks of every country worldwide included in the database (Bureau van Dijk, 2008).

Fairly detailed analyses can thus be carried out based on the available database[6], among which this article will only present the most interesting findings. Of the 100 institutions in the sample, 90 have introduced operational risk management and capital charge allocation based on Basel II. Among the largest banks, 8 employ the basic indicator approach, 43 the standardised approach and 39 the most complex advanced measurement approach. Of course, some of the institutions using simpler approaches intend to switch

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[6] Even the smallest bank in the sample has equity capital of USD 5.7 million and a balance sheet total of USD 62 billion, which means that in comparison, even the smallest institutions and bank groups are slightly larger than the bank group led by the largest Hungarian bank (OTP banking group).

Table 1

Statistical correlation between size and profitability attributes and the operational risk approach used

	Correlation with the chosen operational risk methodology's code	Two-sided level of significance (p-value)	Sample size
Total tier 1 capital (USD million)	0.37	0.00	90
Balance sheet total (USD million)	0.36	0.00	90
Return on Average Assets (ROAA) (%)	−0.05	0.58	90
Return On Average Equity (ROAE) (%)	0.07	0.42	90

Note: the values of the Kendall's tau-b type correlation indicator, which can be used for ordinal data in correlation calculations, are shown. Similarly to the "traditional" linear correlation indicator, Kendall's tau-b varies between −1 and +1; the higher the absolute value of a given indicator, the stronger the correlation. A value of +1 represents perfect covariance, while −1 represents perfectly opposing variance. Significance (p-value) shows the probability of the given indicator equalling zero, i.e. there being no relation between the two timelines. The coding of the chosen operational risk methodology is the following: 1: BIA, 2: TSA, 3: AMA.

Source: own calculation based on data from OpRisk & Compliance (2008) and Bureau van Dijk (2008).

to the advanced measurement approach in the future; 13 institutions expressed such an intention. Based on the data included in the database, I examined the statistical correlation between fundamental size and profitability indicators and the choice of operational risk method among the institutions using Basel II-based approaches. The findings presented in Table 1 suggest that there is a clear, significant correlation between size indicators and the operational risk approach chosen, while no clear correlation can be established with profitability indicators. In other words, the larger an institution is, the more complex its operational risk approach, while from the aspect of profitability, more profitable financial institutions do not show an inclination towards either simpler or more advanced approaches. This leads to the conclusion that using more advanced methods yields economies of scale for larger institutions, as higher profits can be achieved with equal or comparable fixed costs.

Of the 100 institutions examined, 36 are members of the operational risk data consortium, which enables the more effective measurement of operational risk. On the international scene, there are several databases operating on a national level, similar to the one in Hungary (for instance DIPO in Italy or the Landesbanks' DAKOR database in Germany), as well as those stretching beyond national boundaries, such as the ORX database, established by the largest banks. Statistical analyses show that consortium membership is strongly correlated with the applied methodology's complexity.[7]

Hungarian banks' practice in choosing their operational risk method

Several articles have already been written on Hungarian banks' operational risk management practices (including the article published in issue 4, 2007 of the Hitelintézeti Szemle). No comprehensive analysis has yet been published on Hungarian banks' operational risk management practices, and therefore my subjective experience and Hungarian Financial Supervisory Authority (2005) represents a sort of guideline from this perspective. Hungarian banks clearly began focusing on operational risk as a part of the Basel II process, although some banks had already begun to establish special risk management practices for managing certain risks (IT security, risks related to the workout process). Internal control was a fundamental starting point in this process. Given the strong foreign presence in the Hungarian banking sector, parent banks provide strong methodological guidelines for operational risk management. This is especially important in light of the fact that in the course of the Basel II process, not only individual, but also group-level adequacy is important. When developing operational risk management practices, banks undertook efforts to develop risk identification, measurement, monitoring and management, the first step of which was the collection of data pertaining to loss events. HunOR's role from this perspective is vital, as a standardised framework was developed for the participating banks, allowing banks, sharing their experiences, to develop adequate operational risk loss data collection in line with the criteria set forth by the regulation. Overall, it can be said that

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[7] A correlation value of 32% (Kendall's tau-b measuring rank correlation) exists between the external database member's proxy (1: membership, 0: no membership) and the method complexity indicator (0: Basel I, 1: BIA, 2: TSA, 3: AMA), with a rather high level of significance (p=0.02%).

Table 2

Hungarian financial institutions' choice of operational risk approach and the main attributes of the various groups

Chosen method	Number of institutions (pcs)	Balance sheet total based share (percentage)	Regulatory capital based share (percentage)	Average balance sheet total (HUF billion)	Average capital adequacy (percentage)	Average ROE (percentage)	Average ROA (percentage)
BIA	21	19.40	18.06	270	12.02	5.12	0.27
TSA	13	80.42	81.72	1805	10.84	14.34	1.02
AMA	1	0.18	0.22				

Note: non-audited, non-consolidated data from end-2008.

Source: MNB.

Hungarian banks are taking significant steps towards adopting the best international practice, although few Hungarian banks perform modelling at present, due to the lack of maturity of implementation on the one hand, and centralised modelling on the level of parent banks on the other hand. The reasons behind this could be that as there is relatively little data and experience on operational risk, developing databases of sufficient volume and methods yielding robust results can initially only be achieved at the bank group level. At the same time, an important criterion is that the calculations pertaining to subsidiary banks must reflect local idiosyncrasies, and furthermore the use of local models may become necessary as the amount of local experience grows.

Based on year-end 2008 data, the numerical majority of Hungarian banks use the method based on the basic indicator. At the same time, if we consider the proportion based on the balance sheet total or regulatory capital, about 80% of the banking system uses the standardised approach (Table 2). Only one smaller institution in the banking sector currently uses the advanced measurement approach, and some institutions currently applying simpler approaches intend to switch to the AMA in the short or medium term. The Hungarian banking system is therefore split between users of the basic indicator approach ("simpler institutions" in this perspective) and the standardised approach ("more advanced institutions" in this perspective). Considering average values, year-end 2008 data reveals that larger Hungarian banks tend to be the ones using the more complex standardised approach, which has a relatively lower capital adequacy requirement and higher profitability (Table 2). From these ostensible correspondence, correlation analyses highlight the covariance and opposing variance of balance sheet total based size and the capital adequacy indicator. At the same time, the profitability of banks using the basic indicator or the standardised approach does not differ significantly.

Twelve Hungarian financial institutions (typically commercial banks) participate in the HunOR database. From the perspective of method complexity, a pattern similar to that of foreign banks with external operational risk database membership appears. While 75% of the member banks of HunOR, falling under the scope of Basel II, and banks of which the parent bank is a member of HunOR use the standardised approach, this proportion is only 17% among non-members of HunOR. In other words, membership in an external database also indicates the choice of more complex methods in the Hungarian banking system as well, materialising in the form of the standardised approach at present, and hopefully in the use of the advanced measurement approach in future.

CONCLUSIONS

This analysis focuses on the operational risk aspects of the introduction of the capital adequacy regulation which came into force in the Hungarian banking system from 1 January 2008 in line with Basel II. The regulation allows financial institutions falling within its scope to choose their operational risk method, either opting for simpler approaches based on profitability indicators or for more complex ones based on actual measures of risk. Based on the past one-year period, the Hungarian banking system's operational risk capital charge was significant compared to the total capital charge, with the operational risk capital charge for Q1 2009 amounting to HUF 120 billion, or nearly 8% of the total capital charge. The reported realised losses are lower compared to the capital requirement (approximately HUF 13 billion in 2008), but the capital charge must provide a buffer in extreme, unexpected situations, and conclusions on extreme values cannot be drawn based merely on one year of observation, therefore this discrepancy is completely justified. Regarding institutions' choice of approach, larger institutions prefer

more complex methods in both foreign and Hungarian practice. This is due to the fact that the introduction of more complex approaches comes with higher fixed costs, which a larger institution can allocate more easily to its operational risk project, and moreover, they can take better advantage of the capital requirement benefits offered by the method's complexity. Only one smaller actor in the Hungarian banking system applied the most complex, so-called advanced measurement approach as at June 2009, presumably trying to benefit from economies of scale on a bank group level and to adopt the group-level approach locally with relatively low costs. Overall, the conscious management of operational risk and the use of developed methods aimed at managing them can contribute to the financial system's stability, which also deserves more attention given the current gloomy economic climate and the escalation of financial risk. As a continuation of this analysis, it would be worth comparing the choice of operational risk capital allocation approach with that of credit risk in future, which also allows for choice between simpler and more complex methods (standard and internal rating based approach), furthermore, country-specific factors in method selection patterns would also be worth examining.

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