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ECONOMIC CAPITAL GAUGED

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Economic Capital Gauged

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Abstract: The Basel Committee's release of the new Basel Accord and its *new* operational risk class are raising questions on how regulatory capital for operational risk should be determined and is transforming the banks' view of economic capital. This paper investigates the relationship between publicly available economic capital - and regulatory capital figures from 2002 and 2003, and compares these with figures from the Basel Committee's Quantitative Impact Studies. The focus will be constrained to top 50 internationally active banks. Initially, many if not most banks will be using the *simplest* regulatory method, the Basic Indicator Approach, to calculate the operational risk capital charge. Hence, the Basic Indicator Approach is applied in order to study the impact of different definitions of gross income resulting in different levels of operational risk capital charges. Finally, the comprehensiveness of year-end economic capital disclosure in 2002 and 2003 annual reports of the top 50 banks is examined to reflect the considerable evolutionary change that the banking industry is undergoing.

Keywords: economic capital, risk capital, regulatory capital, capital charge, operational risk, Quantitative Impact Study, Basic Indicator Approach.

1. Introduction

Currently, there is a discussion on how regulatory capital (RC) should be determined. The Basel Committee on Banking Supervision (Basel Committee) of the Bank of International Settlements (BIS) is redesigning the first 1988 Capital Accord (Basel I) on the capital adequacy of internationally active banks in a series of detailed proposals for implementation in 2004 – 2007, namely the New Basel Capital Adequacy Framework (Basel II) [BCBS, (1988, 1996, 2001d & 2003a)]. The proposed regulatory changes in credit risk and the inclusion of a *new* risk class, operational risk¹, into the calculation of the minimum capital ratio are transforming the banks' view of economic capital (EC). According to the Basel Committee *It [Basel II] aligns the capital measurement framework with sound contemporary practices in banking, promotes improvements in risk measurement, and is intended to enhance financial stability* (BCBS, 2004a).

The aim of this paper is to: (1) compare publicly available EC and RC figures from 2002 and 2003, with reported figures from the Basel Committee in their Quantitative Impact Studies (QIS) of data from 1998 – 2000 (BCBS, 2002a&b) and 1999 – 2001 (BCBS, 2003d); and (2) investigate the scope of EC disclosure in 2002 and 2003 annual reports. The focus will be constrained to a sample of internationally active banks, i.e., the top 50 banks by total assets in 2002 (Timewell *et al.*, 2003). After a brief introduction to the concept of capital the second section clarifies the EC and RC concepts. In the third section the relationship between EC allocated to operational risk and both overall EC and minimum RC is examined. The relevant QIS results are presented and extended with data collected from 2002 and 2003. The Basic Indicator Approach (BIA), the *simplest* regulatory method, is described in the fourth section. An analysis of the QIS2 data and data from 2002 and 2003 is performed to work out the appropriate overall level of the operational risk capital charge. Also, the impact of different definitions of gross income resulting in different levels of BIA operational risk capital charges is explored. Finally, the extent of year-end EC disclosure in 2002 and 2003 annual reports of the top 50 banks, as snapshots in time, is examined.

There are two main perspectives on capital which bank management should consider when determining level of capital, the shareholder's view and the regulator's view. The *shareholder's view of capital* is based on the notion that shareholders invest in the bank expecting a risk-adjusted return on their investment, whereas the *regulator's view of capital* is

¹ The Basel II framework is based upon the following *operational risk* definition: *the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events*. This includes legal risk, but excludes strategic and reputational risk (BCBS, 2003b).

based on promoting safety and soundness in the financial system. The regulator's objective is to sustain enough capital to protect the depositors and other creditors against loss. However, Greenspan (1998) accentuated: *The management of systemic risk is properly the job of the central banks. Individual banks should not be required to hold capital against the possibility of overall financial breakdown. Indeed, central banks, by their existence, appropriately offer banks a form of catastrophe insurance against such events* (Greenspan, 1998). Hence, the regulator imposes a required minimum level of capital that can be seen as a business constraint, which needs to be complied with at all times. The underlying theoretical idea is that banks hold capital so that the possibility of default is unlikely, but that raising and holding equity capital is costly due to double taxation of investment income, agency and information costs. These costs are usually taken to be an increasing convex function of the capital requirement [Merton & Perold (1993), Miller (1997), Froot & Stein (1998), Perold (2001)]. Hence, an optimal balance must be struck between holding EC to ensure solvency and its cost, in order to provide a decent return on equity for shareholders.

The components that make up shareholders' equity are:

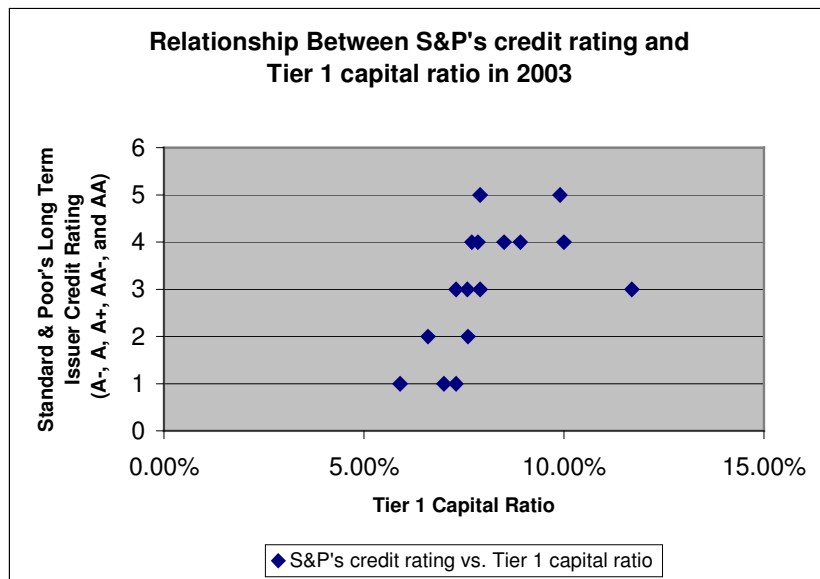
- Ordinary and preference share capital – the amounts received when shares were originally subscribed for
- Reserves – retained profits plus surpluses or deficits arising from, e.g., revaluations of properties and foreign exchange gains or losses on offshore operations
- Retained profits – the amount of profits retained by the banking Group.

While, from the regulatory perspective capital is mainly divided into a three-tier concept:

- Tier 1 capital – the highest quality capital from a risk perspective. It consists of paid-up ordinary shares, general reserves, retained earnings, and certain preference shares less specified reductions
- Tier 2 capital – includes general provisions for doubtful debts (subject to a limit), asset revaluation reserves, mandatory convertible notes and similar capital instruments
- Tier 3 capital – short-term unsecured subordinated debt (can be used only for meeting market risk capital requirements).

Furthermore, credit rating seems to provide a similar signal to RC ratios, i.e., there seems to be a relationship between capital levels and the rating agency's assessment of the bank's ability to absorb risk without endangering its creditors. Figure 1.1 suggests a weak positive

relationship between Standard & Poor's credit rating and the Tier 1 capital ratio². Note that the limited sample consists of banks disclosing EC in their 2003 annual report (16 out of top 50 banks). This is in line with Jackson *et al.* (2002) findings which suggest that the credit ratings banks obtain from rating agencies provide evidence on banks' internal solvency targets since the banks' ratings reflect their actual capitalisation (rather than the regulatory minimum) as well as other factors. For a more in depth discussion of how credit rating agencies use a bottom-up approach in determining the credit rating of a bank based on multiple credit rating criteria and input from a variety of sources, refer to Standard & Poor's (1999).



Source: Data from 2003 Annual Reports and Standard & Poor's Credit Ratings List (www.standardandpoors.com).

*Note that the numerical internal risk ratings map to Standard & Poor's ratings as follows: 1=A-; 2=A; 3=A+; 4=AA-; 5=AA.

**The Pearson correlation is 0.549 with 0.028 (two tailed) significance factor implying the correlation is significant at the 0.05 level.

Figure 1.1: shows relationship between Standard & Poor's issuer credit rating³ (long term) and Tier 1 capital ratio in 2003

In short, it is suggested that the bank's EC framework should incorporate an assessment of the overall level of capital required, having regard to regulatory requirements and credit rating, while ensuring a proper compensation to shareholders based on the riskiness of the bank's business activities.

² Capital adequacy ratio is a measure that compares the bank's available (Tier 1) RC with their risk-weighted assets (RWA).

³ A Standard & Poor's issuer credit rating is a current opinion of the creditworthiness of an obligor with respect to a specific financial obligation, a specific class of financial obligations, or a specific program

2. Economic - and Regulatory Capital

It is in the nature of financial business that unexpected losses arise at times. *Economic capital* is generally described, as an estimate of the amount of equity capital the bank needs in the course of its business to absorb unexpected losses arising from the bank's current exposures. The board of directors and senior management are actively involved in determining the level of EC, which is based on (1) a chosen objective for overall risk level; (2) the statutory capital adequacy requirement; (3) an internal assessment of risk capital, and (4) capital against non-risk factors. The internal assessment of *risk capital* (RiskC) is often performed using the internal risk measurement model⁴, using statistical models to calculate the difference between some high quantile (loss threshold) of the profit and loss (P&L) distribution and its expected value, so called *unexpected loss*⁵. More generally, RiskC is measured to a specified confidence level based on pre-defined solvency standard and debt ratings over a given time horizon. Banks generally choose a standard time horizon of one year. EC represents a key piece of information that the Board of Directors can use to manage the bank and implement its strategy. Figure 2.1 shows an overview of an EC framework.

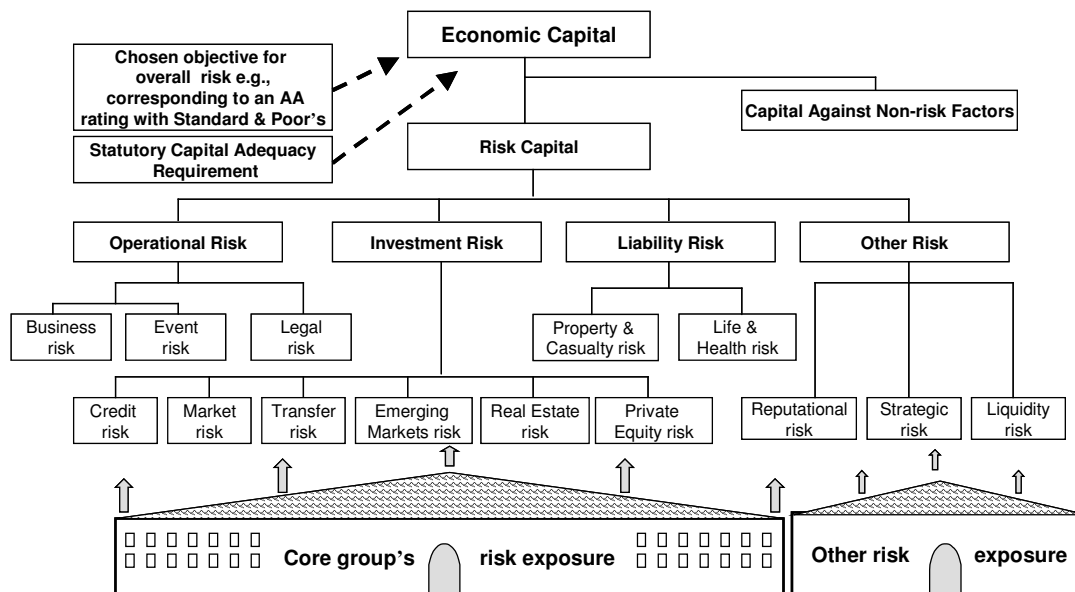


Figure 2.1: shows an overview of an EC framework

⁴ Because no single measure can reflect all aspects of risk most banks use several measures, both statistical and non-statistical, e.g., value-at-risk (VaR), economic value – and net interest income stress tests as well as self-assessment processes.

⁵ For example, Citigroup (2004) defines *economic losses* as losses that appear on the income statement and fair value adjustments to the financial statements, as well as any further declines in the value of assets or increases in the values of liabilities not captured by the income statement. Whereas, *unexpected losses* are the difference between the potential losses at the 99.97% confidence level and the average loss over the one-year time period.

Currently, banks use an array of different definitions of EC tailored to fit a particular bank's needs. It is generally accepted that all relevant risks faced by a banking Group should be taken into account in the bank's EC definition. Ideally, EC shows an aggregated view of the bank's risk position from individual business lines up to the consolidated Group level. It should be noted that there is a substantial variation across institutions in terms of the definition of economic capital, model coverage, model assumptions, data series, calculation methodologies and implementation specifics, which make the EC estimates not fully comparable.

The Basel Committee makes the following distinction between EC and RC: *Economic capital is the capital that a bank holds and allocates internally as a result of its own assessment of risk. It differs from regulatory capital, which is determined by supervisors on the basis of the Capital Accord* (BCBS, 2001e). Capital adequacy ratio is one of the most important financial ratios that supervisors thoroughly examine to assess if banks hold capital and reserves sufficient to support the risks that arise in their business. It is the financial supervisory authorities' (or representations thereof, e.g., the Basel Committee) task to decide at what level the minimum regulatory requirement should be set. The current Basel I sets a *minimum regulatory capital* (MRC) ratio requirement of 8%, of which 4% must be equity or reserves⁶. The *available regulatory capital*⁷ is often a stated multiple of a MRC requirement. Under the Basel II, capital will be assessed according to credit -, market - and operational risk. To ensure an effective future capital regime, the Basel II needs to ensure that capital requirements improve the capture of risk mitigation and diversification. The Basel Committee has determined that it is essential that the absolute level of capital in the financial sector be appropriately maintained in the upcoming Basel II. In other words, Basel II should result in a minimum capital level that is at least equivalent to the current level.

There are considerable risks that are not taken into account by the regulatory framework such as interest rate risk in the banking book, business - and strategic risk, as well as external factors such as business cycle effects. Thus, the bank needs to hold adequate capital to support its risks beyond the ones stated by the regulators to ensure coverage of all relevant risks. Indeed, banks use their own state-of-the-art internal risk measurement models to determine the amount of EC as a basis for further management decisions to satisfy increasing market competition, with stakeholders looking for the bank with the best risk-return profile.

⁶ Note that subordinated debt will not prevent a bank from failing although it may in part absorb losses after failure and therefore help depositors.

⁷ In general, RC may be defined as all qualifying capital instruments issued by the bank, according to official rules and guidelines as to what constitutes qualifying capital. For most regulated banks in OECD countries, the rules and guidelines will be based on Basel Accord (1988) and its amendments.

Whereas the MRC requirement is geared toward investor protection that the bank's financial supervisory authority requires it to maintain at all times, the EC is a more sophisticated measure of the amount of capital required to cover long-term losses. Hence the difference between these two figures may demonstrate how misaligned RC is with the underlying risks, see Figure 2.2.

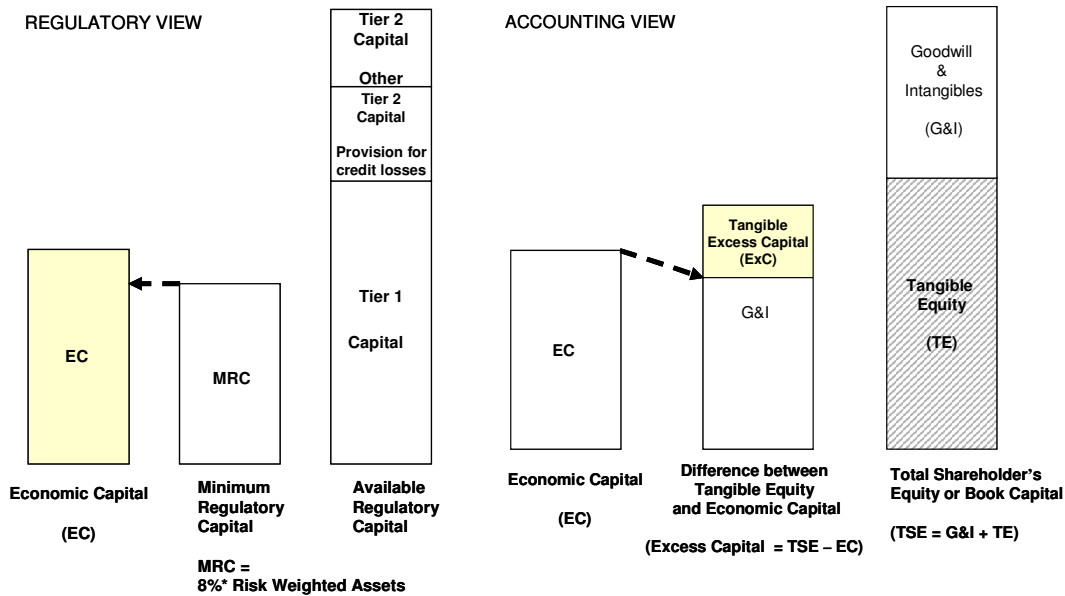


Figure 2.2: shows the regulatory – and accounting view of capital⁸

On one hand, the bank is considered well-capitalised, according to the regulatory view, when Tier 1 capital plus the provisions for credit losses qualifying for the Tier 2 capital compares favourably to the bank's estimated EC. On the other hand, the bank is considered well capitalised, according to the accounting view when the difference between the total shareholder's equity and EC represents a significant level of excess capital. This excess capital may be (1) used as an additional protection against losses and keeping credit ratings of the bank at desirable levels; (2) used to realise business strategies such as provide internal growth or pursue acquisition opportunities; or (3) distributed to the shareholders either through dividends or sharebuybacks.

The regulatory view is commonly used by external analysts, who will typically allocate capital based on the regulatory rules for making interbank comparisons and assessing the relative performance of businesses compared with their peers (Hall, 2002). Furthermore, banks have an incentive to disclose not just their results, but their risk-adjusted results, since this can help

⁸ Source: Citigroup (2004).

their share price. Many analysts and investors in the financial services industry see capital management and return on risk-adjusted capital as key performance measures when they are carrying out share price valuations. The Basel Committee believes that providing disclosures that are based on the regulatory framework is an effective means of informing the market about a bank's exposure to those risks and provides a consistent and understandable disclosure framework that enhances comparability (BCBS, 2003a).

3. Operational Risk Capital Charge

This section takes a closer look on the operational risk capital charge. The Basel Committee's *Working Paper on the Regulatory Treatment of Operational Risk* (2001a) provides an overview of the proposed Basel II framework for the RC charge for operational risk. To gauge the impact of the Basel II proposals on MRC requirements, the Basel Committee conducted Quantitative Impact Studies (QIS1: April 2001; QIS2: May 2001; QIS2.5⁹: June 2002; and QIS3: October 2002). The Basel Committee took 12% of current MRC as its starting point for the analysis of the BIA (BCBS, 2003a). The subsequent results from the QIS data collection and analysis exercises are intended to assist the Basel Committee in adjusting its calculation to ensure that there is neither an abrupt fall nor rise in the overall RC requirement in the financial system. The results of the Basel Committee's QIS2 revealed that on average for banks in the sample (41 banks), operational risk EC represents about 15% of overall EC in year 2000; though there is some amount of dispersion around this figure (BCBS, 2001a). Also, operational risk EC appears to represent a rather smaller share of MRC, somewhat over 12% for the median bank in the sample. Naturally, the share depends on the type of risk profile the bank has. The QIS2.5 results (38 banks) indicated that the potential impact of the operational risk capital charge is 10% of current MRC in year 2001 (BCBS, 2002d). In QIS3 the average contribution from operational risk (under the CP3 proposals) for banks in the sample (188 banks) is 10% for large, diversified and internationally active with Tier 1 capital in excess of €3 billion, and 15% for smaller and more specialised banks, in year 2001 (BCBS, 2003d). The following analyses extend above analysis with data collected from the annual reports of top 50 banks including only the banks disclosing figures for EC for the years 2002 and 2003¹⁰.

⁹ Refer to Basel Committee's Operational Risk Data Collection Exercise, 4 June 2002.

¹⁰ It is important to be aware that the data discussed in this paper reflect developing methodologies and approaches for data collection at the banks. This factor, combined with the relatively short time span and small sample size, suggests that it is necessary to be cautious in using these data to draw any stringent conclusions about the extent of operational risk exposures, either for individual banks or for the industry as a whole.

The analysis suggest that, on average for banks in the sample of large internationally active banks, operational risk EC represents about 15.7% in 2003 (15.5% in 2002) of overall EC with some amount of dispersion around this figure, see Table 3.1. It is also shown that the average operational risk EC using the banks' own definitions of operational risk show a slightly lower average of about 14.6% (15.1%). Further, operational risk EC represents a 9% (8.2%) share of the MRC for the median bank [or 8.3% (10.1%) with bank's *own* definition of operational risk] in the rather limited sample. Subsequently, these results suggest that a reasonable level of the overall operational risk EC charge for an internationally active median bank would be somewhere in the range 8% to 10% of MRC. This is considerably lower than the currently proposed level of 12% of MRC, which is appropriate if there is a desire to calibrate RC to a somewhat less stringent prudential standard than internal EC.

Year 2002	Median	Mean	Standard deviation	Min	Max	Number of banks
Operational Risk EC* / Overall EC	0.133	0.155	0.059	0.119	0.275	6
Operational Risk EC / MRC	0.082	0.093	0.054	0.036	0.178	6
Operational Risk EC (incl. business - and reputational risk**) / Overall EC	0.132	0.151	0.062	0.080	0.275	9
Operational Risk EC (incl. business - and reputational risk) / MRC	0.101	0.113	0.069	0.036	0.252	9
Year 2003	Median	Mean	Standard deviation	Min	Max	Number of banks
Operational Risk EC* / Overall EC	0.137	0.157	0.063	0.086	0.303	11
Operational Risk EC / MRC	0.090	0.111	0.037	0.071	0.163	11
Operational Risk EC (incl. business - and reputational risk**) / Overall EC	0.130	0.146	0.064	0.080	0.303	13
Operational Risk EC (incl. business - and reputational risk) / MRC	0.083	0.106	0.038	0.065	0.163	13

*Operational risk is defined according to Basel Committee's definition, i.e., excluding strategic -, reputational - and business risk (BCBS, 2003a).

** Using the bank's internal definition of operational risk, which may include business – and reputational risk.

Table 3.1: ratio of operational risk EC to overall EC and to MRC in 2002 and 2003

Moreover, it appears that the overall operational risk EC charge could vary greatly for many internationally active banks using the banks' own definition of operational risk, which may include business -, strategic - and/or reputational risk. In particular, the overall level of 12% of MRC is well above the about 8.3% (10.1%) median figure for banks in 2003 (2002), thereby suggesting that operational risk EC should represent a smaller share of MRC. However, if the Basel Committee's definition of operational risk required the bank to include business risk in its operational risk definition, then the benchmark level of 12% of MRC is slightly below the about 12.8% median figure for banks in the sample from 2003, see Table 3.2.

<i>Year 2003</i>	Median	Mean	Standard deviation	Min	Max	Number of banks
Operational Risk EC* / Overall EC	0.180	0.194	0.064	0.090	0.303	13
Operational Risk EC / MRC	0.128	0.140	0.046	0.065	0.235	13

* Using the bank's internal definition of operational risk plus business risk, in order to demonstrate the impact of including business risk in the operational risk definition.

Table 3.2: ratio of operational risk EC (+ business risk EC) to overall EC and to MRC in 2003

Note that some banks may choose to not provide any EC figures, because the capital the bank sets against its internally measured EC usage differs significantly from the Tier 1 and Tier 2 capital definition, e.g., treatment of hidden reserves. In other words, EC usage is incomparable with RC usage since both measures are compared with different capital definitions. This raises the question of overall usefulness of comparisons between the banks' EC assessments and the Basel I capital requirements in order to draw any conclusions regarding Basel II capital adjustments.

The Basel II framework for operational risk proposes three methods for calculating operational risk capital charges on a scale of increasing sophistication and risk sensitivity: (1) The Basic Indicator Approach (BIA); (2) The Standard Approach (TSA); and (3) Advanced Measurement Approaches (AMA) (BCBS, 2003a). According to rating agency Fitch, who surveyed 50 of the world's largest financial institutions, it looks as if many of the global banking institutions are working hard to meet Basel II data requirement, however they found that only 13% of the surveyed respondents had collected internal data necessary to measure operational risk for one year or less (Ferry, 2004). Fitch also says that significant sophistication is required to use the tools necessary to derive appropriate capital numbers, and it added that many survey respondents noted challenges with an integrated approach. Moreover, some banks', e.g., Australia and New Zealand Banking Group's experience from Basel Committee's QIS3 was that they would have to hold more capital under the AMA than TSA or BIA. Their concern is that even with the insurance discounts which may be available in the AMA, the incentives embedded in the current operational risk capital charge calculation may be insufficient to encourage banks to pursue the AMA option (BCBS, 2003b). Consequently, most banks will almost certainly initially be using the BIA (either full scale or partial use) although they may feel there are significant problems with the method.

4. Basic Indicator Approach

Banks using the 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 (BCBS, 2004c). Figures for any year in which annual gross income is negative or zero should be excluded from both the numerator and denominator when calculating the average. The charge may be expressed as follows:

$$K_{BIA} = \frac{\sum(GI_{1..n} \times \alpha)}{n}$$

(1)

where K_{BIA} is the capital charge under the BIA
 GI is the annual gross income¹¹, where positive, over the previous three years¹²
 α is 15% which is set by the Basel Committee, relating the industry wide level of required capital to the industry wide level of the indicator.

The BIA is easy to implement and universally applicable across banks to arrive at a charge for operational risk. However, the Basel Committee acknowledges that the downside of BIA's simplicity is its lack of responsiveness to firm-specific needs and characteristics. The BIA is more of a *top down* methodology, i.e., a technique where a predetermined amount of capital is allocated across business lines. The proposed capital charge should be seen solely as a buffer for losses resulting from unintended exposures¹³. There is an array of opinions in regards to the impact of BIA within the financial industry. According to the Securities Industry Association, the proposed BIA yields operational risk estimates that are grossly exaggerated relative to the industry's experienced losses (BCBS, 2003b). Most banks commenting on the Basel II strongly object to the assumptions underlying the BIA (BCBS, 2003b). For instance, it is not clear why it is possible to approximate operational risk by a variable such as gross income. Utilizing a charge based on gross income puts all banks into the same category regardless of how the banks derive their income, the volatility of that income, or the level of exposure to various operational risks. In other words, transactions within a banking Group can

¹¹ Gross income is defined as net interest income plus net non-interest income. It is intended that this measure should: (i) be gross of any provisions (e.g. for unpaid interest); (ii) be gross of operating expenses, including fees paid to outsourcing service providers; (iii) exclude realised profits/losses from the sale of securities in the banking book; and (iv) exclude extraordinary or irregular items as well as income derived from insurance (BCBS, 2004c).

¹² The use of three-year average is intended to partly alleviate the impact of fluctuations of trading activities.

¹³ While the BIA might be suitable for smaller banks with a simple range of business activities, the Basel Committee expects internationally active banks and banks with significant operational risk to use a more sophisticated approach within the overall framework (BCBS, 2001b).

increase gross income, which in turn will generate a higher operational risk capital requirement whilst the underlying operational risk will not have changed at all. Conversely, falling revenue, which would call for less capital, could actually be a reflection of poor business practices, increased errors, or reputational problems. Yield, a huge loss due to operational problems could result in a lower capital requirement for operational risk!

The currently proposed alpha factor is 15%, i.e., it is believed that 15% is the precise value of alpha that will achieve the target of 12% of the MRC (BCBS, 2001a). Indeed, alpha is:

$$\alpha_{j,t} = \frac{0.12 * MRC_{j,t}}{GI_{j,t}} \quad (2)$$

where

$MRC_{j,t}$ is the minimum regulatory capital for bank j in year t
 $GI_{j,t}$ is gross income for bank j in year t.

In January 2001 the Basel Committee suggested that alpha under the BIA equal 30% of gross income (BCBS, 2001c). Then, in light of more industry data from QIS2 the Basel Committee suggested alpha in the range of 17-20% of gross income, which would produce capital charges consistent with the overall target calibration level (BCBS, 2001a). However, the full range of calculated alphas varied from 5% to 66%. This analysis of Basel Committee's QIS2 data covered the years 1998 - 2000 for large internationally active banks with a given definition of gross income (BCBS, 2001a). Currently, the Basel Committee aim to set the future level of operational risk to average 12% of MRC (BCBS, 2003a). This alpha estimate was based on a number of sources, including industry and Basel Committee surveys of operational risk and reports from individual institutions. However, not everyone is convinced that 12% is the correct level. For example, Standard & Poor's continues to believe that the average minimum capital consumed to cover a broad array of operating risks is closer to 30%, albeit on a wider definition (BCBS, 2003b). Also, two separate surveys, conducted in 2001 – 2002, show similar figures on the EC breakdown: (i) Oliver, Wyman & Company Survey¹⁴ – 53% credit risk, 21% market/ALM risk and 26% operational/other risk; and (ii) Capital Market Risk Advisors Survey¹⁵ – 48% credit risk, 21% market risk and 31% operational/other risk.

At first, a similar calculation to Basel Committee's QIS2 is conducted where BIA is based on 12% of MRC covering the years 1998-2000 for large internationally active banks given Basel

¹⁴ Oliver Wyman & Company surveyed the internal capital allocations of 10 large international banks in Europe and North America (Kuritzkes *et al.*, 2002).

¹⁵ Capital Market Risk Advisors conducted its survey of 38 banks, six of which were classified large global banks (Capital Market Risk Advisors, 2001).

Committee's definition of gross income (BCBS, 2001a). Table 4.1 presents the alphas for the group of banks out of 50 top banks disclosing operational risk EC. The calculations have been performed with figures available from the banks' 2001 - 2003 annual reports. The QIS2 data suggests a median alpha of 16.8%¹⁶. An analogous calculation indicates a median alpha of 17.1% in 2001 and 18.0% in 2002 and 15.9% in 2003. Evidently, the alphas are in line with the result obtained by Basel Committee's QIS2 suggesting that an alpha in the range 15% - 18% would produce regulatory capital figures approximately consistent with an overall capital standard of 12% of MRC.

α Factor	Mean	Median	STD	Min	Max	Number of banks
Analysis of Basel's QIS2 data*: α 1998-2000	0.218	0.168	0.136	0.048	0.659	151
α 2001	0.183	0.171	0.067	0.092	0.296	12**
α 2002	0.185	0.180	0.067	0.098	0.308	12
α 2003	0.167	0.159	0.055	0.080	0.272	15

*Note that one "outlier" observation was dropped where the alpha was very large, since this observation tended to skew the results. Two observations where reported gross income for the bank was negative were also dropped. All observations where the bank did not report gross income for a given year were dropped. Finally, each bank enters the distribution once for every year it is in the sample (maximum of three years).
 **13 banks disclosing EC in 2001 and 2002 increased to 16 in 2003. The outlier DZ bank was excluded from calculation.

Table 4.1: presents alpha calculations performed by the Basel Committee and new figures for the group of top 50 banks disclosing operational risk EC, with the Basel Committee definition of gross income (BCBS, 2001a)

On practical grounds one should be able to directly calculate the gross income from the consolidated income statement items that are based on nationally uniform accounting rules. This raises the question of whether differing interpretations gross income definition and different accounting rules across different jurisdictions will result in an inconsistent implementation and ultimately inconsistency in the calculation of the capital charge on operational risk? Hence, an examination of the alpha shall be performed using different definitions of gross income and net income. The indicator will be defined as follows:

1. Net Income (NI)

The State of New York Banking Department proposes an alternative approach to calculating an operational risk capital charge based on income statement information using a bank's net income rather than gross income. The use of net income would eliminate the possibility for creative accounting within the income statement, and avoid potentially significant changes due to incomprehensible accounting decisions (BCBS, 2003b).

¹⁶ Calculation is using the second consultative proposal's (CP2) definition of gross income.

2. Gross Income in the Third Basel Consultative Document (CP3)

Gross income is defined as net interest income plus net non-interest income¹⁷ comprising: fees and commissions receivable minus fees and commissions payable, the net result on financial operations, and other income. The CP3 states that it is *intended* that this measure (i) should be gross of any provisions (e.g., for unpaid interest); (ii) exclude realised profits/losses from sale of securities in the banking book;¹⁸ (iii) exclude extraordinary or irregular items as well as income derived from insurance (BCBS, 2003a).

3. Gross Income in the Framework for the Assessment of Bank Earnings by the Financial Stability Institute (FSI)

Gross income is defined as net interest income plus net fee income minus operating expenses. Gross income should exclude (i) provisions for loan losses; (ii) other secondary expenses, e.g., other expenses, goodwill, amortization/impairment and restructuring activities; (iii) treasury results (net gains on securities available for sale and net income/loss from equity); (iv) other secondary income, e.g., net trading revenues and other revenues; (v) results of non-banking subsidiaries (Financial Stability Institute, 2002).

4. Gross Income Proposed by European Central Bank (ECB)

According to ECB the definition of gross income (as currently proposed in §613 in CP3) is incomplete and may leave room for misinterpretation and divergent implementation. It should be made clear that gross income is to be calculated before the deduction of operating expenses. ECB proposes that a reference to the main items of gross income, as can be found in the *Consultative Document on Operational Risk* as a supporting document to the New Basel Accord (CP2), January 2001, as well as *Working Paper on the Treatment of Operational Risk*, September 2001, should also be made in Basel II. In this context, gross income is defined as net interest income plus net non-interest income comprising: (i) fees and commissions receivable less fees and commissions payable, (ii) the net result on financial operations and (iii) other gross income. This excludes extraordinary or irregular items. It is intended that this measure should reflect income before deduction of operational losses (BCBS, 2001c).

The calculation of alpha is very problematic because many banks report negative gross income, which is not reasonable in the calculation. In the QIS the Basel Committee's solution was to set capital to zero when gross income was reported negative which is a practical way of getting around the problem¹⁹, however it seems rather unsatisfactory from a conceptual point of view and it may skew the results significantly. Additionally, there is a major problem with missing data when banks merge. In these cases, the Basel Committee chose to exclude the bank from the QIS calculations. It was also stated by the Basel Committee that an average gross income over three years is supposed to lessen the impact of fluctuations in gross income. This raises the question if equation (2) used to derive the alpha factor should be altered?

For the following calculation, when reported gross income for a bank under the BIA was negative the indicator was either set to zero (case 1) or the absolute value was taken of the indicator (case 2). In Table 4.2, it is clearly shown that the calculation of the alpha using

¹⁷ As defined by national supervisors and/or national accounting standards.

¹⁸ Realised profits/losses from securities classified as "held to maturity" and "available for sale" are also excluded from the definition of gross income.

¹⁹ Note that when reported gross income for a bank was negative the bank's capital is set to zero capital in the BIA calculation, see http://www.bis.org/bcbs/qis/qis3qa_h.htm.

different definitions of the indicator for the years 2001 – 2003 result in significantly higher median values of alpha in comparison with previous results²⁰. The case 1 values range from: NI: 70.5% - 75.1%; CP3: 67.5% - 86.6%; and FSI: 57.1% - 101.4%. The case 2 values range from: NI: 73.7% - 75.1%; CP3: 60.8% - 70.4%; and FSI: 60.8% - 91.6%. Note that there exists a significant amount of dispersion around the figures. Hence, this calculation suggests that the median alpha value varies significantly depending on the choice of definition of the indicator used for the BIA. Also, the calculation suggests that the choice of practice when the indicator is negative or zero has a slight impact on the level of alpha.

CASE 1*		Mean	Median	STD	Min	Max	Nbr of banks
NI	α_{2001}	0.964	0.734	0.617	0.277	2.080	7
	α_{2002}	0.855	0.751	0.501	0.261	1.594	7
	α_{2003}	0.929	0.705	1.029	0.262	3.918	11
CP3	α_{2001}	0.866	0.632	0.741	0.280	2.603	8
	α_{2002}	0.804	0.674	0.412	0.282	1.483	9
	α_{2003}	0.675	0.602	0.337	0.236	1.200	12
FSI	α_{2001}	0.986	0.836	0.655	0.325	2.548	10
	α_{2002}	1.014	0.712	0.966	0.309	3.557	11
	α_{2003}	0.646	0.571	0.344	0.220	1.330	12

* Outlier DZ bank excluded (and Commerzbank excluded in 2001 for NI)

CASE 2*		Mean	Median	STD	Min	Max	Nbr of banks
NI	α_{2001}	1.137	0.737	0.851	0.277	3.204	11
	α_{2002}	1.162	0.751	1.300	0.261	4.880	11
	α_{2003}	0.848	0.740	0.518	0.262	1.886	14
CP3	α_{2001}	1.172	0.676	0.923	0.280	2.813	12
	α_{2002}	0.854	0.704	0.431	0.282	1.635	12
	α_{2003}	1.025	0.608	1.051	0.236	4.284	15
FSI	α_{2001}	0.978	0.916	0.593	0.325	2.548	12
	α_{2002}	0.760	0.645	0.496	0.309	1.903	10
	α_{2003}	0.698	0.608	0.378	0.220	1.330	13

* Outlier DZ bank excluded (Fortis and Deutsche bank were excluded in 2002-2003 for FSI; Commerzbank was excluded in 2001-2003 for NI).

Table 4.2: shows alphas for the group of banks out of top 50 banks disclosing EC for operational risk, with different definitions of BIA indicator

Next, a review is performed of the proposed BIA to determine the capital charge for operational risk under different definitions of gross income (or net income). The set up is

²⁰ There were neither negative nor zero gross (net) income figures using the ECB's definition of the indicator.

assumed to be Basel Committee's proposed CP3's definition of gross income, where a negative or zero gross income figure²¹ is excluded from the 3-year average gross income calculation in both numerator and denominator. Again the 1999 - 2003 annual reports from 16 of the world's largest 50 banks were used as the source in the analysis.

The differences in the operational risk capital charge under BIA in relation to, both operational risk EC and each other, are notable, see Figure 4.3²². In particular, there is a large difference in result between the capital charge calculated with ECB proposed definition of the indicator and the other three.

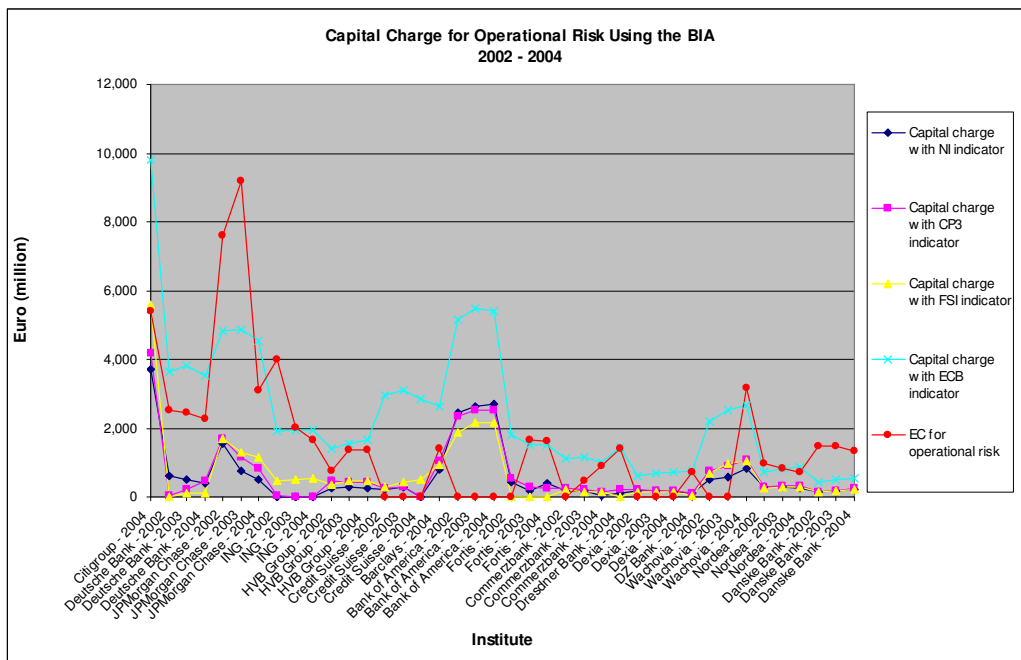


Figure 4.3: the 2002 - 2004 BIA capital charge for operational risk calculated with different definitions of the indicator²³

On average operational risk capital under BIA represents about 2.8 – 4.0% (NI, CP3 and FSI) in comparison with about 13.2 – 17.1 % (ECB) of overall EC, though there is some amount of dispersion around this figure, see Table 4.4 and Appendix 1. Operational risk EC appears to represent a rather smaller share of MRC, around 1.7% - 2.6% (NI, CP3 and FSI) in comparison with around 10.0% - 11.9% (ECB) for the median bank. Analogously, Table 4.4

²¹ See advice used to facilitate the completion of the Basel QIS survey, www.bis.org/bcbs/qis/qis3qa_h.htm

²² Note that a zero EC for operational risk in the graph indicates that the bank has not reported an EC operational risk figure in their annual report.

²³ Rule: exclude negative and zero gross (net) income figures in both denominator and the numerator.

shows ranges of results using different rules to handle negative or zero gross income figures in the calculations. The calculations suggest that on average operational risk capital charge under BIA irrespective of handling rule for negative and zero values ranges about 2% – 4% (NI, CP3 and FSI) in comparison with about 13% – 17% (ECB) of overall EC, though there is some amount of dispersion around this figure, see Appendix 2 - 4. Moreover, operational risk capital charge appears to represent a rather smaller share of MRC, around 1% - 3% (NI, CP3 and FSI) in comparison with around 10% - 12% (ECB) for the median bank.

Definition of Indicator according to:	Range of the <i>Average</i> BIA Capital Charge for Operational Risk by Overall EC		Range of the <i>Median</i> BIA Capital Charge for Operational Risk by MRC	
	NI, CP3 & FSI	ECB	NI, CP3 & FSI	ECB
Exclude negative or zero GI figure from calculation	2.8% - 4.0%	13.2% - 17.1%	1.7% - 2.6%	10.0% - 11.9%
Take the absolute value of the negative GI figure	2.9% - 4.2%	13.2% - 17.1%	1.9% - 2.6%	10.0% - 11.9%
Set negative 3-year average GI to zero	2.2% - 4.0%	13.2% - 17.1%	1.4% - 2.6%	10.0% - 11.9%
Take the absolute value of the 3-year average GI	2.6% - 4.2%	13.2% - 17.1%	1.8% - 2.6%	10.0% - 11.9%

Table 4.4: *The 2002 - 2004 BIA capital charge for operational risk calculated with different definitions of the indicator*

Alternatively, one may relate the operational risk EC reported by the banks with the capital charge calculated using the BIA given its four different definitions of indicator. In Table 4.5, it is clear that the banks' operational risk EC is well above NI, CP3 and FSI calculated operational risk capital charges. Only ECB capital charge is above the reported operational risk EC for a few of the largest banks.

Change in RC charge for operational risk under the BIA relative to EC for Operational Risk in 2004	Citigroup	Deutsche Bank	JPMorgan Chase	ING	HVB Group	Credit Suisse	Barclays	Bank of America	Fortis	Commerzbank	Dresdner Bank	Dexia	DZ Bank	Wachovia	Nordea	Danske Bank
Capital charge with NI indicator	31.3%	82.1%	84.1%	100.0%	81.5%	N/A	43.0%	N/A	76.5%	96.8%	91.7%	N/A	87.0%	73.9%	62.4%	84.7%
Capital charge with CP3 indicator	22.2%	78.9%	72.8%	100.0%	69.5%	N/A	25.3%	N/A	83.9%	83.7%	83.3%	N/A	86.1%	65.6%	55.6%	82.3%
Capital charge with FSI indicator	-3.3%	95.8%	62.6%	66.5%	66.5%	N/A	35.1%	N/A	100.0%	85.6%	100.0%	N/A	96.4%	66.6%	61.6%	83.9%
Capital charge with ECB indicator	-81.6%	-54.2%	-46.4%	-17.9%	-20.5%	N/A	-86.0%	N/A	6.6%	-12.4%	-3.0%	N/A	-0.8%	16.3%	-23.6%	58.8%
EC for operational risk	5,393	2,282	3,094	1,664	1,364	0	1,418	0	1,636	900	1,400	0	735	3,181	712	1,346

Change in RC charge for operational risk under the BIA relative to EC for Operational Risk in 2003	Deutsche Bank	JPMorgan Chase	ING	HVB Group	Credit Suisse	Bank of America	Fortis	Commerzbank	Dexia	Wachovia	Nordea	Danske Bank
Capital charge with NI indicator	79.1%	91.9%	100.0%	79.3%	N/A	N/A	88.2%	63.0%	N/A	N/A	63.2%	88.4%
Capital charge with CP3 indicator	91.4%	87.6%	100.0%	68.4%	N/A	N/A	82.6%	49.9%	N/A	N/A	60.3%	86.7%
Capital charge with FSI indicator	96.1%	85.8%	74.5%	66.6%	N/A	N/A	100.0%	64.9%	N/A	N/A	65.1%	88.1%
Capital charge with ECB indicator	-56.2%	47.0%	2.0%	-12.3%	N/A	N/A	8.8%	-148.7%	N/A	N/A	-3.4%	66.5%
EC for operational risk	2,449	9,201	2,002	1,375	0	0	1,655	462	0	0	816	1,481

Table 4.5: shows the differences between operational risk EC and BIA capital charge for operational risk in relation to operational risk EC given different definitions of the indicator in 2003 and 2004

Note that ECB proposal uses the gross income definition from the second Basel Consultative Document. By changing the gross income definition from ECB to CP3 the results indicate that the Basel Committee has significantly lowered the share of operational risk capital charge of MRC.

Finally, a closer comparison of the treatment of negative or zero indicators is performed for the BIA for operational risk under the four different definitions of indicator. The ECB defined indicator was positive for all banks in sample; therefore calculations will only be presented for NI, CP3, and FSI defined indicators. In general, the BIA capital charge for operational risk is well below the bank's own EC for operational risk and seems mostly to stay below €500 million. It is also apparent from Figures 4.6 – 4.8 that taking the absolute values of the negative indicator show more stability in the capital charge figure in comparison to excluding the negative or zero figures.

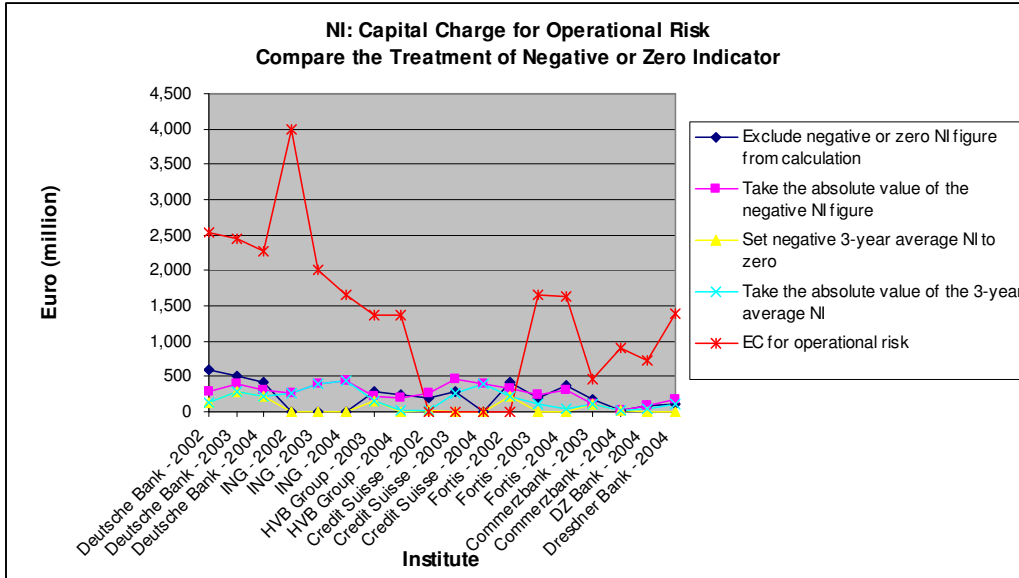


Figure 4.6: shows the banks in 2002 - 2004 which are subject to special treatment of a negative or zero indicator in their BIA capital charge calculation for operational risk given NI definition of the indicator

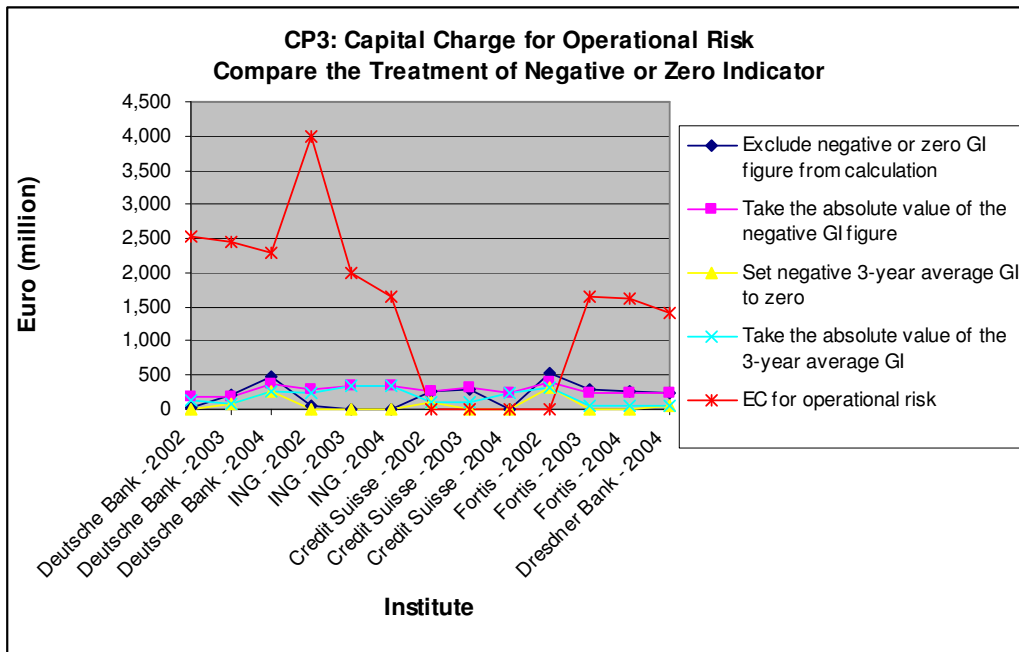


Figure 4.7: shows the banks in 2002 - 2004 which are subject to special treatment of a negative or zero indicator in their BIA capital charge calculation for operational risk given CP3 definition of the indicator

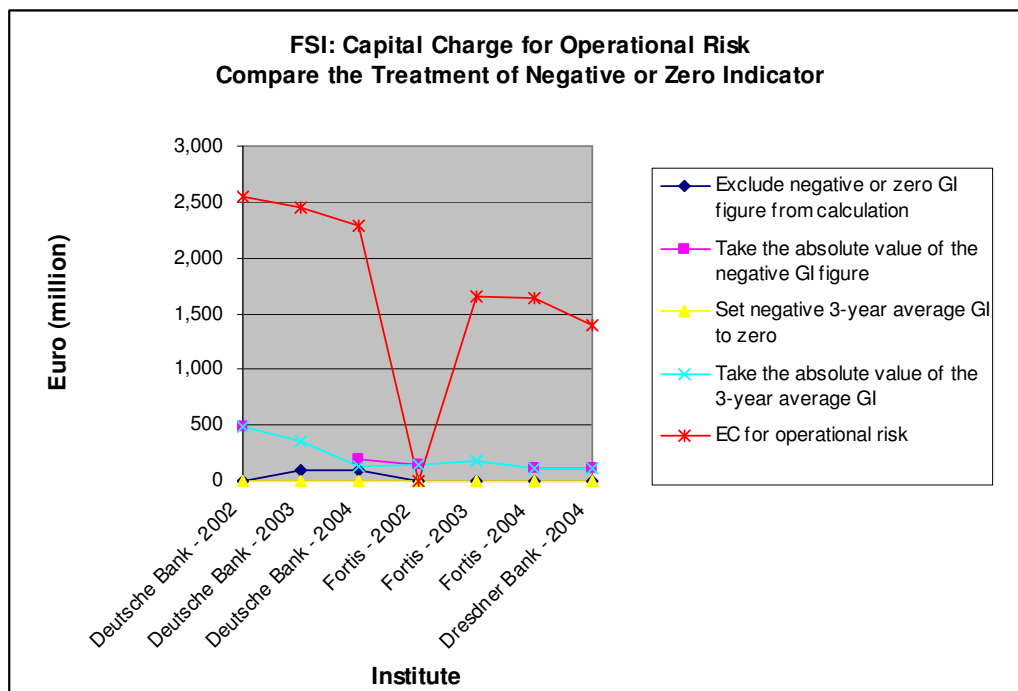


Figure 4.8: shows the banks in 2002 - 2004 which are subject to special treatment of a negative or zero indicator in their BIA capital charge calculation for operational risk given CP3 definition of the indicator

Summing up, the BIA operational risk capital charge calculated with Basel II suggested definition in CP3 is well below most banks' operational risk EC. These observations raise the question of whether the MRC charge for operational risk is set at the correct level? Figure 4.3 demonstrates a clear distinction between the capital charges for operational risk depending on which definition of gross income (net income) is chosen. The BIA operational risk capital charge with ECB proposed definition of gross income is clearly higher than the other three as and above the operational risk EC. This suggests that using ECB's proposal for defining gross income would generate a too punitive capital charge. While, the capital charge for operational risk defined by NI, CP3 and FSI, prove to be quite comparable in regards to the level of capital charge. Additionally, the choice of the treatment of a negative or a zero indicator in the capital charge calculation (and definition of indicator) results in notable differences (< €500 million) in the level of operational risk capital charge.

5. Economic Capital Disclosure

The recent Joint Forum's report, *Financial Disclosure in Banking, Insurance and Securities: Issues and Analysis* (BCBS, 2004b), covers five risk areas: market risk in trading activity, firm-wide exposure to market risk, funding liquidity risk, credit risk and insurance risk. The findings indicate financial institutes have made good progress on enhancing financial disclosures since 2001; however greater levels and quality of disclosure are desirable. The report does not include economic capital disclosure, but encourages that *future work should seek to identify the advanced methodologies currently used internally by the industry including the resulting data upon which senior management relies, and to work with the industry to seek to develop common methodological approaches to disclosure on that basis* (BCBS, 2004b).

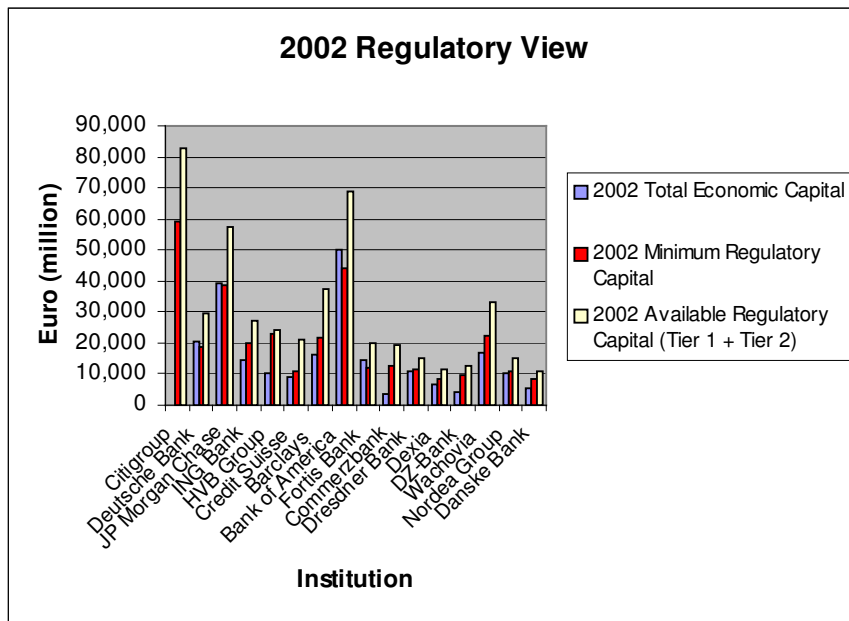
The review undertaken involves an examination of EC and RC disclosure in 2002 and 2003 annual reports of the world's largest 50 banks by total assets 2002 (Timewell *et al.*, 2002) in 13 countries. There is a substantial difference in the number of banks that have an EC framework and how many of these banks actually disclose EC figures in their annual reports. According to Basel Committee's *The 2002 Loss Data Collection Exercise for Operational Risk: Summary of the Data Collected*, 60 out of 89 participating banks (66%) provided information on EC (BCBS, 2003c)²⁴. However, our analysis of the world's 50 largest banks shows that only 16 out of 50 or 32% (26% in 2002) report EC figures in 2003. It is not surprising to see that all banks report available RC²⁵ higher than the required MRC, see Figures 5.1 and 5.2. Moreover, it is eminent to see that all banks reveal total EC being significantly lower than the available RC, especially since the RC framework should overestimate the financial risks. Only for 2 out of 16 cases (2003), total EC was reported to be slightly higher than the MRC, indicating the banks' management's own assessment of capital is deemed to be well capitalised in a regulatory sense. On the contrary, 14 out of 16 banks in 2003 report total EC being lower than the MRC level, which may suggest that the regulatory minimum is set too high. Alternatively, this situation may suggest that the management of the bank will be confronted with a problem of how to use internal assessment to manage EC without breaching regulatory rules and guidelines. It is also notable that there is not a situation where the total EC is reported higher than both the MRC and the available RC²⁶. This situation would have suggested that the bank does not meet its own assessment of capital required. Suppose that the EC is correctly assessed in the latter situation, then the bank will need to increase its

²⁴ 40 banks out of 50 provided data on operational risk EC in QIS2 (BCBS, 2001a).

²⁵ Actual (available) regulatory capital held = total capital ratio (or bank's target ratio) * total risk weighted assets (RWA).

²⁶ There are no other combinations available of actual capital held, economic - and regulatory capital, because then supervisory action would be taken against the bank.

available RC until it is equal or higher than the total EC, which may be difficult to explain to shareholders who view the bank as already well capitalized.



*Note that Citibank did not disclose economic capital for 2002, whereas both Barclays and Dresdner Bank disclosed their figures in respective annual report for 2003

Figure 5.1: a comparison between available RC, MRC and total EC in 2002

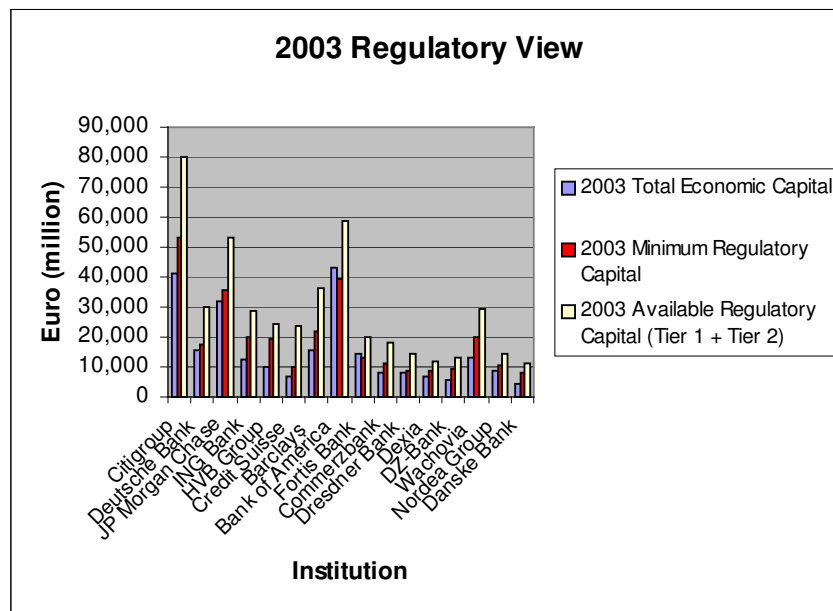


Figure 5.2: a comparison between available RC, MRC and total EC in 2003

Analogously, an assessment of the capital ratios clearly showed that all 16 out of top 50 banks disclosing EC figures hold capital and reserves well above the regulatory minimums sufficient to support the risks that arise in their businesses; see Figures 5.3 and 5.4.

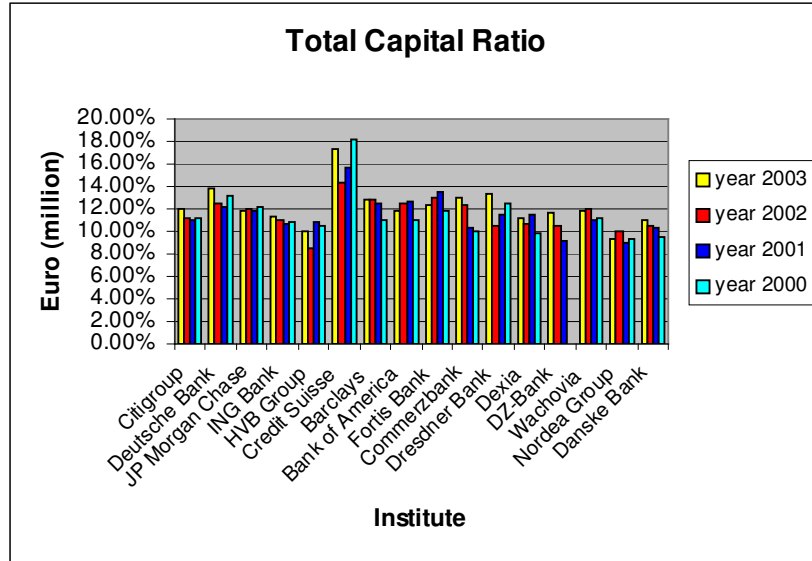


Figure 5.3: a comparison between (BIS) total capital ratio over 2000 – 2003

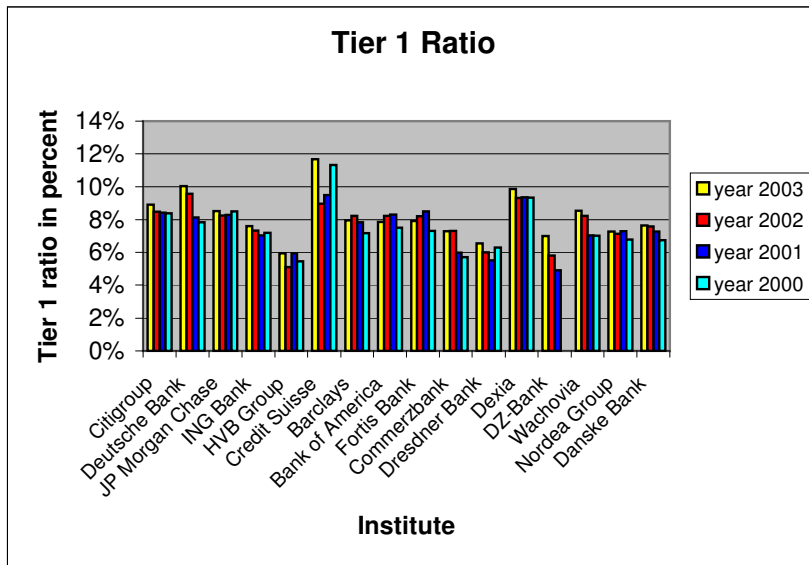


Figure 5.4: a comparison between (BIS) Tier 1 capital ratio over 2000 – 2003

An examination of the banks' definitions of EC revealed that most banks seem to concur that EC is a measure intended to cover unexpected losses during one year with confidence

intervals between the 99% and 99.98%, see Table 5.5. This result is in line with Jackson *et al.* (2002) who discuss the solvency standards implied by current and possible future G10 bank regulation and on the economic solvency standard that banks choose themselves by their own capital-setting decisions and employ a credit risk model to show that the survival probability implied by the Basel I is between 99.0 and 99.9%. Moreover, 10 out of 16 banks in 2003 report that they use a confidence interval consistent with a specific debt rating, and two banks changed their confidence level to a more conservative view of risk, see Tables 5.5 and 5.6. Overall the review of the EC definitions showed progress to clearer and more precise definitions of EC²⁷.

Confidence level	2002	2003
Citigroup	N/A	99.97%
Deutsche Bank	N/A	99.98%
ING Bank	99.95%	99.95%
HVB Group	99.00%	99.95%
Credit Suisse	99.00%	99.00%
Fortis Bank	99.97%	99.97%
Commerzbank	99.80%	99.95%
Wachovia	N/A	99.5%*
Nordea Group	99.97%	99.97%
Danske Bank	99.97%	99.97%

Table 5.5: different banks' confidence intervals consistent with respective debt rating in 2003

Standard & Poor's Rating Category	Standard Deviations	Confidence Level
AAA	3.00	99.9%
AA	2.57	99.5%
A	2.14	98.4%
BBB	1.71	95.7%

Source: Society of Actuaries (2003).

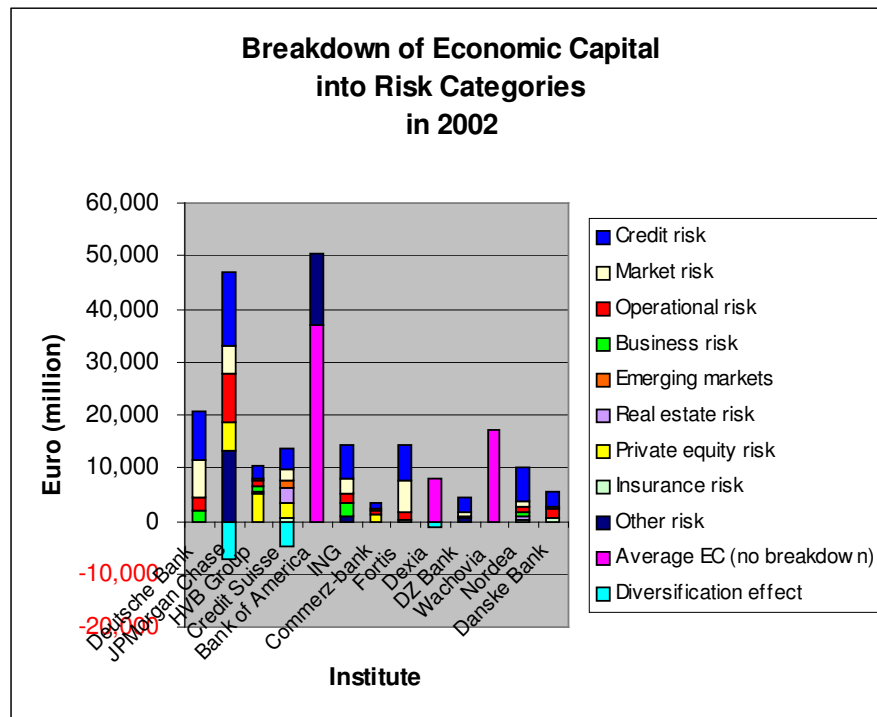
Table 5.6: example of different confidence intervals consistent with respective debt rating and standard deviations

Although EC should take into account all risks faced by the banking Group, this review indicates that this is not yet the case. All banks are including credit – and market risk in the EC calculation, most banks also include operational risk and a variety of other risk categories, see Figures 5.7 and 5.8. Some banks, such as Bank of America, choose to disclose an average EC figure²⁸ instead of breaking EC into risk categories, although the bank's capital is allocated separately based on risk categories. Experience entail that clearly the *universal banking activities* – consisting of corporate, retail and investment banking - are dominated by credit risk, which is clearly shown in Figures 5.7 and 5.8. Further, the review found that business risk

²⁷ Note that there are a variety of terms used for the concept of economic capital, e.g., economic risk capital, equity risk capital and risk capital.

²⁸ If only *other risks* is disclosed it means the bank disclosed a total average economic capital figure.

is either a stand-alone risk category or included in the operational risk category. Conversely, most of the banks identify the following risk categories, but do not include them in their EC calculation: liquidity -, reputational -, and strategic risk²⁹. Note that the proposed Basel II definition of operational risk includes legal risk, but that strategic and reputational risks are not included in this definition for the purpose of a minimum regulatory operational risk capital charge.

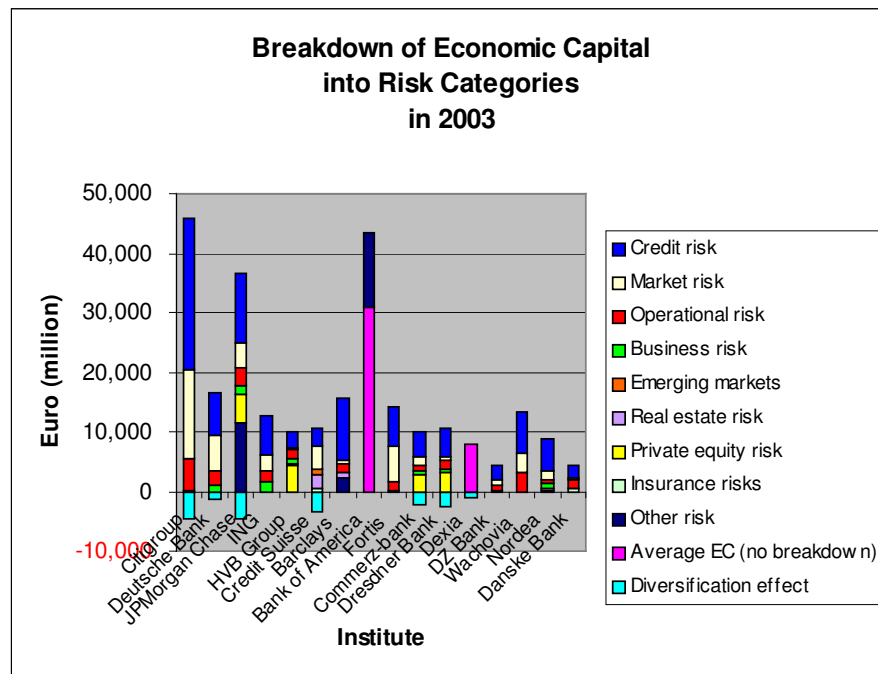


* *Other risk* category includes Goodwill/Intangibles and asset capital tax (J.P. Morgan Chase), and capital against non-risk factors (Bank of America), and transfer risk (ING) as well as strategic risk (DZ Bank)

** Note that Fortis Bank's operational risk definition includes business risk and Nordea's operational risk definition includes reputational risk.

Figure 5.7: breakdown of EC by risk category in 2002

²⁹ Additional elements of *other risk*, e.g., interest rate risk in the banking book and liquidity risk will be dealt with solely through supervisory review and disclosure requirements by the supervisors (2003a).



* *Other risk* category includes Goodwill/Intangibles and asset capital tax (J.P. Morgan Chase), and insurance risk among others (Barclays), and capital against non-risk factors (Bank of America), as well as strategic risk (DZ Bank)
 ** Note that Fortis Bank's operational risk definition includes business risk and Nordea's operational risk definition includes reputational risk.

Figure 5.8: breakdown of EC by risk category in 2003

Moreover, when all the risks of a large bank Group are combined, considerable diversification or portfolio effects will arise, since it is highly improbable that all possible losses should occur at the same time. Due to the diversification effects between risks of the various businesses, the bank's total capital becomes considerably lower than if the businesses were independent. The proposed Basel II allows banks to use internally determined correlations provided the bank can succeed with the difficult task of demonstrating to a high degree of confidence that its systems for determining correlations are sound, implemented with integrity, and take into account the uncertainty surrounding any such correlation estimates (BCBS, 2003a). Currently, reliable estimations of correlation can hardly be extracted from historical data (Frachot *et al.*, 2004). According to Kuritzkes *et al.* (2002) most institutions adopt simplifying assumptions in their aggregation of risks, such as linear aggregation, which is correct if the distributions are normal or near normal. In this case, there are two approaches for estimating correlation between risk factors and categories. The first is through an econometric risk factor approach, and the second is through direct estimation of the correlation matrix of risk categories. The econometric approach takes the correlation between any two risk categories, say market and credit risk, as a function of relevant economic factors, e.g., interest rates and Gross Domestic Product changes. The more practical and direct approach uses a

combination of internal data and management judgement to arrive at inter-risk type correlations. Kuritzkes *et al.* (2002) also point out that once the correlations are obtained, banks are faced with a choice of explicitly adjusting them to incorporate more stressful times or allowing the correlations reflect normal times and then conducting separate stress tests where some correlations are increased.

Further, Kuritzkes *et al.* (2002) state that there are a number of possible ways of approaching risk aggregation. They present the prevailing practice among Dutch banks to adopt the so-called three-level-approach. In this approach, risk is first measured on a stand-alone basis for individual risk factors within business lines. The stand-alone risks are aggregated at the level of major business lines, and then re-aggregated across businesses to create a composite risk profile for the bank as a whole.

An examination of the above mentioned banks reveal that only 7 out of 16 banks in 2003 (3 out of 13 in 2002) disclose the amount of diversification benefit although all banks report using diversification to different degrees in their methodology. For instance, Credit Suisse states that the diversification benefit reflects the net difference between the sum of the 99th percentile loss for each individual market risk type and for the total trading portfolio. In regards to credit risk, Credit Suisse regularly analyses their industry diversification and concentration in selected segments. Practices regarding market access, such as diversification of liabilities and investor relations, are reviewed at the Credit Suisse Group level. J.P. Morgan Chase estimates the portfolio effect on required EC based on correlations of risk across risk categories. This estimated diversification benefit is not allocated to the business segments. Additionally, J.P. Morgan Chase estimates the portfolio effect on required EC based on correlations of risk in stress scenarios across risk categories. The estimated diversification benefit leads to a reduction in required EC for the bank. Table 5.9 shows that the overall diversification effect of total required EC varies widely, ranging between 7% to 55%, among the few banks that disclose it.

Diversification benefit	2003	2002
Citigroup	10.02%	N/A
Deutsche Bank	7.20%	N/A
JP Morgan Chase	12.38%	18.77%
Credit Suisse	33.49%	54.44%
Commerzbank	21.78%	N/A
Dresdner Bank	22.64%	N/A
Dexia	15.00%	18.25%

Table 5.9: *diversification effect of total required EC in 2002 and 2003*

In a word, the definition of EC is not consistent across banks, banks have a wide variety of risk categorisations and disclosure of diversification effect is sparse. One potential approach to improve comparability is for the supervisors to request for internal EC figures based on a common supervisory standard, e.g., 99.9th percentile over a one-year time period. If a bank is unable to meet this standard, then it should provide information concerning what soundness standard the figures are designed to meet.

Finally, it is apparent from Figures 5.10 and 5.11 that US and West European banks³⁰ are at the forefront in disclosing EC figures in comparison with the Japanese and Chinese banks. West European banks are the largest group reporting EC figures, (12 out of 30), followed by US banks (4 out of 8) and then by the Japanese and Chinese banks where none reported EC figures in 2003.

³⁰ West European banks include: German, Swiss, Dutch, Belgian, Swedish and Danish.

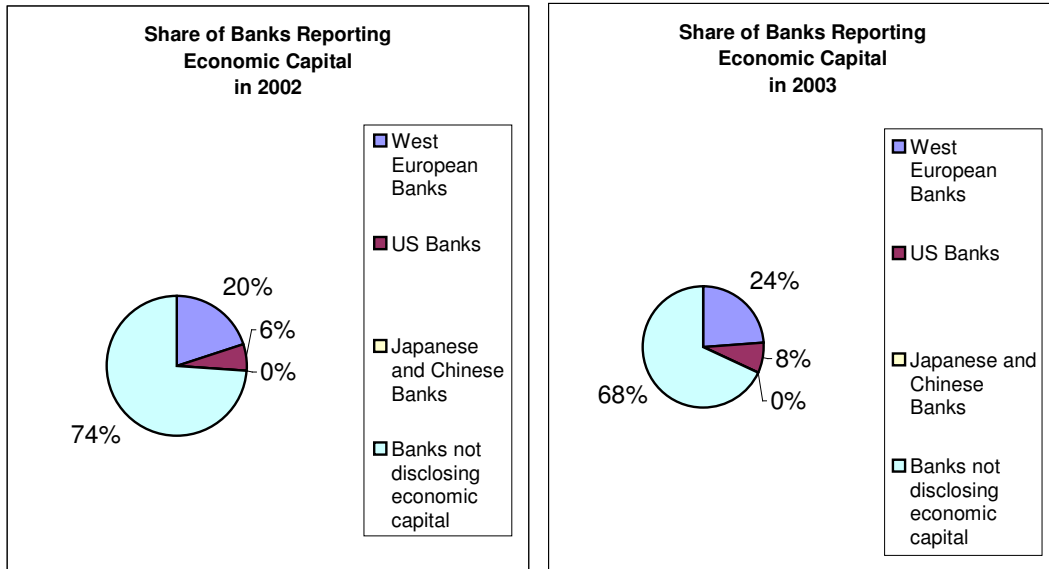


Figure 5.10: shows the share of banks by geographic region that disclose EC figures in their 2002 - 2003 annual report

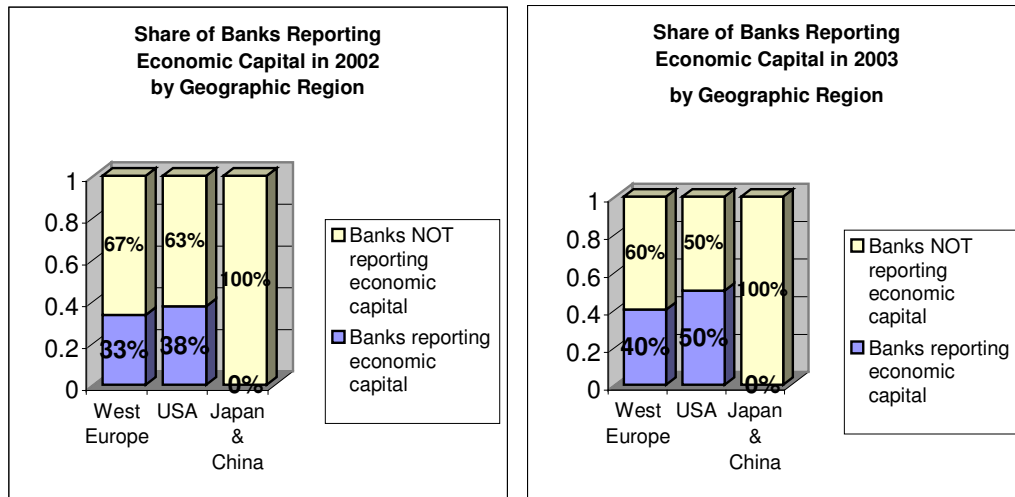


Figure 5.11: banks by geographic region that report EC in 2002 - 2003 annual report

Concluding Remarks

Our aim was twofold to investigate the relationship between EC - and RC figures from 2002 and 2003 and to examine the scope of EC disclosure in 2002 and 2003 annual reports. Our review suggests that overall operational risk capital charge for an internationally active median bank should be considerably lower (8% - 10%) than the currently proposed level of 12% of MRC. Calculations also indicate that BIA's alpha (15% - 18%) is in line with the results obtained from the Basel Committee's QIS2. However, the median alpha value varies significantly depending on the choice of definition of the indicator used for the BIA. In addition, the calculations suggest that the choice of practice when the indicator is negative or zero has a slight impact on the level of alpha. The capital charge calculations suggest that an average BIA operational risk capital charge ranges about 2% - 4% (NI, CP3 and FSI proposed indicators) in comparison with around 13% - 17% (ECB proposed indicator) of overall EC. Similarly, BIA operational risk capital charge appears to represent a rather smaller share of MRC, around 1% - 3% (NI, CP3 and FSI) in comparison with around 10% - 12% (ECB) for the median bank. By changing the indicator from ECB to CP3 the results indicate that the Basel Committee has significantly lowered the share of operational risk capital charge of MRC. In short, the proposed BIA used to determine capital charge for operational risk reveals complexity and ambiguity of regulatory definitions, which could lead to substantial impact on operational risk capital levels. To achieve consistency and improved comparability, it is clear that the upcoming Basel II requires greater clarification and guidance on the interpretation of EC and gross income definitions. In particular, guidance is needed on the calculation of gross income for operational risk purposes in specific cases, such as mergers and de-mergers or when the average gross income is negative or zero. Otherwise, the different approaches of calculating operational risk capital charge may end up only distorting competition further. Our analysis has been limited at best and would greatly benefit from further review and understanding, e.g., by gaining access to complete and reliable information from a greater number of banking institutions. A general problem, and one of the hurdles complicating the calculation, is availability of sufficient data, due to confidentiality reasons among others, to perform appropriate statistical analysis. Also, the level of model sophistication for various risk categories varies significantly and is highly dependant on the availability of data.

Analysis of 2002 and 2003 annual reports showed variations in the way EC for operational risk is disclosed. Despite the shortage of EC disclosed in 2002 and 2003 annual reports, a third of the top 50 banks, there are some interesting facts evolving about EC in the banking industry. A majority of banks in 2003 report total EC (14 out of 16) being lower than the MRC level, which may suggest that the regulatory minimum is set too high. The definition of EC is not

consistent across banks, however most banks seem to concur that EC is a measure intended to cover unexpected losses during one year between 99% to 99.98% and equivalently AA to AAA Standard & Poor's debt rating. Also, banks have a wide variety of risk categorisations and the disclosure of diversification effect is sparse and there is an apparent geographical separation of banks that publicly disclose EC. Ultimately, it is concluded that quantity and quality of EC disclosure in banks are uneven and incomplete. Most practitioners agree that the measurement and understanding of risk is an evolving field where periodical enhancements are made. The extent of existing EC disclosure is already a proof of an increased expectation of better disclosure of EC figures by investors, analysts and boards. Although, Basel II appears to leave the determination and disclosure of EC to the discretion of the financial institution itself, this determination will be subject to regulatory scrutiny. Therefore, one should continue efforts to encourage increases in the quantity and quality of relevant financial disclosures by banks. On the other hand, one should encourage the development of integrated risk frameworks. For example, Medova (2001) suggests an integrated view where key contributors (credit -, market - and operational risk) are consistently derived from statistics of the P&L distributions at different levels of a bank. In short, EC at each level must be assessed from the expectation of returns on the total capital involved. Credit and market risk can be measured by any existing method with increasing ordered thresholds as these risks are combined. However, extreme operational risk should be measured as an excess over a consolidated value-at-risk level for credit risk and market risk at any level of financial institution and the corresponding excess capital charge assessed by expected excess loss – resulting in a coherent risk measure [Medova (2000 & 2001), Medova & Kyriacou (2002)]. After all, the main quantitative objective for banks should be to use a fully statistical aggregation approach at all levels to explicitly model all interactions between different risk categories on the basis of a common set of key risk indicators. Lastly, although EC is evolving slowly, demonstrated by market surveys and annual report disclosure, it is evolving into a standard model for comprehensive and consistent monitoring of a bank's financial risks.

Appendix 1

Ratio of BIA capital charge for operational risk to overall EC and to MRC in 2001 – 2003 for 16 out of top 50 banks disclosing operational risk EC. Note gross income terms that were negative or zero are excluded in both numerator and denominator from the capital charge calculation.

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.031	0.026	0.025	0.000	0.090	16
Net Income 2002	0.029	0.029	0.015	0.000	0.057	12
Net Income 2001	0.029	0.028	0.015	0.001	0.058	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.024	0.021	0.021	0.000	0.070	16
Net Income 2002	0.022	0.020	0.016	0.000	0.065	12
Net Income 2001	0.024	0.024	0.016	0.000	0.061	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.038	0.030	0.028	0.000	0.102	16
CP3 2002	0.035	0.033	0.019	0.000	0.066	12
CP3 2001	0.032	0.032	0.019	0.001	0.063	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.029	0.025	0.022	0.000	0.079	16
CP3 2002	0.025	0.023	0.016	0.000	0.062	12
CP3 2001	0.025	0.022	0.018	0.001	0.058	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.040	0.040	0.035	0.000	0.135	16
FSI 2002	0.034	0.036	0.018	0.000	0.062	12
FSI 2001	0.028	0.024	0.018	0.000	0.056	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.030	0.026	0.027	0.000	0.105	16
FSI 2002	0.024	0.023	0.016	0.000	0.053	12
FSI 2001	0.020	0.017	0.015	0.000	0.047	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.171	0.159	0.074	0.099	0.401	16
ECB 2002	0.162	0.136	0.087	0.083	0.344	12
ECB 2001	0.132	0.121	0.053	0.064	0.247	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.128	0.119	0.057	0.067	0.282	16
ECB 2002	0.115	0.112	0.048	0.057	0.201	12
ECB 2001	0.102	0.100	0.041	0.048	0.165	12

Appendix 2

Ratio of BIA capital charge for operational risk to overall EC and to MRC in 2001 – 2003 for 16 out of top 50 banks disclosing operational risk EC. Note the absolute value is calculated for gross income terms that were negative in the capital charge calculation.

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.036	0.026	0.023	0.003	0.090	16
Net Income 2002	0.031	0.029	0.012	0.017	0.057	12
Net Income 2001	0.029	0.026	0.014	0.013	0.058	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.028	0.022	0.019	0.002	0.070	16
Net Income 2002	0.024	0.021	0.014	0.008	0.065	12
Net Income 2001	0.023	0.020	0.015	0.009	0.061	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.042	0.032	0.025	0.016	0.102	16
CP3 2002	0.036	0.033	0.017	0.009	0.066	12
CP3 2001	0.033	0.030	0.017	0.009	0.063	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.031	0.023	0.020	0.011	0.079	16
CP3 2002	0.026	0.021	0.014	0.010	0.062	12
CP3 2001	0.026	0.022	0.015	0.008	0.058	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.042	0.040	0.033	0.006	0.135	16
FSI 2002	0.036	0.036	0.015	0.012	0.062	12
FSI 2001	0.031	0.028	0.014	0.009	0.056	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.031	0.026	0.025	0.003	0.105	16
FSI 2002	0.027	0.024	0.013	0.013	0.053	12
FSI 2001	0.023	0.019	0.012	0.012	0.047	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.171	0.159	0.074	0.099	0.401	16
ECB 2002	0.162	0.136	0.087	0.083	0.344	12
ECB 2001	0.132	0.121	0.053	0.064	0.247	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.128	0.119	0.057	0.067	0.282	16
ECB 2002	0.115	0.112	0.048	0.057	0.201	12
ECB 2001	0.102	0.100	0.041	0.048	0.165	12

Appendix 3

Ratio of BIA capital charge for operational risk to overall EC and to MRC in 2001 – 2003 for a sample of 16 out of top 50 banks disclosing operational risk EC. Note in the following banks with negative 3-year average gross incomes were set to zero for the capital charge calculation.

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.026	0.015	0.029	0.000	0.090	15
Net Income 2002	0.022	0.022	0.017	0.000	0.057	12
Net Income 2001	0.024	0.026	0.019	0.000	0.058	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.021	0.014	0.024	0.000	0.070	15
Net Income 2002	0.018	0.017	0.018	0.000	0.065	12
Net Income 2001	0.020	0.018	0.018	0.000	0.061	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.035	0.027	0.030	0.000	0.102	16
CP3 2002	0.030	0.032	0.024	0.000	0.066	12
CP3 2001	0.029	0.030	0.021	0.000	0.063	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.026	0.022	0.024	0.000	0.079	16
CP3 2002	0.021	0.020	0.019	0.000	0.062	12
CP3 2001	0.023	0.022	0.018	0.000	0.058	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.040	0.040	0.036	0.000	0.135	16
FSI 2002	0.033	0.036	0.019	0.000	0.062	12
FSI 2001	0.028	0.024	0.018	0.000	0.056	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.029	0.026	0.028	0.000	0.105	16
FSI 2002	0.024	0.023	0.017	0.000	0.053	12
FSI 2001	0.020	0.017	0.015	0.000	0.047	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.171	0.159	0.074	0.099	0.401	16
ECB 2002	0.162	0.136	0.087	0.083	0.344	12
ECB 2001	0.132	0.121	0.053	0.064	0.247	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.128	0.119	0.057	0.067	0.282	16
ECB 2002	0.115	0.112	0.048	0.057	0.201	12
ECB 2001	0.102	0.100	0.041	0.048	0.165	12

Appendix 4

Ratio of BIA capital charge for operational risk to overall EC and to MRC in 2001 – 2003 for 16 out of top 50 banks disclosing operational risk EC. Note that the absolute value of the 3-year average gross income is taken when the 3-year average gross income is negative in the capital charge calculation.

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.032	0.026	0.027	0.002	0.090	16
Net Income 2002	0.027	0.029	0.013	0.007	0.057	12
Net Income 2001	0.026	0.026	0.017	0.001	0.058	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
Net Income 2003	0.025	0.020	0.022	0.001	0.070	16
Net Income 2002	0.021	0.020	0.015	0.006	0.065	12
Net Income 2001	0.021	0.018	0.017	0.001	0.061	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.039	0.031	0.027	0.004	0.102	16
CP3 2002	0.033	0.032	0.020	0.003	0.066	12
CP3 2001	0.031	0.030	0.019	0.006	0.063	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
CP3 2003	0.029	0.023	0.021	0.004	0.079	16
CP3 2002	0.023	0.020	0.017	0.004	0.062	12
CP3 2001	0.024	0.022	0.016	0.005	0.058	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.042	0.040	0.034	0.006	0.135	16
FSI 2002	0.036	0.036	0.015	0.012	0.056	12
FSI 2001	0.031	0.028	0.014	0.009	0.056	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
FSI 2003	0.031	0.026	0.026	0.003	0.105	16
FSI 2002	0.026	0.023	0.013	0.013	0.053	12
FSI 2001	0.023	0.019	0.012	0.012	0.047	12

BIA Capital Charge for Operational Risk / Overall EC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.171	0.159	0.074	0.099	0.401	16
ECB 2002	0.162	0.136	0.087	0.083	0.344	12
ECB 2001	0.132	0.121	0.053	0.064	0.247	11

BIA Capital Charge for Operational Risk / MRC	Mean	Median	STD	Min	Max	Number of banks
ECB 2003	0.128	0.119	0.057	0.067	0.282	16
ECB 2002	0.115	0.112	0.048	0.057	0.201	12
ECB 2001	0.102	0.100	0.041	0.048	0.165	12

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