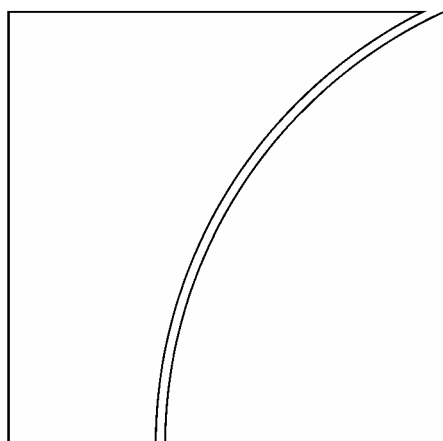


# Basel Committee on Banking Supervision



## Results of the fifth quantitative impact study (QIS 5)

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## **Working Group on Overall Capital and Quantitative Impact Study of the Basel Committee on Banking Supervision**

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## Executive summary

The efforts of the Basel Committee on Banking Supervision to revise the standards governing the capital adequacy of internationally active banks achieved a critical milestone in the publication of an agreed text in June 2004. The Basel II Framework<sup>1</sup> describes a more comprehensive measure and minimum standard for capital adequacy. It seeks to improve on the existing rules by aligning regulatory capital requirements more closely to the underlying risks that banks face.

To evaluate the effects of the Basel II Framework on capital levels, the Basel Committee undertook a global fifth Quantitative Impact Study (QIS 5) in 31 countries. All G10 countries (except the US) and 19 non-G10 countries participated in the exercise. This report summarises the results of QIS 5. The Secretariat of the Basel Committee received data from 56 Group 1 banks located in the G10 countries, 146 G10 Group 2 banks (including some German banks on the basis of their QIS 4 returns), and 155 banks from other countries. Limited data from the US QIS 4 exercise – an additional 26 institutions – were also included where possible. The Committee appreciates the substantial efforts that banks and national supervisors have put into this data collection exercise.

The primary objective of the study was to allow the Committee to evaluate the potential changes in minimum required capital levels under the Basel II Framework as the industry progresses toward implementation. In contrast to previous exercises, the QIS 5 workbooks reflect all recent changes to the Basel II Framework, in particular the move to a UL-only framework for computing risk-weighted assets, the change in the treatment of reserves, the 1.06 scaling factor applied to credit risk-weighted assets, the recognition of double default, and the revised trading book rules. A comparison of the results from QIS 5 and QIS 3 is difficult for various reasons besides the different rules. Although national supervisors reported that data survey quality has significantly improved since the previous exercise, the implementation of economic downturn loss-given-default estimates and issues relating to the Committee's trading book paper need further improvement. Macroeconomic and credit conditions prevailing in most G10 countries at the time of QIS 4 and 5 were more benign than during QIS 3.

The QIS results for the G10 countries show that minimum required capital under Basel II (including the 1.06 scaling factor to credit risk-weighted assets) would decrease relative to the current Accord. For Group 1 banks, minimum required capital under the most likely approaches to credit and operational risk would on average decrease by 6.8%. Among the two IRB approaches, the advanced approach shows more reduction in minimum required capital (-7.1%) than the foundation approach (-1.3%). Minimum required capital under the standardised approach would increase by 1.7% for Group 1 banks. However, only very few G10 Group 1 banks are expected to adopt this approach. Group 2 banks show a larger reduction in minimum required capital under the internal ratings-based approaches, and minimum required capital would decrease by 1.3% under the standardised approach, in particular due to the higher proportion of retail exposures for those banks.

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<sup>1</sup> Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards: A Revised Framework*, June 2004. The paper was revised in November 2005 in order to reflect the Committee's paper on *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects*.

In general, results for the CEBS<sup>2</sup> countries are broadly in line with the figures which were obtained on the G10 level. Results for banks in the rather small sample of other non-G10 countries show substantial dispersion both within and between countries, mostly due to the specialised business profile of certain banks and particularities of national implementation. The wide range of bank- and country-specific circumstances suggests that supervisory discretion is particularly important in these countries, and the results might therefore not be representative for all non-G10 countries. Although data quality is an issue for some banks in other non-G10 countries, the results appear to be broadly in line with results for G10 banks to the extent that the risk profiles are similar.

Table 1

**Change in minimum required capital relative to current Accord, in per cent**

	<b>Standardised approach</b>	<b>FIRB approach</b>	<b>AIRB approach</b>	<b>Most likely approach</b>
G10 Group 1	1.7	-1.3	-7.1	-6.8
G10 Group 2	-1.3	-12.3	-26.7	-11.3
CEBS Group 1	-0.9	-3.2	-8.3	-7.7
CEBS Group 2	-3.0	-16.6	-26.6	-15.4
Other non-G10 Group 1	1.8	-16.2	-29.0	-20.7
Other non-G10 Group 2	38.2	11.4	-1.0	19.5

Due to a different sample of banks for the various approaches, the incentive structure should be evaluated only according to Table 7. Moreover, the figures do not take account of the transitional floors.

The retail mortgage portfolio contributes the most to the reduction in minimum required capital under the standardised and the IRB approaches (-6.3% to -7.6% for G10 Group 1 banks). Since there was no explicit capital charge for operational risk under Basel I, the highest increase is due to the new capital requirements for operational risk (5.6% to 6.1% for G10 Group 1 banks). For Group 1 banks under the IRB approaches, the other main contributing portfolios are corporate and SME retail (decreases) as well as equity (increase). Although dispersion of the results has decreased for some portfolios compared to QIS 3, it is still fairly large.

Among the other non-G10 countries, capital ratios are on average higher than in the G10. The high current capital ratios suggest that judgement by bank management, market pressures or Pillar 2-type supervisory discretions may be acting to maintain higher levels of capital than are explicitly required under the current Accord. These elements will likely continue to have significant impact for these countries under the Basel II Framework.

In order to analyse the incentives for banks to move to the more advanced approaches, the capital requirements for banks providing data on at least two different approaches were compared. This analysis shows that capital requirements provide an incentive for banks on average to move to the more advanced approaches (with minimum required capital for G10 Group 1 banks being 13.3% lower under the foundation IRB approach than under the

<sup>2</sup> The CEBS figures include both G10 and non-G10 members of the CEBS group. See Section 1.1 for further details.

standardised approach, and 5.1% lower under the advanced IRB approach than under the foundation IRB approach, not taking account of the transitional floors).

It is important to note that macroeconomic conditions prevailing in most countries at the time of QIS 4 and 5 were more benign than during QIS 3. The Committee concluded in May 2006 that this influenced the results, but currently available information does not allow the impact to be quantified with precision. Also taking into account the remaining uncertainties in the data, the Committee agreed that no adjustment of the scaling factor of 1.06 to credit risk-weighted assets under the internal ratings-based approaches would be warranted at this stage. The Committee expects that in the course of implementing the Basel II Framework, supervisors will ensure that banks will maintain a solid capital base throughout the economic cycle. The Committee believes that mechanisms are in place to achieve this goal. National authorities will continue to monitor capital requirements during the implementation period of the Basel II Framework. Moreover, the Committee will monitor national experiences with the Basel II Framework.



# Results of the fifth quantitative impact study (QIS 5)

## 1. General remarks on QIS 5

The efforts of the Basel Committee on Banking Supervision to revise the standards governing the capital adequacy of internationally active banks achieved a critical milestone in the publication of an agreed text in June 2004. The Basel II Framework<sup>3</sup> describes a more comprehensive measure and minimum standard for capital adequacy that national supervisory authorities are now working to implement through domestic rule-making and adoption procedures. It seeks to improve on the existing rules by aligning regulatory capital requirements more closely to the underlying risks that banks face. In addition, the Basel II Framework is intended to promote a more forward-looking approach to capital supervision, one that encourages banks to identify the risks they may face, today and in the future, and to develop or improve their ability to manage those risks. As a result, it is intended to be more flexible and better able to evolve with advances in markets and risk management practices.

To evaluate the effects of the Basel II Framework on capital levels, QIS 4 was completed on a limited basis in 2004 in Germany, the US and South Africa, in addition to a field test in Japan in 2005. Following issuance of the trading book rules which the Basel Committee developed jointly with the International Organization of Securities Commissions<sup>4</sup> and the Committee's guidance on economic downturn loss-given-default (LGD)<sup>5</sup> in 2005, a global fifth Quantitative Impact Study (QIS 5) was undertaken in 31 countries. All G10 countries (except the US) and 19 non-G10 countries participated in the exercise. National supervisors collected data on the basis of the instructions and the workbook prepared by the Committee<sup>6</sup> in the fourth quarter and results were submitted to the Secretariat of the Committee in late February and early March 2006.

The Committee appreciates the substantial efforts that banks and national supervisors have put into this data collection exercise. This report summarises the results of the analysis of the combined QIS 4 and QIS 5 data<sup>7</sup> which will also form a very important input to the work on implementation by the Committee and national supervisory agencies.

### 1.1 Sample of participating banks

The combined QIS 4/QIS 5 effort encompasses results from 32 countries. The Secretariat received data from 56 G10 Group 1 banks, 146 G10 Group 2 banks, and 154 banks from

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<sup>3</sup> Basel Committee on Banking Supervision, *International Convergence of Capital Measurement and Capital Standards: A Revised Framework*, June 2004. The paper was revised in November 2005 in order to reflect the Committee's paper on *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects*.

<sup>4</sup> Basel Committee on Banking Supervision, *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects*, July 2005.

<sup>5</sup> Basel Committee on Banking Supervision, *Guidance on the estimation of loss given default (Paragraph 468 of the Framework Document)*, July 2005.

<sup>6</sup> Basel Committee on Banking Supervision, *Instructions to QIS 5*, September 2005.

<sup>7</sup> For technical reasons, QIS 4 data could not be included in all analyses provided in this paper. Analyses which do not include QIS 4 data are indicated with a footnote.

other countries. Limited data from the US QIS 4 exercise – an additional 26 Group 1 banks – were also included where possible.

As in QIS 3, Group 1 banks are banks which fulfil all of the following three criteria:

- The bank has a Tier 1 capital in excess of €3 billion;
- The bank is diversified; and
- The bank is internationally active.

In QIS 5, the Committee considers three different country groupings:

- G10, which includes the 13 Basel Committee member countries;<sup>8</sup>
- European countries which are either EU member states, EU accession candidates or members of the European Economic Area (EEA). In total this group comprises the Committee of European Banking Supervisors (CEBS), which includes 30 countries (both G10 and non-G10), 20 of which provided data for QIS 5.<sup>9</sup> Since they are all CEBS member or observer countries this group is referred to as the “CEBS group”; and
- Other non-G10 countries encompasses all non-G10 countries which are not part of the CEBS group. Eight other non-G10 countries provided data for QIS 5.<sup>10</sup>

The sample of other non-G10 countries is considerably smaller compared to QIS 3, in part caused by the fact that several former other non-G10 countries are now part of the CEBS group. Table 2 shows the number of banks which provided data for the three approaches to credit risk available in the Basel II Framework – the standardised approach (RSA), the foundation internal ratings-based approach (FIRB), and the advanced internal ratings-based approach (AIRB).

In many cases national supervisory agencies have asked the banks in their jurisdiction to submit data for more than one approach. However, it is important to note that the overall quality and reliability of the data used in the one-notch down calculations (foundation IRB approach for banks targeting the advanced IRB approach, and the standardised approach for banks targeting the foundation IRB approach) was typically not of the same standard as that used for targeted approaches.

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<sup>8</sup> Members of the Committee are Belgium, Canada, France, Germany, Italy, Japan, Luxembourg, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

<sup>9</sup> Non-G10 members of this group are Bulgaria, Cyprus, the Czech Republic, Finland, Greece, Hungary, Ireland, Malta, Norway, Poland, and Portugal. The average results for this country grouping have been provided by CEBS.

<sup>10</sup> Other non-G10 countries participating in QIS 5 are Australia, Bahrain, Brazil, Chile, India, Indonesia, Peru and Singapore.

Table 2  
**QIS 5 participation**

	Group 1				Group 2			
	Total	RSA	FIRB	AIRB	Total	RSA	FIRB	AIRB
G10	82	30	43	62	146	130	108	12
CEBS non-G10	8	7	6	2	86	85	9	2
Other non-G10	6	3	6	4	54	50	5	2
<b>Total</b>	<b>96</b>	<b>40</b>	<b>55</b>	<b>68</b>	<b>286</b>	<b>265</b>	<b>122</b>	<b>16</b>

Since banks may have provided data for more than one approach, the total number of participating banks is in general less than the sum of the numbers of banks providing data for one of the approaches.

Table 3 shows the number of QIS 5 participants by their “most likely approach” to credit risk. In this table, only the approach for which a bank provided data and which it is expected to adopt after implementation is reported<sup>11</sup> (typically, the more sophisticated approach). In the QIS sample the data for the other approach(es) are in particular included to investigate the incentive structure. Of the G10 Group 1 banks in the QIS sample, 72% plan to implement the advanced IRB approach, 28% are most likely to adopt the foundation IRB approach, and none intend to use the standardised approach. Of the G10 Group 2 banks, 7% are likely to adopt the advanced IRB approach, 70% plan to implement the foundation IRB approach, and 23% intend to use the standardised approach. The non-G10 Group 1 banks are split between the IRB approaches, while most of the non-G10 Group 2 banks intend to use the standardised approach.

Table 3  
**Most likely approach of QIS 5 participants**

	Group 1			Group 2		
	RSA	FIRB	AIRB	RSA	FIRB	AIRB
G10	0	23	59	33	102	11
CEBS non-G10	2	4	2	78	7	1
Other non-G10	0	2	4	49	3	2
<b>Total</b>	<b>2</b>	<b>29</b>	<b>65</b>	<b>160</b>	<b>112</b>	<b>14</b>

Table 4 shows the numbers of G10 banks using each approach to operational risk in their capital calculation. Estimates for the advanced measurement approach (AMA) are still a challenge for many institutions, with less than half of the G10 Group 1 banks able to provide an AMA estimate which could be used in this analysis.

<sup>11</sup> In a small number of cases the banks could not yet provide data for the approach they will most likely use after implementation. In these cases, the most sophisticated approach for which data was provided has been included in the sample for the most likely approach.

Table 4

**Number of G10 banks using the different approaches to operational risk**

Approach	Group 1	Group 2
Basic indicator approach	2	81
Standardised approach	32	65
Advanced measurement approach	22	0
<b>Total</b>	<b>56</b>	<b>146</b>

The figures in this table do not include US banks.

Data collection was carried out on the basis of the national implementation of the Basel II Framework and the current Accord. For example, some of the other non-G10 countries have simplified and adapted the standardised approach to their specific circumstances by introducing higher risk weights for mortgages or corporate exposures.

In order to maintain the confidentiality of results, all charts showing individual bank results are aggregated across all countries of the respective country grouping and across Group 1 and Group 2 banks. There is, however, a distinction between two size classes defined in terms of capital,<sup>12</sup> distinguishing banks with more than €10 billion capital from those with less capital for G10 and CEBS countries, and banks with more than €1 billion from those with less capital for the other non-G10 countries.

## 1.2 Comparability with QIS 3 data

The Committee considered the differences in the two QIS periods to examine banks' input parameters and gauge industry progress towards implementation; however, caution must be taken when making comparisons to QIS 3. Various changes to the Basel II Framework have occurred since QIS 3 was completed, including different correlation factors for qualifying revolving exposures (QRE) and other retail risk-weight curves, the move to a framework calibrated on unexpected losses (UL) only for computing IRB risk-weighted assets, a change in the treatment of reserves, and a 1.06 scaling factor applied to IRB credit risk-weighted assets. In addition, the sample of banks that completed QIS 3 and QIS 5 is different.

Moreover, macroeconomic and credit conditions changed considerably since QIS 3 was conducted in 2002. In contrast to some downturn conditions experienced at the time of QIS 3, the overall economic environment was more favourable in most G10 and many non-G10 countries at the time of QIS 5. Some supervisors noted this likely affected estimates of probabilities of default (PD) through strong credit quality conditions.

More banks submitted data on the advanced approaches as compared to QIS 3, although supervisors noted many G10 banks are still not able to estimate operational risk using the advanced measurement approach. In addition, countries reported increased use of credit risk mitigation techniques as compared to QIS 3, however supervisors also noted that in most cases credit risk mitigation is not being fully recognised. While extensive improvement was

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<sup>12</sup> In this context, capital refers to the sum of Tier 1 and Tier 2 capital minus deductions under the current Accord.

made with regard to data survey quality, length of time series, and systems development, supervisors note that further progress is needed. The coverage of economic downturn LGDs and issues relating to the Committee's trading book paper needs further improvement. Some G10 banks attempted to estimate economic downturn LGDs by incorporating stress factors or conservatism. Only a few G10 banks were able to apply the new methods to estimate counterparty credit risk, while roughly ten were able to provide double default estimates.

As regards the other non-G10 countries it should be noted that the sample of countries changed considerably compared to QIS 3; the results shown for this country grouping are therefore not comparable to the previous exercise.

### 1.3 Methodology

In order to ensure comparability across approaches, the impact of the Basel II Framework is measured in terms of percentage changes in **minimum required capital (MRC)**. In practice, minimum required capital measures the capital required to cover (i) 8% times risk-weighted assets; (ii) a potential difference between the total expected loss amount and total eligible provisions (ie the regulatory calculation difference – RCD) under the IRB approaches; and (iii) deductions other than the regulatory calculation difference. Under the IRB approaches, risk-weighted assets are calculated on a UL-only basis and include the 1.06 scaling factor to IRB credit risk-weighted assets. Market risk-weighted assets were computed – in a few cases using the new trading book rules – and operational risk-weighted assets were derived to complete the risk-weighted asset figure. In addition, this regulatory calculation difference was allocated to the portfolios on an expected loss (EL) basis in order to compare changes in minimum required capital by portfolio. In Section 4.5 the percentage change in minimum required capital is decomposed, isolating the contribution of the regulatory calculation difference from the impact of the other components.

Similarly the impact of Basel II on **minimum required Tier 1 capital** has been calculated, taking into account changes to the capital only to the extent they have an impact on Tier 1 capital. However, unless stated otherwise, the term minimum required capital always refers to total minimum required capital.

To analyse the impact of the Basel II Framework at the portfolio level, the so-called **contribution** of the portfolio is used. The contribution can in general be calculated by multiplying the portfolio size by the change in minimum required capital under Basel II relative to minimum required capital under the current Accord on the portfolio level.

As **bank weights** for aggregation within a country the share of a Group 1 bank in total minimum required capital under the current Accord relative to all Group 1 banks participating in QIS 5 in a certain country was used. In addition, the portfolio size is taken into account in the aggregation of portfolio-level minimum required capital. For Group 2 banks, simple averages are used.

In order to aggregate results of the various countries in the sample and to determine the overall change of capital in the global banking system, **country weights** are assigned to each country's total change in minimum required capital. Results of Group 1 banks are weighted by the proportion of Tier 1 plus Tier 2 capital, less deductions, of all Group 1 banks in the banking system of each country, irrespective of whether or not they participated in the data collection exercise. For Group 2 banks, the results are weighted based on the capital of Group 2 banks in each country.

A more detailed explanation of the calculation methods is contained in Annex A.

## 2. Summary of results across approaches

In this section a summary of the results of all banks which participated in QIS 5 is provided for the three credit risk approaches available in the Basel II Framework (standardised, foundation IRB, and advanced IRB approaches) as well as for the most likely approach to credit and operational risk. The results for the IRB approaches have been calculated on the basis of the scaling factor of 1.06.

For each approach, all banks which provided data for the approach were taken into account except for the analysis of the incentive structure (Section 2.2). It should be noted that even for portfolios for which the same capital treatment applies under all approaches to credit risk (such as it is the case for operational risk, but also the retail portfolios under the foundation and advanced IRB approaches) the results for the different approaches reported in the following sections will in general be different. This is due to the different sample of banks which provided data for the different approaches.

### 2.1 Overall results

#### *Total minimum required capital*

Table 5 reports the overall change in minimum required capital relative to the current Accord. The table shows that total minimum required capital under Basel II would on average decrease relative to the current Accord for all groupings except G10 Group 1 banks and the banks in other non-G10 countries under the standardised approach, and other non-G10 Group 2 banks using the foundation IRB approach.

Table 5  
Overall results  
Average change in total minimum required capital  
relative to current Accord, in per cent

	Standardised approach	FIRB approach	AIRB approach	Most likely approach
G10 Group 1	1.7	-1.3	-7.1	-6.8
G10 Group 2	-1.3	-12.3	-26.7	-11.3
CEBS Group 1	-0.9	-3.2	-8.3	-7.7
CEBS Group 2	-3.0	-16.6	-26.6	-15.4
Other non-G10 Group 1	1.8	-16.2	-29.0	-20.7
Other non-G10 Group 2	38.2	11.4	-1.0	19.5

Due to a different sample of banks for the various approaches, the incentive structure should be evaluated only according to Table 7. Moreover, the figures do not take account of the transitional floors set by the Committee.

For Group 1 banks in **G10 countries**, minimum required capital under the most likely approach would decrease by 6.8%. Among the two IRB approaches, the advanced approach shows more reduction in minimum required capital (-7.1%) than the foundation approach (-1.3%). Minimum required capital under the standardised approach would increase by 1.7%, however, very few G10 Group 1 banks are expected to adopt this approach. For G10 Group 2 banks, the reduction in minimum required capital is bigger. Minimum required capital under the most likely approach would decrease by 11.3%, while reductions under the standardised, the foundation IRB and the advanced IRB approaches are 1.3%, 12.3% and

26.7% respectively. Some of the main factors which were pointed out by G10 countries as reasons for the reduction in minimum required capital are a favourable macroeconomic environment in which banks operate and the contribution of the mortgage portfolio.

The results for **CEBS countries** are similar to the G10 results. CEBS Group 1 banks show an average decrease in minimum required capital of 0.9%, 3.2% and 8.3% for the standardised, foundation and advanced IRB approaches respectively. CEBS Group 2 banks show decreases of 3.0%, 16.6% and 26.6%. Focussing on the most likely approach, the results show an average decrease of 7.7% for CEBS Group 1 banks and of 15.4% for CEBS Group 2 banks.

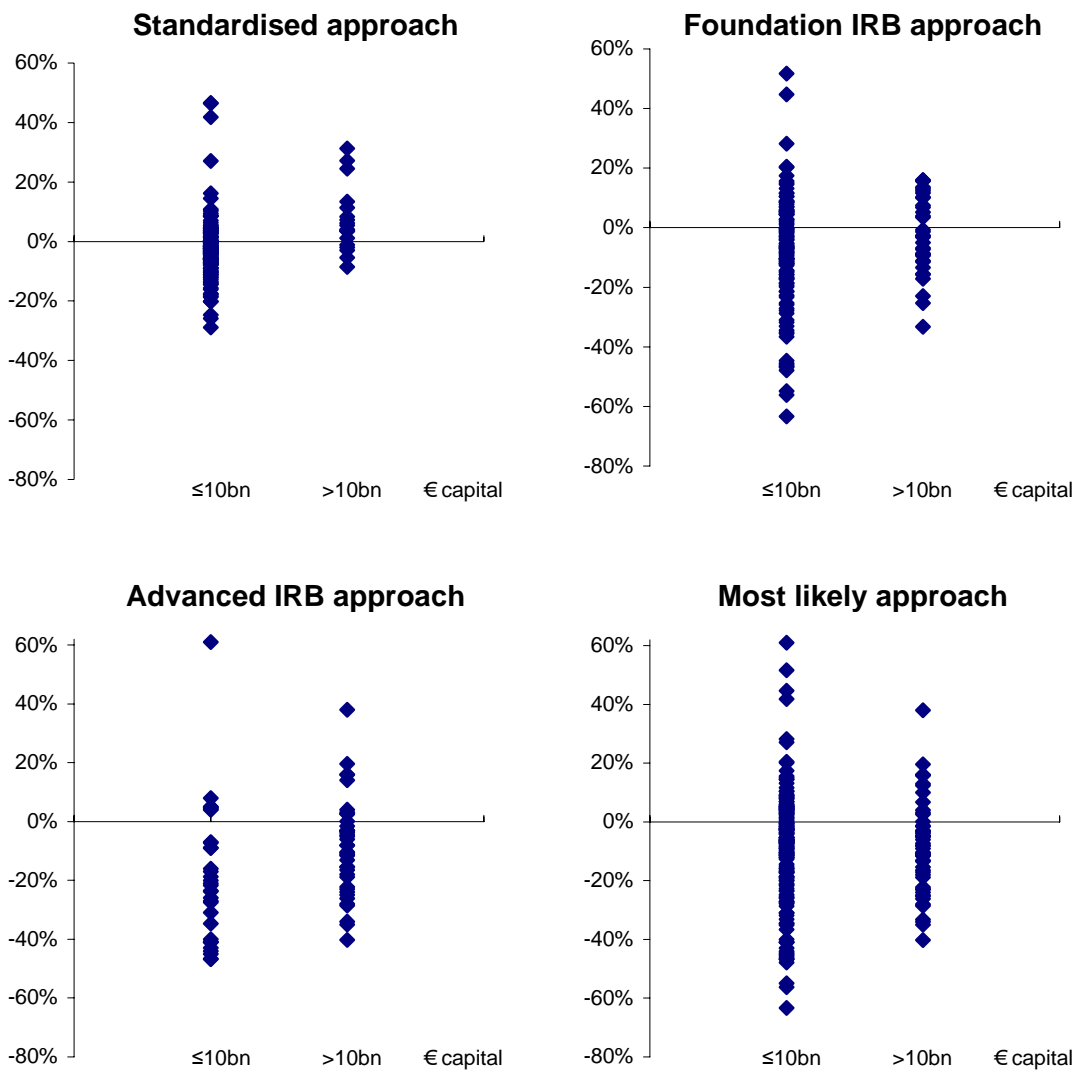
The average results for the Group 1 banks in **other non-G10 countries** show a decrease by 16.2% and 29.0% under the foundation and advanced IRB approaches respectively. Under the standardised approach there is an increase of 1.8%, and under the most likely approach a decrease of 20.7%. Group 2 banks show an increase of 38.2% under the standardised approach, an increase of 11.4% under the foundation IRB approach and a slight decrease of 1.0% under the advanced IRB approach. Under the most likely approach, other non-G10 Group 2 banks expect an increase in minimum required capital of 19.5%.

There is some dispersion in the change in minimum required capital relative to the current Accord among participating banks. The dispersion within **G10** (see Charts 1) and **CEBS** countries seems to be caused by a combination of differences in portfolio characteristics and disparity and uncertainties in estimation methodologies.

The **other non-G10** results show substantial dispersion both within and between countries (see Charts 2), mostly due to the specialised risk profile of some participating banks and country-specific circumstances that are reflected in national implementation. The results are therefore not representative for all non-G10 countries. Capital ratios are on average higher than in the G10 countries; they suggest that judgement by bank management, market pressures or Pillar 2-type supervisory discretions may be acting to maintain higher levels of capital than are explicitly required under the current Accord. These elements will likely continue to have significant impact for these countries under the Basel II Framework. Although data quality is an issue for some banks, the results appear to be broadly in line with results for G10 banks to the extent that the risk profiles are similar.

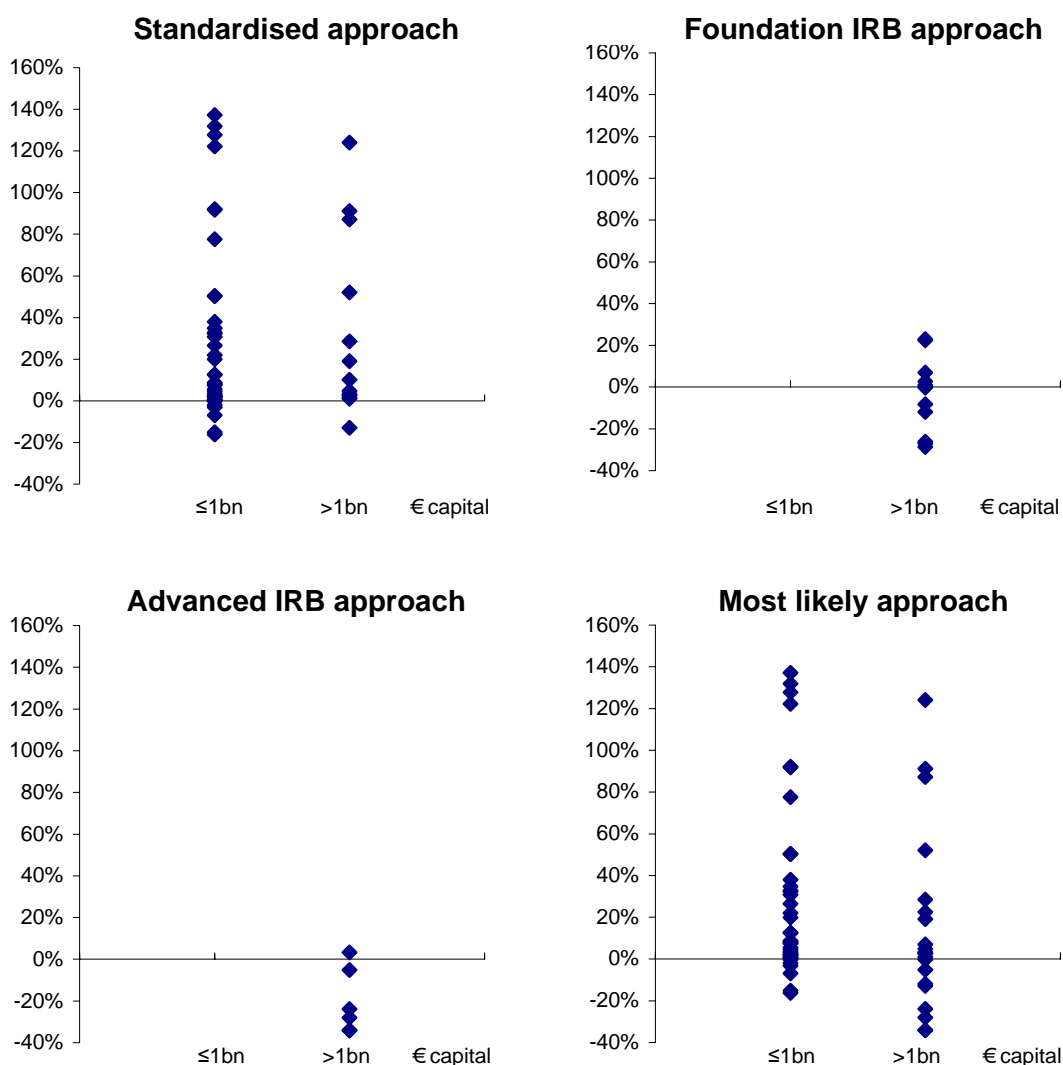
### Charts 1

## Change in banks' total minimum required capital versus current Accord, G10 banks by size



## Charts 2

### Change in banks' total minimum required capital versus current Accord, other non-G10 banks by size



### **Minimum required Tier 1 capital**

Table 6 reports the impact of Basel II on minimum required Tier 1 capital. The change in minimum required Tier 1 capital is slightly different from the change in total minimum required capital since there are several items which have an impact on only one of the two capital figures (eg certain deductions from Tier 1 capital only, and a negative regulatory calculation difference being only eligible for inclusion in Tier 2 capital).

For G10 Group 1 banks, minimum required Tier 1 capital under the most likely approach would decrease by 10.6%. Between the two IRB approaches, the advanced approach shows more reduction in minimum required Tier 1 capital (-11.0%) than the foundation approach (-4.0%). Minimum required Tier 1 capital under the standardised approach would increase by 1.8%. As for total minimum required capital, the reduction in minimum required Tier 1 capital is greater for Group 2 banks. Minimum required Tier 1 capital under the most likely approach would decrease by 12.9%, while reductions under the standardised, the foundation IRB and the advanced IRB approaches are 1.2%, 14.0% and 26.2% respectively.

Table 6

**Overall results**  
**Average change in minimum required Tier 1 capital**  
**relative to current Accord, in per cent**

	Standardised approach	FIRB approach	AIRB approach	Most likely approach
G10 Group 1	1.8	-4.0	-11.0	-10.6
G10 Group 2	-1.2	-14.0	-26.2	-12.9
CEBS Group 1	-0.5	-4.7	-9.5	-8.9
CEBS Group 2	-2.6	-16.4	-26.1	-15.1
Other non-G10 Group 1	1.5	-17.9	-27.7	-21.0
Other non-G10 Group 2	34.5	11.0	-1.1	17.9

Due to a different sample of banks for the various approaches, the incentive structure should be evaluated only according to Table 7. Moreover, the figures do not take account of the transitional floors set by the Committee.

## 2.2 Incentive structure

In order to analyse the incentives for banks to move to the more advanced approaches, the following analysis includes only those banks which provided data for at least two approaches.<sup>13</sup> On the aggregated level and in general also on the level of individual countries, for both Group 1 and Group 2 banks within and outside the G10, there is an incentive to move to the more advanced approaches (see Table 7). The capital requirements for the foundation IRB approach are lower than those for the standardised approach for 65% of the G10 banks in the sample, and the capital requirements for the advanced IRB approach are lower than those for the foundation IRB approach for 79% of the G10 banks in the sample.

<sup>13</sup> 39 out of 82 Group 1 banks and 98 out of 146 Group 2 banks in G10 countries provided data for more than one approach. In the CEBS countries, 38 out of 50 Group 1 and 81 out of 205 Group 2 banks provided data for more than one approach. The same holds true for all six Group 1 banks in other non-G10 countries, but only three out of 54 Group 2 banks. Not all national supervisors had asked banks to provide data for approaches which are not most likely.

Table 7

**Incentive structure**  
**Minimum required capital for foundation IRB relative to standardised, and minimum required capital for advanced IRB relative to foundation IRB, in per cent**

	Foundation IRB/standardised	Advanced IRB/foundation IRB
G10 Group 1	-13.3	-5.1
G10 Group 2	-8.1	-6.6
CEBS Group 1	-13.5	-6.8
CEBS Group 2	-12.4	-6.7
Other non-G10 Group 1	-20.6	-7.3
Other non-G10 Group 2	-19.9	-11.0

For "Foundation IRB/standardised" columns, only those banks which provided data for both the standardised and the foundation IRB approaches are included. For "Advanced IRB/foundation IRB" columns, only those banks which provided data for both the foundation and the advanced IRB approaches are included. The figures do not take account of the transitional floors set by the Committee.

### 2.3 Calibration

In 2004, the Committee introduced the scaling factor of 1.06 on IRB credit risk-weighted assets in particular in order to offset the decrease in minimum required capital which resulted from the changes in the Framework between the third Consultative Paper and the final text, primarily the UL-only calibration and the EL-provisions calculation instead of the recognition of provisions in Tier 2 capital. The size of the scaling factor, 1.06, is based on the analysis of QIS 3 results, adjusted for the above-mentioned changes.

It is important to note that macroeconomic conditions prevailing in most countries at the time of QIS 4 and 5 were more benign than during QIS 3. The Committee concluded in May 2006 that this influenced the results, but currently available information does not allow the impact to be quantified with precision. Also taking into account the remaining uncertainties in the data, the Committee agreed that no adjustment of the scaling factor of 1.06 to credit risk-weighted assets under the IRB approaches would be warranted at this stage. The Committee expects that in the course of implementing the Basel II Framework, supervisors will ensure that banks will maintain a solid capital base throughout the economic cycle. The Committee believes that mechanisms are in place to achieve this goal. National authorities will continue to monitor capital requirements during the implementation period of the Basel II Framework. Moreover, the Committee will monitor national experiences with the Basel II Framework.

### 3. Standardised approach

#### 3.1 Overview of portfolio results

Table 8 provides the average results for the standardised approach on a portfolio basis for Group 1 and Group 2 banks in **G10 countries**. For both groups, retail portfolios drive the reduction in minimum required capital (relative to the current Accord), while operational risk is the main driver for increasing minimum required capital. Other portfolios' contributions are much lower.

The retail residential mortgage portfolio contributes the most to the reduction in minimum required capital (-6.3% for Group 1 and -6.2% for Group 2). The remaining retail portfolios also show a negative contribution. Their magnitude is much larger for Group 2 banks, whose asset structure is more oriented towards retail activity. Other retail, small and medium enterprises treated as retail (SME retail) and qualified revolving retail exposures contribute for Group 2 banks for -2.5%, -1.2% and -0.3%, respectively (-0.7%, -0.4% and -0.1% for Group 1 banks).

In general, the corporate and SME corporate portfolios contribute less to the change in minimum required capital. However, the limited reduction in minimum required capital may be due to the incomplete coverage of corporate counterparties with external ratings in some countries, therefore assigning them a 100% risk weight as in the current regime.

With regard to the equity exposures, both the percentage change and the relative contribution are in general relatively small, which is not surprising given the 100% risk weight both in the standardised approach and in the current Accord. For some countries, the related entities portfolio is one of the drivers for increasing minimum required capital, mainly due to the deduction of insurance entities (as opposed to the 100% risk-weighting treatment in the current Accord).

Operational risk, of course, produces a positive contribution. It is the biggest positive contributor to the increase in minimum required capital (5.6% for Group 1 banks and 8.3% for Group 2 banks). A detailed analysis of operational risk is provided in Section 6.

The results for the **CEBS group** are similar. As shown in Table 9, the main contributor to the overall results is the mortgage portfolio (-7.8% contribution to minimum required capital change for Group 1, -7.2% for Group 2). The remaining retail portfolios also show a negative contribution with a higher magnitude for Group 2 banks. The SME corporate portfolio for Group 2 banks shows a slight increase in minimum required capital, whereas the SME corporate portfolio for Group 1 banks as well as the corporate portfolio for both groups on average show a slight decrease.

The results for **other non-G10 countries** Group 1 banks are also broadly similar. As shown in Table 10, the main contributor to the overall results is the mortgage portfolio (-4.1%). For Group 2 banks, the sovereign portfolio and related entities are the main drivers for the increase in minimum required capital. Some of the Group 2 banks have substantial sovereign exposures on account of country-specific circumstances. The results for the related entities portfolio are driven by the bank-specific circumstances of some of the Group 2 banks. Operational risk makes positive contributions to the minimum required capital (3.5% for Group 1 and 13.0% for Group 2).

Table 8

**Overall results standardised approach relative to current Accord,  
G10 average by portfolio in per cent**

Portfolio	Group 1			Group 2		
	Size	Change in MRC	Contrib.	Size	Change in MRC	Contrib.
Wholesale; of which:	32.2	7.9	2.5	21.8	-4.1	-0.9
– Corporate	26.9	3.2	0.9	16.1	-6.5	-1.0
– Bank	4.9	30.0	1.5	5.1	4.3	0.2
– Sovereign	0.4	55.5*	0.2	0.5	-14.8	-0.1
SME corporate	8.6	-2.5	-0.2	16.4	-0.5	-0.1
Specialised lending	4.6	-5.5	-0.3	1.5	7.2	0.1
Retail; of which:	26.5	-26.9	-7.1	36.0	-25.0	-9.0
– Mortgage	22.3	-28.3	-6.3	22.1	-28.2	-6.2
– Revolving	0.6	-20.5	-0.1	1.2	-22.3	-0.3
– Other	3.7	-19.7	-0.7	12.8	-19.8	-2.5
SME retail	1.8	-23.4	-0.4	5.8	-20.0	-1.2
Equity	3.2	5.3	0.2	3.2	-0.9	0.0
Purch. receivables	0.3	-6.2	0.0	0.3	-3.4	0.0
Other assets	3.3	0.0	0.0	3.3	0.0	0.0
Securitisation	3.0	7.4	0.2	1.7	30.6	0.5
Counterparty risk	1.2	35.1	0.4	0.1	42.4	0.1
Specific risk	1.3	5.4	0.1	0.3	1.7	0.0
Market risk	1.6	0.6	0.0	1.2	0.0	0.0
Related entities	4.7	16.7	0.8	1.7	41.2	0.7
Other deductions	3.5	0.0	0.0	2.3	0.6	0.0
Partial use**, others	3.9	-1.1	0.0	4.2	1.3	0.1
Operational risk			5.6			8.3
<b>Total</b>	<b>100.0</b>		<b>1.7</b>	<b>100.0</b>		<b>-1.3</b>

\* The large percentage change in capital for the sovereign portfolio arises because a significant part of the sovereign exposures are allocated a 0% risk weight under the current Accord. Applying any risk weight under the new approaches gives an infinite percentage increase in capital requirement for those banks with only such exposures, even if in absolute terms the change in capital requirements is small. – \*\* This row includes standardised approach capital requirements for exposures subject to partial use under the IRB approaches for banks also providing data for at least one IRB approach.

Table 9

**Overall results standardised approach relative to current Accord,  
CEBS average by portfolio in per cent**

Portfolio	Group 1			Group 2		
	Size	Change in MRC	Contrib.	Size	Change in MRC	Contrib.
Wholesale; of which:	24.1	7.6	1.9	16.3		-1.2
– Corporate	17.7	-1.9	-0.3	10.1	-6.1	-0.6
– Bank	6.0	29.0	1.8	6.0	-11.1	-0.7
– Sovereign*	0.4	97.6	0.4	0.2	27.2	0.1
SME corporate	8.3	-5.1	-0.4	13.0	1.5	0.2
Specialised lending	5.4	-6.4	-0.4	1.7	-0.6	0.0
Retail; of which:	32.9	-27.4	-9.0	41.2	-25.1	-10.6
– Mortgage	27.7	-28.2	-7.8	24.5	-28.5	-7.2
– Revolving	0.7	-22.9	-0.2	1.4	-22.3	-0.3
– Other	4.4	-23.6	-1.0	15.3	-20.0	-3.1
SME retail	2.7	-22.2	-0.9	8.1	-20.6	-1.7
Equity	1.2	18.3	0.2	1.8	1.8	0.0
Purch. receivables	0.1	-19.3	-0.1	0.2	-0.7	0.0
Other assets	3.0	0.0	0.0	3.3	0.0	0.0
Securitisation	2.6	12.9	0.4	1.2	5.0	0.1
Counterparty risk	1.6	34.4	0.9	0.1	46.6	0.1
Specific risk	1.3	6.5	0.1	0.4	2.6	0.0
Market risk	2.1	0.9	0.0	1.7	0.0	0.0
Related entities	5.7	19.9	2.0	2.3	37.2	0.9
Other deductions	5.0	-0.5	0.0	3.2	-1.2	0.0
Partial use**, others	4.2	-3.2	-0.2	5.4	1.2	0.1
Operational risk			5.5			9.0
<b>Total</b>	<b>100.0</b>		<b>-0.9</b>	<b>100.0</b>		<b>-3.0</b>

\* The large percentage change in capital for the sovereign portfolio arises because a significant part of the sovereign exposures are allocated a 0% risk weight under the current Accord. Applying any risk weight under the new approaches gives an infinite percentage increase in capital requirement for those banks with only such exposures, even if in absolute terms the change in capital requirements is small. – \*\* This row includes standardised approach capital requirements for exposures subject to partial use under the IRB approaches for banks also providing data for at least one IRB approach.

Table 10

**Overall results standardised approach relative to current Accord,  
other non-G10 average by portfolio in per cent**

Portfolio	Group 1			Group 2		
	Size	Change in MRC	Contrib.	Size	Change in MRC	Contrib.
Wholesale; of which:	22.1	7.7	1.7	40.8	40.2	16.4
– Corporate	20.1	2.1	0.4	34.8	-0.5	-0.2
– Bank	1.9	64.2	1.2	5.1	45.5	2.3
– Sovereign*	0.1	80.5	0.1	0.9	1643.2	14.3
SME corporate	9.9	0.5	0.0	6.5	-1.2	-0.1
Specialised lending	1.7	-2.5	0.0	0.2	79.6	0.1
Retail; of which:	17.1	-24.1	-4.1	21.7	-14.9	-3.2
– Mortgage	14.1	-28.9	-4.1	3.6	-3.3	-0.1
– Revolving	1.3	-3.1	0.0	2.3	-24.5	-0.6
– Other	1.7	-1.0	0.0	15.7	-16.3	-2.5
SME retail	0.0	72.8	0.0	3.7	-21.8	-0.8
Equity	0.1	-1.5	0.0	2.2	-1.1	0.0
Purch. receivables	0.0	0.0	0.0	0.6	9.4	0.1
Other assets	2.0	0.0	0.0	8.1	0.0	0.0
Securitisation	0.3	102.4	0.3	0.8	-18.2	-0.1
Counterparty risk	1.3	66.8	0.9	0.0	1739.2	0.6
Specific risk	0.9	12.4	0.1	1.6	306.1	5.0
Market risk	1.8	0.0	0.0	6.3	22.1	1.4
Related entities	7.5	0.0	0.0	5.2	124.1	6.4
Other deductions	32.5	0.0	0.0	2.6	-24.9	-0.6
Partial use**, others	2.7	-19.7	-0.5	0.0	0.0	0.0
Operational risk			3.5			13.0
<b>Total</b>	<b>100.0</b>		<b>1.8</b>	<b>100.0</b>		<b>38.2</b>

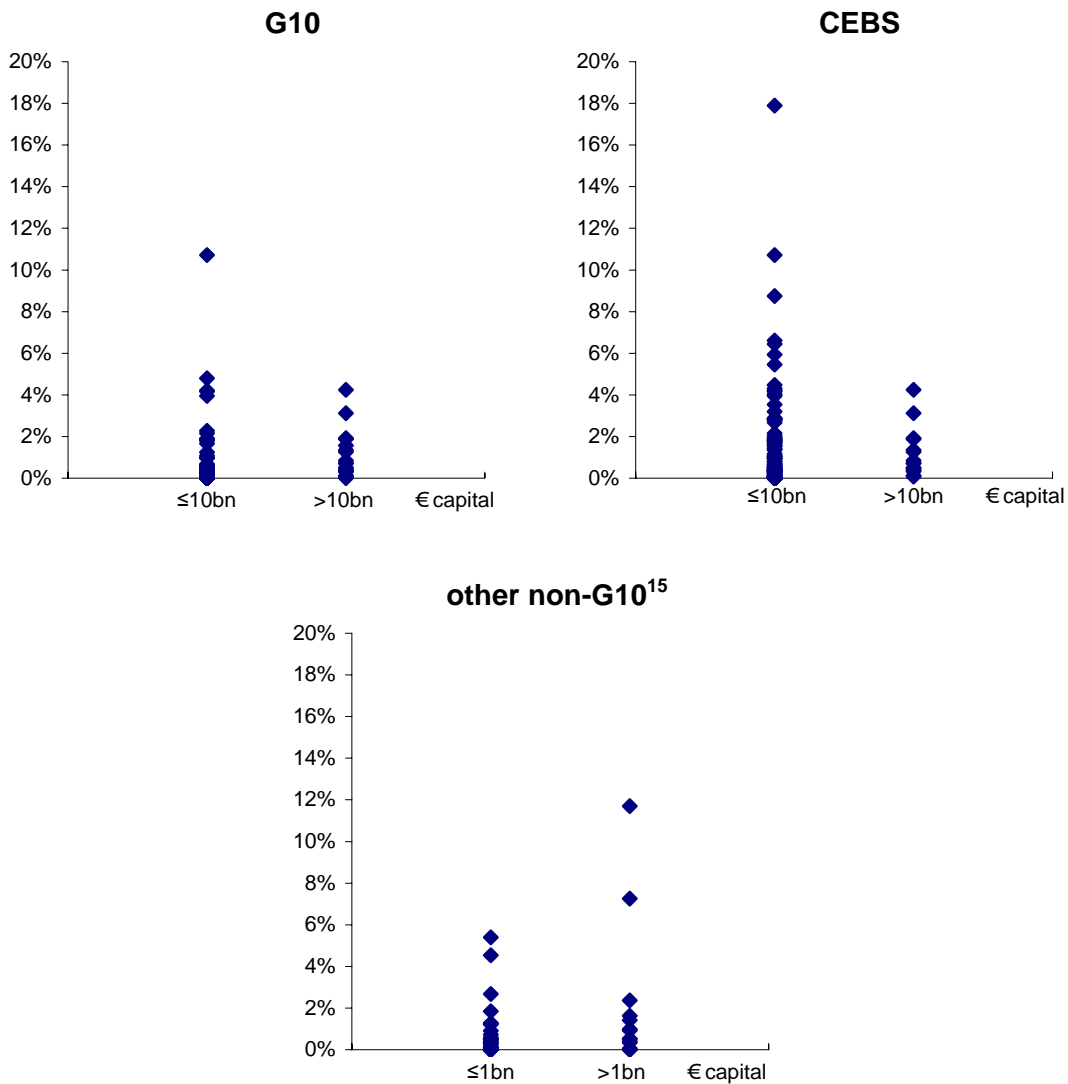
\* The large percentage change in capital for the sovereign portfolio arises because a significant part of the sovereign exposures are allocated a 0% risk weight under the current Accord. Applying any risk weight under the new approaches gives an infinite percentage increase in capital requirement for those banks with only such exposures, even if in absolute terms the change in capital requirements is small. – \*\* This row includes standardised approach capital requirements for exposures subject to partial use under the IRB approaches for banks also providing data for at least one IRB approach.

### 3.2 Asset quality distribution<sup>14</sup>

The following scattergrams show the percentage of exposures past-due for the G10, CEBS and other non-G10 banks that provided data for the standardised approach. The majority of G10 banks have less than 2% of exposure in default. Reflecting the general improvement in macroeconomic conditions and the credit cycle, these figures represent significant reductions in capital requirements compared to QIS 3. The figures for non-G10 banks are similar.

Charts 3

#### Percentage of exposure past-due, all banks by size



<sup>14</sup> The analysis in this section only includes banks which participated in QIS 5.

<sup>15</sup> This chart excludes one bank with a particularly high portion of exposures past-due.

## 4. IRB approaches

### 4.1 Overview of portfolio results

Table 11 presents the contribution of portfolios to the changes in minimum required capital for banks in **G10 countries** under the most likely IRB approach. Minimum required capital for G10 Group 1 banks declined by 4.5%, while G10 Group 2 banks show a decline in minimum required capital of 14.1%.<sup>16</sup> Group 1 banks in the G10 countries are by definition diversified and internationally active banks and therefore involved in wholesale activities, while the Group 2 banks are typically more focused on retail business, which explains the larger decline in minimum required capital for the Group 2 banks.

As noted in the standardised section, the largest capital driver for both groups is residential mortgages (7.6% decrease for Group 1 banks). For G10 Group 1 banks, the other main drivers are corporate portfolios (5.0% decrease) and operational risk (6.1% increase). G10 Group 2 banks have larger shares of mortgage lending, thus their contribution of residential mortgages to the overall change is larger at -12.6%. Other contributing factors for G10 Group 2 banks include operational risk (7.5% increase), other retail (4.5% decrease), and SME retail (3.3% decrease). Both the corporate and SME corporate portfolios show decreases in minimum required capital.

Sovereign portfolios show a rather large percentage change in minimum required capital due to the change from the current accord treatment of a 0% risk weight, however the relatively small size of this portfolio mitigates the impact on banks' overall results. In general, the estimated PDs seem to be rather conservative which might be due to remaining methodological uncertainties. In some cases increasing capital requirements for sovereign and bank exposures were not observed directly but shown in the partial use portfolio as banks in some jurisdictions were allowed to report the exposures eligible for partial use separately.

Retail portfolios in general show declines in minimum required capital. However, there is significant difference across countries for qualifying revolving exposures. While this portfolio has a negative contribution in most countries under the foundation and advanced IRB approaches, there is a positive contribution in some other countries.

Relative to the neutral impact under the standardised approach, the equity portfolio has contributed as a factor to increase the minimum required capital by 2.6% (Group 1 banks) and 3.6% (Group 2 banks) under the most likely IRB approach. In QIS 5, data on the PD/LGD and market-based approaches for equities are relatively limited since most banks were permitted to use the treatment for immaterial exposures and/or grandfathering based on the national implementation in each jurisdiction.

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<sup>16</sup> These figures differ from the results presented previously since the Group 1 figures exclude the US data, and Group 2 results exclude those banks for which the standardised approach is the most likely approach.

Table 11

**Overall results most likely IRB approach relative to current Accord,  
G10 average by portfolio in per cent**

Portfolio	Group 1			Group 2		
	Size	Change in MRC	Contrib.	Size	Change in MRC	Contrib.
Wholesale; of which:	32.1	-10.3	-3.3	21.2	-18.2	-3.9
– Corporate	27.8	-18.0	-5.0	16.9	-26.8	-4.5
– Bank	3.8	10.1	0.4	4.0	2.4	0.1
– Sovereign*	0.5	239.5	1.3	0.4	139.6	0.6
SME corporate	6.9	-19.0	-1.3	15.1	-14.7	-2.2
Specialised lending	3.4	-11.6	-0.4	2.4	7.8	0.2
Retail; of which:	17.6	-46.3	-8.1	33.7	-51.3	-17.3
– Mortgage	11.8	-64.4	-7.6	21.6	-58.2	-12.6
– Revolving	1.5	23.0	0.3	1.1	-18.7	-0.2
– Other	4.3	-20.4	-0.9	11.0	-41.0	-4.5
SME retail	2.9	-48.7	-1.4	7.2	-45.7	-3.3
Equity	3.1	85.1	2.6	2.8	130.7	3.6
Purch. receivables	0.1	17.7	0.0	0.2	17.9	0.0
Other assets	3.6	0.0	0.0	3.0	0.0	0.0
Securitisation	2.8	0.5	0.0	1.7	-24.1	-0.4
Counterparty risk	1.9	14.8	0.4	0.3	25.5	0.1
Specific risk	1.4	4.1	0.1	0.9	-0.6	0.0
Market risk	2.5	-0.7	0.0	1.6	0.4	0.0
Related entities	6.8	8.1	0.6	3.0	44.2	1.3
Other deductions	12.1	-0.1	0.0	2.2	3.0	0.1
Partial use**, others	2.8	9.3	0.3	4.8	3.9	0.2
Operational risk			6.1			7.5
<b>Total</b>	<b>100.0</b>		<b>-4.5</b>	<b>100.0</b>		<b>-14.1</b>

These figures differ from the results presented previously for the most likely approach since the Group 1 figures exclude the US data, and Group 2 results exclude those banks for which the standardised approach is the most likely approach. – \* The large percentage change in capital for the sovereign portfolio arises because a significant part of the sovereign exposures are allocated a 0% risk weight under the current Accord. Applying any risk weight under the new approaches gives an infinite percentage increase in capital requirement for those banks with only such exposures, even if in absolute terms the change in capital requirements is small.

The results for **CEBS** countries as shown in Table 12 are similar to those observed in G10 countries.

Table 12

**Overall results most likely IRB approach relative to current Accord,  
CEBS average by portfolio in per cent**

Portfolio	Group 1			Group 2		
	Size	Change in MRC	Contrib.	Size	Change in MRC	Contrib.
Wholesale; of which:	28.2	-11.5	-3.2	17.1	-18.3	-3.1
– Corporate	23.3	-17.1	-4.0	12.7	-28.5	-3.6
– Bank	4.3	-4.5	-0.2	4.3	-0.1	0.0
– Sovereign*	0.5	178.4	0.9	0.1	391.0	0.5
SME corporate	7.2	-18.1	-1.3	12.7	-19.1	-2.4
Specialised lending	4.2	-16.9	-0.7	2.7	5.8	0.2
Retail; of which:	20.1	-44.1	-8.9	36.9	-54.3	-20.0
– Mortgage	13.8	-64.5	-8.9	23.4	-61.6	-14.4
– Revolving	1.6	48.8	0.8	1.3	-27.7	-0.4
– Other	4.8	-15.8	-0.8	12.1	-43.1	-5.2
SME retail	4.1	-49.5	-2.0	8.8	-45.7	-4.0
Equity	1.3	81.9	1.1	1.7	127.2	2.2
Purch. receivables	0.1	-39.5	0.0	0.1	-13.7	0.0
Other assets	2.8	0.0	0.0	2.8	0.0	0.0
Securitisation	2.0	8.6	0.2	1.3	-26.6	-0.4
Counterparty risk	2.3	9.1	0.2	0.3	14.4	0.0
Specific risk	1.5	5.1	0.1	1.1	-1.0	0.0
Market risk	2.9	-2.1	-0.1	1.9	0.4	0.0
Related entities	6.9	12.7	0.9	3.6	42.8	1.6
Other deductions	13.2	0.0	0.0	2.9	0.0	0.0
Partial use**, others	3.1	12.2	0.4	6.0	3.8	0.2
Operational risk			5.8			7.7
<b>Total</b>	<b>100.0</b>		<b>-7.5</b>	<b>100.0</b>		<b>-18.0</b>

These figures differ from the results presented previously for the most likely approach since they exclude those banks for which the standardised approach is the most likely approach. – \* The large percentage change in capital for the sovereign portfolio arises because a significant part of the sovereign exposures are allocated a 0% risk weight under the current Accord. Applying any risk weight under the new approaches gives an infinite percentage increase in capital requirement for those banks with only such exposures, even if in absolute terms the change in capital requirements is small.

For Group 1 banks in **other non-G10 countries** there is a 20.7% decline in minimum required capital in aggregate under the most likely IRB approach. The largest capital driver for other non-G10 banks is the residential mortgages portfolio which accounts for a decline in minimum required capital of around 13.7%. Similar to the G10 countries, the other main contributing portfolios are corporate (-4.3%) and SME corporate (-3.3%).

Operational risk partly offsets the large falls in credit risk capital requirements, contributing on average 4.5% for the other non-G10 Group 1 banks. As for the standardised approach, the sovereign portfolio shows a substantial percentage increase in capital requirements under

the most likely IRB approach, but the contribution is negligible owing to the small size of the portfolio for the IRB banks. Equity exposures are relatively insignificant for the other non-G10 countries, comprising less than 0.5% of minimum required capital reported under the current Accord. Most banks either reported zero exposures or excluded the portfolio from QIS 5 on the basis of immateriality. All national supervisors indicated that grandfathering of equity exposures will either not be available to banks under the Basel II Framework or has no impact.

Table 13

**Overall results most likely IRB approach relative to current Accord,  
other non-G10 average by portfolio in per cent**

Portfolio	Group 1			Group 2		
	Size	Change in MRC	Contrib.	Size	Change in MRC	Contrib.
Wholesale; of which:	18.2	-22.2	-4.0	27.9	-17.8	-4.9
– Corporate	15.9	-27.1	-4.3	22.8	-18.0	-4.1
– Bank	2.1	9.5	0.2	4.9	-19.1	-0.9
– Sovereign*	0.2	39.7	0.1	0.2	39.6	0.1
SME corporate	10.3	-32.6	-3.3	3.2	78.3	2.5
Specialised lending	3.1	-13.2	-0.4	0.3	87.8	0.3
Retail; of which:	20.3	-74.8	-15.2	20.5	31.8	6.5
– Mortgage	16.6	-82.5	-13.7	0.4	182.6	0.7
– Revolving	1.6	-36.3	-0.6	4.9	47.5	2.3
– Other	2.1	-43.7	-0.9	15.2	22.7	3.5
SME retail	1.6	-72.1	-1.1	0.3	25.6	0.1
Equity	0.2	66.0	0.1	0.1	62.4	0.1
Purch. receivables	0.0	0.0	0.0	1.6	150.1	2.4
Other assets	2.1	0.0	0.0	22.2	0.0	0.0
Securitisation	1.3	-35.0	-0.5	1.9	-59.8	-1.2
Counterparty risk	1.2	8.8	0.1	2.0	-49.5	-1.0
Specific risk	0.9	11.2	0.1	1.9	-25.6	-0.5
Market risk	1.8	0.1	0.0	12.0	-63.6	-7.6
Related entities	6.7	-0.3	0.0	3.0	64.6	1.9
Other deductions	28.7	-0.8	-0.2	3.1	0.0	0.0
Partial use**, others	3.7	-18.5	-0.7	0.0	0.0	0.0
Operational risk			4.5			6.8
<b>Total</b>	<b>100.0</b>		<b>-20.7</b>	<b>100.0</b>		<b>-5.4</b>

\* The large percentage change in capital for the sovereign portfolio arises because a significant part of the sovereign exposures are allocated a 0% risk weight under the current Accord. Applying any risk weight under the new approaches gives an infinite percentage increase in capital requirement for those banks with only such exposures, even if in absolute terms the change in capital requirements is small.

The Group 2 banks in other non-G10 countries show a different result for the retail portfolio, where they experience a positive contribution of 6.5%. This is due to the significantly higher average PDs and higher share of defaulted exposures in their portfolios, as shown below. Similar to the Group 1 banks, other non-G10 Group 2 banks show a decrease in the corporate portfolio (-4.1%) and a contribution of 6.8% from operational risk. Market risk makes a negative contribution of 7.6%. This is mainly due to some of the Group 2 banks moving from the standardised models to internal models for the calculation of the market risk requirements.

#### 4.2 PD averages and distribution<sup>17</sup>

Rating distributions for the wholesale portfolios are shown in the following tables. They show the percentage of exposures in four PD ranges which broadly reflect the rating grades of A and better, BBB, less than BBB, and defaulted exposures.

As for the overall average of G10 Group 1 banks in the corporate portfolio as shown in Table 14, 72.6% of exposure have a PD below 0.8%, which is assumed to be better than investment grade. In addition, the percentage of defaulted exposure is relatively small at 2.2%. Among G10 countries, almost all countries have achieved over 70% of exposures which are below a PD of 0.8% and 4% of defaulted exposure at most in the corporate portfolio of Group 1 banks. This is likely due to favourable macroeconomic conditions and a better credit environment in most countries.

Table 14

#### PD quality distributions corporate portfolio in per cent

PD bucket	Average	PD < 0.2%	0.2% ≤ PD < 0.8%	PD ≥ 0.8%	In default
G10 Group 1	0.99	40.9	31.7	25.2	2.2
G10 Group 2	0.89	42.0	31.5	23.4	3.0
CEBS Group 1	1.04	38.5	31.8	27.8	1.9
CEBS Group 2	0.83	41.9	32.6	23.0	2.5
Other non-G10 Group 1	0.85	44.8	30.1	23.6	1.3
Other non-G10 Group 2	1.47	32.5	42.0	23.5	2.0

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

<sup>17</sup> The analysis in this section only includes banks which participated in QIS 5.

Not surprisingly, Table 15 shows that around 80% of the bank exposures have a PD of less than 0.2%.

Table 15  
**PD quality distributions bank portfolio in per cent**

<b>PD bucket</b>	<b>Average</b>	<b>PD &lt; 0.2%</b>	<b>0.2% ≤ PD &lt; 0.8%</b>	<b>PD ≥ 0.8%</b>	<b>In default</b>
G10 Group 1	0.27	79.7	13.6	6.6	0.2
G10 Group 2	0.12	85.9	12.0	2.0	0.1
CEBS Group 1	0.22	86.2	9.1	4.5	0.2
CEBS Group 2	0.11	85.3	13.4	1.1	0.1
Other non-G10 Group 1	0.26	82.7	12.1	5.2	0.0
Other non-G10 Group 2	0.74	50.1	38.1	11.5	0.3

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

In the sovereign portfolio shown in Table 16, except for Group 1 banks in other non-G10 countries more than 90% of all exposures are assigned a PD of less than 0.2%.

Table 16  
**PD quality distributions sovereign portfolio in per cent**

<b>PD bucket</b>	<b>Average</b>	<b>PD &lt; 0.2%</b>	<b>0.2% ≤ PD &lt; 0.8%</b>	<b>PD ≥ 0.8%</b>	<b>In default</b>
G10 Group 1	0.12	93.8	3.1	3.0	0.1
G10 Group 2	0.03	98.3	0.8	0.5	0.4
CEBS Group 1	0.13	93.4	3.3	3.2	0.1
CEBS Group 2	0.04	98.1	1.0	0.6	0.4
Other non-G10 Group 1	0.14	86.4	9.0	4.4	0.2
Other non-G10 Group 2	0.24	97.7	0.5	1.6	0.2

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

Table 17 shows the quality distribution of the SME corporate portfolio. These exposures show on average relatively higher PDs than larger corporates, with less than 50% of all exposures having a PD of less than 0.8%.

Table 17

**PD quality distributions SME corporate portfolio in per cent**

PD bucket	Average	PD < 0.2%	0.2% ≤ PD < 0.8%	PD ≥ 0.8%	In default
G10 Group 1	2.10	13.8	33.7	47.5	5.0
G10 Group 2	2.19	16.1	27.0	48.1	8.8
CEBS Group 1	2.20	14.1	31.5	50.2	4.3
CEBS Group 2	2.16	16.8	27.7	47.8	7.7
Other non-G10 Group 1	1.61	12.6	29.9	55.8	1.8
Other non-G10 Group 2	4.31	9.8	30.2	58.4	1.6

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

The following tables show the average retail PDs together with the percentage of defaulted exposure in each retail portfolio. Except for Group 2 banks in other non-G10 countries, the average PD of mortgages (Table 18) is relatively smaller than in the other retail portfolios.

Table 18

**PDs for the retail mortgage portfolio in per cent**

	average PD	In default
G10 Group 1	1.17	1.5
G10 Group 2	1.21	1.2
CEBS Group 1	1.52	1.9
CEBS Group 2	1.39	1.3
Other non-G10 Group 1	0.97	0.8
Other non-G10 Group 2	17.72	8.3

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

Table 19

**PDs for the retail QRE portfolio in per cent**

	average PD	In default
G10 Group 1	2.95	3.1
G10 Group 2	2.23	2.9
CEBS Group 1	3.69	4.4
CEBS Group 2	2.33	3.3
Other non-G10 Group 1	2.58	1.4
Other non-G10 Group 2	11.34	7.1

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

Table 20

**PDs for the other retail portfolio in per cent**

	<b>average PD</b>	<b>In default</b>
G10 Group 1	3.45	4.9
G10 Group 2	2.09	4.9
CEBS Group 1	4.33	5.7
CEBS Group 2	2.32	5.1
Other non-G10 Group 1	2.77	2.0
Other non-G10 Group 2	11.86	6.0

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

Table 21

**PDs for the SME retail portfolio in per cent**

	<b>average PD</b>	<b>In default</b>
G10 Group 1	2.99	4.8
G10 Group 2	3.68	5.1
CEBS Group 1	3.26	5.0
CEBS Group 2	3.66	5.2
Other non-G10 Group 1	1.52	0.8
Other non-G10 Group 2	6.22	6.8

The analysis in this table only includes banks which participated in QIS 5. The average PD is for non-defaulted exposures.

Additional information is contained in Section 1 of Annex B.

**4.3 Collateralisation<sup>18</sup>**

Table 22 shows the exposures secured by collateral. The analysis was carried out on the basis of data for the foundation IRB approach because no separation was possible under the advanced IRB approach. Over 88% of corporate exposures for Group 1 banks are on average reported as unsecured, which may in part be due to limited reporting of credit risk mitigation in the QIS 5 data collection exercise. The same holds true for Group 2 banks where commercial mortgages are likely to represent a big share of the corporate portfolio.

Both for G10 Group 1 and Group 2 banks more than 97% of sovereign exposures are unsecured, but given the relatively small size of this portfolio and the high quality of these exposures (over 93% and 98% of these exposures with a PD less than 0.20% for Group 1

<sup>18</sup> The analysis in this section only includes banks which participated in QIS 5.

and Group 2 banks, respectively) the contribution to the overall change in minimum required capital is small.

Similar arguments apply to the bank portfolio where only 11.8% of G10 Group 1 banks' exposures are secured<sup>19</sup> (9.3% for Group 2 banks). Around 80% and 86% of these exposures have a PD lower than 0.20% for Group 1 and Group 2 banks, respectively.

Banks in the other non-G10 countries show a significantly lower percentage of secured exposures in the bank portfolio (1.9% for Group 1 and 0.9% for Group 2), while as much as 16.1% of Group 1 and even 44.3% of Group 2 sovereign exposures are secured by collateral.

Table 22

**Exposures secured by collateral in per cent, foundation IRB approach**

	<b>Corporate</b>	<b>Bank</b>	<b>Sovereign</b>	<b>SME Corporate</b>
G10 Group 1	12.8	11.8	1.0	27.7
G10 Group 2	11.5	9.3	2.9	22.1
CEBS Group 1	14.7	15.7	1.9	29.4
CEBS Group 2	11.6	11.6	3.7	19.0
Other non-G10 Group 1	9.5	1.9	16.1	25.2
Other non-G10 Group 2	8.4	0.9	44.3	21.0

The analysis in this table only includes banks which participated in QIS 5. Repo-style transactions where banks adjusted the EAD amount are treated as unsecured in this analysis.

#### **4.4 LGDs under the IRB approaches<sup>20</sup>**

Methodologies and systems for LGD calculations are still under development. This is reflected in the variety of approaches adopted for the purposes of QIS 5 and may explain most of the dispersion observed in the results.

Few banks across the **G10 and CEBS** samples have already fully incorporated economic downturn considerations in their estimates of LGDs by the time the data collection exercise for QIS 5 was conducted. It appears that, as a tendency, the impact of downturn has been underestimated in many cases. Difficulties in the assessment of downturn effects have been encountered across portfolios, mostly due to the lack of downturn history. In most countries banks reported that they attempted to make conservative adjustments to account for limitations in the estimations and/or lack of data.

Among the **other non-G10 countries**, national supervisors reported limited compliance with downturn LGD requirements. Furthermore, the application of the definition of default also seems to be an area that will require further work in some other non-G10 countries.

Given the small number of Group 2 banks and banks in other non-G10 countries providing data for the advanced IRB approach, these banks are only included with their retail portfolios.

<sup>19</sup> Repo-style transactions where banks adjusted the EAD amount are treated as unsecured in this analysis.

<sup>20</sup> The analysis in this section only includes banks which participated in QIS 5.

Table 23 shows banks' average LGD estimates for non-defaulted exposure in the IRB retail and advanced IRB portfolios. Additional information – especially on the variation of the bank-internal estimates of the LGDs and the distribution of LGD estimates – is included in Section 2 of Annex B.

Table 23  
**LGD averages for different portfolios in per cent**

	IRB Retail				AIRB			
	RM	QRE	Other	SME	Wholesale			SME Corp.
					Corp.	Bank	Sov.	
G10 Group 1 (excl US)					39.8	40.9	33.3	35.0
G10 Group 1 (incl US)	20.3	71.6	48.0	46.2				
G10 Group 2	26.2	57.5	43.0	31.1				
CEBS Group 1	16.1	55.0	47.9	38.8	38.1	37.7	27.7	35.1
CEBS Group 2	21.4	51.9	42.2	31.7	35.2	39.4	38.2	26.7
Other non-G10 Group 1	11.0	67.2	48.3	28.4				
Other non-G10 Group 2	40.4	55.7	45.1	49.6				

This table includes banks which participated in QIS 5, as well as additional data for the US. The figures take account of the 10% LGD floor applicable for exposures in the retail residential mortgage portfolio and include only non-defaulted exposure.

#### *Retail residential mortgage (RM)*

For G10 Group 1 banks, the weighted average of the retail residential mortgage portfolio LGD across the whole sample is equal to 20.3%, with individual banks' LGDs ranging between 10.0% and 54.6%. For G10 Group 2 banks, both the weighted average LGD and the dispersion across countries are slightly higher (26.2% on average with values ranging between 10.0% and 68.2%). Whilst, some of this dispersion does actually reflect differences in individual firms' risk profile and workout practices (including differences in banks' average loan-to-value ratios), differences in assumptions made when estimating these factors, methodologies and system limitations have still played an important role. Furthermore, particularities of the different markets have also contributed to the differences to some extent; for example, residential mortgages are government-insured in some countries, resulting in particularly low LGDs.

#### *Qualifying revolving retail exposures (QRE)*

Qualifying revolving exposures include credit cards and overdrafts. Unlike mortgages, where around 95% of exposures are drawn, less than 30% of exposures are actually drawn. For G10 Group 1 banks the average LGD is equal to 71.6%. The LGD values for this portfolio are widely dispersed across firms and countries. Firms' values range from 29.8% to a conservative 100% reported by banks with a very small QRE portfolio. Similar results are reported for G10 Group 2 banks: the average LGD is estimated around 57.5% and firms' values vary between 17.6% and 100%.

#### *Other retail exposure*

The other retail portfolio consists of a mixture of secured and unsecured personal lending, although the proportion of unsecured lending seems predominant. This is reflected by the high average LGD for both G10 Group 1 and Group 2 banks (48.0% and 43.0%,

respectively) and by the wide dispersion of results across firms and countries. LGDs range between 15.2% and 80.6% for G10 Group 1 banks and from 8.7% to 79.4% for G10 Group 2 banks.

#### *SME retail exposure*

For G10 Group 1 banks, the weighted average LGD for the SME retail portfolio is equal to 46.2%, with individual banks' results highly dispersed and ranging between 15.8% and 83.4%. For G10 Group 2 banks, both the weighted average LGD (31.1%) and the dispersion are slightly lower than those for G10 Group 1 banks, with values ranging from 9.9% to 63.7%.

#### *Wholesale exposure*

The dispersion of LGDs for the wholesale portfolios for G10 Group 1 banks targeting the advanced IRB approach is on average slightly lower than that emerging from the analysis of retail portfolios. The highest dispersion across portfolios is shown by the sovereign portfolio with individual firms' values ranging from 1.9% to 65.6% with an average of 33.3%. The dispersion is partly attributable to characteristics of the underlying investments ranging from US government bills and bonds to emerging countries debt.

The bank portfolio presents the second highest dispersion across the wholesale portfolios with LGDs ranging from 10.8% to 67.6% (the average for G10 Group 1 is equal to 40.9%). Some dispersion is also displayed by the SME corporate portfolio where the average LGD for G10 Group 1 is equal to 35.0%, but values range from 16.3% to 54.5%. Finally, a lower level of dispersion is shown by the corporate portfolio: LGDs range between 29.1% and 56.3% (the average LGD is equal to 39.8%).

## **4.5 Regulatory calculation difference**

In the UL-based framework, a shortfall or excess in provisioning affects the numerator of the capital ratio, ie the eligible capital figure. As mentioned in Section 1.3, to ensure comparability of the results across approaches, the impact of the new rules is measured in terms of percentage changes in minimum required capital. Table 24 decomposes the percentage change in minimum required capital, isolating the contribution of the regulatory calculation difference from the impact of the other components, which takes into account the percentage change in risk-weighted assets, deductions, etc.

As explained in detail in the previous sections, the overall change in minimum required capital for G10 Group 1 banks under the foundation and advanced IRB approaches is equal to -1.3% and -7.1% respectively. For advanced IRB banks, the regulatory calculation difference has on average no impact on minimum required capital. Under the foundation IRB approach the contribution of the regulatory calculation difference to the overall change in minimum required capital is 1.5%, whereas, the impact of the other components is negative and equal to -2.8%. The size of the regulatory calculation difference varies considerably across firms, reflecting differences in national regulation and firms' provisioning policies.

For G10 Group 2 banks, the impact of the regulatory calculation difference to the overall change in minimum required capital is 2.1% and 1.1% under the foundation and advanced IRB approaches, respectively.

For the other non-G10 banks, with the exception of an outlier bank the contribution of the regulatory calculation difference lies mostly within  $\pm 4\%$ , suggesting that banks' provisioning

practices are broadly in line with the expected losses calculated under the Basel II Framework.

Table 24

**Impact of regulatory calculation difference on minimum required capital in per cent**

Country	Foundation IRB			Advanced IRB		
	Change in MRC (1)	RCD impact on MRC (2)	Other impact on MRC (3)=(1)-(2)	Change in MRC (4)	RCD impact on MRC (5)	Other impact on MRC (6)=(4)-(5)
G10 Group 1	-1.3	1.5	-2.8	-7.1	0.0	-7.1
G10 Group 2	-12.3	2.1	-14.4	-26.7	1.1	-27.8
CEBS Group 1	-3.2	2.8	-6.0	-8.3	2.4	-10.7
CEBS Group 2	-16.6	1.6	-18.2	-26.6	1.1	-27.7
Other non-G10 Group 1	-16.2	-0.7	-15.5	-29.0	-1.8	-27.2
Other non-G10 Group 2	11.4	6.9	4.5	-1.0	9.9	-10.9

## 5. Securitisation

Due to the complexity of the securitisation products and the rapid changes in the strategies of the institutions the data quality in this portfolio was not equally good for all banks participating in the QIS 5 exercise. However in comparison to previous studies banks made significant progress with respect to the coverage of the transactions and the reliability of reported data. Even if a certain trend is observable some countries seem to depart from it. This effect could be traced back to differences in the banks' strategies but also to different current regulations. Therefore it has to be kept in mind that the results only show an average and results on a single-country basis could divert significantly.

The incentive structure for banks appears to work properly, with the overall increase in minimum required capital being much more important for banks using the standardised approach than for the ones using the IRB approach (+7.7% for G10 Group 1 and +10.2% for G10 Group 2 banks under the standardised approach, and +0.5% for G10 Group 1 banks and -17.3% for G10 Group 2 banks under the IRB approach).

The study also shows that the change in minimum required capital relative to the current Accord for Group 1 banks was different compared to the impact on Group 2 banks. An important driver of the increase of capital charges between the current regime and both approaches is the future treatment of liquidity facilities. Liquidity facilities, which represent an important part of Group 1 banks' positions currently usually have a 0% risk weight (as a commitment with an original maturity of less than one year). This current practice does not adequately reflect the economic risk the provider of such a facility is bearing. Therefore the risk-insensitive current practice will be replaced by a more appropriate treatment – with the result of an overall capital increase under both the standardised and the IRB approaches.

The decline or lower increase of the capital requirements under the IRB approach compared to the standardised approach can mainly be attributed to the introduction of the internal assessment approach (IAA), which is mainly used in the context of the above-mentioned liquidity facilities. Under the standardised approach results are much more conservative, particularly if the facilities did not qualify as eligible ones. Even if this is still a new approach

in the early stage of development and banks have faced some difficulties in applying it properly and comprehensively, the scope of application and the quality of the results increased in comparison to earlier studies.

However, even if the overall result for Group 1 banks shows an increase for the standardised and the IRB approaches there are also some countries experiencing a significant reduction. The average change in minimum required capital from the securitisation portfolio for G10 Group 1 banks varies between -42% and +60% for the IRB approach. This seems to be the result of different types of positions and differences in current national regulations. Some countries have already under their current national regulation a stricter treatment than the current Accord provides (this affects in particular liquidity facilities and retained securitisation positions).

Table 25

**Change in minimum required capital for the securitisation portfolio  
in per cent, G10 Group 1 banks**

	<b>Standardised approach</b>	<b>IRB approach</b>
Total risk-weighted assets; of which	-15.5	-18.5
– Risk-weighted assets rated exposures	-25.6	-18.7
– Risk-weighted assets unrated exposures	12.0	27.7
– Investors' interest early amortisation	0.0	0.1
– Correction for cap	-2.0	-20.8
– Correction for provisions		6.8
Positions to be deducted	23.2	19.0
<b>Overall change in MRC versus current</b>	<b>7.7</b>	<b>0.5</b>

This table only includes banks for which complete QIS 5 workbooks were available.

Table 26

**Change in minimum required capital for the securitisation portfolio  
in per cent, G10 Group 2 banks**

	<b>Standardised approach</b>	<b>IRB approach</b>
Total risk-weighted assets; of which	-69.5	-62.6
– Risk-weighted assets rated exposures	-52.5	-56.2
– Risk-weighted assets unrated exposures	-16.2	5.0
– Investors' interest early amortisation	0.0	0.0
– Correction for cap	-0.7	-11.4
– Correction for provisions		0.0
Positions to be deducted	79.7	45.4
<b>Overall change in MRC versus current</b>	<b>10.2</b>	<b>-17.3</b>

This table only includes banks for which complete QIS 5 workbooks were available.

Table 27

**Change in minimum required capital for the securitisation portfolio  
in per cent, CEBS Group 1 banks**

	<b>Standardised approach</b>	<b>IRB approach</b>
Total risk-weighted assets; of which	3.7	-5.8
– Risk-weighted assets rated exposures	-17.1	-10.1
– Risk-weighted assets unrated exposures	23.4	43.4
– Investors' interest early amortisation	0.0	0.0
– Correction for cap	-2.6	-29.4
– Correction for provisions		-9.7
Positions to be deducted	17.5	13.7
<b>Overall change in MRC versus current</b>	<b>21.2</b>	<b>7.9</b>

This table only includes banks for which complete QIS 5 workbooks were available.

Table 28

**Change in minimum required capital for the securitisation portfolio  
in per cent, CEBS Group 2 banks**

	<b>Standardised approach</b>	<b>IRB approach</b>
Total risk-weighted assets; of which	-67.5	-60.3
– Risk-weighted assets rated exposures	-49.6	-52.3
– Risk-weighted assets unrated exposures	-16.9	-7.4
– Investors' interest early amortisation	0.0	0.0
– Correction for cap	-1.0	-0.6
– Correction for provisions		0.0
Positions to be deducted	63.6	45.8
<b>Overall change in MRC versus current</b>	<b>-3.9</b>	<b>-14.6</b>

This table only includes banks for which complete QIS 5 workbooks were available.

## 6. Operational risk<sup>21</sup>

There was considerable dispersion among operational risk estimates, as banks are in different stages of systems development. For the 22 institutions providing an estimate for the advanced measurement approach in **G10 countries**, contributions ranged from 1.2% to 17.8%. Group 2 banks completed the basic indicator approach and the standardised approach only. The range of Group 2 standardised approach contributions was 2.5% to 64.2%, and the range of basic indicator approach contributions was 0.0% to 43.5%.

The operational risk contributions to minimum required capital are shown in Table 29. Including US results, the Group 1 average contribution for the advanced measurement approach increases to 7.5%. For Group 1 banks, most G10 countries averaged 4% to 7% contribution. According to national supervisors, while some banks that are now able to estimate a figure for the advanced measurement approach experienced a decrease in operational risk requirements compared to QIS 3, it is not clear how a more widespread application of the advanced measurement approach will impact capital requirements in the future. As regards the G10 Group 2 banks, the size of the retail business line with its 12% beta might have been a major driver for the lower contribution of the standardised approach relative to the basic indicator approach.

Table 29

### Contribution of operational risk to total minimum required capital by approach, G10 banks in per cent

Approach	Group 1	Group 2
Basic indicator approach	6.3	8.3
Standardised approach	5.7	7.6
Advanced measurement approach	7.2	

For each bank only the approach actually used for calculation of minimum required capital is used in the calculation of the averages.

Table 30

### Contribution of operational risk to total minimum required capital by approach, CEBS banks in per cent

Approach	Group 1	Group 2
Basic indicator approach		8.9
Standardised approach	5.5	7.9
Advanced measurement approach	5.9	5.4

For each bank only the approach actually used for calculation of minimum required capital is used in the calculation of the averages.

For the other non-G10 Group 1 banks, the advanced measurement approach contributions ranged from 3.3% to 7.7%. There was considerable dispersion among the operational risk

<sup>21</sup> Unless otherwise stated the numbers in this section do not include US results.

results for the Group 2 banks, with the basic indicator approach contributions ranging from 5.3% to 34.3% and the standardised approach from 0.4% to 27.7%.

Table 31

**Contribution of operational risk to total minimum required capital by approach, other non-G10 banks in per cent**

Approach	Group 1	Group 2
Basic indicator approach		13.5
Standardised approach	4.0	5.2
Advanced measurement approach	4.7	

For each bank only the approach actually used for calculation of minimum required capital is used in the calculation of the averages.

Experience suggests that all operational risk contributions should be interpreted with caution. For example, banks that specialise in providing financial services – as opposed to lending – will tend to report higher operational risk contributions as credit risk is relatively less important. It is likely therefore that some of the dispersion is due to differences in banks' risk profiles.

## 7. Impact of the trading book capital requirements and the double default treatment

In July 2005, the Committee published *The Application of Basel II to Trading Activities and the Treatment of Double Default Effects* in order to revise the trading book aspects of the Basel II Framework. Most segments of the trading book paper were captured in the QIS 5 exercise, including the new treatment of counterparty credit risk including the internal models method (IMM) of computing expected positive exposure (EPE) and cross-product netting. In addition, the workbooks were modified compared to QIS 4 to provide for recognition of double default. The short-term maturity adjustment and the incremental charge for default risk not captured in Value-at-Risk were also applicable.

Overall, information on the trading book changes is sparse. A few banks did incorporate some of the counterparty credit risk changes. Of the banks using the expected positive exposure method, most did not use own estimates of alpha, but rather defaulted to 1.2 or 1.4. Most supervisors indicated that banks had not computed this incremental charge.

With regard to double default, 12 G10 Group 1 banks provided data in their QIS 5 submissions, however two applied them to an extremely small percentage of their exposures and thus are basically excluded. Most of the estimation of the remaining ten banks was within their corporate portfolios, with three banks applying it to SME corporate exposures. Few banks from other non-G10 countries completed the double default worksheets and it is therefore difficult to estimate the impact of double default.

As the Committee's trading book paper was only released within the last year, banks are currently building their systems to incorporate the new framework. Thus most were unable to apply the new treatment at the time of QIS 5. National supervisors noted that many banks indicated they intend to evaluate the potential benefits of the double default treatment and potentially implement it in the future.

For most of the banks that attempted double default estimation, there was a significant effect on risk-weighted assets, however the overall effect was negligible due to the small sample

size. One national supervisor noted that for some banks, double default treatment only rarely provided capital relief greater than the substitution approach. Four of the advanced IRB banks noted a material reduction in their risk weight from the estimation, however it was only applicable to a minimal amount of their corporate portfolios due to the limited scope of application of the double default treatment.

In most countries and portfolios subject to an explicit maturity adjustment, less than 5% of the drawn exposures are subject to the short-term maturity adjustment provisions. Not surprisingly the bank portfolio is an exception, and here up to 33.7% of the exposures on average are of a short-term nature.

# Annex A

## Methodology

The purpose of this Annex is to outline the calculation of minimum required capital (MRC) on the level of individual portfolios and to present a weighting scheme for the aggregation of QIS 5 data that is applicable for two types of analysis:

1. For an aggregation of changes in minimum required capital on a portfolio level across banks for a certain portfolio. "Portfolio" in this document refers to the different exposure classes laid out in the Basel II Framework as well as to several other items with an impact on overall minimum required capital, such as for example capital requirements for market and operational risk and for the requirements arising from the partial use of the standardised approach under the IRB approaches.
2. For an aggregation of changes in minimum required capital in the whole banking system of individual countries. This includes in particular an assessment how changes in the individual portfolios contribute to the total change in the banking system.

This Annex is structured as follows: At first the necessary notation is provided in Section 2. Afterwards the formulae on the changes in minimum required capital and contribution on a portfolio level are derived in Section 3. Section 4 describes how aggregation across banks is carried out. The final Section 5 of this Annex discusses how cross-country averages are computed.

### 1. Notation

Throughout this Annex the following notation is used:<sup>22</sup>

$RWA_i, RWA_i^{Curr}$	Risk-weighted assets of bank $i$ according to the Basel II Framework and the current Accord
$cRWA_i, cRWA_i^{Curr}$	Credit risk-weighted assets of bank $i$ (ie risk-weighted assets without market risk and operational risk)
$RWA_i^{PF}, RWA_i^{PF,Curr}$	Risk-weighted assets according to the Basel II Framework for a specific portfolio $PF$ of bank $i$
$EL_i, EL_i^{PF}$	Aggregated expected losses for the whole bank $i$ and for a specific portfolio $PF$ of bank $i$
$D_i$	Regulatory calculation difference, ie total expected loss amount minus total eligible provisions

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<sup>22</sup> Where applicable, portfolio-level figures reflect the effects of the scaling mechanism in the QIS workbooks and the 1.06 scaling factor to credit risk risk-weighted assets.

$Ded_i, Ded_i^{Curr}$	Total deductions under the Basel II Framework and the current Accord respectively, including deductions for securitisation, related entities, and other supervisory deductions. This amount does not include deductions due to a possibly positive regulatory calculation difference.
$GP_i^{incl,Curr}, GP_i^{incl}$	General provisions included in capital under the current Accord and under the standardised approach of Basel II
$GP_i^{incl,PU}$	General provisions which are eligible for Tier 2 under the standardised approach partial use
$MRC_i, MRC_i^{PF}$	Minimum required capital for a bank and for the claims of a specific portfolio $PF$ of that bank under Basel II
$MRC_i^{Curr}, MRC_i^{PF,Curr}$	Minimum required capital for a bank and for the claims of a specific portfolio $PF$ of that bank under the current Accord
$\Delta MRC_i, \Delta MRC_i^{PF}$	Absolute change in minimum required capital for bank $i$ and portfolio $PF$ for the Basel II Framework relative to the current Accord, ie the differences $MRC_i - MRC_i^{Curr}$ , $MRC_i^{PF} - MRC_i^{PF,Curr}$
$\% \Delta MRC_i, \% \Delta MRC_i^{PF}$	Percentage change in minimum required capital for bank $i$ and portfolio $PF$ for the Basel II Framework relative to the current Accord, ie the expressions $(MRC_i - MRC_i^{Curr}) / MRC_i^{Curr}$ , $(MRC_i^{PF} - MRC_i^{PF,Curr}) / MRC_i^{PF,Curr}$
$Size_i^{PF}$	Size of a portfolio $PF$ in terms of the share of minimum required capital of the respective portfolio with respect to the current Accord compared to the total minimum required capital of the bank with respect to the current Accord
$Contr_i^{PF}$	Contribution of the portfolio $PF$ to the change of the total minimum required capital

$PF$  is used as an index for the portfolios and  $i$  as index for the banks. Throughout the rest of this note the following formula is used for the **minimum required capital** according to the current Accord

$$MRC_i^{Curr} = 8\% \cdot RWA_i^{Curr} + Ded_i^{Curr} - GP_i^{incl,Curr}, \quad (1)$$

for the minimum required capital under the IRB approaches of Basel II

$$MRC_i = 8\% \cdot RWA_i + \max\{D_i, -0.6\% \cdot cRWA_i\} + Ded_i - GP_i^{incl,PU}, \quad (2)$$

and for the minimum required capital under the standardised approach of Basel II

$$MRC_i = 8\% \cdot RWA_i + Ded_i - GP_i^{incl}. \quad (3)$$

These formulae take into account that the recognition of general provisions in Tier 2 capital is different under the standardised and IRB approaches.

## 2. Calculation of the change in minimum required capital on a portfolio level

### 2.1 Standardised approach

The important quantities for the change in minimum required capital are the risk-weighted assets both for the standardised approach and the current Accord and the amount of general provisions which are eligible for inclusion in Tier 2 capital under the standardised approach and the current Accord. General provisions are allocated to each of the specific portfolios according to the share of risk-weighted assets relative to the overall credit risk-weighted assets for the entire bank. The percentage change in minimum required capital on portfolio level can be calculated as:

$$\% \Delta MRC_i^{PF} = \frac{8\% \cdot RWA_i^{PF} - \frac{RWA_i^{PF}}{cRWA_i} \cdot GP_i^{incl}}{8\% \cdot RWA_i^{PF,Curr} - \frac{RWA_i^{PF,Curr}}{cRWA_i^{Curr}} \cdot GP_i^{incl,Curr}} - 1. \quad (4)$$

### 2.2 IRB approaches

Under the IRB approaches, the switch to UL-based risk weights in the Basel II Framework results in risk weights which are fundamentally different from (EL+UL)-based risk weights used for computing minimum required capital under CP3 and the current Accord. In the UL-based framework, a shortfall or excess in provisioning affects the numerator of the capital ratio, ie the capital figure. In order to take account of the fact that both numerator and denominator of the capital ratio changed and to ensure the comparability of the data, percentage changes in minimum required capital on the level of individual banks are calculated by

$$\% \Delta MRC_i = \frac{8\% \cdot RWA_i + \max\{D_i, -0.6\% \cdot cRWA_i\} + Ded_i - GP_i^{incl,PU}}{8\% \cdot RWA_i^{Curr} + Ded_i^{Curr} - GP_i^{incl,Curr}} - 1. \quad (5)$$

### 2.3 Allocation of the regulatory calculation difference for the IRB approaches

Thereafter, the regulatory calculation difference must be allocated to the portfolios of a bank such that the change in minimum required capital on the level of the entire bank can be computed as the sum of the contributions arising from the different portfolios. This is more difficult than in previous impact studies because some of the elements, eg general provisions appearing in formula (5), are available only on a bank aggregate level. This means that a method is needed to distribute these elements in some reasonable way across the different portfolios. The following formula has been used as a definition of the percentage change in minimum required capital for a single bank portfolio:

$$\% \Delta MRC_i^{PF} = \frac{8\% \cdot RWA_i^{PF} + \frac{EL_i^{PF}}{EL_i} \cdot (\max\{D_i, -0,6\% \cdot cRWA_i\}) + Ded^{PF}}{8\% \cdot RWA_i^{PF,Curr} - \frac{RWA_i^{PF,Curr}}{cRWA_i^{Curr}} \cdot GP_i^{incl,Curr} + Ded^{PF,Curr}} - 1. \quad (6)$$

The denominator of formula (6) describes the minimum required capital on portfolio level according to the current Accord. Note that in the definition of the minimum required capital on portfolio level a certain share of the general provisions which are currently eligible as Tier 2 capital are deducted from 8% of the risk-weighted assets of this particular portfolio.<sup>23</sup> This share depends on the risk-weighted assets of the portfolio relative to the credit risk-weighted assets of the entire bank. Since the regulatory calculation difference depends on the expected losses, the most natural scheme for allocating it to individual bank portfolios is by relating it to the expected losses associated with the respective portfolios. Note that the contributions to the change in minimum required capital that result from the change in other supervisory deductions have not been incorporated at the portfolio level and are treated as a separate “portfolio” instead.

The portfolios equity, securitisation and related entities are not considered in the calculation of the regulatory difference  $D_i$ ;  $EL^{PF}$  is assumed to be zero for these portfolios, and the EL amount for equity is fully allocated to the equity portfolio. Similarly, for exposures subject to partial use of the standardised approach general provisions which were eligible elements of Tier 2 capital under the current Accord can be still recognised as eligible Tier 2 capital under the Basel II Framework. These provisions are therefore fully allocated to the partial use portfolio. Portfolio-specific deductions  $Ded^{PF}$  are only relevant for securitisation and related entities and are zero for all other portfolios.

## 2.4 Portfolio size and contribution

Portfolios must be weighted by their size in order to get the overall change in minimum required capital of the bank from the changes of its portfolios. The size of the portfolio  $PF$  is expressed in terms of current Accord minimum required capital:

$$Size_i^{PF} = \frac{MRC_i^{PF,Curr}}{MRC_i^{Curr}}. \quad (7)$$

Accounting for the size of the portfolio the contribution of the change in minimum required capital of the portfolio  $PF$  is defined as follows:

$$Contr_i^{PF} = \% \Delta MRC_i^{PF} \cdot Size_i^{PF} = \frac{\Delta MRC_i^{PF}}{MRC_i^{Curr}}. \quad (8)$$

While this derivation of the contribution is more intuitive, the first part of formula (8) cannot be applied in cases where there is no capital charge under the current Accord, eg for operational risk. The contribution is therefore in general calculated as the absolute change in minimum required capital for a portfolio relative to minimum required capital of the whole

<sup>23</sup> This allocation only concerns portfolios which contribute to credit risk-weighted assets.

bank under the current Accord. The contribution can easily identify the portfolios of a bank that have the largest impact on the overall result.

### 3. Aggregation of results across banks

#### 3.1 Group 1 banks

In order to aggregate the contributions on a portfolio level as well as for the aggregation of all risk parameters and the total change in minimum required capital across the banks the following weight was applied to each bank:

$$w_i = \frac{MRC_i^{Curr}}{\sum_i MRC_i^{Curr}}, \quad (9)$$

where the index  $i$  runs over all Group 1 banks. For example, applying these weights to portfolio contributions results in

$$Contr_{avg}^{PF} = \sum_i w_i \cdot Contr_i^{PF} \quad (10)$$

as an average contribution to the change of minimum required capital of the portfolios.

Applying the weights  $w_i$  to determine the average  $\% \Delta MRC_{avg}^{PF}$  analogously would be misleading because of possibly empty or small portfolios of certain banks. In this case, the weights are given by  $(w_i \cdot Size_i^{PF}) / \sum_i w_i \cdot Size_i^{PF}$ , resulting in:

$$\% \Delta MRC_{avg}^{PF} = \frac{\sum_i w_i \cdot Size_i^{PF} \cdot \% \Delta MRC_i^{PF}}{\sum_i w_i \cdot Size_i^{PF}}. \quad (11)$$

For analysis purposes (11) are very useful to analyse effects on portfolio level. However, it should be noticed that the weights used in (11) are different for each portfolio.

#### 3.2 Group 2 banks

The majority of Group 1 banks participate in the QIS exercise and, therefore, the data collected for these banks are broadly representative for Group 1 banks of an entire country. This is not the case for Group 2 banks. Since relatively few of the smaller Group 2 banks are participating in QIS 5, they would be underrepresented in the analysis if the same weighting scheme was applied as for Group 1 banks. Therefore, a different weighting scheme is used for Group 2 banks:

$$w_i = 1 / (\text{number of Group 2 banks})$$

The same formulae as in Section 4.1 can be used for the averages of the change in total minimum required capital, the contributions on the portfolio level and the changes in minimum required capital on a portfolio level of the Group 2 banks.

#### **4. Computing the cross-country averages**

The weights which are to be assigned to the individual countries must both reflect the size of their banking systems and the importance of the different approaches of the Basel II Framework, ie the standardised approach and the two IRB approaches, which varies between the different participating countries.

As in previous QIS exercises, the weight assigned to each country for Group 1 banks is based on the Tier 1 capital + Tier 2 capital – supervisory deductions of the Group 1 banks of the entire banking system, irrespective of the participation of individual banks in the QIS. For the aggregation of the results of the G10 Group 2 banks the Tier 1 capital + Tier 2 capital – deductions weight relative to the capital of all Group 2 banks in the banking system is taken into consideration instead.

# Annex B

## Additional information on risk parameters<sup>24</sup>

### 1. PDs

The present section of this Annex shows additional data regarding the PD estimates of IRB banks. The scattergrams for the risk parameter PD do not require a distinction between foundation and advanced IRB approaches; they include all banks on the basis of the most likely approach if this is an IRB approach. Average PDs are weighted by non-defaulted exposure.

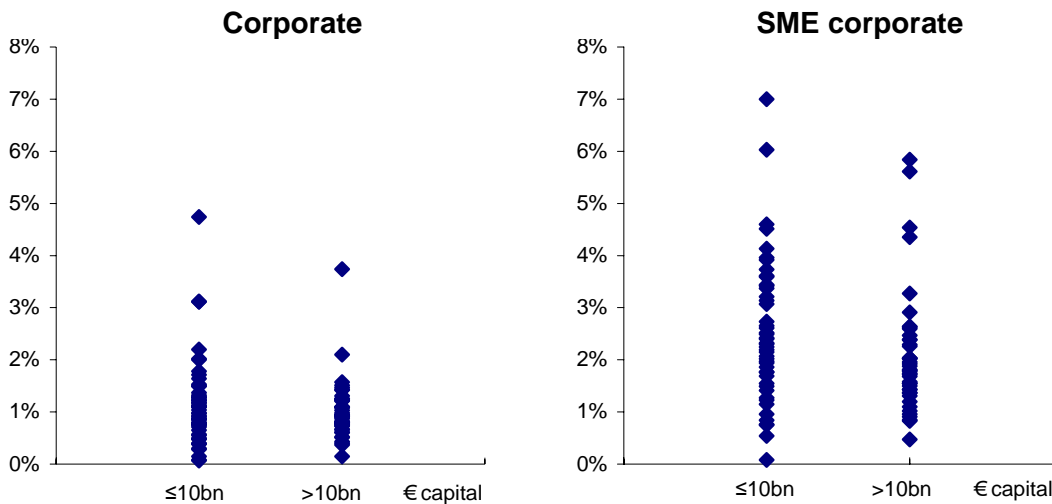
According to qualitative analysis for G10 countries, banks are broadly compliant with the default definition of the Basel II Framework.

#### 1.1 Corporate and SME corporate

Charts 4 show the scattergrams of average PDs by banks in G10 countries. As is seen in the chart for the corporate portfolio, most banks are within the range of PDs from 0.5% to 1.5% while only a few banks are greater than 2%. Smaller banks seem to be more dispersed than that larger banks.

Charts 4

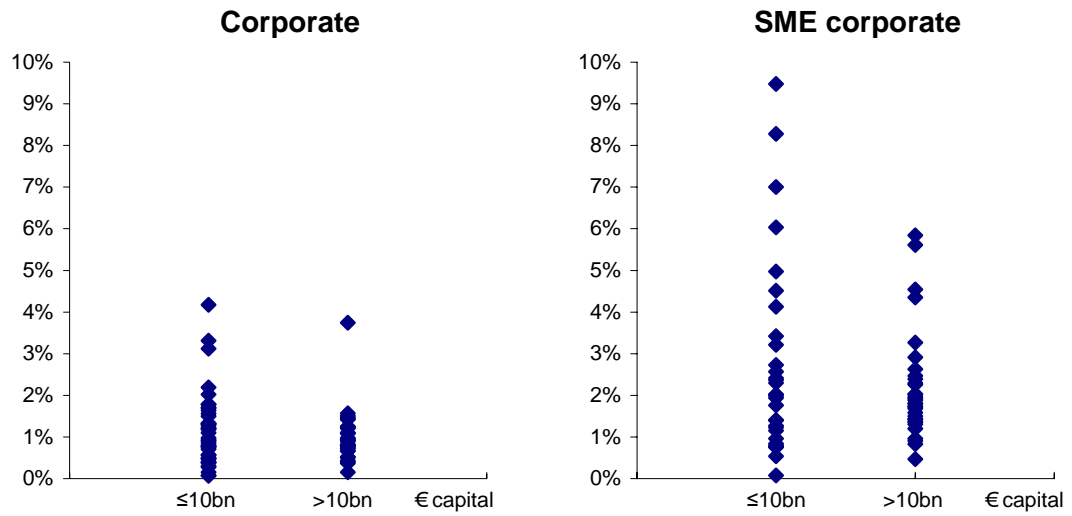
Average PDs for the corporate and SME corporate portfolios, G10 banks by size



<sup>24</sup> All charts and tables in this annex only include banks for which QIS 5 workbooks were available.

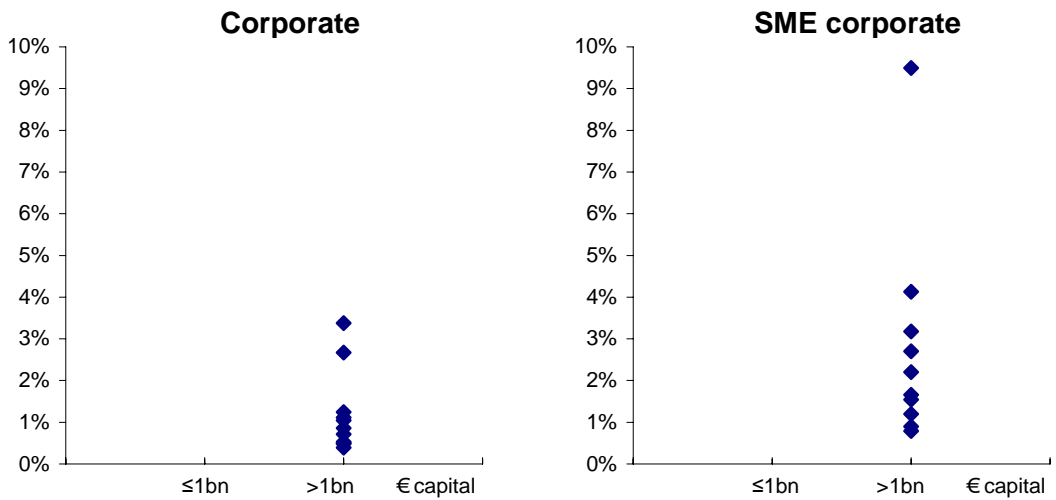
Charts 5

**Average PDs for the corporate and SME corporate portfolios, CEBS banks by size**



Charts 6

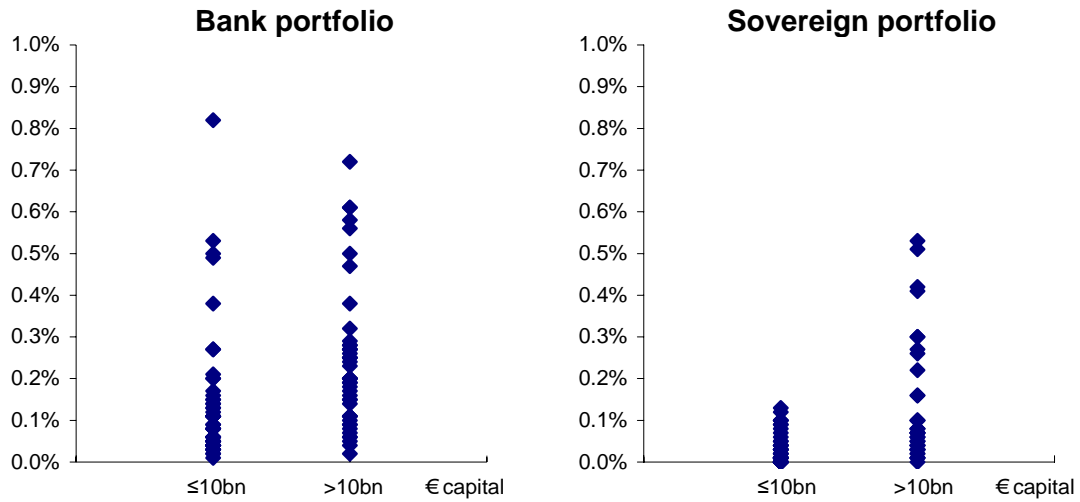
**Average PDs for the corporate and SME corporate portfolios, other non-G10 banks by size**



## 1.2 Bank and sovereign portfolios

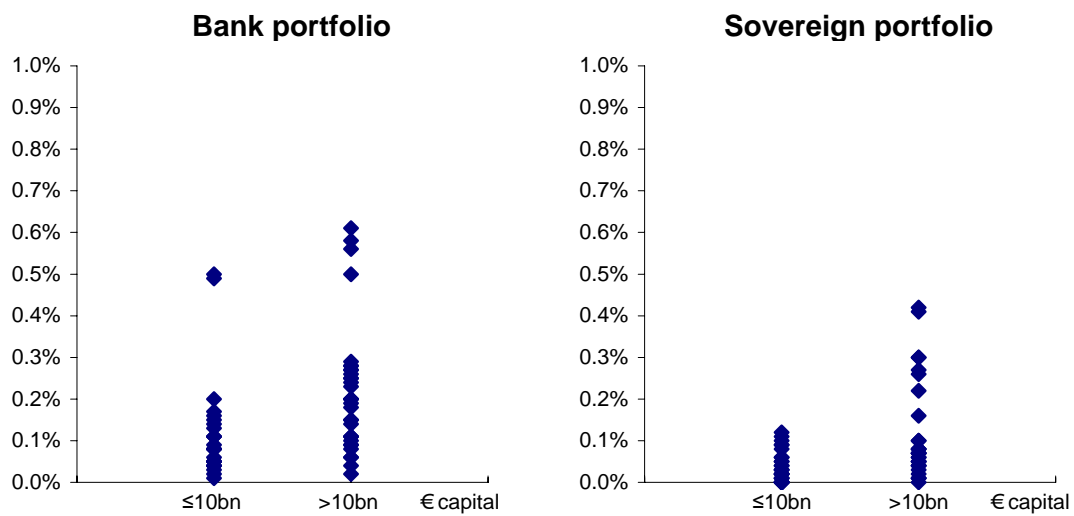
Charts 7

Average PDs for the bank and sovereign portfolios, G10 banks by size



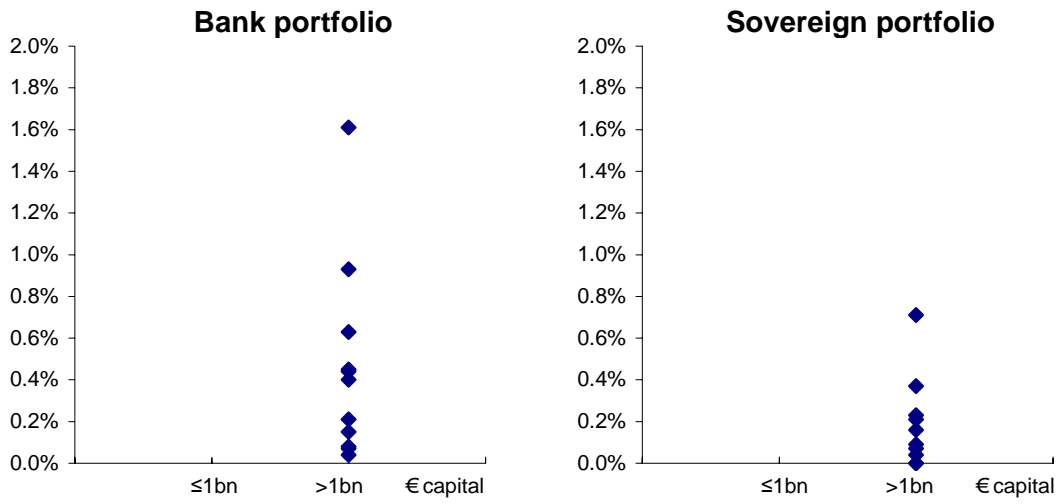
Charts 8

Average PDs for the bank and sovereign portfolios, CEBS banks by size



Charts 9

Average PDs for the bank and sovereign portfolios, other non-G10 banks by size



## 2. LGDs and collateralisation

Average LGDs shown in this section are weighted by non-defaulted exposure and take account of the 10% LGD floor applicable for exposures in the retail residential mortgage portfolio. LGD distributions only include LGDs assigned to non-defaulted exposure. The figures are for the advanced IRB approach and the IRB approach to retail and do not include exposure subject to the double default treatment.

### 2.1 LGD distribution for main portfolios

Chart 10

**LGD distribution corporate portfolio, G10 banks, advanced IRB approach**

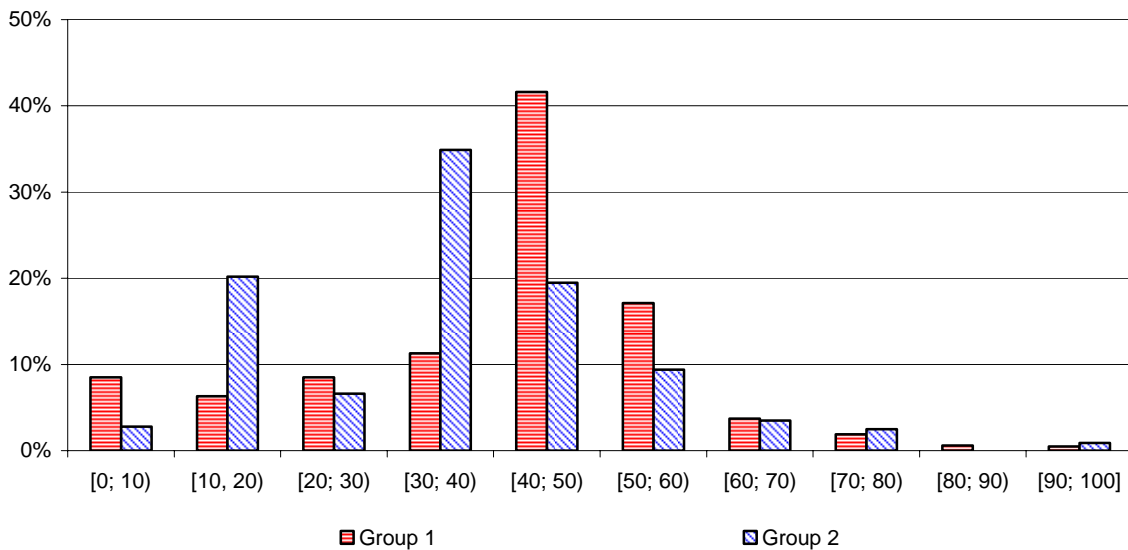


Chart 11

**LGD distribution bank portfolio, G10 banks, advanced IRB approach**

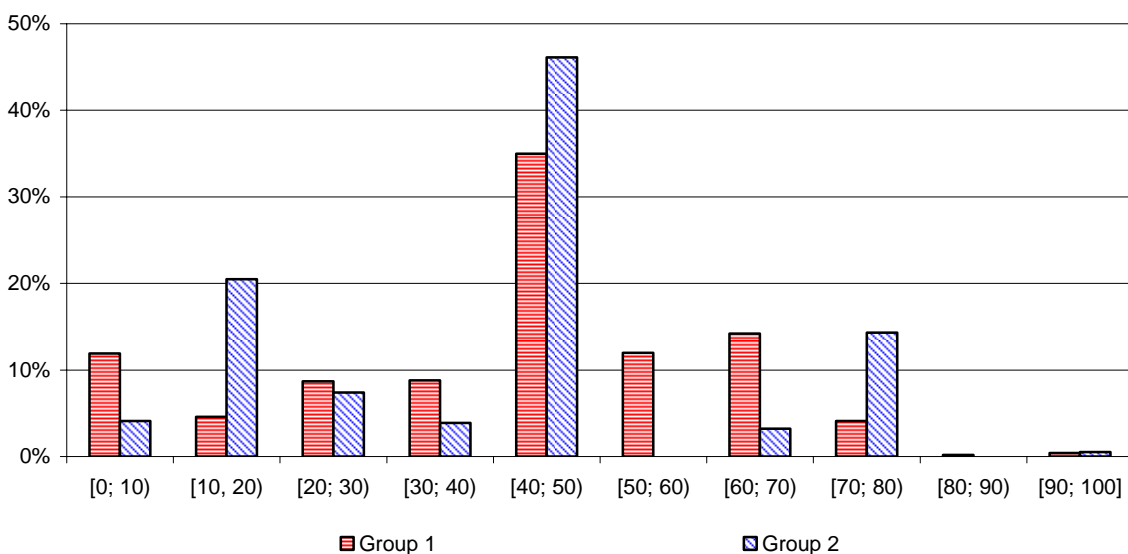


Chart 12

**LGD distribution sovereign portfolio, G10 banks, advanced IRB approach**

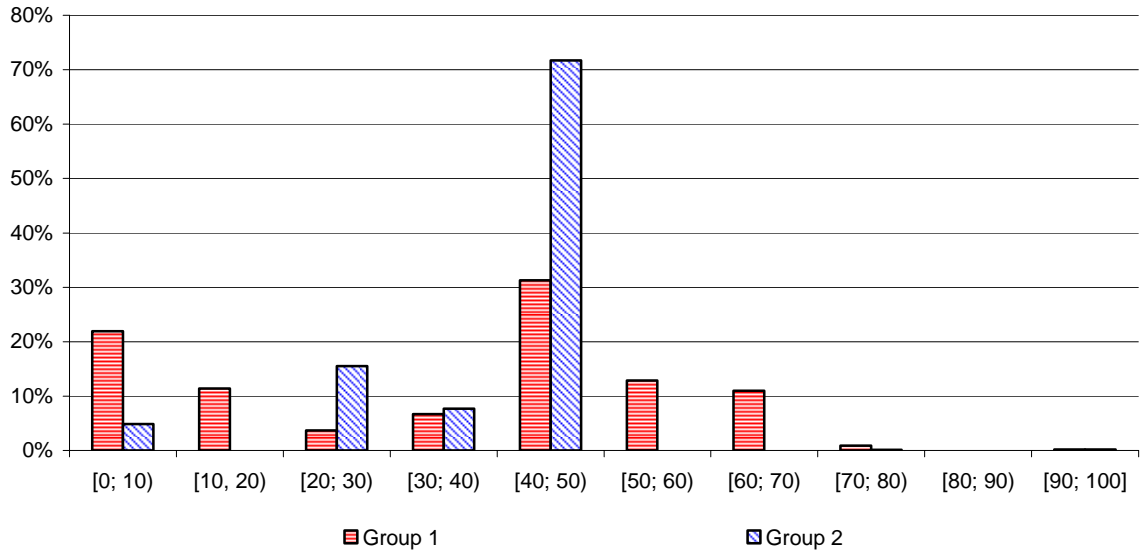


Chart 13

**LGD distribution SME corporate portfolio, G10 banks, advanced IRB approach**

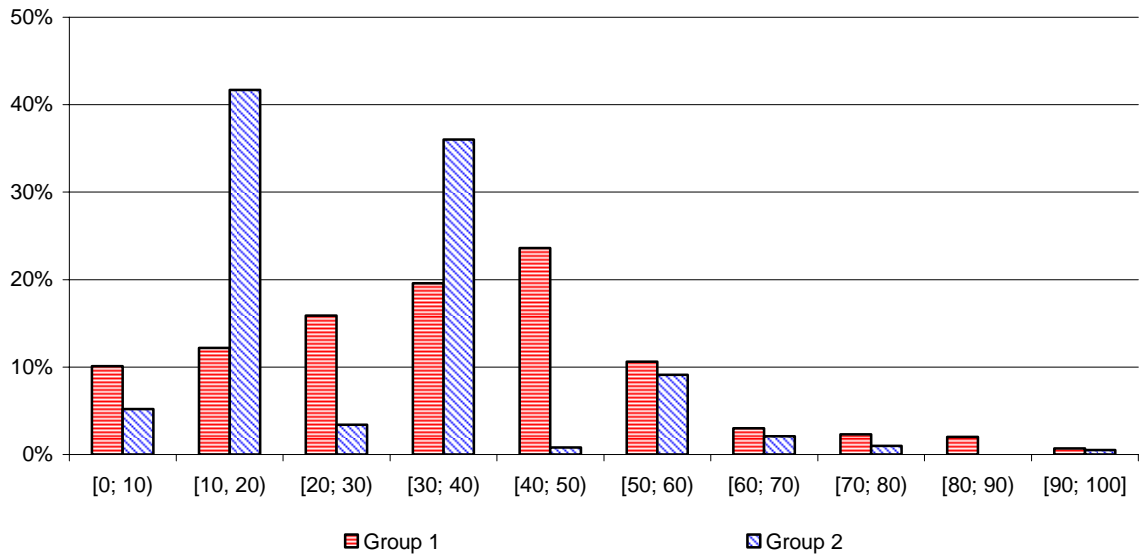


Chart 14

**LGD distribution other retail portfolio, G10 banks**

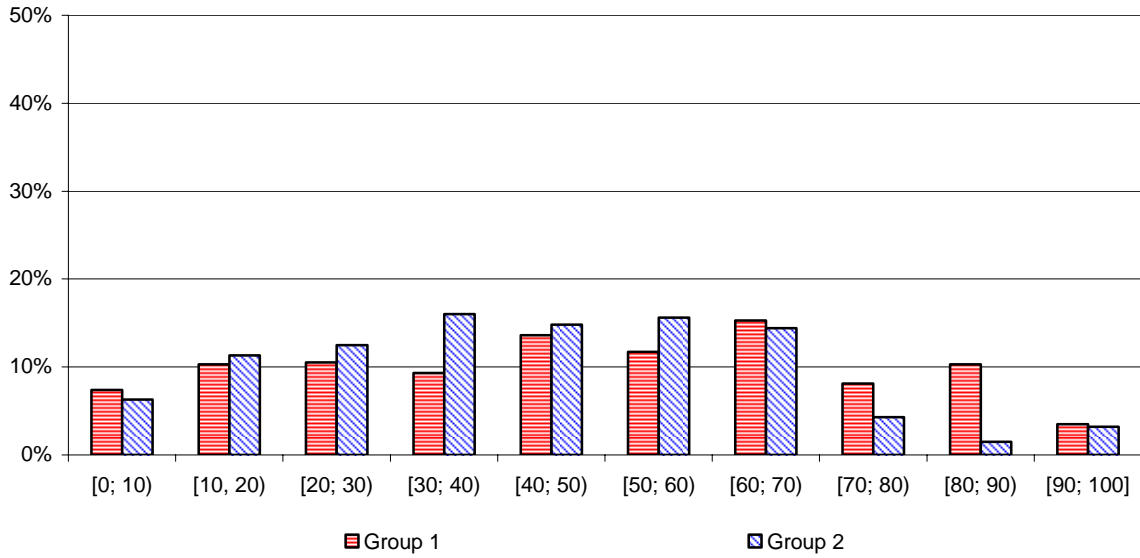


Chart 15

**LGD distribution retail residential mortgage portfolio, G10 banks**

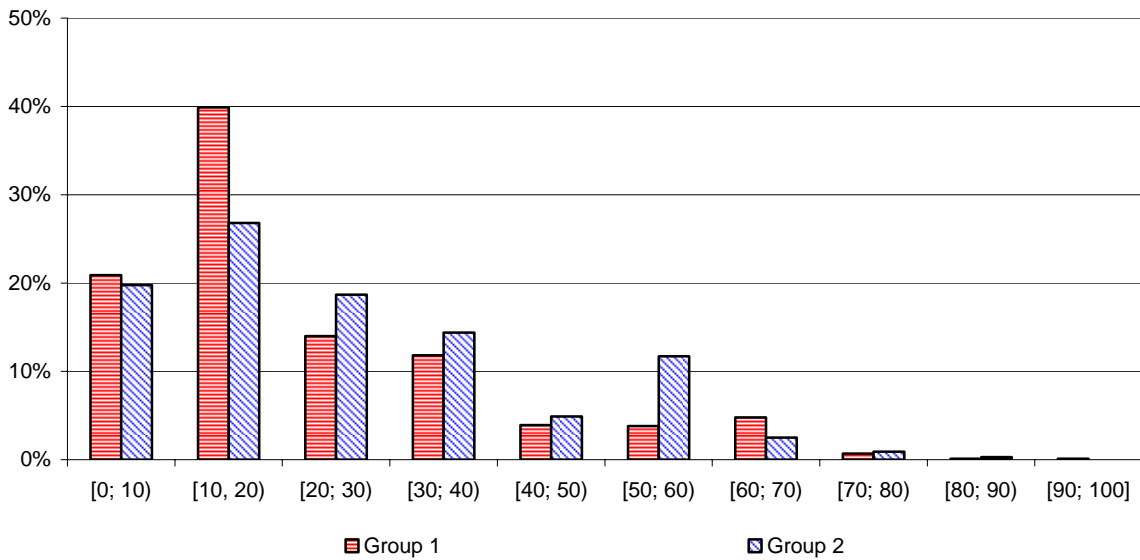


Chart 16  
**LGD distribution retail QRE portfolio, G10 banks**

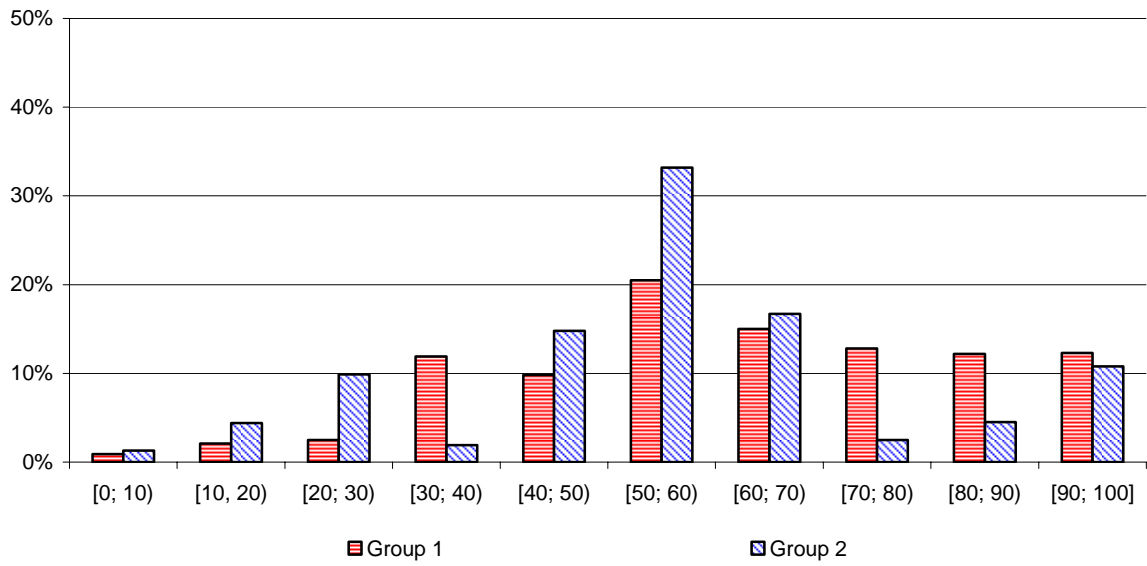
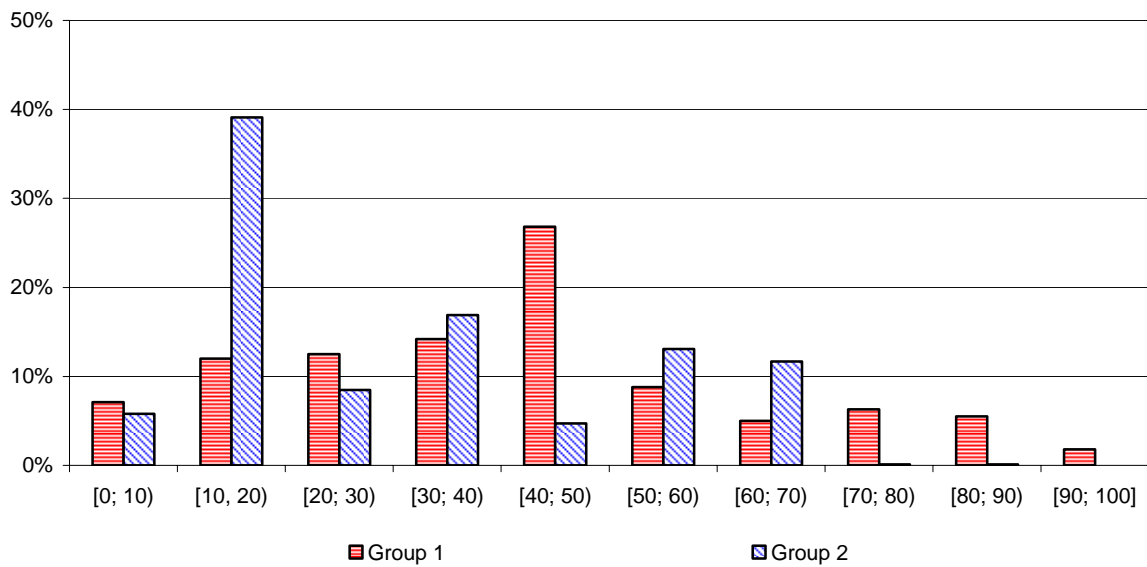


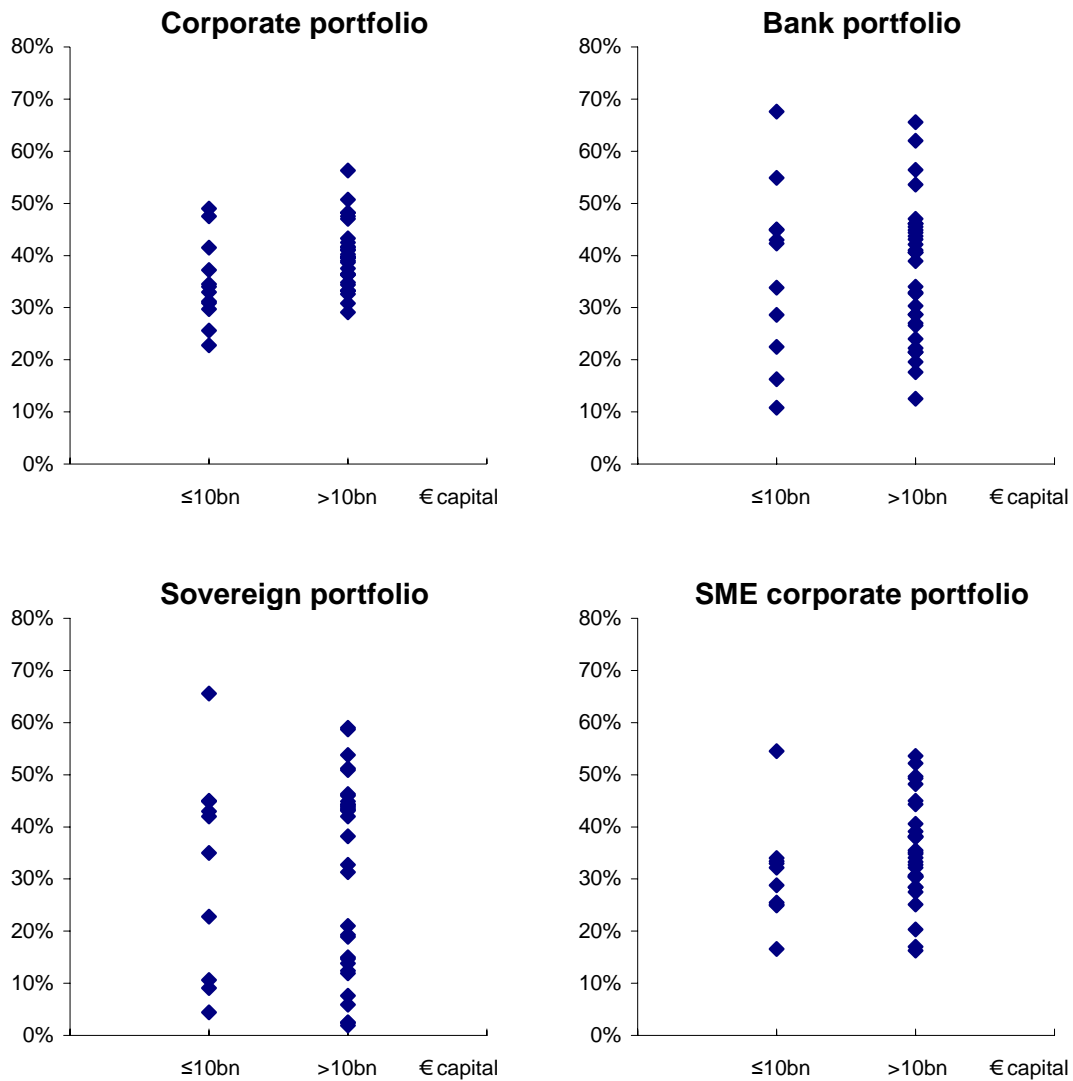
Chart 17  
**LGD distribution SME retail portfolio, G10 banks**



## 2.2 Variation in average LGDs under the advanced IRB approach across banks

Charts 18

### Average LGDs in per cent, G10 banks by size



Charts 19

Average LGDs in per cent, CEBS banks by size

