The Third Quantitative Impact Study (Basel II): An In-Depth Analysis of Regional and International Results[1])

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Introduction

The core element of the third quantitative impact study (QIS 3) was an analysis of the changes in risk-weighted assets (RWA) resulting from a comparison of the new approaches introduced by the Basel II framework with the current Accord. An increase in RWA is tantamount to a higher capital requirement.[2])

The analysis focused on two key indicators: first, the relative change in RWA, which enables us to quantify the impact of the new approaches on the capital requirement in the individual exposure categories, and, second, the so-called contribution of changes in the individual exposure categories to the aggregate result. This contribution, which is calculated by multiplying the percentage share of RWA for one exposure category in total RWA by the relative change under the Basel II framework, allows us to assess the impact on the aggregate result. As an example, RWA as a percentage of loans to sovereigns increased considerably (in some cases by several hundred percent) across all aggregated reports (G-10, Europe) and the majority of the individual country reports (e.g. Germany). The relative change in RWA is thus substantial. At the same time, the absolute amount of RWA for sovereign exposures is very low (e.g. less than 1% of total RWA in the Austrian sample), and, by extension, their contribution to the aggregate result is not very high.

The following considerations have to be taken into account when analyzing and interpreting the data given below:

– The published results are not only based on actual data but also on estimates and reflect the status as at about four years prior to the entering into force of the new Accord. Moreover, neither the new framework itself nor its implementation by banks has yet been concluded. Thus, the results presented in this paper must be seen as a snapshot of current conditions. Further changes will have occurred by the time the final Accord has been published and fully implemented by banks, and these modifications may and most probably will have a substantial impact on the results published in this paper.
– The banks calculated their results on the basis of the QIS 3 Technical Guidance documentation. The modifications contained in the third consultative paper (CP3) were taken into account retroactively to the extent possible, although the CP3 does not reflect the most recent changes to the new framework. In addition, the EU draft Directive, which will have a major impact on the implementation of the new capital adequacy rules in Austria, introduces a series of important changes, as for example "permanent partial use"[3]) with regard to bank and

1 *The conclusions drawn from the QIS 3 results, which are presented in this paper, would not have been possible without the manifold contributions of the OeNB staff members involved in the preparation of the country report for Austria. In the first place I would like to thank Yi-Der Kuo and Brigit Wlaschitz for their active support. Moreover, I would like to thank the following colleagues for their valuable contributions: Nikolaus Böck, Gabriela de Raaij, Evgenia Glogova, Mario Oschischnig and Vanessa Redak.*

2 *The correlation* $\frac{tier\,1 + tier\,2\,capital}{risk\text{-}weighted\,assets}$ *= capital ratio in % ≥ 8%) continues to apply under the new Basel Accord.*

3 *Under the IRB approach, banks are given the option to continue applying the standardized approach for certain asset categories that fall below a specified materiality threshold.*

Table 1

Comparison: Capital Ratio for the Aggregate Sample

	Current approach	Standardized approach
	EUR billion	
Eligible capital	15.8	15.6
Risk-weighted assets	115.9	123.0
	%	
Capital ratio	13.6	12.7

Source: Austrian country report.

Table 2

Comparison: Capital Ratio of IRB Banks

	Current approach	Standardized approach	FIRB
	EUR billion		
Eligible capital	9.7	9.6	9.6
Risk-weighted assets	62.7	70.3	67.8
	%		
Capital ratio	15.5	13.7	14.2

Source: Austrian country report.

sovereign portfolios, which is not contained in the Basel II framework and therefore not reflected in the results.

– Moreover, the borrowers' probabilities of default (PD) were estimated on the basis of the rating models currently used. However, by 2007, when banks will actually apply the new rules, they are likely to have greatly refined their rating tools, which is bound to allow for a much more precise and finely tuned PD assessment.
– Furthermore, banks will increasingly be taking recourse to credit risk mitigation techniques, a fact the QIS 3 figures also fail to reflect.
– Finally, the banks that participated in the field test made a formidable effort to provide the required data at short notice, for which we are very grateful. This time constraint, however, also increased the risk of data errors.

Aggregate Result

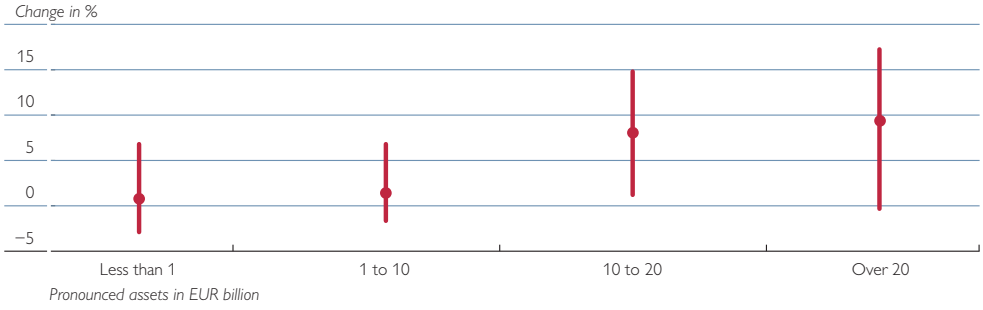
As noted in the Financial Stability Report 5,[1]) a total of 18 banks were included in the Austrian sample, all of which sent in data based on the standardized approach and 11 of which additionally provided data based on the foundation IRB approach (FIRB).

In the majority of the QIS 3 country reports, the aggregate result equals a simple, often unweighted average of the data reported by the individual banks. Under such an approach, the effect of small banks on the overall result is overstated and that of large banks understated. The distorting effect inherent in such an approach is likely to be particularly pronounced for the Austrian aggregate result as the assets reported by banks included in the Austrian sample sometimes differ by a factor of 1,000. The presentation of the Austrian aggregate result in tables 1 and 2 is therefore based on a different approach. In a first step, we summed

1 *See Redak and Tscherteu (2003).*

Chart 1

Change in RWA Under the Standardized Approach
(Differentiated by Size Class)



Source: Austrian country report.

the eligible capital as well as the calculated RWA of all banks before computing the capital ratio for the entire sample. The participating banks are thus treated as if they were a single institution.

Overall, the 18 banks reported about EUR 16 billion of eligible capital under both the new standardized approach and the current Accord. This figure compares with about EUR 116 billion of RWA under the current Accord. Under the standardized approach and including operational risk, the RWA increase to EUR 123 billion. As a consequence, the banks' capital ratio drops slightly to 12.7% under the standardized approach but continues to be well above the minimum requirement of 8%. In other words, under the new standardized approach the 18 banks would still be in a position to increase their risk-weighted assets by more than 50% without falling below the minimum capital requirement of 8%. This represents a respectable capital buffer.

When we carry out the same aggregation for the 11 banks that also applied the foundation IRB approach, the following picture emerges: The application of the standardized approach again results in an increase in the RWA and a decrease in the capital ratio. Under the FIRB approach, however, the RWA decrease markedly. All in all, the capital ratio for the 11 IRB banks is considerably above that of the aggregate sample and hence translates into an even greater capital buffer compared with the minimum capital requirement of 8%.

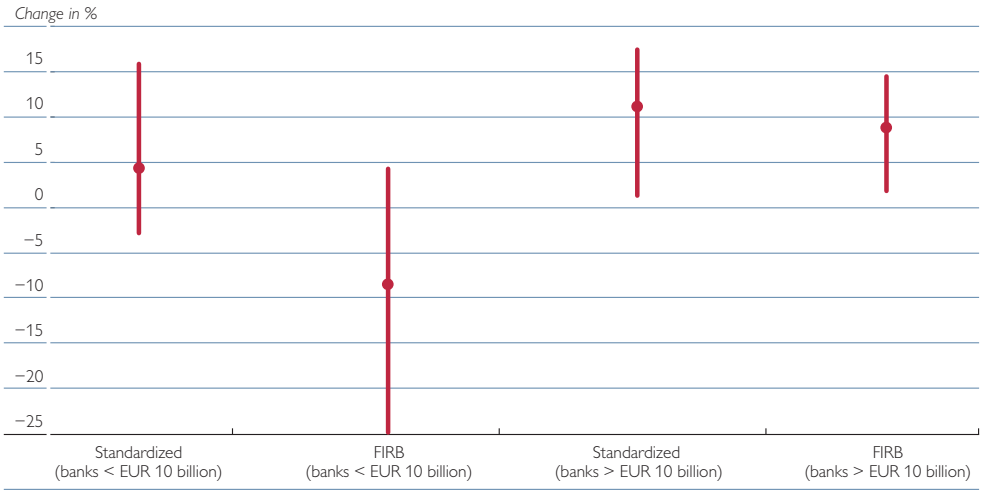
In calculating some further key indicators, we again started out from unweighted averages. In a first step, we tested the sample for a correlation between the size of the reporting bank and the results obtained by using the standardized and foundation IRB approaches. It must be noted in this context that comparisons of international results usually only differentiate between Group 1 and Group 2 banks.[1]) As the Austrian banking sample consists exclusively of Group 2 banks, this differentiation cannot be applied to the Austrian sample. To take account of this fact, we therefore adopted a finer gradation. The assets reported by the 18 banks using the standardized approach were differentiated by size and allocated to one of four classes.

1 *Group 1 banks are banks with tier 1 capital in excess of EUR 3 billion; all other banks fall into Group 2. See also the International Comparison section.*

Chart 2

Change in RWA

(Standardized and FIRB Approach to Current Approach)



Source: Austrian country report.

Each of these classes contained four to five banks. Chart 1 illustrates the result.

The vertical axis measures the change in RWA under the standardized approach in comparison with the current Accord. The dot on the vertical line marks the equally weighted average of all banks in the respective size class, whereas the line itself represents the variability of the results obtained for the banks in the respective size class. As the chart clearly shows, under the standardized approach[1]) the increase in RWA is the more pronounced the larger the bank.

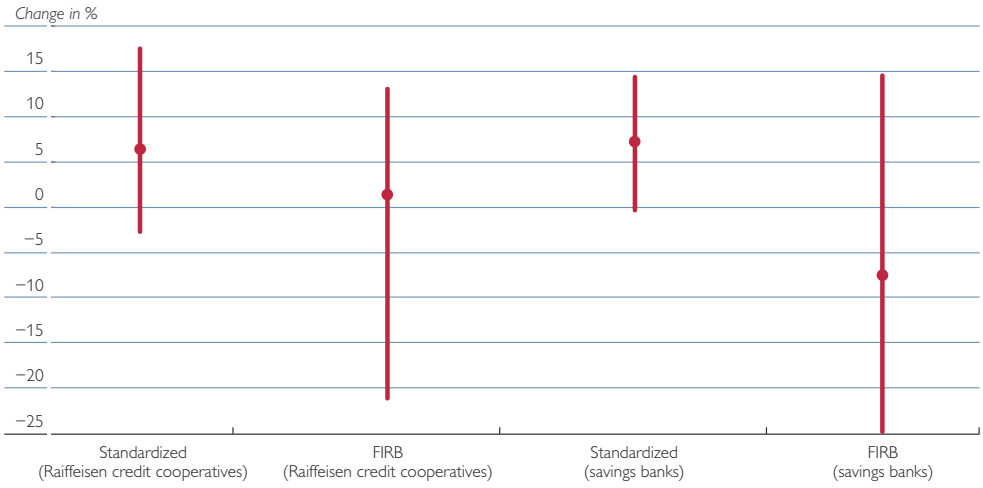
In chart 2, we made a similar differentiation for the 11 banks that had calculated the foundation IRB approach in addition to the standardized approach. In a first step, we subdivided the sample into banks with assets below EUR 10 billion (6) and banks with assets above EUR 10 billion (5). Then we marked the changes for the comparison of the standardized and the foundation IRB approaches with the current Accord each. Again, smaller banks are seen to exhibit a lower increase in or larger discount on RWA than larger banks. Another notable feature is that while all banks benefit from a changeover from the standardized to the foundation IRB approach, the smaller banks exhibit a more pronounced reduction in RWA under the foundation IRB approach.

Finally, the sample was tested to determine whether sectoral groupings had a material impact on the aggregate result. As pointed out by Redak and Tscherteu (2003), the large share of IRB banks in the Austrian QIS 3 sample is primarily attributable to the efforts undertaken in the individual banking sectors to find a common solution for implementing the new Accord. The sample comprised six Raiffeisen credit cooperatives and four banks from the Austrian savings bank sector. The results for both the stand-

1 *Under the standardized approach, total RWA are calculated as the sum total of the RWA for the credit, market and operational risks.*

Chart 3

Change in RWA (Sector Comparison)



Source: Austrian country report.

ardized and foundation IRB approaches for these banks had been computed separately. As is evident from chart 3, the standardized approach results are almost identical for the two sectors. Both the averages and the degrees of variability are quite similar. Under the foundation IRB approach, the savings banks exhibit a markedly lower average, though the variability of the individual results is somewhat greater.

To summarize, the comparison showed that the size of the credit institutions, but not the sectoral groupings had an impact on the volume of RWA under the new approaches introduced by Basel II.

Result by Exposure Category

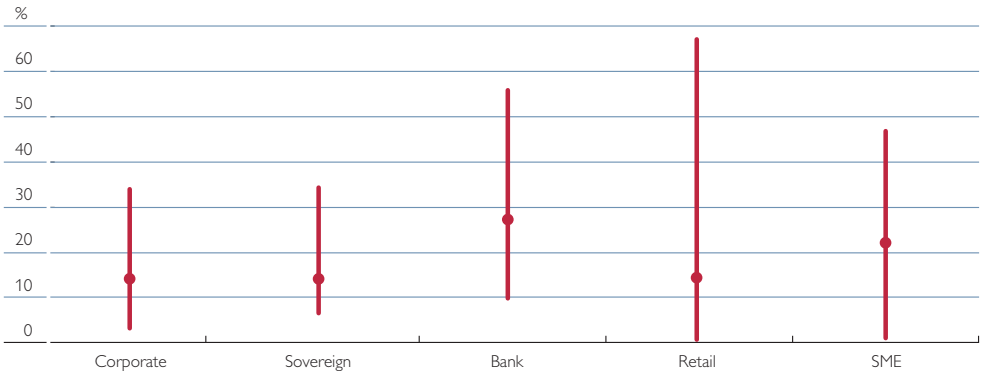
Let us now focus on the individual exposure categories. Here, we need to answer two questions: How does the new capital adequacy framework impact on the individual types of exposure, and which of these exposure categories have a material impact on the aggregate result?

Chart 4 illustrates the share of the individual exposure categories in total reported assets. The five exposure categories shown account for about 90% of total reported assets and represent over 85% of the RWA.[1]) As in charts 1 to 3, the dot represents the unweighted average of the respective exposure category in total exposures, whereas the length of the vertical line shows the variability within the respective exposure category. Exposures to corporates, for example, account for an average share of about 14% in total assets, whereas bank exposures amount to almost 30%. Retail exposures, which account for a share of about 14% on average, exhibit the greatest variability. The sample included banks with no retail exposures at all as well as banks with credit expo-

1 *We restricted our analysis to these five exposure categories because they virtually are the main determinants and because all banks included in the sample reported data for them. This allows us to make statements for the entire sample.*

Chart 4

Share of Exposure Categories in Total Assets



Source: Austrian country report.

sures in the retail category accounting for more than two thirds of total exposures. At the microlevel, we find that small banks generally have a larger share of retail exposures. The reverse is usually true for corporate and bank exposures. The two largest subcategories are bank exposures and exposures to small and medium-sized enterprises (SMEs); the two of them together account for about half of the participating banks' total exposures.[1])

Table 3 shows the average unweighted change in RWA under the standardized and the foundation IRB approaches in comparison with the current Accord. Except for sovereign and bank exposures, the RWA are lower for all exposure categories when calculated in accordance with the two new approaches.

Under the standardized approach, this decrease is most pronounced for retail exposures, followed by SME and corporate exposures, with the latter two exhibiting slightly lower RWA than under the current Accord. For bank exposures, by contrast, the standardized approach yields markedly higher RWA on average; the RWA figures for sovereign exposures show a very steep increase. However, as is evident from the last column in table 3, which shows RWA for the individual exposure categories in relation to total RWA under the current Accord, this strong increase in the

Table 3

Change in RWA – Austrian Sample

	Change in RWA		Share in RWA
	Standardized approach	FIRB approach	Current Accord
	%		
Corporate	−3	−22	22.4
Sovereign	136	386	0.5
Bank	42	30	8.1
Retail (total)	−18	−35	16.8
Residential	−21	−42	..
Other retail	−20	−35	..
SME (total)	−5	−2	32.9
thereof: corporate	2	4	..
retail	−17	−29	..

Source: Austrian country report.

sovereign subcategory relates to a very small share of only 0.5% of total RWA. Hence, the effect on the overall result is not very pronounced. Of a total of EUR 116 billion of reported RWA, a mere EUR 0.57 billion relate to sovereign exposures.

Under the foundation IRB approach, the ranking of the capital reduction per exposure category remains almost the same, but the relative changes are more pronounced. Retail exposures benefit even more from switching from the current framework to the foundation IRB approach. At 35%, the decline is double the rate obtained under the standardized approach. Corporate exposures also benefit by a relatively high margin. A decrease in the RWA by one fifth implies a reduction in the cost of capital by the same rate. The RWA for sovereign exposures increase at an even higher rate in the IRB sample than under the standardized approach. This is mainly traceable to the effect of two outliers, namely two banks that record only minimal RWA for their sovereign exposures under the current framework, and which thus cause a pronounced upward distortion of the overall result.

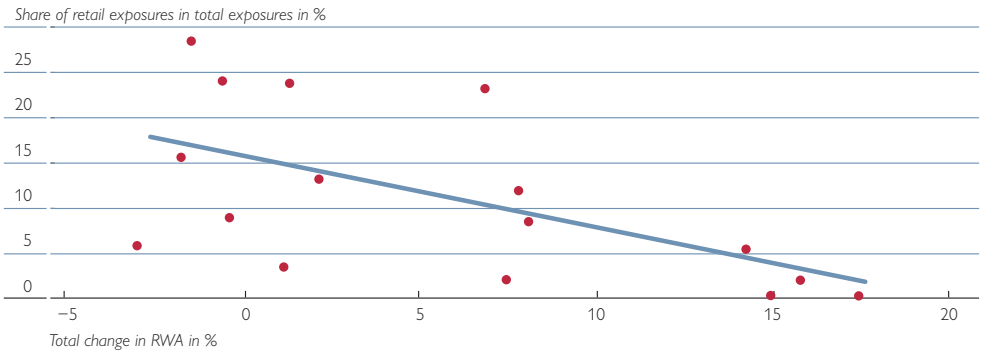
The QIS 3 data provide the basis for an even finer differentiation of the effects the new approaches have on individual exposure categories. The data reported for the individual exposure categories were subdivided further by credit lines actually drawn and loan commitments. We found that with regard to drawn credit lines the new approaches resulted in a decline in RWA in all the above exposure categories and subcategories. The only exceptions were exposures to sovereigns and banks. RWA for loan commitments, by contrast, increased in all exposure categories under the new approaches. However, as became evident from bank-internal estimates of loss given default (LGD) and exposure at default (EAD) provided by banks that used the advanced IRB approach in the QIS 3 exercise, increasing the risk weights of loan commitments is basically justified and actually eliminates a weakness of the current Accord.

Having analyzed the effects of the new framework on the individual exposure categories and having learned more about the distribution of the individual exposure categories, we may draw the following conclusion: The markedly lower level of RWA observed for small banks under the new approaches is not primarily due to their size, but rather to the fields of business in which these banks operate. The QIS 3 results provide evidence that a strong concentration on the retail business has a positive effect on the size of the RWA. Chart 5 once again illustrates this relationship for banks applying the standardized approach, and so does chart 6 for IRB banks. The vertical axis shows the share of retail exposures in total exposures, while the horizontal axis reflects the overall change in the RWA, with the standardized approach and the foundation IRB approach each compared with the current Accord. The charts indicate that banks with a high share of retail exposures generally tend to exhibit lower RWA. The trend lines included in the charts additionally underscore this relationship. The variability of the data points is ascribable to the fact that banks reported differing default rates on retail loans. Naturally, these have a pronounced effect on the volume of RWA.

Chart 5

Retail Exposures and Aggregate Result

Under the Standardized Approach

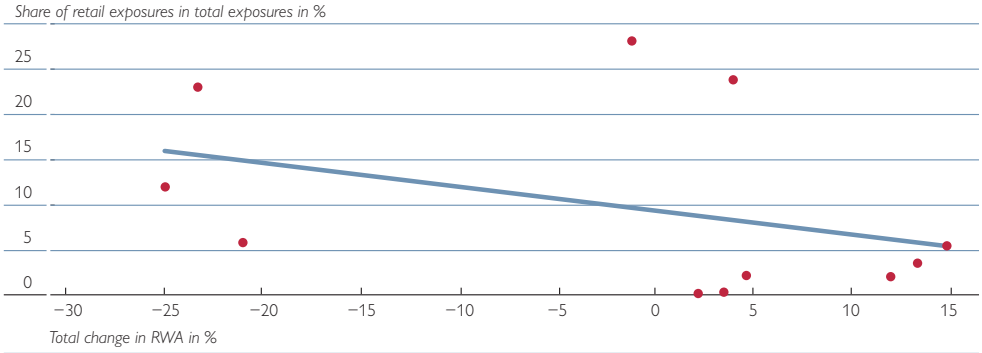


Source: Austrian country report.

Chart 6

Retail Exposures and Aggregate Result

Under the Foundation IRB Approach



Source: Austrian country report.

International Comparison

The QIS 3 exercise has spawned a wealth of country and aggregated reports. Table 4 presents a comparison of the results for Austria, Germany and the G-10 countries. Generally, the international reports show similarities with the Austrian sample. Large banks, i.e. Group 1 banks, exhibit a stronger increase in RWA across all approaches than Group 2 banks. Generally speaking, all banks benefit from the transition to the IRB approach, but again the decline is more pronounced for Group 2 banks than for their Group 1 counterparts. This comparison confirms the conclusions drawn in the previous section. Small banks with a business focus on retail and SME customers benefit from the more favorable capital charges applicable to these categories and are less affected by the rather higher charges for sovereign, bank and specialized lending exposures, as their share in these fields of business is lower. The Austrian results generally lie between those of Group 1 and Group 2 banks. In the absence of any Group 1 bank in Austria, the banks with a business focus other than the retail business obtained results that are chiefly comparable with those of Group 2 banks and thus were responsible for the general result lying between that of Group 1 and Group 2.

Table 4

Change in RWA – International Comparison

	Austria	G-10		Germany	
		Group 1 banks	Group 2 banks	Group 1 banks	Group 2 banks
	%				
Standardized	7	11	3	12	0
FIRB	−2	3	−19	0	−10

Source: Country reports of Germany, G-10, Austria.

However, in analyzing the results, one has to bear in mind that the variability of the individual bank results is enormous. Thus, under the standardized approach, the maximum values obtained for the G-10 sample vary between –15% and +84% for Group 1 banks and between –23% and +81% for Group 2 banks. The EU sample similarly contained values ranging from –7% to +31% and –67% to +81%, respectively. The same applies to the foundation IRB approach, which yielded an across-the-board variability of nearly 100 percentage points; the results are distributed more symmetrically around zero (= no change in RWA) though.

Table 5 shows the change in RWA under the standardized approach, subdivided into the most important exposure categories. Generally, the changes in RWA are largely similar across the different samples. The differences are such that they can be attributed to differences in the recognition of eligible collateral as well as differing measures of default risk, conservative estimates and similar factors. In the Austrian sample, the outlier in the category of sovereign exposures is attributable to the fact that, by comparison, neither the G-10 nor the German result comprised those banks that under the current framework exhibit very low RWA for sovereign exposures or none at all. For this group of banks the change in comparison with the standardized approach is either not defined or very high, but always relates to a very low exposure volume, which in turn results in an overstatement of the effects. In the Austrian country report the sample remained unchanged.

An international comparison of the results obtained for the foundation IRB approach confirms the above-described changes observed for the Austrian sample. Compared with the standardized approach, RWA again decline markedly for retail exposures

Table 5

Change in RWA – Standardized Approach

	Austria	G-10		Germany	
		Group 1 banks	Group 2 banks	Group 1 banks	Group 2 banks
	%				
Corporate	−3	1	−10	1	−10
Sovereign	136	19	1	19	1
Bank	42	43	15	43	15
Retail (total)	−18	−21	−19	−25	−23
Residential	−21	−20	−14	−27	−20
Other retail	−20	−22	−19	−23	−20
SME (total)	−5	−3	−5	−4	−6
thereof: corporate	2	..	..	1	1
retail	−17	..	..	−13	−12

Source: Country reports of Germany, G-10, Austria.

Table 6

Change in RWA – Foundation IRB Approach

	Austria	G-10		Germany	
		Group 1 banks	Group 2 banks	Group 1 banks	Group 2 banks
	%				
Corporate	−22	−9	−27	−9	−27
Sovereign	386	47	51	47	51
Bank	30	45	−5	45	−5
Retail (total)	−35	−47	−54	−45	−44
Residential	−42	−56	−55	−53	−44
Other retail	−35	−34	−27	−34	−26
Qualifying revolving	−24	−3	−33	−7	−33
SME (total)	−2	−14	−17	−15	−17
thereof: corporate	4	..	..	−11	−3
retail	−29	..	..	−26	−24

Source: Country reports of Germany, G-10, Austria.

and, to a somewhat lesser degree, for corporate and SME exposures. Like in the Austrian sample, the cost of capital for bank exposures increases slightly for Group 1 banks and decreases for Group 2 banks. As regards retail exposures, Austria fails to match the high rate of decline in RWA observed especially for G-10 banks under the IRB approach. This might be attributable to the fact that residential mortgage loans are eligible for state guarantees in some countries, which may have resulted in a perceptible reduction in loss given default in comparison with Austria. Moreover, at about 32% of total retail loans, the share of residential mortgage loans reported by Austrian banks was considerably lower than, for instance, the roughly two-thirds reported by German banks.

A conspicuous feature that becomes evident from the data shown in tables 5 and 6 is that Austrian corporate exposures, in comparison with the other samples, benefit perceptibly from the changeover from the standardized to the foundation IRB approach, whereas SME exposures treated as corporate exposures deteriorate slightly against the general trend. For this reason, we analyze the reported credit risk estimates in the corporate and SME categories in more detail below. Table 7 shows the credit risk estimates reported for corporate loans in the individual samples. We see that corporate exposures with a probability of default (PD) of less than 0.2% are substantially higher in the Austrian sample than in the sample of German Group 1 and Group 2 banks. At the same time, the share of exposures with a PD higher than 0.8% is markedly lower at about 17%. In the Austrian sample, the LGD rate (net of reported collateral)

Table 7

Credit Risk Estimates for Corporate Exposures

	PD < 0.2%	0.2% ≤ PD < 0.8%	PD ≥ 0.8%	Defaulted	LGD
	%				
Austria	53	26	17	4	43
Group 1 banks					
Germany	38	24	34	4	48
G-10	42	30	25	3	40
Group 2 banks					
Germany	38	36	23	3	48
G-10	58	21	17	3	40

Source: Country reports of Germany, G-10, Austria.

Table 8

Credit Risk Estimates for SME Exposures (Treated as Corporates)

	PD < 0.2%	0.2% ≤ PD < 0.8%	PD ≥ 0.8%	Defaulted	LGD
	%				
Austria	13.5	34.9	45.6	5.9	42.7

Source: Austrian country report.

is shown at 43%, which puts it between the German and the G-10 samples. Since the correlation between LGD and the capital requirement is linear, i.e. a 1% increment of LGD translates into a 1% increase of the capital requirement, higher RWA ensue in comparison with the G-10, and lower ones in comparison with Germany.

Unfortunately, the reports on the QIS 3 results published to date fail to show the results for SME exposures in as much detail as for corporate exposures. In analogy to table 7, table 8 presents a breakdown for the SME category. A striking feature is the markedly poorer credit risk assessments, which appear justified given the high percentage of defaulted loans. As the LGD rate is only minimally below that for corporate exposures, the higher average default risk is not canceled out by a higher degree of collateralization, which probably explains the higher RWA for SME exposures under the foundation IRB approach.

Conclusions

In this analysis, we have attempted to distill the most important insights to be gained from the wealth of available data. The high degree of consistency in the changes in RWA and hence of the cost of capital in the different exposure categories across all approaches and groups of banks may be interpreted as evidence of the generally high quality of the reported data and the computed results. Nevertheless, the high degree of variability of the microlevel results also shows that some of the methods have not yet been developed to perfection. After all, the study was carried out about four years ahead of the full implementation of the Basel II framework. The capital ratios of the banks that provided the data for the Austrian QIS 3 continue to exceed the regulatory minimum capital requirement of 8% by a wide margin. Under the standardized approach, total RWA of the 18 banks included in the Austrian sample increased by 6.6% on average, whereas the foundation IRB approach applied by 11 banks resulted in a decrease by 1.8% in comparison with the current framework. Banks focusing on retail business, i.e. mostly smaller institutions, generally exhibit lower RWA under the new approaches and also benefit more perceptibly from switching to more advanced IRB approaches. Banks operating primarily in areas that carry higher risk will have to apply comparatively higher capital charges under the new, more risk-sensitive approaches. However, the new framework offers greater scope for applying credit risk mitigating techniques, allowing banks to reduce risk and thus to achieve substantial reductions in capital costs on some exposures. The QIS 3 data was not conclusive in this respect, which is why the volume of RWA may well be overstated in the results. Moreover, as regards corporate exposures, special note must be made of the fact that most data relate to a period characterized by higher default rates. In addi-

tion, Austrian banks took a very conservative stance when interpreting the default criterion under the new framework, which is not yet in general use throughout the banking sector.

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