HSBC HOLDINGS PLC
Form 6-K
February 22, 2016

FORM 6-K

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Report of Foreign Private Issuer

Pursuant to Rule 13a - 16 or 15d - 16 of

the Securities Exchange Act of 1934

For the month of February
HSBC Holdings plc

42nd Floor, 8 Canada Square, London E14 5HQ, England

(Indicate by check mark whether the registrant files or will file annual reports under cover of Form 20-F or Form 40-F).

Form 20-F X Form 40-F .....

(Indicate by check mark whether the registrant by furnishing the information contained in this Form is also thereby furnishing the information to the Commission pursuant to Rule 12g3-2(b) under the Securities Exchange Act of 1934).

Yes..... No X

(If "Yes" is marked, indicate below the file number assigned to the registrant in connection with Rule 12g3-2(b): 82-.....).

Credit risk

Overview and responsibilities

Credit risk represents our largest regulatory capital requirement.

The principal objectives of our credit risk management function are:
· to maintain across HSBC a strong culture of responsible lending and a robust

credit risk policy and control framework;
· to both partner and challenge our businesses in defining, implementing and continually re-evaluating our credit risk appetite under actual and stress scenario conditions; and
· to ensure there is independent, expert scrutiny of credit risks, their costs and their mitigation.

The credit risk functions within Wholesale Credit and Market Risk and RBWM are the constituent parts of Global Risk that support the Group Chief Risk Officer in overseeing credit risks at the highest level. For this, their major duties comprise undertaking independent reviews of large and high-risk credit proposals, overseeing large exposure policy and reporting on our wholesale and retail credit risk management disciplines, owning our credit policy and credit systems programmes, overseeing portfolio management and reporting on risk matters to senior executive management and to regulators.

These credit risk functions work closely with other parts of Global Risk, for example with Security and Fraud Risk on the enhancement of protection against retail product fraud, with Operational Risk on the internal control framework and with Risk Strategy on the risk appetite process. In addition, they work jointly with Risk Strategy and Global Finance on stress testing.

The credit responsibilities of Global Risk are described on page 195 of the Annual Report and Accounts 2015.

Group-wide, the credit risk functions comprise a network of credit risk management offices reporting within regional, integrated risk functions. They fulfil an essential role as independent risk control units distinct from business line management in providing objective scrutiny of risk rating assessments, credit proposals for approval and other risk matters.

Credit risk operates through a hierarchy of personal credit limit approval authorities, not committee structures. Operating company chief executives, acting under authorities delegated by their boards and Group standards, are accountable for credit risk and other risks in their business. In turn, chief executives delegate authority to operating company chief risk officers and management teams on an individual basis. Each operating company is responsible for the quality and performance of its credit portfolios, and for monitoring and controlling all credit risks in those portfolios in accordance with Group standards. Above these thresholds of delegated personal credit limited approval authorities, approval or concurrence must be sought from the regional and, as appropriate, global credit risk function before facilities are advised to the customer.

Moreover, risk proposals in certain portfolios - sovereign obligors, banks, some non-bank financial institutions and intra-Group exposures - are approved centrally in Global Risk to facilitate efficient control and the reporting of regulatory large and cross-border exposures.

Credit risk management

Our exposure to credit risk arises from a wide range of customer and product types, and the risk rating systems in place to measure and monitor these risks are correspondingly diverse. Each major subsidiary typically has some exposures across this range, and requirements may differ according to the jurisdictions in which it operates.

Credit risk exposures are generally measured and managed in portfolios of either customer types or product categories. Risk rating systems are designed to assess the default propensity of, and loss severity associated with, distinct customers who are typically managed as individual relationships or, in the case of retail business exposures,

on a product portfolio basis.

Risk rating systems for retail exposures are generally quantitative in nature, applying techniques such as behavioural analysis across product portfolios comprising large numbers of homogeneous transactions. Rating systems for individually managed relationships typically use customer financial statements and market data analysis, but also qualitative elements and a final subjective overlay to better reflect any idiosyncratic elements of the customer's risk profile. See 'Application of the IRB Approach' on page 46.

Whatever the nature of the exposure, a fundamental principle of our policy and approach is that analytical risk rating systems and scorecards are all valuable tools at the disposal of management, informing judgemental decisions for which individual approvers are ultimately accountable.

In the case of automated decision-making processes, as used in retail credit origination where risk decisions may be taken 'at the point of sale' with no management intervention, that accountability rests with those responsible for the parameters built into those processes/systems and the governance and controls surrounding their use.

The credit process provides for at least an annual review of facility limits granted. Review may be more frequent, as required by circumstances such as the emergence of adverse risk factors, and any consequent amendments to risk ratings must be promptly implemented.

We constantly seek to improve the quality of our risk management. For central management and reporting purposes, Group IT systems are deployed to process credit risk data. A central database is used which covers substantially all of our direct lending exposures and holds the output of risk rating systems Group-wide. This continues to be enhanced in order to deliver both comprehensive management information in support of business strategy and solutions to evolving regulatory reporting requirements. The latter continue to present major challenges in view of the number and scope of concurrent initiatives, requiring more frequent and faster provision of regulatory, risk and financial data at an increasingly granular level. Given the global nature of our business we typically need to generate this granular information both at local and Group level, but often in materially different ways. The new stress testing and G-SIB reporting requirements are prime examples of significant data requirements and related processes that are in the process of being embedded into existing or enhanced systems architecture at various levels in the Group.

Group standards govern the process through which risk rating systems are initially developed, judged fit for purpose, approved and implemented. They also govern the conditions under which analytical risk model outcomes can be over-ridden by decision-takers and the process of model performance monitoring and reporting. The emphasis is on an effective dialogue between business line and risk management, suitable independence of decision-takers, and a good understanding and robust challenge on the part of senior management.

Like other facets of risk management, analytical risk rating systems are not static and are subject to review and modification in light of the changing environment, the greater availability and quality of data and any deficiencies identified through internal and external regulatory review. Structured processes and metrics are in place to capture relevant data and feed this into continuous model improvement. See also the comments on 'Model performance' on page 66.

Credit risk models governance

All new or materially changed IRB capital models require the PRA's approval, as set out in more detail on page 46, and throughout HSBC such models fall directly under the remit of the global functional MOCs. Additionally, the global functional MOCs are responsible for the approval of stress testing models used for regulatory stress testing exercises such as those carried out by the EBA and the Bank of England.

The global functional MOCs are responsible for defining the thresholds above which models require their approval, supporting both internal governance and the PRA approval process, for example if they cover exposures generating credit risk capital requirements exceeding a prescribed threshold or are otherwise deemed material on grounds of risk, portfolio size, or business type.

Wholesale MOC requires all credit risk models for which it is responsible to be approved by delegated senior managers with notification to the committee which retains the responsibility for oversight. RBWM MOC applies different thresholds for approval at the committee depending on model type. For models falling below these thresholds final approval is delegated to regional committees or Regional Heads of RBWM Risk. Where approval has been delegated the RBWM MOC is kept notified of any material model decisions and issues.

The RBWM MOC model materiality thresholds are:

- all new IRB models as part of the IRB roll-out from standardised to advanced approach;
- existing IRB models exceeding, or estimated to exceed, $2bn in RWAs;
- all significant changes to approved IRB models which will require notification to the PRA prior to implementation;
- stress testing models being used in portfolios with EAD exceeding $20bn for secured lending and $5bn for unsecured lending;
- application models with annual proposed value of new business sourced through the model exceeding $2bn for secured lending and $0.5bn for unsecured lending;
- behavioural models that are used to inform globally material IRB or provisioning models; and
- provisioning models (IAS 39 and IFRS 9) used in portfolios with loan impairment charges exceeding $100m or EAD exceeding $20bn for secured lending and $5bn for unsecured lending.

Global Risk utilises HSBC standards for the development, validation, independent review, approval, implementation and performance monitoring of credit risk rating models, and oversight of respective local standards for local models. All models are reviewed as frequently as the need arises, but at least annually.

Compliance with Group standards is subject to examination both by Risk oversight and review from within the Risk function itself, and by Internal Audit. While the standards set out minimum general requirements, Global Risk has discretion to approve dispensations on an exceptional basis, and fosters best practice between offices.

The following tables set out credit risk exposure values, RWAs and regulatory capital requirements calculated at 8% of RWAs. Table 22 presents exposure values analysed across geographical regions and tables 23 and 24,

respectively, RWAs and RWA density by geographical region. Exposure values are allocated to a region based on the country of incorporation of the HSBC subsidiary or associate where the exposure was originated. In table 25, allocation to industry sectors is based on the Standard Industrial Classification codes. Table 26 shows exposures by period outstanding from the reporting date to the maturity date. The full exposure value is allocated to a residual maturity band based on the contractual end date.

In these tables, and in others in the Credit Risk section of this document unless stated otherwise, the data is presented according to a 'guarantor view', i.e. assigning exposures to the exposure class of the protection provider where applicable. This is to align our disclosure with our supervisory reporting.

Table 21: Credit risk - summary

	Exposure value $bn	Average exposure value4 $bn	RWAs $bn	Capital required $bn
IRB advanced approach	1,510.8	1,564.0	515.8	41.3
Retail:				
- secured by mortgages on immovable property SME	2.9	3.0	0.6	-
- secured by mortgages on immovable property non-SME	275.4	283.0	60.0	4.8
- qualifying revolving retail	67.8	67.0	15.3	1.2
- other SME	12.1	12.9	5.8	0.5
- other non-SME	46.3	46.5	11.5	0.9
- total retail	404.5	412.4	93.2	7.4
- central governments and central banks	327.4	331.8	49.4	4.0
- institutions	90.5	114.3	18.4	1.5
- corporates1	597.3	617.0	314.3	25.1
- securitisation positions	40.9	36.6	28.4	2.3
- non-credit obligation assets	50.2	51.9	12.1	1.0
IRB foundation approach	43.7	36.2	27.4	2.2
- central governments and central banks	0.1	0.1	-	-
- institutions	0.3	0.2	0.2	-
- corporates	43.3	35.9	27.2	2.2
Standardised approach	592.0	592.3	332.7	26.6
- central governments and central banks	199.9	194.5	20.0	1.6
- institutions	38.9	34.2	14.7	1.2
- corporates	226.4	234.3	210.6	16.8
- retail	44.2	45.7	32.5	2.6
- secured by mortgages on immovable property	40.3	39.4	14.4	1.2
- exposures in default	4.9	4.6	6.4	0.5
- regional governments or local authorities	2.8	1.9	1.0	0.1
- equity2	7.0	9.1	12.2	1.0

- items associated with particularly high risk	4.4	4.4	6.6	0.5
- securitisation positions	0.7	0.6	0.7	0.1
- claims in the form of CIU	0.5	0.6	0.5	-
- international organisations	2.6	2.9	-	-
- other items	19.4	20.1	13.1	1.0
At 31 December 2015	2,146.5	2,192.5	875.9	70.1
IRB advanced approach	1,593.8	1,679.5	581.6	46.5
Retail:				
- secured by mortgages on immovable property SME	3.1	2.6	0.6	-
- secured by mortgages on immovable property non-SME	288.9	302.8	71.6	5.7
- qualifying revolving retail	66.2	66.6	15.3	1.2
- other SME	13.9	15.9	6.2	0.5
- other non-SME	47.3	46.8	12.4	1.0
- total retail	419.4	434.7	106.1	8.4
- central governments and central banks	327.4	332.1	54.1	4.3
- institutions	130.4	139.0	38.7	3.1
- corporates1	625.8	675.0	328.5	26.3
- securitisation positions	38.3	42.4	40.7	3.3
- non-credit obligation assets	52.5	56.3	13.5	1.1
IRB foundation approach	25.8	24.7	16.8	1.3
- central governments and central banks	0.1	0.1	-	-
- institutions	0.1	-	-	-
- corporates	25.6	24.6	16.8	1.3
Standardised approach	590.5	606.5	356.9	28.6
- central governments and central banks	189.3	207.7	19.7	1.6
- institutions	30.1	34.2	11.2	0.9
- corporates	240.1	235.3	224.7	18.0
- retail	47.9	46.6	35.2	2.8
- secured by mortgages on immovable property	38.6	42.0	13.8	1.1
- exposures in default	4.7	5.6	6.1	0.5
- regional governments or local authorities	1.1	1.1	0.6	-
- equity2	13.2	5.8	26.9	2.2
- other3	25.5	28.2	18.7	1.5
At 31 December 2014	2,210.1	2,310.7	955.3	76.4

1 Corporates includes specialised lending exposures subject to supervisory slotting approach of $24.9bn (2014: $30.5bn) and RWAs of $18.2bn (2014: $23.0bn).

2 This includes investment in Insurance companies which are risk weighted at 250%.

3 In 2014, this included the exposure class 'Other items' with an exposure value of $17.0bn, average exposure value of $19.7bn and RWAs of $11.3bn as well as other less material standardised exposure classes not individually shown

above. In 2015, all exposure classes are disclosed separately.
4 Average exposures are calculated by aggregating exposure value of the last five quarters and dividing by five to get the average.

Table 22: Credit risk exposure - by region

	Exposure value						
	Europe $bn	Asia $bn	MENA $bn	North America $bn	Latin America $bn	Total $bn	RWAs $bn
IRB advanced approach	543.7	659.5	23.7	261.4	22.5	1,510.8	515.8
Retail:							
- secured by mortgages on immovable property SME	2.0	0.6	-	0.3	-	2.9	0.6
- secured by mortgages on immovable property non-SME	136.7	88.6	-	50.1	-	275.4	60.0
- qualifying revolving retail	33.2	30.6	-	4.0	-	67.8	15.3
- other SME	11.6	0.1	-	0.4	-	12.1	5.8
- other non-SME	34.3	6.5	-	5.5	-	46.3	11.5
- total retail	217.8	126.4	-	60.3	-	404.5	93.2
- central governments and central banks	38.7	189.3	15.9	66.1	17.4	327.4	49.4
- institutions	26.2	52.4	0.9	9.0	2.0	90.5	18.4
- corporates 1	215.4	254.4	6.1	120.8	0.6	597.3	314.3
- securitisation positions	36.9	0.3	-	3.7	-	40.9	28.4
- non-credit obligation assets	8.7	36.7	0.8	1.5	2.5	50.2	12.1
IRB foundation approach	27.7	-	16.0	-	-	43.7	27.4
- central governments and central banks	-	-	0.1	-	-	0.1	-
- institutions	-	-	0.3	-	-	0.3	0.2
- corporates	27.7	-	15.6	-	-	43.3	27.2
Standardised approach	172.0	302.0	43.6	30.8	43.6	592.0	332.7
- central governments and central banks	121.8	65.9	4.8	5.3	2.1	199.9	20.0
- institutions	0.2	36.6	2.0	0.1	-	38.9	14.7
- corporates	27.2	132.2	23.8	18.6	24.6	226.4	210.6
- retail	4.9	21.6	6.1	1.7	9.9	44.2	32.5
- secured by mortgages on immovable property	5.7	27.3	3.0	1.0	3.3	40.3	14.4
- exposures in default	1.2	0.4	0.9	0.8	1.6	4.9	6.4
- regional governments or local authorities	-	-	2.1	-	0.7	2.8	1.0
- equity2	2.0	2.8	0.2	1.5	0.5	7.0	12.2
- items associated with particularly high risk	2.7	-	0.1	1.0	0.6	4.4	6.6
- securitisation positions	-	0.7	-	-	-	0.7	0.7

- claims in the form of CIU	0.3	-	0.2	-	-	0.5	0.5
- international organisations	2.6	-	-	-	-	2.6	-
- other items	3.4	14.5	0.4	0.8	0.3	19.4	13.1
At 31 December 2015	743.4	961.5	83.3	292.2	66.1	2,146.5	875.9
IRB advanced approach	592.6	649.7	29.3	292.5	29.7	1,593.8	581.6
Retail:							
- secured by mortgages on immovable property SME	2.4	0.7	-	-	-	3.1	0.6
- secured by mortgages on immovable property non-SME	144.1	88.2	-	56.6	-	288.9	71.6
- qualifying revolving retail	34.9	27.3	-	4.0	-	66.2	15.3
- other SME	13.2	0.1	-	0.6	-	13.9	6.2
- other non-SME	34.6	6.0	-	6.7	-	47.3	12.4
- total retail	229.2	122.3	-	67.9	-	419.4	106.1
- central governments and central banks	37.4	166.0	19.3	81.4	23.3	327.4	54.1
- institutions	32.8	74.0	8.8	11.7	3.1	130.4	38.7
- corporates 1	247.7	250.8	0.4	126.9	-	625.8	328.5
- securitisation positions	34.9	0.4	-	3.0	-	38.3	40.7
- non-credit obligation assets	10.6	36.2	0.8	1.6	3.3	52.5	13.5
IRB foundation approach	19.2	-	6.6	-	-	25.8	16.8
- central governments and central banks	-	-	0.1	-	-	0.1	-
- institutions	0.1	-	-	-	-	0.1	-
- corporates	19.1	-	6.5	-	-	25.6	16.8
Standardised approach	177.6	279.0	49.1	27.5	57.3	590.5	356.9
- central governments and central banks	127.0	50.3	4.9	5.2	1.9	189.3	19.7
- institutions	0.2	28.6	1.3	-	-	30.1	11.2
- corporates	25.8	132.9	31.6	15.2	34.6	240.1	224.7
- retail	5.8	22.2	5.7	1.9	12.3	47.9	35.2
- secured by mortgages on immovable property	5.9	24.1	3.1	1.0	4.5	38.6	13.8
- exposures in default	1.1	0.3	1.2	0.6	1.5	4.7	6.1
- regional governments or local authorities	-	-	0.3	-	0.8	1.1	0.6
- equity2	2.4	8.1	0.2	1.9	0.6	13.2	26.9
- other3	9.4	12.5	0.8	1.7	1.1	25.5	18.7
At 31 December 2014	789.4	928.7	85.0	320.0	87.0	2,210.1	955.3

For footnotes, see page 36.

Key points

· The total Credit risk exposure value has decreased by $63.6bn over the year. Overall foreign exchange movements have decreased exposure value by $110.3bn across approaches.
· Exposures in Retail secured by mortgages on immovable property non-SME have reduced under the IRB advanced approach. The movement on a constant currency basis across approaches is insignificant, there are offsetting movements between Asia and North America. There is continued growth in mortgage lending within Asia, offset by a decrease in North America due to continued US run-offs and disposals in the US CML portfolio.
· In Asia, exposures to institutions decreased as a result of reduced balances with correspondent banks, money market term placements and debt securities.
· A change in EEA equivalence rules resulted in a reclassification of some exposures from institutions to corporates.
· Corporate exposures have decreased under both the IRB advanced and standardised approaches due to foreign exchange movements. This is offset by an increase largely from growth in term lending to corporate customers within Asia.
· Standardised institution exposures increase is mainly driven by BoCom resulting from growth in treasury bills, other eligible bills and debt securities.
· Equity exposures under the standardised approach decreased in Asia as a result of the partial sale of our investment in Industrial Bank.

Table 23: Credit risk - RWAs by region

	RWAs					
	Europe $bn	Asia $bn	MENA $bn	North America $bn	Latin America $bn	Total $bn
IRB advanced approach	175.1	195.9	9.5	122.5	12.8	515.8
Retail:						
- secured by mortgages on immovable property SME	0.5	-	-	0.1	-	0.6
- secured by mortgages on immovable property non-SME	7.5	12.5	-	40.0	-	60.0
- qualifying revolving retail	6.1	8.0	-	1.2	-	15.3
- other SME	5.6	-	-	0.2	-	5.8
- other non-SME	5.5	1.3	-	4.7	-	11.5
- total retail	25.2	21.8	-	46.2	-	93.2
- central governments and central banks	5.2	19.2	6.9	8.5	9.6	49.4
- institutions	4.8	9.0	0.2	2.5	1.9	18.4
- corporates1	107.7	140.4	2.1	63.8	0.3	314.3
- securitisation positions	27.9	0.1	-	0.4	-	28.4
- non-credit obligation assets	4.3	5.4	0.3	1.1	1.0	12.1
IRB foundation approach	17.5	-	9.9	-	-	27.4
- central governments and central banks	-	-	-	-	-	-
- institutions	-	-	0.2	-	-	0.2
- corporates	17.5	-	9.7	-	-	27.2

Standardised approach	46.8	177.7	32.0	33.9	42.3	332.7
- central governments and central banks	2.6	3.0	0.6	9.3	4.5	20.0
- institutions	0.1	13.7	0.8	0.1	-	14.7
- corporates	27.0	117.9	22.4	18.3	25.0	210.6
- retail	3.5	16.2	4.5	1.2	7.1	32.5
- secured by mortgages on immovable property	2.2	9.5	1.1	0.4	1.2	14.4
- exposures in default	1.5	0.5	1.2	1.2	2.0	6.4
- regional governments or local authorities	-	-	0.5	-	0.5	1.0
- equity2	4.2	5.5	0.2	1.5	0.8	12.2
- items associated with particularly high risk	4.0	-	0.2	1.5	0.9	6.6
- securitisation positions	-	0.6	-	-	0.1	0.7
- claims in the form of CIU	0.3	-	0.2	-	-	0.5
- international organisations	-	-	-	-	-	-
- other items	1.4	10.8	0.3	0.4	0.2	13.1
	239.4	373.6	51.4	156.4	55.1	875.9
At 31 December 2015	239.4	373.6	51.4	156.4	55.1	875.9

	RWAs					
	Europe $bn	Asia $bn	MENA $bn	North America $bn	Latin America $bn	Total $bn
IRB advanced approach	203.3	213.1	11.6	142.0	11.6	581.6
Retail:						
- secured by mortgages on immovable property SME	0.6	-	-	-	-	0.6
- secured by mortgages on immovable property non-SME	8.0	9.3	-	54.3	-	71.6
- qualifying revolving retail	6.9	7.1	-	1.3	-	15.3
- other SME	5.9	-	-	0.3	-	6.2
- other non-SME	5.7	1.3	-	5.4	-	12.4
- total retail	27.1	17.7	-	61.3	-	106.1
- central governments and central banks	5.8	23.4	8.9	7.9	8.1	54.1
- institutions	12.4	18.8	2.4	3.0	2.1	38.7
- corporates1	112.5	147.8	-	68.2	-	328.5
- securitisation positions	40.1	0.2	-	0.4	-	40.7
- non-credit obligation assets	5.4	5.2	0.3	1.2	1.4	13.5
IRB foundation approach	12.8	-	4.0	-	-	16.8
- central governments and central banks	-	-	-	-	-	-
- institutions	-	-	-	-	-	-

- corporates	12.8	-	4.0	-	-	16.8
Standardised approach	47.1	186.0	39.0	29.6	55.2	356.9
- central governments and central banks	3.3	2.7	0.5	8.9	4.3	19.7
- institutions	0.2	10.4	0.6	-	-	11.2
- corporates	25.2	119.2	30.0	15.2	35.1	224.7
- retail	4.2	16.7	4.3	1.3	8.7	35.2
- secured by mortgages on immovable property	2.1	8.4	1.3	0.4	1.6	13.8
- exposures in default	1.4	0.5	1.4	0.8	2.0	6.1
- regional governments or local authorities	-	-	-	-	0.6	0.6
- equity2	4.6	19.1	0.3	1.9	1.0	26.9
- other3	6.1	9.0	0.6	1.1	1.9	18.7
At 31 December 2014	263.2	399.1	54.6	171.6	66.8	955.3

For footnotes, see page 36.

Key points

· See commentary on RWA movement for IRB and Standardised on pages 24 and 22, respectively.

Table 24: Credit risk - RWA density by region

	RWA density					
	Europe %	Asia %	MENA %	North America %	Latin America %	Total %
IRB advanced approach	32	30	40	47	57	34
Retail:						
- secured by mortgages on immovable property SME1	24	-	-	32	-	21
- secured by mortgages on immovable property non-SME	5	14	-	80	-	22
- qualifying revolving retail	18	26	-	29	-	23
- other SME	48	-	-	46	-	48
- other non-SME	16	20	-	86	-	25
- total retail	12	17	-	77	-	23
- central governments and central banks	13	10	44	13	56	15

- institutions	18	17	19	28	96	20
- corporates1	50	55	34	53	44	53
- securitisation positions	77	45	-	10	-	70
- non-credit obligation assets	50	15	43	69	39	24
IRB foundation approach	63	-	62	-	-	63
- central governments and central banks	-	-	-	-	-	-
- institutions	-	-	53	-	-	53
- corporates	63	-	62	-	-	63
Standardised approach	27	59	74	110	97	56
- central governments and central banks	2	4	12	176	216	10
- institutions	81	37	40	67	-	38
- corporates	99	89	95	98	101	93
- retail	71	75	75	72	71	74
- secured by mortgages on immovable property	39	35	35	42	36	36
- exposures in default	127	128	127	145	129	131
- regional governments or local authorities	-	-	25	-	67	35
- equity2	205	194	129	100	171	174
- items associated with particularly high risk	150	-	150	150	150	150
- securitisation positions	-	87	-	-	-	104
- claims in the form of CIU	100	-	100	-	-	100
- international organisations	-	-	-	-	-	-
- other items	41	74	65	51	90	67
At 31 December 2015	32	39	62	54	83	41

	RWA density					
	Europe %	Asia %	MENA %	North America %	Latin America %	Total %
IRB advanced approach	34	33	40	49	39	36
Retail:						
- secured by mortgages on immovable property SME	24	-	-	-	-	21
- secured by mortgages on immovable property non-SME	6	10	-	96	-	25
- qualifying revolving retail	20	26	-	31	-	23
- other SME	45	-	-	50	-	45
- other non-SME	17	22	-	80	-	26
- total retail	12	14	-	90	-	25
	16	14	46	10	35	17

- central governments and central banks						
- institutions	38	25	28	26	67	30
- corporates1	45	59	-	54	-	52
- securitisation positions	115	46	-	12	-	106
- non-credit obligation assets	51	14	40	77	41	26
IRB foundation approach	67	-	60	-	-	65
- central governments and central banks	-	-	-	-	-	-
- institutions	-	-	-	-	-	-
- corporates	67	-	60	-	-	65
Standardised approach	27	67	79	108	96	60
- central governments and central banks	3	5	10	174	226	10
- institutions	76	37	43	-	-	37
- corporates	98	90	95	99	102	94
- retail	72	75	75	72	71	74
- secured by mortgages on immovable property	36	35	41	36	37	36
- exposures in default	126	128	118	143	134	129
- regional governments or local authorities	-	-	-	-	72	57
- equity2	192	236	126	100	172	204
- other3	65	72	89	64	160	74
At 31 December 2014	33	43	64	54	77	43

For footnotes, see page 36.

Key points

· Higher IRB density in Latin America resulted from higher risk weights applied to institutional exposures as a result of Brazil's CRR downgrades. Additionally the corporate IRB exposure density increased due to migration of a Project Finance portfolio from standardised to IRB approach.

· North America Retail IRB density has improved as a result of disposals and continued run-off of the US CML retail mortgage portfolio.

· A change in EEA equivalence rules resulted in a reclassification of some exposures from institutions to corporates with a corresponding decrease in institutions RWA density under IRB approach.

· Reduction in securitisation density is primarily the result of the disposal of highly risk weighted positions and a newly issued HSBC synthetic securitisation carrying a lower risk-weight in Europe.

· The decrease in RWA density in Asia equity exposure class results from the sale of our investment in Industrial Bank.

Table 25: Credit risk exposure - by industry sector

	Exposure value								
	Personal $bn	Manu-facturing $bn	Inter-national trade and services $bn	Property and other business activities $bn	Government and public administration $bn	Other commercial $bn	Financial $bn	Non-customer assets $bn	Total $bn
IRB advanced approach	390.2	125.3	136.6	158.7	137.3	87.3	425.2	50.2	1,510.8
Retail:									
- secured by mortgages on immovable property SME	0.5	-	0.1	2.3	-	-	-	-	2.9
- secured by mortgages on immovable property non-SME	275.4	-	-	-	-	-	-	-	275.4
- qualifying revolving retail	67.8	-	-	-	-	-	-	-	67.8
- other SME	-	0.4	1.0	10.0	0.1	0.5	0.1	-	12.1
- other non-SME	46.1	-	-	-	0.2	-	-	-	46.3
- total retail	389.8	0.4	1.1	12.3	0.3	0.5	0.1	-	404.5
- central governments and central banks	-	-	0.1	-	119.9	-	207.4	-	327.4
- institutions	-	-	-	-	0.8	0.1	89.6	-	90.5
- corporates1	0.4	124.9	135.4	146.4	16.3	86.7	87.2	-	597.3
- securitisation positions	-	-	-	-	-	-	40.9	-	40.9
- non-credit obligation assets	-	-	-	-	-	-	-	50.2	50.2
IRB foundation approach	-	11.9	10.6	8.3	0.7	7.9	4.3	-	43.7
- central governments and central banks	-	-	-	-	-	-	0.1	-	0.1
- institutions	-	-	-	-	-	-	0.3	-	0.3
- corporates	-	11.9	10.6	8.3	0.7	7.9	3.9	-	43.3
Standardised approach	83.5	57.9	45.4	49.8	97.2	41.8	201.9	14.5	592.0
- central governments or central banks	-	0.1	-	-	70.2	-	121.9	7.7	199.9
- institutions	-	-	-	-	-	-	38.9	-	38.9
- corporates	1.5	56.2	43.5	46.1	21.9	40.2	17.0	-	226.4

- retail	40.8	0.6	1.0	1.2	0.1	0.3	0.2	-	44.2
- secured by mortgages on immovable property	39.7	0.1	-	0.4	-	0.1	-	-	40.3
- exposures in default	1.5	0.9	0.8	0.8	0.1	0.7	0.1	-	4.9
- regional governments or local authorities	-	-	-	-	2.3	-	0.5	-	2.8
- equity 2	-	-	-	0.1	-	-	3.4	3.5	7.0
- items associated with particularly high risk	-	-	0.1	1.1	-	0.5	2.7	-	4.4
- securitisation positions	-	-	-	-	-	-	0.7	-	0.7
- claims in the form of CIU	-	-	-	-	-	-	0.5	-	0.5
- international organisations	-	-	-	-	2.6	-	-	-	2.6
- other items	-	-	-	0.1	-	-	16.0	3.3	19.4
	473.7	195.1					630.9	64.2	2,145.9
At 31 December 2015	473.7	195.1	192.6	216.8	235.2	137.0	631.4	64.2	2,146.5

	Exposure value								
	Personal $bn	Manu-facturing $bn	International trade and services $bn	Property and other business activities $bn	Government and public administration $bn	Other commercial $bn	Financial $bn	Non-customer assets $bn	Total $bn
IRB advanced approach	404.2	140.4	149.2	181.1	113.1	88.4	464.9	52.5	1,593.8
Retail:									
- secured by mortgages on immovable property SME	0.5	-	0.2	2.4	-	-	-	-	3.1
- secured by mortgages on immovable property non-SME	288.7	-	-	0.1	-	-	0.1	-	288.9

- qualifying revolving retail	66.2	-	-	-	-	-	-	66.2
- other SME	-	0.9	2.5	7.3	0.8	2.1	0.3	13.9
- other non-SME	47.1	-	-	-	0.2	-	-	47.3
- total retail	402.5	0.9	2.7	9.8	1.0	2.1	0.4	419.4
- central governments and central banks	-	-	0.1	-	94.7	-	232.6	327.4
- institutions	-	-	-	-	0.7	-	129.7	130.4
- corporates1	1.7	139.5	146.4	171.3	16.7	86.3	63.9	625.8
- securitisation positions	-	-	-	-	-	-	38.3	38.3
- non-credit obligation assets	-	-	-	-	-	-	-	52.5 52.5
IRB foundation approach	0.2	8.9	6.0	1.5	0.5	4.9	3.8	25.8
- central governments and central banks	-	-	-	-	-	-	0.1	0.1
- institutions	-	-	-	-	-	-	0.1	0.1
- corporates	0.2	8.9	6.0	1.5	0.5	4.9	3.6	25.6
Standardised approach	88.0	63.0	52.0	46.2	89.0	44.0	187.7	20.5 590.5
- central governments or central banks	-	-	-	-	62.4	-	119.3	7.6 189.3
- institutions	-	-	-	-	-	-	30.1	30.1
- corporates	5.4	61.6	49.4	42.3	22.2	41.9	17.3	240.1
- retail	43.9	0.7	1.5	1.0	0.2	0.4	0.2	47.9
- secured by mortgages on immovable property	36.8	0.1	0.1	1.5	-	0.1	-	38.6
- exposures in default	1.9	0.6	0.8	0.6	0.1	0.6	0.1	4.7
- regional governments or local authorities	-	-	-	-	0.8	-	0.3	1.1
- equity2	-	-	-	0.4	-	-	3.8	9.0 13.2
- other3	-	-	0.2	0.4	3.3	1.0	16.6	4.0 25.5
At 31 December 2014	492.4	212.3	207.2	228.8	202.6	137.3	656.4	73.1 2,210.1

For footnotes, see page 36.

Key points
· There is an overall decrease in manufacturing sector exposures. The decrease is primarily in the North America region resulting from client facility reductions driven by RWA initiatives.
· A decrease International trade and services is driven mainly by the reduced exposures in telecommunications, energy and large food retailers in Europe following a reduction in collateralised exposures.
· The increase in Government and public administration sector is due to a rise in treasury bills and government debt securities in Asia.

Table 26: Credit risk exposure - by residual maturity

	Exposure value					
	Less than 1 year $bn	Between 1 and 5 years $bn	More than 5 years $bn	Undated $bn	Total $bn	RWAs $bn
IRB advanced approach	654.2	376.1	430.4	50.1	1,510.8	515.8
Retail:						
- secured by mortgages on immovable property SME	0.2	0.4	2.3	-	2.9	0.6
- secured by mortgages on immovable property non-SME	2.4	4.2	268.8	-	275.4	60.0
- qualifying revolving retail	67.8	-	-	-	67.8	15.3
- other SME	2.4	6.4	3.3	-	12.1	5.8
- other non-SME	13.9	12.8	19.6	-	46.3	11.5
- total retail	86.7	23.8	294.0	-	404.5	93.2
- central governments and central banks	200.9	75.6	50.9	-	327.4	49.4
- institutions	66.9	20.1	3.5	-	90.5	18.4
- corporates1	289.8	246.0	61.5	-	597.3	314.3
- securitisation positions	9.9	10.5	20.5	-	40.9	28.4
- non-credit obligation assets	-	0.1	-	50.1	50.2	12.1
IRB foundation approach	20.0	19.1	4.6	-	43.7	27.4
- central governments and central banks	-	-	0.1	-	0.1	-
- institutions	0.1	0.2	-	-	0.3	0.2
- corporates	19.9	18.9	4.5	-	43.3	27.2
Standardised approach	230.0	207.5	120.8	33.7	592.0	332.7
- central governments and central banks	126.2	48.0	18.0	7.7	199.9	20.0
- institutions	22.4	0.5	16.0	-	38.9	14.7
- corporates	60.1	136.7	29.6	-	226.4	210.6

- retail	11.9	14.1	18.2	-	44.2	32.5
- secured by mortgages on immovable property	2.3	2.6	35.4	-	40.3	14.4
- exposures in default	2.6	1.2	1.1	-	4.9	6.4
- regional governments or local authorities	1.2	1.2	0.4	-	2.8	1.0
- equity2	-	-	-	7.0	7.0	12.2
- items associated with particularly high risk	0.4	1.6	0.7	1.7	4.4	6.6
- securitisation positions	-	-	0.7	-	0.7	0.7
- claims in the form of CIU	0.4	-	-	0.1	0.5	0.5
- international organisations	0.4	1.6	0.6	-	2.6	-
- other items	2.1	-	0.1	17.2	19.4	13.1
	904.3	602.7	555.1	83.8	2,145.9	875.9
At 31 December 2015	904.2	602.7	555.8	83.8	2,146.5	875.9

	Exposure value					
	Less than 1 year $bn	Between 1 and 5 years $bn	More than 5 years $bn	Undated $bn	Total $bn	RWAs $bn
IRB advanced approach	729.1	382.5	429.8	52.4	1,593.8	581.6
Retail:						
- secured by mortgages on immovable property SME	0.1	0.2	2.8	-	3.1	0.6
- secured by mortgages on immovable property non-SME	2.9	4.1	281.9	-	288.9	71.6
- qualifying revolving retail	66.2	-	-	-	66.2	15.3
- other SME	3.3	7.0	3.6	-	13.9	6.2
- other non-SME	13.8	12.7	20.8	-	47.3	12.4
- total retail	86.3	24.0	309.1	-	419.4	106.1
- central governments and central banks	212.7	80.2	34.5	-	327.4	54.1
- institutions	100.9	25.4	4.1	-	130.4	38.7
- corporates1	318.6	247.1	60.1	-	625.8	328.5
- securitisation positions	10.6	5.7	22.0	-	38.3	40.7
- non-credit obligation assets	-	0.1	-	52.4	52.5	13.5
IRB foundation approach	10.5	12.9	2.4	-	25.8	16.8
- central governments and central banks	-	0.1	-	-	0.1	-
- institutions	-	0.1	-	-	0.1	-
- corporates	10.5	12.7	2.4	-	25.6	16.8

Standardised approach	242.1	201.6	116.8	30.0	590.5	356.9
- central governments and central banks	123.5	37.7	20.5	7.6	189.3	19.7
- institutions	16.2	0.9	13.0	-	30.1	11.2
- corporates	70.2	142.6	27.2	0.1	240.1	224.7
- retail	17.1	12.8	18.0	-	47.9	35.2
- secured by mortgages on immovable property	1.9	3.0	33.7	-	38.6	13.8
- exposures in default	2.2	1.3	1.2	-	4.7	6.1
- regional governments or local authorities	0.4	0.3	0.4	-	1.1	0.6
- equity2	-	-	-	13.2	13.2	26.9
- other3	10.6	3.0	2.8	9.1	25.5	18.7
At 31 December 2014	981.7	597.0	549.0	82.4	2,210.1	955.3

For footnotes, see page 36.

Key points

· The decrease in 'Less than 1 year' banding is driven by a reduction in corporate customers exposures in Europe which are fully cash collateralised. This has no impact on RWAs.

· The increase under IRB approach in 'More than 5 years' banding in central government or central bank exposures is largely driven by a decline in deposits in central banks with shorter maturity as well as an increase in exposures with longer maturity.

Application of the IRB approach

The narrative explanations that follow relate to the IRB approaches: advanced and foundation IRB for distinct customers and advanced IRB for the portfolio-managed retail business.

Details of our use of the standardised approach can be found on page 76.

Our Group IRB credit risk rating framework incorporates obligor propensity to default expressed in PD, and loss severity in the event of default expressed in EAD and LGD. These measures are used to calculate regulatory EL and capital requirements. They are also used with other inputs to inform rating assessments for the purpose of credit approval and many other management decisions.

Use of internal estimates

PDs, LGDs, and EAD applied in the calculation of regulatory capital requirements are also extensively used for other purposes, for example:

- credit approval and monitoring: IRB models are used in the assessment of customer and portfolio risk in lending decisions;
- risk appetite: IRB measures are an important element in identifying risk exposure at customer, sector, and portfolio level;
- pricing: IRB parameters are used in pricing tools for new transactions and reviews; and
- economic capital and portfolio management: IRB parameters are used in the economic capital model that has been implemented across HSBC.

Roll-out of the IRB approach

With the PRA's permission, we have adopted the advanced approach for the majority of our business. At the end of 2015, portfolios in much of Europe, Asia and North America were on advanced IRB approaches. Others remain on the standardised or foundation approaches pending the development of models for the PRA's approval in line with our IRB roll-out plans, or under exemptions or exclusions from the IRB treatment. Additionally, in some instances, regulators have allowed us to transition from advanced to standardised approaches for a limited number of immaterial portfolios.

Under the advanced IRB approach, banks are allowed to develop their own empirical models to quantify required capital for credit risk. All such models developed by us, and any material changes to those models, must be approved by the PRA, subject to de minimis exceptions. Material changes are those that individually have a high impact, or where a number of small changes in aggregate have a high impact. Quantitative and qualitative materiality thresholds for these model changes are determined by CRD IV, which also requires us to obtain the PRA's approval before implementation where these thresholds are breached.

The effectiveness of this process is monitored by the PRA through an annual review of IRB usage, focusing on the proportion of total credit risk assets for which IRB approaches are used.

Banks have experienced difficulties in adopting advanced IRB in some cases, for example in portfolios which have very low levels of default, such that the PD, LGD and EAD cannot be assessed to a sufficiently high degree of confidence due to a lack of default or loss data. Difficulties also arise in countries where the rules and requirements of the local regulator's implementation of the Basel Committee's requirements are different from those of the PRA, or where the regulators have introduced capital floors and overlays to mitigate perceived model deficiencies. Tables 27 and 31 detail several material regulatory thresholds and overlays. While recognising the complexity of adopting IRB in some situations, we remain committed to working constructively with our regulators to achieve acceptable roll-out plans.

The wholesale risk rating system

This section describes how we build and operate our credit risk analytical models and use IRB metrics in the wholesale customer business.

PDs for wholesale customer segments (that is central governments and central banks, financial institutions and corporate customers) and for certain individually assessed personal customers, are estimated using a CRR master scale of 23 grades. Of these, 21 are non-default grades representing varying degrees of strength of financial condition, and two are default grades.

The score generated by a credit risk rating model for the obligor is mapped to a corresponding PD and master-scale CRR. The CRR is then reviewed by a credit approver who, taking into account all relevant information, such as the most recent events and market data, where available, makes the final decision on the rating. The rating assigned therefore reflects the approver's overall view of the obligor's credit standing and propensity to default.

The finally assigned CRR determines the applicable master-scale PD range from which the reference PD, generally the arithmetical mid-point, is used in the regulatory capital calculation.

Reviewing the initial model score, relationship managers may propose a different CRR from that indicated, where they believe this is more appropriate. Such amendments may only be made through an override process and must be approved by the Credit function. Overrides for each model are recorded, and override levels are reviewed, as part of the model management process.

The CRR is assigned at an obligor level, which means that separate exposures to the same obligor are generally subject to a single, consistent rating. Unfunded credit risk mitigants such as guarantees, where they apply, may also influence the final assignment of a CRR to an obligor. The effect of unfunded risk mitigants is considered for IRB approaches in table 43 and for the standardised approach in table 44.

If an obligor is in default on any material credit obligation to the Group, all of the obligor's facilities from the Group are considered to be in default.

Under the IRB approach, obligors are grouped into grades that have similar PD or anticipated default frequency. The anticipated default frequency may be estimated using all relevant information at the relevant date (PIT rating system), or be free of the effects of the credit cycle (TTC rating system).

We generally utilise a hybrid approach of PIT and TTC. That is, while models are calibrated to long-run default rates, obligor ratings are reviewed annually, or more frequently if necessary to reflect changes in their circumstances and/or their economic operating environment.

Thus, over the economic cycle, a cycle will also appear in CRR migration. The influence of longer-term economic cycle factors implied by the model's calibration, combined with the effect of ongoing credit reviews, will result in long-term PDs generally above the actual default frequency during benign economic periods, but not changing so fast in a downturn. In practice, under a hybrid approach, ratings tend to be more volatile than would be the case in a pure TTC system, but less volatile than in a pure PIT one.

Moreover, our policy requires approvers to downgrade ratings on expectations but to upgrade them only on performance. Therefore, ratings will typically migrate during a downturn in response to higher perceived risks, but be upgraded more slowly in an upswing. This leads to expected defaults typically exceeding actual defaults, overall.

For EAD and LGD estimation, operating entities are permitted, subject to overview by Group Risk, to use their own modelling approaches for those parameters to suit conditions in their jurisdictions. Group Risk provides co-ordination, benchmarks, and the sharing and promotion of best practice on EAD and LGD estimation.

EAD is estimated to a 12-month forward time horizon and represents the current exposure plus an estimate for future increases in exposure, taking into account such factors as available but undrawn facilities, and the realisation of contingent exposures post-default.

LGD is based on the effects of facility and collateral structure on outcomes post-default. This includes such factors as the type of client, the facility seniority, the type and value of collateral, past recovery experience and priority under law. It is expressed as a percentage of EAD.

Wholesale models

To determine credit ratings for the different types of wholesale obligor, many different models and scorecards are used for PD, LGD, and EAD; there are over 100 wholesale IRB models in use or under development within HSBC. These models may be differentiated by region, customer segment and/or customer size. For example, PD models are differentiated for all of our key customer segments, including sovereigns, financial institutions and large, medium and small-sized corporates.

Global PD models have been developed for asset classes or clearly identifiable segments of asset classes where the customer relationship is managed globally, for example sovereigns, financial institutions and the largest corporate clients, typically those which operate internationally.

Local PD models, specific to a particular country, region, or sector, are developed for other obligors. This includes corporate clients when they show distinct characteristics in common in a particular geography. The most material local corporate PD models are the UK mid-market PD model, and the Hong Kong and Asia-Pacific mid-market models.

The two major drivers of model methodology are the nature of the portfolio and the availability of internal or external data on historical defaults and risk factors. For some historically low-default portfolios, e.g. sovereign and financial institutions, a model will rely more heavily on external data and/or the input of an expert panel. By contrast, where sufficient data is available, models are built on a statistical basis, although the input of expert judgement may still form an important part of the overall model development methodology.

Most LGD and EAD models are developed according to local circumstances, taking into account legal and procedural differences in the recovery and workout processes. However, our approach to EAD and LGD also encompasses global models for central governments and central banks, and for institutions, as exposures to these customer types are managed centrally by Global Risk. The PRA requires all firms to apply an LGD floor of 45% for senior unsecured exposure to sovereign entities. This floor was applied to reflect the relatively few loss observations across all firms in relation to these obligors. This floor is applied for the purposes of regulatory capital reporting.

In addition, the PRA has published guidance on the appropriateness of LGD models for low default portfolios generally. The PRA has determined that there should be at least 20 defaults per country per collateral type for LGD models to be approved. Where there are insufficient defaults, an LGD floor will be applied. As a result, in 2015, we continued to apply LGD floors for our banks portfolio and some Asian corporate portfolios where there were insufficient loss observations.

In the same guidance, the PRA also indicated that it considered income producing real estate to be an asset class that would be difficult to model. As a result, RWAs for our UK CRE portfolio are calculated using the supervisory slotting approach and our US income producing CRE portfolio is on the standardised approach.

Local models for the corporate exposure class are developed using various data inputs, including collateral information and geography (for LGD) and product type (for EAD). The most material corporate models are the UK and Asia models, all of which are developed using more than 10 years' worth of data. The LGD models are calibrated to a period of credit stress or downturn in economic conditions. The global LGD models for sovereigns and for banks reflect the expected increase in observed losses during an economic downturn period.

None of the EAD models are calibrated for a downturn, as analysis shows that utilisation decreases during a downturn because credit stress is accompanied by more intensive limit monitoring and facility reduction.

Table 27 sets out the key characteristics of the significant wholesale credit risk models that drive the capital calculation split by regulatory wholesale asset class, with their associated RWAs, including the number of models for each component, the model method or approach and the number of years of loss data used.

Table 27: Wholesale IRB credit risk models

Regulatory asset classes measured	RWAs for associated asset class $bn	Com-ponent	Number of significant models	Model description and methodology	Number of years loss data
Central governments and central banks	49.4	PD	1	A shadow rating approach constrained with expert judgement which includes macroeconomic and political factors.	8
		LGD	1	An unsecured model built on assessment of structural factors that influence the country's long-term economic performance. As required by the PRA, the model is floored at 45%.	8
		EAD	1	A cross-classification model which uses both internal data and expert judgement as well as information on similar exposure types from other asset classes.	8
Institutions	18.6	PD	1	A statistical model which combines quantitative analysis on financial information with expert inputs and macroeconomic factors.	10
		LGD	1	A quantitative model which produces both downturn and expected LGD. Several securities types are included in the model to recognise collateral in the LGD calculation. As required by the PRA, a floor of 45% is applied.	10
		EAD	1	A quantitative model which predicts credit conversion factors taking into account current utilisation, available headroom, product types, and committed/uncommitted indicator.	10
Corporates1	323.3				
Global large corporates		PD	1	A statistical model built on 15 years of data. The model uses financial information, macroeconomic information	>10

			and market-driven data and is complemented by a qualitative assessment.	
Other corporates	PD	5	Corporates that fall below the global large corporate threshold are rated through local PD models, which reflect regional circumstances. These models use balance sheet data, behavioural data and qualitative information to derive a statistically built PD.	>10
All corporates	LGD	3	Local statistical models covering all corporates including global large corporates developed using various data inputs, including collateral information, recoveries and geography.	>7
	EAD	3	Local statistical models developed using various data inputs, including product type and geography.	>7

1 Excludes specialised lending exposures subject to supervisory slotting approach (see table 29).

Table 28 sets out risk metrics broken down by region. Table 30 shows the same metrics broken down by CRR band. Table 29 sets out an analysis of those exposures to which a supervisory slotting approach is applied. An analysis of PD, LGD, RWAs and exposure by country is provided in Appendix IV.

Table 28: Wholesale IRB portfolio analysis

	Europe %	Asia %	MENA %	North America %	Latin America %	Total %
At 31 December 2015						
Exposure weighted average PD						
IRB advanced approach						
Central governments and central banks	0.08	0.06	0.88	0.01	0.90	0.14
Institutions	0.34	0.08	0.11	0.16	0.86	0.18
Corporates1	2.92	1.52	0.79	1.65	17.83	2.04
IRB foundation approach						
Central governments and central banks	-	-	0.04	-	-	0.04
Institutions	-	-	0.29	-	-	0.29
Corporates	1.45	-	2.10	-	-	1.68
Exposure weighted average LGD						
IRB advanced approach	45.0	45.0	45.0	45.1	45.0	45.0

Central governments and central banks						
Institutions	24.5	43.3	45.4	38.4	45.3	37.4
Corporates1	30.2	43.0	34.4	36.0	40.3	37.0
At 31 December 2014						
Exposure weighted average PD						
IRB advanced approach						
Central governments and central banks	0.09	0.09	1.23	0.01	0.57	0.17
Institutions	0.66	0.22	0.55	0.13	0.76	0.36
Corporates1	2.62	1.44	0.09	1.26	-	1.85
IRB foundation approach						
Central governments and central banks	-	-	0.04	-	-	0.04
Institutions	0.13	-	0.03	-	-	0.10
Corporates1	1.36	-	2.86	-	-	1.74
Exposure weighted average LGD						
IRB advanced approach						
Central governments and central banks	45.0	45.0	45.0	45.4	45.0	45.1
Institutions	35.3	45.3	39.8	40.6	45.4	42.0
Corporates1	25.8	44.3	13.7	36.6	-	35.6

1 Excludes specialised lending exposures subject to supervisory slotting approach (see table 29).

Table 29: Wholesale IRB exposures under the slotting approach

	Remaining maturity less than 2.5 years		Remaining maturity greater than 2.5 years		Total	
	Exposure value $bn	RWAs $bn	Exposure value $bn	RWAs $bn	Exposure value $bn	RWAs $bn
Supervisory Category						
Category 1 - Strong	6.4	3.1	8.3	5.8	14.7	8.9
Category 2 - Good	2.8	2.0	3.2	2.9	6.0	4.9
Category 3 - Satisfactory	0.9	1.0	1.2	1.3	2.1	2.3
Category 4 - Weak	0.7	1.6	0.2	0.5	0.9	2.1
Category 5 - Default	1.0	-	0.2	-	1.2	-
At 31 December 2015	11.8	7.7	13.1	10.5	24.9	18.2
Supervisory Category						
Category 1 - Strong	7.0	3.4	9.7	6.7	16.7	10.1
Category 2 - Good	4.4	3.1	3.7	3.2	8.1	6.3
Category 3 - Satisfactory	1.4	1.7	1.5	1.7	2.9	3.4

Category 4 - Weak	0.9	2.4	0.3	0.8	1.2	3.2
Category 5 - Default	1.4	-	0.2	-	1.6	-
At 31 December 2014	15.1	10.6	15.4	12.4	30.5	23.0

Table 30 and the graphs below set out IRB exposures by obligor grade for central governments and central banks, institutions and corporates, all of which are assessed using our 23-grade CRR master scale. We benchmark the master scale against the ratings of external rating agencies. Each CRR band is associated with an external rating grade by reference to long-run default rates for that grade, represented by the average of issuer-weighted historical default rates.

The correspondence between the agency long-run default rates and the PD ranges of our master scale is obtained by matching a smoothed curve based on those default rates with our master scale reference PDs. This association between internal and external ratings is indicative and may vary over time. In these tables, the ratings of S&P are cited for illustration purposes, though we also benchmark against other agencies' ratings in an equivalent manner.

For further details of the Group's approach to credit quality classification, see the definition of 'obligor grade' in the glossary and page 196 of the Annual Report and Accounts 2015.

Table 30a: Wholesale IRB exposure - by obligor grade1 - Central governments and central banks

	CRR	PD range %	Exposure value $bn	Average exposure value5 $bn	Undrawn commit-ments $bn	Average PD2 %	Average LGD2 %	RWA density2 %	RWAs $bn	Mapped external rating
Default risk										
Minimal	0.1	0.000 to 0.010	139.8	131.3	0.6	0.01	45.0	8	11.3	AAA
	1.1	0.011 to 0.028	101.9	86.6	1.0	0.02	45.0	7	6.7	AA+ to AA
	1.2	0.029 to 0.053	38.8	54.0	0.4	0.04	45.0	15	5.7	AA- to A+
Low	2.1	0.054 to 0.095	10.5	25.9	-	0.07	45.0	28	2.9	A
	2.2	0.096 to 0.169	11.6	6.7	-	0.13	45.0	30	3.5	A-
Satisfactory	3.1	0.170 to 0.285	3.6	10.6	-	0.22	45.0	36	1.3	BBB+
	3.2	0.286 to 0.483	9.2	4.6	-	0.37	45.0	54	5.0	BBB
	3.3		2.2	2.0	-	0.63	45.0	64	1.4	BBB-

		0.484 to 0.740								
		0.741 to		1.0	-	0.87		100		
Fair	4.1	1.022	0.1				45.1		0.1	BB+
		1.023 to		0.5	-	1.20		91		
	4.2	1.407	1.1				45.0		1.0	BB
		1.408 to		0.5	-	1.65		100		
	4.3	1.927	1.1				45.0		1.1	BB-
		1.928 to		2.9	0.3	2.25		106		
Moderate	5.1	2.620	4.7				45.0		5.0	BB-
		2.621 to		0.5	0.2	3.05		129		
	5.2	3.579	0.7				45.2		0.9	B+
		3.580 to		3.5	0.1	4.20		130		
	5.3	4.914	1.0				45.0		1.3	B
		4.915 to		0.4	-	5.75		100		
Significant	6.1	6.718	0.1				45.0		0.1	B
		6.719 to		0.3	-	7.85		200		
	6.2	8.860	0.3				45.0		0.6	B-
		8.861 to		0.6	-	10.00		188		
High	7.1	11.402	0.8				45.0		1.5	CCC+
		11.403 to		-	-	-		-		
	7.2	15.000	-				-		-	CCC+
Special		15.001 to		-	-	-		-		
management	8.1	22.000	-				-		-	CCC+
		22.001 to		-	-			-		
	8.2	50.000	-				-		-	CCC+
		50.001 to		-	-	-		-		CCC to
	8.3	99.999	-				-		-	C
Default3	9/10	100.000	-	-	-	-	-	-	-	Default
At 31 December 2015			327.5	331.9	2.6	0.14	45.0	15	49.4	

	CRR	PD range %	Exposure value $bn	Average PD2 %	Average LGD2 %	RWA density2 %	RWAs $bn	Mapped external rating
Default risk								
		0.000 to						
Minimal	0.1	0.010	122.8	0.01	45.2	7	8.7	AAA
		0.011 to						AA+ to
	1.1	0.028	60.3	0.02	45.0	7	4.4	AA

	1.2	0.029 to 0.053	59.2	0.04	45.4	13	7.4	AA- to A+
Low	2.1	0.054 to 0.095	51.6	0.07	45.0	20	10.4	A
	2.2	0.096 to 0.169	6.0	0.13	45.2	25	1.5	A-
Satisfactory	3.1	0.170 to 0.285	11.3	0.22	45.0	43	4.9	BBB+
	3.2	0.286 to 0.483	3.6	0.37	45.0	53	1.9	BBB
	3.3	0.484 to 0.740	1.6	0.63	45.0	63	1.0	BBB-
Fair	4.1	0.741 to 1.022	1.7	0.87	45.0	81	1.4	BB+
	4.2	1.023 to 1.407	0.4	1.16	45.0	125	0.5	BB
	4.3	1.408 to 1.927	0.2	1.65	43.3	100	0.2	BB-
Moderate	5.1	1.928 to 2.620	0.9	2.25	45.0	111	1.0	BB-
	5.2	2.621 to 3.579	0.7	3.05	45.0	129	0.9	B+
	5.3	3.580 to 4.914	5.6	4.20	45.0	130	7.3	B
Significant	6.1	4.915 to 6.718	0.7	5.75	45.2	157	1.1	B
	6.2	6.719 to 8.860	0.1	7.85	45.0	200	0.2	B-
High	7.1	8.861 to 11.402	0.7	10.00	45.0	186	1.3	CCC+
	7.2	11.403 to 15.000	-	-	-	-	-	CCC+
Special management	8.1	15.001 to 22.000	-	-	-	-	-	CCC+
	8.2	22.001 to 50.000	-	-	-	-	-	CCC+
	8.3	50.001 to 99.999	-	-	-	-	-	CCC to C
Default3	9/10	100.000	-	-	-	-	-	Default
At 31 December 2014			327.4	0.17	45.1	17	54.1	

For footnotes, see page 53.

Table 30b: Wholesale IRB exposure - by obligor grade1 - Institutions (continued)

	CRR	PD range %	Exposure value $bn	Average exposure value5 $bn	Undrawn commit-ments $bn	Average PD2 %	Average LGD2 %	RWA density2 %	RWAs $bn	Mapped external rating
Default risk										
Minimal	0.1	0.000 to 0.010	2.0	2.2	0.1	0.03	45.4	20	0.4	AAA
	1.1	0.011 to 0.028	12.5	15.0	1.3	0.03	35.1	10	1.2	AA+ to AA
	1.2	0.029 to 0.053	35.5	28.8	3.8	0.04	42.6	13	4.5	AA-
Low	2.1	0.054 to 0.095	20.0	36.4	5.0	0.07	22.3	12	2.3	A+ to A
	2.2	0.096 to 0.169	9.5	11.9	3.5	0.13	45.4	33	3.1	A-
Satisfactory	3.1	0.170 to 0.285	3.9	7.8	1.4	0.22	42.2	44	1.7	BBB+
	3.2	0.286 to 0.483	4.6	4.9	0.4	0.37	41.8	67	3.1	BBB
	3.3	0.484 to 0.740	1.1	3.3	0.5	0.63	44.5	73	0.8	BBB-
Fair	4.1	0.741 to 1.022	0.5	0.9	0.2	0.87	44.5	67	0.4	BB+
	4.2	1.023 to 1.407	0.6	1.7	0.2	1.20	43.1	83	0.5	BB
	4.3	1.408 to 1.927	0.1	0.4	-	1.65	44.7	100	0.1	BB-
Moderate	5.1	1.928 to 2.620	0.1	0.3	0.1	2.25	50.0	100	0.1	BB-
	5.2	2.621 to 3.579	0.1	0.1	-	3.05	45.1	100	0.1	B+
	5.3	3.580 to 4.914	0.1	0.3	-	4.20	33.5	100	0.1	B
Significant	6.1	4.915 to 6.718	0.1	0.3	-	5.75	45.1	100	0.1	B-
	6.2	6.719 to 8.860	-	-	-	-	-	-	-	B- CCC

		8.861 to		0.2	-					
High	7.1	11.402	0.1			10.00	45.1	100	0.1	CCC+
		11.403 to		-	-					
	7.2	15.000	-			-	-	-	-	CCC+
Special		15.001 to		-	-					
management	8.1	22.000	-			-	-	-	-	CCC
		22.001 to		-	-					CCC- to
	8.2	50.000	-			-	-	-	-	CC
		50.001 to		-	-					
	8.3	99.999	-			-	-	-	-	C
Default3	9/10	100.000	-	-	-	-	-	-	-	Default
At 31 December 2015			90.8	114.5	16.5	0.18	37.4	20	18.6	

	CRR	PD range %	Exposure value $bn	Average PD2 %	Average LGD2 %	RWA density2 %	RWAs $bn	Mapped external rating
Default risk								
		0.000 to						
Minimal	0.1	0.010	1.8	0.02	50.2	22	0.4	AAA
		0.011 to						AA+ to
	1.1	0.028	15.3	0.03	41.0	12	1.8	AA
		0.029 to						
	1.2	0.053	27.4	0.04	31.7	11	3.0	AA-
		0.054 to						
Low	2.1	0.095	44.0	0.07	45.2	20	8.5	A+ to A
		0.096 to						
	2.2	0.169	14.3	0.13	45.4	34	4.8	A-
		0.170 to						
Satisfactory	3.1	0.285	9.3	0.22	44.7	42	3.9	BBB+
		0.286 to						
	3.2	0.483	6.1	0.37	45.1	56	3.4	BBB
		0.484 to						
	3.3	0.740	4.2	0.63	46.7	74	3.1	BBB-
		0.741 to						
Fair	4.1	1.022	1.9	0.87	48.3	100	1.8	BB+
		1.023 to						
	4.2	1.407	2.3	1.20	31.3	65	1.5	BB
		1.408 to						
	4.3	1.927	0.9	1.65	45.8	133	1.2	BB-
		1.928 to						
Moderate	5.1	2.620	0.3	2.25	54.3	167	0.5	BB-

	5.2	2.621 to 3.579	0.3	3.05	47.6	167	0.5	B+
	5.3	3.580 to 4.914	0.6	4.20	55.7	180	0.9	B B-
Significant	6.1	4.915 to 6.718	0.3	5.75	76.0	267	0.8	B-
	6.2	6.719 to 8.860	0.4	7.85	28.8	100	0.4	B- CCC
High	7.1	8.861 to 11.402	0.6	10.00	57.4	250	1.5	CCC+
	7.2	11.403 to 15.000	0.3	13.00	51.2	233	0.7	CCC+
Special management	8.1	15.001 to 22.000	-	-	-	-	-	CCC
	8.2	22.001 to 50.000	-	-	-	-	-	CCC- to CC
	8.3	50.001 to 99.999	-	-	-	-	-	C
Default3	9/10	100.000	0.1	100.00	64.7	-	-	Default
At 31 December 2014			130.4	0.36	42.0	30	38.7	

For footnotes, see page 53.

Table 30c: Wholesale IRB exposure - by obligor grade1 - Corporates4 (continued)

	CRR	PD range %	Exposure value $bn	Average exposure value5 $bn	Undrawn commit-ments $bn	Average PD2 %	Average LGD2 %	RWA density2 %	RWAs $bn	Mapped external rating
Default risk										
Minimal	0.1	0.000 to 0.010	-	-	-	-	-	-	-	
	1.1	0.011 to 0.028	11.5	11.8	15.9	0.03	39.4	11	1.3	AAA to AA
	1.2	0.029 to 0.053	51.7	48.1	37.9	0.04	34.6	14	7.4	AA-
Low	2.1	0.054 to 0.095	66.1	69.5	57.8	0.07	38.4	22	14.7	A+ to A
	2.2	0.096 to 0.169	84.3	89.4	68.3	0.13	36.3	28	23.7	A-

										BBB+
Satisfactory	3.1	0.170 to 0.285	75.5	79.7	59.5	0.22	39.3	40	30.3	BBB+
	3.2	0.286 to 0.483	74.8	73.1	54.4	0.37	39.0	51	38.4	BBB
	3.3	0.484 to 0.740	70.0	70.5	44.8	0.63	36.3	61	42.4	BBB-
Fair	4.1	0.741 to 1.022	43.3	45.9	26.2	0.87	38.3	73	31.6	BB+
	4.2	1.023 to 1.407	39.9	37.4	23.7	1.20	34.8	75	30.1	BB
	4.3	1.408 to 1.927	28.4	31.6	18.7	1.65	39.6	96	27.3	BB-
Moderate	5.1	1.928 to 2.620	26.2	24.0	17.3	2.24	37.5	98	25.7	BB-
	5.2	2.621 to 3.579	12.1	12.5	8.6	3.07	39.5	112	13.6	B+
	5.3	3.580 to 4.914	11.9	11.9	8.0	4.15	35.1	108	12.9	B
Significant	6.1	4.915 to 6.718	5.9	5.3	4.4	5.73	38.4	134	7.9	B-
	6.2	6.719 to 8.860	2.4	3.0	1.4	7.85	42.2	167	4.0	B-
High	7.1	8.861 to 11.402	2.1	2.1	1.2	10.02	33.1	138	2.9	CCC+
	7.2	11.403 to 15.000	1.0	0.9	0.5	13.00	32.3	160	1.6	CCC+
Special management	8.1	15.001 to 22.000	0.7	0.8	0.5	19.00	36.1	200	1.4	CCC
	8.2	22.001 to 50.000	0.5	0.4	0.2	35.85	33.0	180	0.9	CCC- to CC
	8.3	50.001 to 99.999	0.2	0.3	0.1	75.00	35.5	100	0.2	C
Default3	9/10	100.000	7.2	6.8	1.0	100.00	42.8	70	5.0	Default
At 31 December 2015			615.7	625.0	450.4	2.01	37.5	53	323.3	

CRR	PD range %	Exposure value $bn	Average PD2 %	Average LGD2 %	RWA density2 %	RWAs $bn	Mapped external rating

Default risk								
Minimal	0.1	0.000 to 0.010	-	-	-	-	-	
	1.1	0.011 to 0.028	11.5	0.03	43.6	16	1.8	AAA to AA
	1.2	0.029 to 0.053	43.0	0.04	30.4	13	5.6	AA-
Low	2.1	0.054 to 0.095	70.7	0.07	32.8	18	12.5	A+ to A
	2.2	0.096 to 0.169	91.3	0.13	32.8	25	22.9	A- BBB+
Satisfactory	3.1	0.170 to 0.285	82.9	0.22	37.0	38	31.5	BBB+
	3.2	0.286 to 0.483	71.9	0.37	39.7	53	38.2	BBB
	3.3	0.484 to 0.740	71.1	0.63	35.0	60	42.7	BBB-
Fair	4.1	0.741 to 1.022	47.4	0.87	36.1	70	33.1	BB+
	4.2	1.023 to 1.407	33.0	1.20	37.9	81	26.7	BB
	4.3	1.408 to 1.927	32.6	1.65	40.3	101	32.8	BB-
Moderate	5.1	1.928 to 2.620	22.6	2.24	38.0	100	22.6	BB-
	5.2	2.621 to 3.579	12.8	3.07	40.8	116	14.9	B+
	5.3	3.580 to 4.914	11.6	4.16	38.7	121	14.0	B
Significant	6.1	4.915 to 6.718	4.7	5.74	36.9	123	5.8	B-
	6.2	6.719 to 8.860	3.6	7.85	39.7	158	5.7	B-
High	7.1	8.861 to 11.402	1.7	10.03	32.9	139	2.5	CCC+
	7.2	11.403 to 15.000	0.9	13.00	38.0	178	1.6	CCC+
Special management	8.1	15.001 to 22.000	0.7	19.01	34.5	175	1.4	CCC
	8.2	22.001 to 50.000	0.3	36.00	31.2	167	0.5	CCC- to CC
	8.3	50.001 to 99.999	0.3	75.00	45.1	133	0.4	C

Default3	9/10	100.000	6.3	100.00	40.8	81	5.1	Default
At 31 December 2014			620.9	1.85	36.0	52	322.3	

1 See glossary for definition of obligor grade.
2 Average PD, average LGD and RWA density percentages represent an exposure weighted average.
3 There is a requirement to hold additional capital for unexpected losses on defaulted exposures where LGD exceeds our best estimate of EL. As a result, in some cases, RWAs arise for exposures in default.
4 Excludes specialised lending exposures subject to the supervisory slotting approach (EAD: $24.9bn; RWA: $18.2bn).
5 Average exposures are calculated by aggregating exposure value of the last five quarters and dividing by five to get the average.

Key points
· The increases in central governments and central banks in CRR0.1 and CRR1.1 are primarily driven by rise in central bank balances, debt securities and treasury bills in Asia and North America, along with the purchase of government guaranteed mortgage backed securities as part of interest rate risk management.
· The decrease in central governments and central banks exposure class in CRR2.1 is primarily driven a model update changing China rating to CRR1.2 and local currency downgrade of Brazil to CRR3.2.
· The decrease in institution exposure class in CRR2.1 has been primarily driven by upgrades in Asia to CRR1.2.

Wholesale exposures by CRR Band

Wholesale 2015

Click on the attached PDF to view the chart

http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

Wholesale 2014

Click on the attached PDF to view the chart

http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

Central governments and central banks

Click on the attached PDF to view the chart
http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

Institutions

Click on the attached PDF to view the chart

http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

Corporates

Click on the attached PDF to view the chart
http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

Retail risk rating systems

Owing to the different country-level portfolio performance characteristics and loss history, there are no global models for our retail portfolios. Our retail models are developed at a local level, based on portfolio behaviour and observed defaults. Across the Group, we maintain over 1,000 retail risk predictive scorecards and models. Of these, over 170 are used with the PRA's approval under our IRB permission, the remainder being application scorecards, behavioural scorecards, or forecasting models.

We classify approximately 70% of the total number of retail IRB models as constituting globally or regionally material risk rating systems, taking account of their strategic importance to the Group. These material risk rating systems represented approximately 87% of our total retail IRB RWAs of $93bn at 31 December 2015.

The ten most material risk rating systems based on the above criteria, for which we disclose details of modelling methodology in table 31 and performance data in table 38, represented RWAs of approximately $62bn or 67% of the total retail IRB RWAs, the majority being attributable to the five risk rating systems for residential mortgages, our most material retail exposure class.

All newly adopted IRB models for retail portfolios, irrespective of size, require the PRA's approval. For changes to existing IRB models, a PRA approval process applies to all but a list of de minimis exemptions representing an immaterial percentage of total Group credit risk RWAs. This approval process sets various quantitative and qualitative thresholds to ensure that all significant model changes go forward for approval.

When developing retail models, segmentation based on risk characteristics is often adopted to enhance the models' discrimination and accuracy. The majority of our retail models are designed for a particular product or group of products in a specific country. We have developed and issued global internal model governance, development, validation and monitoring standards to ensure that locally developed models adhere, as far as possible, to consistent global standards. These permit specific variances in model approach, depending on local

regulatory, legal or data requirements, which are used to determine and predict the risks in these portfolios.

Our models incorporate conservatism where required under regulatory rules. Additional levels of conservatism, varying from region to region, may arise from a methodological choice of ours or from a specific regulatory intervention, depending on the local assessment of the risk factors by us and the regulatory authorities. Regulators may additionally impose 'floor' values for various metrics where data is scarce.

Our PD models are developed using statistical estimation based on a minimum of five years of historical data. The modelling approach is typically inherently TTC or, where models are developed based on a PIT approach, as in the UK, the model outputs become effectively TTC through the application of buffer or model adjustments as agreed with the PRA.

Our retail EAD models are also developed using at least five years of historical observations and typically adopt one of two approaches:

· for closed-end products without the facility for additional drawdowns, EAD is estimated as the outstanding balance of accounts at the time of observation; or

· EAD for products with the facility for additional drawdowns is estimated as the outstanding balance of accounts at the time of observation plus a CCF applied to the undrawn portion of the facility.

Our approach to LGD estimates has more variation, particularly in respect of the downturn period calculation that they generally include. For instance, UK mortgage models use a regulatory-defined downturn based on a minimum 40% decline in house prices from peak to trough.

In Hong Kong, the downturn LGD for the mortgage model is defined to be the period when historical default rates and property price declines were at their most severe. This was observed in 2003 to 2004, when Hong Kong experienced the Severe Acute Respiratory Syndrome.

In the US, the downturn period is established by identifying the period where default rates were at their most severe and selecting the surrounding 12 months. This was observed between 2008 and 2010.

Table 31: Material retail IRB risk rating systems

Portfolio	CRD IV asset class	RWA $bn	Component model	Number of material component models	Model description and methodology	Number of years loss data1	Applicable Pillar 1 regulatory thresholds and overlays
UK HSBC residential mortgages	Retail - secured by mortgages on immovable property non-SME	4.97	PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	7-10	PD floor of 0.03%
			LGD	1	Statistical estimates of loss and probability of possession in combination with the workout process and using the 1990's recession in benchmarking the downturn LGD.	> 10	LGD floor of 10% at portfolio level
			EAD	1	Statistical model based on historical data and uses balance at observation and expected number of months to default.	7-10	EAD must at least be equal to current balance
UK HSBC credit cards	Retail - qualifying revolving	1.85	PD	1	Statistical model built on internal behavioural data and bureau information, and	7-10	PD floor of 0.03%

					calibrated to a long-run default rate.		
			LGD	1	Statistical model based on forecasting the amount of expected future recoveries.	7-10	
			EAD	1	Statistical model which derives a credit conversion factor to determine the proportion of undrawn limit to be added to the balance at observation.	7-10	EAD must at least be equal to current balance
			PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	7-10	PD floor of 0.03%
UK HSBC personal loans	Retail - other non-SME	2.44	LGD	1	Statistical model based on forecasting the amount of expected future recoveries.	7-10	
			EAD	1	Rule-based calculation based on current balance which continues to be a conservative estimate for EAD.	7-10	EAD must at least be equal to current balance
			PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	7-10	PD floor of 0.03%
UK business banking	Retail - other SME	4.63	LGD	2	Two sets of models - one for secured and another for unsecured exposures. The secured model uses the value to loan as a key component for estimation while the unsecured model estimates the amount of future recoveries and undrawn portion.	7-10	
			EAD	1	Statistical model using segmentation according to limit and utilisation and estimation of the undrawn exposure.	7-10	EAD must at least be equal to current balance
			PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	> 10	PD floor of 0.03%
Hong Kong HSBC personal residential mortgages2	Retail - secured by mortgages on immovable property non-SME	5.60	LGD	1	Statistical model based on estimate of loss incurred over a recovery period derived from historical data with downturn LGD based on the worst observed default rate.	> 10	LGD floor of 10% at portfolio level

			EAD	1	Rule-based calculation based on current balance which continues to be a conservative estimate for EAD.	> 10	EAD must at least be equal to current balance
			PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	> 10	PD floor of 0.03%
Hong Kong HSBC credit cards	Retail - qualifying revolving	3.27	LGD	1	Statistical model based on forecasting the amount of expected future recoveries.	> 10	
			EAD	1	Statistical model which derives a credit conversion factor to determine the proportion of undrawn limit to be added to the balance at observation.	> 10	EAD must at least be equal to current balance

Portfolio	CRD IV asset class	RWA $bn	Component model	Number of material component models	Model description and methodology	Number of years loss data1	Applicable Pillar 1 regulatory thresholds and overlays
Hong Kong HSBC personal instalment loans	Retail - other non-SME	1.34	PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	> 10	PD floor of 0.03%
			LGD	1	Statistical model based on forecasting the amount of expected future recoveries.	> 10	
			EAD	1	Rule-based calculation based on current balance which continues to be a conservative estimate for EAD.	> 10	EAD must at least be equal to current balance
US Consumer Lending first lien3	Retail - secured by mortgages on immovable property non-SME	21.24	PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	> 10	PD floor of 0.03%
			LGD	1	Statistical model based on identifying the main risk drivers of loss and recovery and grouping them into homogeneous pools. Downturn LGD is derived based on the peak default rate observed	> 10	LGD floor of 10% at portfolio level 10% uplift on the total LGD for first lien portfolio LGD floor at the segment level based

					while additional assumptions and estimations are done on incomplete workouts.		on the value notified to the PRA and ranges from circa 60% to circa 98%
			EAD	1	Rule-based calculation based on current balance which continues to be a conservative estimate for EAD.	> 10	EAD must at least be equal to current balance
			PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	> 10	PD floor of 0.03%
US Mortgage Services first lien3	Retail - secured by mortgages on immovable property non-SME	8.34	LGD	1	Statistical model based on identifying the main risk drivers of loss and recovery and grouping them into homogeneous pools. Downturn LGD is derived based on the peak default rate observed while additional assumptions and estimations are done on incomplete workouts.	> 10	LGD floor of 10% at portfolio level 10% uplift on the total LGD for first lien portfolio LGD floor at the segment level based on the value notified to the PRA and ranges from circa 60% to circa 98%
			EAD	1	Rule-based calculation based on current balance which continues to be a conservative estimate for EAD.	> 10	EAD must at least be equal to current balance
US HSBC Mortgage Corporation first lien3	Retail - secured by mortgages on immovable property non-SME	8.61	PD	1	Statistical model built on internal behavioural data and bureau information, and calibrated to a long-run default rate.	> 10	PD floor of 0.03% Uplift in RWA and EL based on comparison of outputs between existing and new models
			LGD	1	Statistical model based on identifying the main risk drivers of loss and recovery and grouping them into homogeneous pools. Downturn LGD is derived based on the peak default rate observed while additional assumptions and estimations are done on incomplete workouts.	> 10	LGD floor of 10% at portfolio level Uplift in RWA and EL based on comparison of outputs between existing and new models
			EAD	1	Rule-based calculation based on current balance which continues to be a conservative estimate for EAD.	> 10	EAD must at least be equal to current balance

	Uplift in RWA and EL based on comparison of outputs between existing and new models

1 Defined as the number of years from the data period used for model development up to the present.
2 The Hong Kong Monetary Authority introduced a 15% risk weight floor for all residential mortgages granted after 22 February 2013 in Hong Kong. In 2015, it extended the floor to residential mortgages granted on or before 22 February 2013 with a phased implementation (10% by June 2015 increasing to 15% by June 2016). This risk weight floor is also reflected in Group reported numbers.
3 In US mortgage business, first lien is a primary claim on a property which takes precedence over all subsequent claims and will be paid first from the proceeds in case of the property's foreclosure sale.

The approval of the models that are currently used for the CML portfolios was subject to certain conditions with regard to LGD floors and regular assessment of the capital difference in applying the US instead of the PRA rules, mainly on the definition of default used for modelling.

For the HSBC Mortgage Corporation first lien portfolio, we continue to include agreed adjustments to the current model outputs based on a new set of models which are yet to be approved by the PRA.

Table 32 sets out the exposure-weighted average PDs and LGDs by retail exposure class. An analysis by country is provided in Appendix IV. Table 33 provides the exposure value, exposure-weighted average PDs and LGDs, RWA density and RWAs for our most material residential mortgages risk rating systems.

In table 33, the regulatory LGD and PD floors of 10% and 0.03%, respectively, are included. In this table, the UK HSBC residential mortgages include the HSBC branded portfolios of HSBC Bank plc but not those of First Direct. Hong Kong residential mortgages consist of HSBC and Hang Seng portfolios, and the US residential mortgages cover the CML and the US HSBC Mortgage Corporation portfolios. The PD and LGD values in the US residential mortgages are stated before the quantitative adjustment due to the existing deficiencies of the current US HSBC Mortgage Corporation models. This quantitative adjustment is applied at the total portfolio RWA and EL levels.

Within table 33, the RWAs and other metrics have decreased in 2015 due to the increasing house prices in most regions of the UK and the continued sale of assets and improving house prices in the US. The extension of the risk-weight floor to all residential mortgages in June 2015, not just those granted after 22 February 2013, increased the RWAs and RWA density in Hong Kong. A floor of 10% was implemented in June 2015 for those granted on or before 22 February 2013. This will increase to 15% in June 2016.

Tables 34 and 35 show IRB exposures by exposure sub-class and portfolio quality bands: at Group level by internal PD band and by geographical region using a composite EL measure, respectively.

In table 34, band seven has lower RWAs because, as assets approach and go into default, our capital requirements are increasingly reflected in an EL deduction from capital, rather than a direct RWA impact.

Table 32: Retail IRB portfolio analysis1

	North

	Europe	Asia	America	Total
	%	%	%	%
At 31 December 2015				
Exposure-weighted average PD				
Retail - secured by mortgages on immovable property non-SME	1.43	0.99	9.66	2.78
Retail - secured by mortgages on immovable property SME	8.06	0.99	2.21	5.91
Retail - qualifying revolving	1.17	1.11	1.62	1.17
Retail - other SME	9.90	0.13	3.40	9.62
Retail - other non-SME	1.93	1.85	6.39	2.44
Exposure-weighted average LGD				
Retail - secured by mortgages on immovable property non-SME	12.5	11.4	45.3	18.1
Retail - secured by mortgages on immovable property SME	19.0	11.1	30.7	18.6
Retail - qualifying revolving	85.2	100.1	90.8	92.2
Retail - other SME	54.1	10.8	65.1	54.1
Retail - other non-SME	23.8	21.1	71.8	29.1
At 31 December 2014				
Exposure-weighted average PD				
Retail - secured by mortgages on immovable property non-SME	0.98	1.00	11.54	3.06
Retail - secured by mortgages on immovable property SME	8.81	0.76	-	7.06
Retail - qualifying revolving	1.41	1.09	1.74	1.30
Retail - other SME	10.09	0.12	3.75	9.73
Retail - other non-SME	1.90	1.76	7.54	2.68
Exposure-weighted average LGD				
Retail - secured by mortgages on immovable property non-SME	13.5	12.1	51.5	20.5
Retail - secured by mortgages on immovable property SME	19.0	11.1	-	17.5
Retail - qualifying revolving	84.5	100.2	90.1	91.3
Retail - other SME	48.7	9.1	61.0	49.0
Retail - other non-SME	22.0	22.8	77.7	30.0

1 The MENA and Latin America regions are not included in this table as retail exposures in these regions are calculated under the standardised approach.

Table 33: Retail IRB exposures secured by mortgages on immovable property (non-SME)

	Exposure value	Average PD	Average LGD	RWA density	RWAs
	$bn	%	%	%	$bn
At 31 December 2015					
	275.4	2.78	18.1	22	60.0

Total Retail IRB exposures secured by mortgages on immovable property (non-SME)					
Of which:					
- US first lien residential mortgages	34.2	12.66	52.0	112	38.2
- UK HSBC residential mortgages	94.0	1.49	11.1	5	5.0
- Hong Kong residential mortgages	60.4	0.76	10.0	15	9.0
At 31 December 2014					
Total Retail IRB exposures secured by mortgages on immovable property (non-SME)	288.9	3.06	20.5	25	71.6
Of which:					
- US first lien residential mortgages	37.3	14.83	56.4	136	50.9
- UK HSBC residential mortgages	98.3	0.93	15.5	6	5.9
- Hong Kong residential mortgages	56.3	0.78	10.1	10	5.8
At 31 December 2013					
Total Retail IRB exposures secured on real estate property	310.7	4.02	20.1	34	105.4
Of which:					
- US first lien residential mortgages	42.8	18.13	59.6	176	75.3
- UK HSBC residential mortgages	104.4	1.11	16.4	7	7.3
- Hong Kong residential mortgages	52.1	0.74	10.1	7	3.8

Table 34: Retail IRB exposure - by internal PD band

	PD range %	Exposure value $bn	Average exposure value2 $bn	Undrawn commit-ments $bn	Average PD1 %	Average LGD1 %	RWA density1 %	RWAs $bn
At 31 December 2015								
Secured by mortgages on immovable property SME								
Band 1	0.000 to 0.483	0.6	0.6	-	0.15	12.6	-	-
Band 2	0.484 to 1.022	0.4	0.5	-	0.76	19.6	25	0.1
Band 3	1.023 to 4.914	1.4	1.4	-	2.36	19.8	29	0.4
Band 4	4.915 to 8.860	0.2	0.2	-	6.56	21.9	50	0.1
Band 5	8.861 to 15.000	0.1	0.1	-	11.27	27.2	-	-
Band 6	15.001 to 50.000	0.1	0.1	-	24.94	20.9	-	-
Band 7	50.001 to 100.000	0.1	0.1	-	100.00	18.4	-	-

		2.9	3.0	-	5.91	18.6	21	0.6
Secured by mortgages on immovable property Non-SME								
Band 1	0.000 to 0.483	215.5	218.9	16.2	0.11	14.5	7	15.0
Band 2	0.484 to 1.022	22.4	24.1	0.8	0.67	23.1	28	6.3
Band 3	1.023 to 4.914	22.4	23.1	0.3	1.95	32.5	76	17.1
Band 4	4.915 to 8.860	5.8	6.1	-	5.77	36.6	153	8.9
Band 5	8.861 to 15.000	1.1	1.5	0.1	11.94	29.4	200	2.2
Band 6	15.001 to 50.000	2.3	2.9	-	24.40	49.0	330	7.6
Band 7	50.001 to 100.000	5.9	6.4	-	97.97	43.1	49	2.9
		275.4	283.0	17.4	2.78	18.1	22	60.0
Qualifying revolving retail exposures								
Band 1	0.000 to 0.483	49.1	48.7	85.2	0.12	92.9	7	3.2
Band 2	0.484 to 1.022	7.1	6.8	6.7	0.71	92.3	28	2.0
Band 3	1.023 to 4.914	9.1	9.0	5.7	2.23	90.0	64	5.8
Band 4	4.915 to 8.860	1.3	1.3	0.5	6.62	89.2	131	1.7
Band 5	8.861 to 15.000	0.5	0.4	0.1	11.09	91.1	180	0.9
Band 6	15.001 to 50.000	0.5	0.5	0.1	23.56	91.1	280	1.4
Band 7	50.001 to 100.000	0.2	0.3	0.1	89.41	67.6	150	0.3
		67.8	67.0	98.4	1.17	92.2	23	15.3
Other SME								
Band 1	0.000 to 0.483	1.6	1.7	1.1	0.29	64.7	31	0.5
Band 2	0.484 to 1.022	2.1	2.2	1.0	0.74	52.6	33	0.7
Band 3	1.023 to 4.914	5.6	6.0	1.5	2.58	53.6	55	3.1
Band 4	4.915 to 8.860	1.2	1.4	0.2	6.65	50.0	67	0.8
Band 5		0.5	0.5	0.2	10.89	59.2	80	0.4

	8.861 to 15.000							
	15.001 to				25.79	60.6		
Band 6	50.000	0.3	0.3	0.1			100	0.3
	50.001 to				99.47	39.8		
Band 7	100.000	0.8	0.8	0.1			-	-
		12.1	12.9	4.2	9.62	54.1	48	5.8
Other non-SME								
	0.000 to				0.18	26.7		
Band 1	0.483	26.5	26.4	11.5			12	3.2
	0.484 to				0.66	30.5		
Band 2	1.022	6.7	6.7	1.3			27	1.8
	1.023 to				1.91	27.4		
Band 3	4.914	10.7	10.7	1.4			40	4.3
	4.915 to				7.05	53.3		
Band 4	8.860	0.9	0.9	-			89	0.8
	8.861 to				11.88	64.8		
Band 5	15.000	0.5	0.6	-			120	0.6
	15.001 to				27.58	67.8		
Band 6	50.000	0.3	0.5	-			200	0.6
	50.001 to				96.40	57.7		
Band 7	100.000	0.7	0.7	-			29	0.2
		46.3	46.5	14.2	2.44	29.1	25	11.5
Total retail								
	0.000 to				0.12	29.0		
Band 1	0.483	293.3	296.3	114.0			7	21.9
	0.484 to				0.68	38.5		
Band 2	1.022	38.7	40.3	9.8			28	10.9
	1.023 to				2.07	44.1		
Band 3	4.914	49.2	50.2	8.9			62	30.7
	4.915 to				6.14	46.8		
Band 4	8.860	9.4	9.9	0.7			131	12.3
	8.861 to				11.58	51.2		
Band 5	15.000	2.7	3.1	0.4			152	4.1
	15.001 to				24.72	57.2		
Band 6	50.000	3.5	4.3	0.2			283	9.9
	50.001 to				97.74	44.5		
Band 7	100.000	7.7	8.3	0.2			44	3.4
		404.5	412.4	134.2	2.70	32.9	23	93.2

	PD range	Exposure value	Average PD1	Average LGD1	RWA density1	RWAs	
	%	$bn	%	%	%	$bn	
At 31 December 2014							

Secured by mortgages on immovable property SME						
Band 1	0.000 to 0.483	0.5	0.10	11.9	0	0.0
Band 2	0.484 to 1.022	0.6	0.80	16.8	17	0.1
Band 3	1.023 to 4.914	1.5	2.45	18.3	20	0.3
Band 4	4.915 to 8.860	0.2	6.94	23.0	50	0.1
Band 5	8.861 to 15.000	0.1	11.25	26.4	0	0.0
Band 6	15.001 to 50.000	0.1	25.01	18.8	100	0.1
Band 7	50.001 to 100.000	0.1	100.00	16.8	0	0.0
		3.1	7.06	17.5	21	0.6
Secured by mortgages on immovable property Non-SME						
Band 1	0.000 to 0.483	219.7	0.12	15.2	6	12.1
Band 2	0.484 to 1.022	27.2	0.69	27.5	31	8.5
Band 3	1.023 to 4.914	24.1	2.01	36.2	82	19.8
Band 4	4.915 to 8.860	5.8	5.89	52.0	221	12.8
Band 5	8.861 to 15.000	2.2	12.31	36.7	200	4.4
Band 6	15.001 to 50.000	3.2	23.72	57.7	378	12.1
Band 7	50.001 to 100.000	6.7	97.17	59.4	28	1.9
		288.9	3.06	20.5	25	71.6
Qualifying revolving retail exposures						
Band 1	0.000 to 0.483	47.8	0.12	91.9	6	3.1
Band 2	0.484 to 1.022	6.6	0.71	91.3	29	1.9
Band 3	1.023 to 4.914	9.1	2.26	89.8	65	5.9
Band 4	4.915 to 8.860	1.4	6.64	87.8	136	1.9
Band 5		0.5	11.06	89.1	200	1.0

	8.861 to 15.000					
	15.001 to					
Band 6	50.000	0.5	24.44	90.3	260	1.3
	50.001 to					
Band 7	100.000	0.3	89.52	64.5	67	0.2
		66.2	1.30	91.3	23	15.3
Other SME						
	0.000 to					
Band 1	0.483	1.8	0.29	57.1	17	0.3
	0.484 to					
Band 2	1.022	2.3	0.74	46.0	30	0.7
	1.023 to					
Band 3	4.914	6.3	2.56	49.4	52	3.3
	4.915 to					
Band 4	8.860	1.5	6.68	45.7	60	0.9
	8.861 to					
Band 5	15.000	0.6	11.00	52.7	67	0.4
	15.001 to					
Band 6	50.000	0.5	24.99	54.1	100	0.5
	50.001 to					
Band 7	100.000	0.9	99.27	37.9	11	0.1
		13.9	9.73	49.0	45	6.2
Other non-SME						
	0.000 to					
Band 1	0.483	27.0	0.19	25.7	11	3.0
	0.484 to					
Band 2	1.022	6.3	0.71	33.3	30	1.9
	1.023 to					
Band 3	4.914	11.3	1.98	30.1	42	4.7
	4.915 to					
Band 4	8.860	0.9	7.24	60.6	100	0.9
	8.861 to					
Band 5	15.000	0.5	12.25	71.2	160	0.8
	15.001 to					
Band 6	50.000	0.6	28.20	63.4	150	0.9
	50.001 to					
Band 7	100.000	0.7	95.81	66.5	29	0.2
		47.3	2.68	30.0	26	12.4
Total retail						
	0.000 to					
Band 1	0.483	296.8	0.13	28.8	6	18.5
	0.484 to					
Band 2	1.022	43.0	0.70	39.0	30	13.1
Band 3		52.3	2.13	45.2	65	34.0

	1.023 to 4.914					
	4.915 to					
Band 4	8.860	9.8	6.27	56.2	169	16.6
	8.861 to					
Band 5	15.000	3.9	11.91	51.0	169	6.6
	15.001 to					
Band 6	50.000	4.9	24.47	60.7	304	14.9
	50.001 to					
Band 7	100.000	8.7	97.05	57.3	28	2.4
		419.4	2.99	33.7	25	106.1

1 Average PD, average LGD and RWA density percentages represent exposure-weighted averages.
2 Average exposures are calculated by aggregating exposure value of the last five quarters and dividing by five to get the average.

Retail exposures by internal PD band

2015

Click on the attached PDF to view the chart

http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

2014

Click on the attached PDF to view the chart

http://www.rns-pdf.londonstockexchange.com/rns/6692P_-2016-2-21.pdf

Key points
· The general decrease in Retail bands is mainly driven by foreign exchange effects.
· Continued non-core portfolio run-off and disposals in the US CML portfolio improved the quality of the residual portfolio.

The possibility of variations between jurisdictions' definitions underlying retail PD and LGD diminishes the usefulness of these measures as comparators for the purposes of global retail portfolio management. To address this shortcoming, we maintain an EL scale for retail business, combining obligor and facility/product risk factors in a composite measure of PD and LGD. This scale, summarised in table 35, enables the diverse risk profiles of retail portfolios across the Group to be assessed using a common denominator instead of their disparate PD and LGD measures.

Table 35: Retail IRB exposure - by region1

	Exposure value			
	Europe $bn	Asia $bn	North America $bn	Total exposure $bn
Secured by mortgages on immovable property SME				
Expected loss band				
- less than 1%	1.5	0.6	0.2	2.3
- greater than or equal to 1% and less than 5%	0.4	-	0.1	0.5
- greater than or equal to 5% and less than 10%	-	-	-	-
- greater than or equal to 10% and less than 20%	-	-	-	-
- greater than or equal to 20% and less than 40%	-	-	-	-
- greater than or equal to 40% or exposures in default	0.1	-	-	0.1
	2.0	0.6	0.3	2.9
Secured by mortgages on immovable property non-SME				
Expected loss band				
- less than 1%	134.3	88.1	34.7	257.1
- greater than or equal to 1% and less than 5%	0.7	0.2	8.6	9.5
- greater than or equal to 5% and less than 10%	0.1	-	1.2	1.3
- greater than or equal to 10% and less than 20%	0.2	-	1.1	1.3
- greater than or equal to 20% and less than 40%	-	-	0.5	0.5
- greater than or equal to 40% or exposures in default	1.4	0.3	4.0	5.7
	136.7	88.6	50.1	275.4
Qualifying revolving retail exposures				
Expected loss band				
- less than 1%	28.4	26.2	3.2	57.8
- greater than or equal to 1% and less than 5%	3.9	3.5	0.7	8.1
- greater than or equal to 5% and less than 10%	0.4	0.5	0.1	1.0
- greater than or equal to 10% and less than 20%	0.2	0.3	-	0.5
- greater than or equal to 20% and less than 40%	0.1	0.1	-	0.2
- greater than or equal to 40% or exposures in default	0.2	-	-	0.2
	33.2	30.6	4.0	67.8
Other SME				
Expected loss band				
- less than 1%	5.3	0.1	0.3	5.7

- greater than or equal to 1% and less than 5%	4.7	-	0.1	4.8
- greater than or equal to 5% and less than 10%	0.5	-	-	0.5
- greater than or equal to 10% and less than 20%	0.2	-	-	0.2
- greater than or equal to 20% and less than 40%	0.1	-	-	0.1
- greater than or equal to 40% or exposures in default	0.8	-	-	0.8
	11.6	0.1	0.4	12.1
Other non-SME				
Expected loss band				
- less than 1%	32.6	5.8	3.2	41.6
- greater than or equal to 1% and less than 5%	1.2	0.5	1.4	3.1
- greater than or equal to 5% and less than 10%	0.1	0.1	0.3	0.5
- greater than or equal to 10% and less than 20%	-	-	0.3	0.3
- greater than or equal to 20% and less than 40%	-	-	0.1	0.1
- greater than or equal to 40% or exposures in default	0.4	0.1	0.2	0.7
	34.3	6.5	5.5	46.3
Total retail				
Expected loss band				
- less than 1%	202.1	120.8	41.6	364.5
- greater than or equal to 1% and less than 5%	10.9	4.2	10.9	26.0
- greater than or equal to 5% and less than 10%	1.1	0.6	1.6	3.3
- greater than or equal to 10% and less than 20%	0.6	0.3	1.4	2.3
- greater than or equal to 20% and less than 40%	0.2	0.1	0.6	0.9
- greater than or equal to 40% or exposures in default	2.9	0.4	4.2	7.5
At 31 December 2015	217.8	126.4	60.3	404.5

	Exposure value			
	Europe $bn	Asia $bn	North America $bn	Total exposure $bn
Secured by mortgages on immovable property				
SME				
Expected loss band				
- less than 1%	1.8	0.7	-	2.5
- greater than or equal to 1% and less than 5%	0.5	-	-	0.5
- greater than or equal to 5% and less than 10%	-	-	-	-
	-	-	-	-

- greater than or equal to 10% and less than 20%				
- greater than or equal to 20% and less than 40%	-	-	-	-
- greater than or equal to 40% or exposures in default	0.1	-	-	0.1
	2.4	0.7	-	3.1
Secured by mortgages on immovable property non-SME				
Expected loss band				
- less than 1%	142.2	87.6	35.9	265.7
- greater than or equal to 1% and less than 5%	0.7	0.2	10.7	11.6
- greater than or equal to 5% and less than 10%	0.2	-	1.9	2.1
- greater than or equal to 10% and less than 20%	0.1	-	2.0	2.1
- greater than or equal to 20% and less than 40%	-	-	0.7	0.7
- greater than or equal to 40% or exposures in default	0.9	0.4	5.4	6.7
	144.1	88.2	56.6	288.9
Qualifying revolving retail exposures				
Expected loss band				
- less than 1%	29.4	23.4	3.2	56.0
- greater than or equal to 1% and less than 5%	4.4	3.1	0.7	8.2
- greater than or equal to 5% and less than 10%	0.6	0.4	0.1	1.1
- greater than or equal to 10% and less than 20%	0.2	0.3	-	0.5
- greater than or equal to 20% and less than 40%	0.1	0.1	-	0.2
- greater than or equal to 40% or exposures in default	0.2	-	-	0.2
	34.9	27.3	4.0	66.2
Other SME				
Expected loss band				
- less than 1%	6.3	0.1	0.4	6.8
- greater than or equal to 1% and less than 5%	5.1	-	0.2	5.3
- greater than or equal to 5% and less than 10%	0.6	-	-	0.6
- greater than or equal to 10% and less than 20%	0.2	-	-	0.2
- greater than or equal to 20% and less than 40%	0.1	-	-	0.1
- greater than or equal to 40% or exposures in default	0.9	-	-	0.9
	13.2	0.1	0.6	13.9
Other non-SME				
Expected loss band				
- less than 1%	32.6	5.4	3.9	41.9

- greater than or equal to 1% and less than 5%	1.5	0.5	1.6	3.6
- greater than or equal to 5% and less than 10%	0.2	0.1	0.3	0.6
- greater than or equal to 10% and less than 20%	-	-	0.4	0.4
- greater than or equal to 20% and less than 40%	-	-	0.2	0.2
- greater than or equal to 40% or exposures in default	0.3	-	0.3	0.6
	34.6	6.0	6.7	47.3
Total retail				
Expected loss band				
- less than 1%	212.3	117.2	43.4	372.9
- greater than or equal to 1% and less than 5%	12.2	3.8	13.2	29.2
- greater than or equal to 5% and less than 10%	1.6	0.5	2.3	4.4
- greater than or equal to 10% and less than 20%	0.5	0.3	2.4	3.2
- greater than or equal to 20% and less than 40%	0.2	0.1	0.9	1.2
- greater than or equal to 40% or exposures in default	2.4	0.4	5.7	8.5
At 31 December 2014	229.2	122.3	67.9	419.4

1 The MENA and Latin America regions are not included in this table as retail exposures in these regions are calculated under the standardised approach.

Model performance

Model validation within HSBC is subject to global internal standards. All material models whose outputs are used in calculations of IRB capital requirements fall under this governance framework. These arrangements are designed to support a comprehensive quantitative and qualitative process within a cycle of model monitoring and validation that includes:

· The investigation of model stability;

· model performance measured through testing the model's outputs against actual outcomes; and

· model use within the business, e.g. user input data quality, override activity and the assessment of results from key controls around the usage of the rating system as a whole within the overall credit process.

The purpose of periodic monitoring and validation is therefore:

· to determine that the model continues to produce accurate outputs, suitable for the intended purposes;

· to confirm that the model remains conceptually sound, that the model design is still appropriate and the assumptions made at development remain valid;

· to ensure that the model is used for its intended purpose and for appropriate exposures only (use test); and

· to prompt corrective actions when the model outputs move away from the expected levels. These actions would include redevelopment of the model and, where appropriate, mitigating capital overlays until implementation of the revised model.

Models are validated against a series of metrics and triggers approved by the governance committee. The metrics and quantitative checks for periodic validation include a review of the data inputs and overall population stability, and an assessment of the model's discriminatory power or rank order capability, its calibration accuracy and its performance against available benchmarks. The qualitative checks include and reconfirm all elements assessed at design phase, including the model's conceptual soundness.

The results of periodic in-depth validation must be presented to a model governing committee at least annually. A subset of the key performance metrics is produced and reviewed as part of the ongoing monitoring process.

A large number of models are used within the Group, and data at individual model level is, in most cases, immaterial in the context of the overall Group. We therefore disclose data covering most wholesale models including corporate models on an aggregated basis, and on our individually most material retail models as set out in table 31. The tables below show estimated values at the beginning of the relevant observation periods and subsequent actual experienced values for key regulatory calculation metrics. Values for wholesale models are shown in tables 36 and 37 and for retail models in table 38. The basis of preparation of each table is set out below and in footnotes.

Wholesale credit models

For wholesale portfolios, we disclose the performance of models covering sovereign obligors, banks and corporates. As explained on page 47, we operate global models for the first two of these customer groups. In the case of corporates, we have aggregated data on models covering a customer population ranging from large multinational companies to medium-sized and smaller corporates. The PD analysis for this group includes mainly advanced IRB exposures but also a small element of foundation IRB.

In table 36, the data for sovereigns and banks are based on such a small number of defaults that the comparison of estimated with actual results, even where these are available, is not fully reflective of a model's performance. To mitigate this characteristic of low-default portfolios, additional analysis is carried out on these models at annual validation. This analysis shows that they discriminate risk well and are appropriately calibrated. The latter reflects both a prudent modelling approach and the conservatism required by regulations. As noted in table 27, sovereign and institutions exposures are subject to an explicit LGD floor applied for the calculation of regulatory capital.

Within table 36, for back-testing purposes, a customer's CRR/PD is observed at a point in time and then their default or non-default status in the following one-year period is recorded against that PD grade. The PD presentation in table 36 is expressed for all exposure classes on an obligor basis, as model performance is judged on this basis in validation. The LGD and EAD refer to observations for the defaulted population, being the appropriate focus of an assessment of these models' performance.

Table 36: IRB models - estimated and actual values (wholesale)1

	PD2		LGD3		EAD4	
	Estimated	Actuals	Estimated5	Actuals5	Estimated	Actuals
	%	%	%	%	%	%
2015						
Sovereigns model6	1.72	1.12	45.00	-	0.07	-

Banks model	2.22	-	-	-	-	-
Corporates models7	1.89	1.26	37.74	21.52	0.60	0.55
2014						
Sovereigns model6	2.27	-	-	-	-	-
Banks model	3.28	-	-	-	-	-
Corporates models7	1.88	1.16	36.83	16.06	0.47	0.34
2013						
Sovereigns model6	4.14	-	-	-	-	-
Banks model	3.18	0.20	40.01	-	0.06	0.04
Corporates models7	2.63	1.20	33.09	18.69	0.54	0.48

1 Data represents an annual view, analysed at 30 September.
2 Estimated PD for all models is average PD calculated on the number of obligors covered by the model(s).
3 Average LGD values are EAD-weighted.
4 Expressed as a percentage of total EAD which includes all defaulted and non-defaulted exposures for the relevant population.
5 For sovereigns and banks models, estimated and actual LGD represents the average LGD for customers that defaulted in the year. For corporates models, they represent the average LGD for customers that have defaulted and which have been resolved in the period.
6 There was one sovereign default in 2015 (Greece) but no actual loss was incurred. In both 2015 and 2014, the estimated PD excludes inactive sovereign obligors.
7 Covers the combined populations of the global large corporates model, all regional IRB models for large, medium and small corporates and non-bank financial institutions. In 2015 and 2014, the estimated and observed PDs were calculated only for unique obligors.

Table 37 expands upon the estimated and actual corporate PD in table 36, as sufficient defaults in this population make analysis at this level meaningful. This analysis is conducted as part of regular validation to ensure that, throughout the entire population, there is a satisfactory degree of conservative performance at all grades. Table 37 is not comparable with table 30c, mainly because table 37 is a distribution of facility limits, rather than exposure value, and for a back-testing population that does not exactly match the exposure class population of tables 28 and 30.

Table 37: IRB models - corporate PD models - performance by CRR grade

	Corporates1				
	Facility2	Defaulted3	Estimated PD4	Actual PD5	Diff. in PD
	%	%	%	%	%
2015					
CRR 0.16	0.00	0.00	0.01	0.00	0.01
CRR 1.1	5.72	0.00	0.02	0.00	0.02

CRR 1.2	5.25	0.00	0.04	0.00	0.04
CRR 2.1	16.48	0.00	0.07	0.00	0.07
CRR 2.2	14.17	0.00	0.13	0.01	0.12
CRR 3.1	11.92	0.17	0.22	0.15	0.07
CRR 3.2	11.00	0.10	0.37	0.30	0.07
CRR 3.3	9.35	0.14	0.63	0.47	0.16
CRR 4.1	6.52	0.64	0.87	0.97	(0.10)
CRR 4.2	5.07	0.45	1.20	1.06	0.14
CRR 4.3	4.38	0.62	1.65	1.55	0.10
CRR 5.1	3.52	0.99	2.25	1.24	1.01
CRR 5.2	2.19	0.61	3.05	1.44	1.61
CRR 5.3	2.24	1.74	4.20	1.89	2.31
CRR 6.1	0.89	4.66	5.75	5.05	0.70
CRR 6.2	0.66	3.58	7.85	6.46	1.39
CRR 7.1	0.31	10.79	10.00	7.13	2.87
CRR 7.2	0.09	7.27	13.00	9.48	3.52
CRR 8.1	0.14	11.33	19.00	11.11	7.89
CRR 8.2	0.07	16.97	36.00	23.61	12.39
CRR 8.3	0.03	16.66	75.00	17.10	57.90
Total	100.00				

Corporates1

	Facility2	Defaulted3	Estimated PD4	Actual PD5
	%	%	%	%
2014				
CRR 0.16	0.01	0.00	0.01	0.00
CRR 1.1	6.32	0.00	0.02	0.00
CRR 1.2	6.68	0.00	0.04	0.00
CRR 2.1	16.71	0.01	0.07	0.04
CRR 2.2	13.07	0.00	0.13	0.00
CRR 3.1	10.38	0.06	0.22	0.10
CRR 3.2	12.50	0.11	0.37	0.23
	6.62	0.25	0.63	

CRR 3.3				0.54
CRR 4.1	10.41	0.28	0.87	0.54
CRR 4.2	4.12	0.79	1.20	0.81
CRR 4.3	3.49	0.83	1.65	0.91
CRR 5.1	2.50	0.53	2.25	0.97
CRR 5.2	2.09	0.54	3.05	1.24
CRR 5.3	1.47	1.74	4.20	2.70
CRR 6.1	0.59	3.02	5.75	4.11
CRR 6.2	0.30	1.12	7.85	4.27
CRR 7.1	0.29	14.59	10.00	11.35
CRR 7.2	0.08	2.78	13.00	10.11
CRR 8.1	2.31	1.17	19.00	13.77
CRR 8.2	0.04	32.32	36.00	22.33
CRR 8.3	0.02	4.85	75.00	14.89
Total	100.00			

2013				
CRR 0.16	0.00	0.00	0.01	0.00
CRR 1.1	4.83	0.00	0.02	0.00
CRR 1.2	7.47	0.00	0.04	0.00
CRR 2.1	20.85	0.00	0.07	0.00
CRR 2.2	10.38	0.01	0.13	0.03
CRR 3.1	10.79	0.07	0.22	0.16
CRR 3.2	9.49	0.13	0.37	0.22
CRR 3.3	8.33	0.15	0.63	0.27
CRR 4.1	6.40	0.35	0.87	0.48
	5.84	0.93	1.20	

CRR 4.2				0.80
CRR 4.3	4.22	0.47	1.65	0.67
CRR 5.1	4.18	0.72	2.25	0.76
CRR 5.2	3.07	0.97	3.05	1.03
CRR 5.3	1.85	2.77	4.20	1.89
CRR 6.1	0.98	4.37	5.75	3.28
CRR 6.2	0.46	5.74	7.85	3.77
CRR 7.1	0.44	12.69	10.00	7.95
CRR 7.2	0.15	7.84	13.00	8.68
CRR 8.1	0.15	9.48	19.00	11.44
CRR 8.2	0.07	14.94	36.00	13.70
CRR 8.3	0.05	13.12	75.00	13.64
Total	100.00			

1 Covers the combined populations of the global large corporates model, all regional IRB models for large, medium and small corporates and non-bank financial institutions.

2 Total facility limits for each CRR grade, expressed as a percentage of total limits granted.

3 Defaulted facilities as a percentage of total facility limits at that grade.

4 The estimated PD is before application of the 0.03% regulatory floor.

5 Actual PD is based on the number of defaulted obligors covered by the model(s), without taking into account the size of the facility granted or the exposures to the obligor.

6 The top band of the wholesale CRR master scale is not available to entities in the corporates exposure class, but restricted to the strongest central governments, central banks and institutions.

Retail credit models

In the case of retail portfolios, we do not operate global models due to the different country-level portfolio performance characteristics and loss history. Given the large number of retail IRB models globally, we disclose information on our most material local models.

The actual and estimated values are derived from the model monitoring and calibration processes performed at a local level. Within the discipline of our global modelling policies, our analytics teams adopt back-testing criteria specific to local conditions in order to assess the accuracy of their models.

Table 38 contains the estimated and actual values from the back-testing of our material IRB models covering the HSBC brand portfolios in the UK, the HSBC portfolios under the Area Management Office in Hong Kong, and the residential mortgage portfolios in the US.

The PD, LGD and EAD estimated values here were calculated to compare with the reported actual values and have a different basis of preparation to the estimates reported in tables 32 and 33.

Within table 38, for back-testing purposes, a customer's PD is observed at a point in time and their default or non-default status in the following one-year period is recorded against that PD grade. The PD presentation here is expressed on an obligor count basis consisting of non-defaulted obligors at the time of observation. The LGD and EAD refer to observations for the defaulted population, being the appropriate focus of an assessment of these models' performance. The LGD values represent the amount of loss as a percentage of EAD and are calculated based on defaulted accounts that were fully resolved or have completed the modelled recovery outcome period at the reporting date. The EAD values of the defaulted exposures are presented as a percentage of the total EAD which includes all defaulted and non-defaulted exposures for the relevant population. The regulatory PD and LGD floors of 0.03% and 10%, respectively, are applied during final capital calculation and hence are not reflected in the estimates below.

The UK estimated values in table 38 are based on model outputs including required regulatory downturn adjustments.

In conducting the back-testing, our UK HSBC residential mortgage LGD model uses a recovery outcome period of 24 months starting at the date of default. The significant proportion of defaulted population, which has not reached a fully resolved outcome at the reporting date, contributed to the low actual LGD while the estimated LGD increased as a result of the required downturn adjustments. Overall, UK estimates in table 38 remain conservative and higher than calculated actual values.

The Hong Kong estimated PD and LGD values in table 38 include required stressed factors to reflect downturn conditions, especially in the case of the residential mortgage model. The LGD model for our Hong Kong HSBC residential mortgage portfolio uses a recovery outcome period of 24 months starting at the date of default. The estimates for our Hong Kong HSBC residential mortgage LGD remain higher than the calculated actual values but significantly below the 10% regulatory floor. The Hong Kong credit card EAD model currently underestimates exposure values at the point of default; however, this is mitigated by a temporary adjustment to RWAs. An updated model is expected to be implemented by the end of 2016.

The US estimates in table 38 include downturn adjustments and model overlays agreed with the PRA. The LGD models for our Consumer Lending and Mortgage Services portfolios use a recovery outcome period of 30 months, and for HSBC Mortgage Corporation portfolio 36 months, reflecting the longer recovery process due to foreclosure moratoria.

The LGD estimates for our Consumer Lending and Mortgage Services portfolios remained stable in 2015; however, actual LGD values are decreasing due to the continuing sale of assets and improving house prices in the US.

For the HSBC Mortgage Corporation portfolio, we report the estimates from the current models whilst we await approval from the PRA for the new models and continue to make the agreed quantitative adjustment to the amount of capital we hold against this portfolio to reflect the underperformance of the current models. The quantitative adjustment is performed at the portfolio RWA and EL levels and hence is not reflected in table 38.

Table 38: IRB models - estimated and actual values (retail)

	PD		LGD		EAD	
	Estimated	Actuals	Estimated	Actuals	Estimated	Actuals
	%	%	%	%	%	%
2015						
UK						
HSBC residential mortgage	0.45	0.22	16.43	3.54	0.17	0.17
HSBC credit card	1.06	0.86	91.54	88.42	1.23	1.19
HSBC personal loans	1.93	1.23	82.10	78.46	1.18	1.13
Business Banking (Retail SME)	2.26	2.21	76.06	71.78	1.57	1.47
Hong Kong						
HSBC personal residential mortgage	0.79	0.03	1.90	0.03	0.04	0.03
HSBC credit card	0.67	0.32	90.40	81.75	0.52	0.58
HSBC personal instalment loans	2.40	2.02	89.43	69.59	1.69	1.51
US						
Consumer Lending real estate first lien	5.92	5.47	75.98	51.60	5.37	5.31
Mortgage Services real estate first lien	6.96	5.96	69.59	54.09	7.97	7.88
HSBC Mortgage Corporation first lien	4.66	2.08	29.63	37.19	0.70	0.69
2014						
UK						
HSBC residential mortgage	0.50	0.31	15.82	4.68	0.24	0.23
HSBC credit card	1.37	1.07	91.11	86.30	1.83	1.78
HSBC personal loans	2.28	1.57	81.56	80.45	1.52	1.46
Business Banking (Retail SME)	2.83	2.57	73.04	68.17	2.00	1.88
Hong Kong						
HSBC personal residential mortgage	0.72	0.04	1.26	0.35	0.03	0.03
HSBC credit card	0.62	0.32	92.91	88.13	0.55	0.59
HSBC personal instalment loans	2.37	2.04	89.69	87.66	1.77	1.63
US						
Consumer Lending real estate first lien	7.31	7.72	77.16	60.29	7.83	7.72
Mortgage Services real estate first lien	9.43	8.12	71.40	60.17	7.51	7.43
HSBC Mortgage Corporation first lien	5.24	2.28	29.63	39.36	1.00	1.00

2013						
UK						
HSBC residential mortgage	0.55	0.38	17.30	6.40	0.32	0.31
HSBC credit card	1.54	1.27	88.10	84.10	1.70	1.67
HSBC personal loans	3.57	2.35	85.40	73.00	2.19	2.11
Business Banking (Retail SME)	2.39	2.61	78.00	70.00	2.03	1.99
Hong Kong						
HSBC personal residential mortgage	0.71	0.03	1.84	0.43	0.03	0.03
HSBC credit card	0.63	0.33	91.41	84.58	0.56	0.59
HSBC personal instalment loans	2.20	1.99	90.07	96.16	1.69	1.55
US						
Consumer Lending real estate first lien	7.74	8.22	67.13	64.93	7.08	6.72
Mortgage Services real estate first lien	10.15	9.68	60.04	62.92	6.12	5.88
HSBC Mortgage Corporation first lien	4.64	4.43	49.85	37.17	2.40	2.40

Past due but not impaired exposures, impaired exposures and credit risk adjustments

Table 39 and 40 analyse past due but not impaired exposures, impaired exposures and impairment allowances and other credit risk provisions on a regulatory consolidation basis. These tables use accounting values. The proportional consolidation of associates is the main difference between the amounts presented here and those on a financial consolidation basis.

Our approach for determining impairment allowances is explained on page 354 of the Annual Report and Accounts 2015, and the Group's definitions for accounting purposes of 'past due' and 'impaired' are set out on pages 127 and 128 respectively.

Under the accounting standards currently adopted by HSBC, impairment allowances, value adjustment and credit related provisions for off-balance sheet amounts are treated as specific CRAs.

Table 39: Past due but not impaired exposures, impaired exposures and impairment allowances and other credit risk provisions by counterparty and by geographical region

	Europe	Asia	MENA	North America	Latin America	Total
	$m	$m	$m	$m	$m	$m

Past due but not impaired exposures	1,928	4,925	1,159	5,466	1,252	14,730
- personal	1,152	2,935	329	3,332	790	8,538
- corporate and commercial	762	1,948	732	1,868	460	5,770
- financial	14	42	98	266	2	422
Impaired exposures	11,209	4,095	1,977	9,135	3,151	29,567
- personal	2,533	817	230	8,130	857	12,567
- corporate and commercial	6,873	3,267	1,629	1,003	2,285	15,057
- financial	1,803	11	118	2	9	1,943
Impairment allowances and other credit risk provisions	(3,895)	(4,087)	(1,643)	(2,235)	(2,168)	(14,028)
- personal	(948)	(735)	(267)	(1,232)	(872)	(4,054)
- corporate and commercial	(2,752)	(3,339)	(1,182)	(971)	(1,296)	(9,540)
- financial	(195)	(13)	(194)	(32)	-	(434)

Table 40: Movement in specific credit risk adjustments by counterparty and by geographical region

	Europe	Asia	MENA	North America	Latin America	Total
	$m	$m	$m	$m	$m	$m
Specific credit risk adjustments at 1 January 2015	4,430	3,883	1,633	2,764	2,621	15,331
Amounts written off	(1,295)	(595)	(336)	(662)	(1,306)	(4,194)
- personal	(626)	(416)	(114)	(554)	(997)	(2,707)
- corporate and commercial	(657)	(179)	(222)	(106)	(309)	(1,473)
- financial	(12)	-	-	(2)	-	(14)
Recoveries of amounts written off in previous years	388	165	33	76	146	808
- personal	340	135	30	57	119	681
- corporate and commercial	46	30	3	18	27	124
- financial	2	-	-	1	-	3
Charge to income statement	734	1,392	336	547	1,450	4,459
- personal	263	334	127	157	983	1,864

- corporate and commercial	457	1,058	199	397	467	2,578
- financial	14	-	10	(7)	-	17
Exchange and other movements	(362)	(758)	(23)	(490)	(743)	(2,376)
Specific credit risk adjustments at 31 December 2015	3,895	4,087	1,643	2,235	2,168	14,028

EL and credit risk adjustments

We analyse credit loss experience in order to assess the performance of our risk measurement and control processes, and to inform our understanding of the implications for risk and capital management of dynamic changes occurring in the risk profile of our exposures.

This analysis includes comparison of the EL calculated in the use of IRB risk rating models, which drives part of the regulatory capital calculation, with other reported measures of credit loss within financial statements prepared under IFRSs. These measures include loan impairment allowances, value adjustments and credit related provisions for off-balance sheet amounts, collectively referred to as CRAs. The excess of EL over CRAs is treated as a capital deduction in the composition of regulatory capital.

The disclosures below set out:

- commentary on aspects of the relationship between regulatory EL and CRAs recognised in our financial statements; and

- tables of EL and CRA balances and charges during the period by exposure class (within retail IRB, also by sub-class) and by region.

When comparing EL with measures of credit losses under IFRSs, it is necessary to take into account differences in the definition and scope of each. Below are examples of matters that can give rise to material differences in the way economic, business and methodological drivers are reflected quantitatively in the accounting and regulatory measures of loss.

Tables 41 and 42 set out for IRB credit exposures the EL, CRA balances and actual loss experience reflected in the charges for CRAs.

CRA balances represent management's best estimate of losses incurred in the loan portfolios at the balance sheet date. Charges for CRAs represent a movement in the CRA balance during the year, reflecting loss events which occurred during the financial year and changes in estimates of losses arising on events which occurred prior to the current year. EL represents the one-year regulatory expected loss accumulated in the book and is calculated at a point in time.

Examples of differences in definition and scope between EL and CRA balances

- Under IAS 39 our estimates of loss in impairment allowances are required to reflect the current circumstances and specific cash flow expectations of a customer. EL is based on modelled estimates and although the estimates may be individually assigned to specific exposures, the statistical nature of these models means that they are influenced by the behaviour of the overall portfolio;
- EL is based on exposure values that incorporate expected future drawings of committed credit lines, while CRAs are recognised in respect of financial assets recognised on the balance sheet and in respect of committed credit lines where a loss is probable;
- EL is generally based on TTC estimates of PD over a one-year future horizon, determined via statistical analysis of historical default experience. CRAs are recognised for losses that have been incurred at the balance sheet date;
- in the majority of cases, EL is based on economic downturn estimates of LGD, while CRAs are measured using estimated future cash flows at the balance sheet date;
- EL incorporates LGD, which may discount recoveries at a different rate from the effective interest rate employed in discounted cash flow analysis for CRAs;
- LGDs typically include all costs associated with recovery, whereas the accounting measurement considers only the costs of obtaining and selling collateral;
- the LGD and EAD used for the EL calculation in the foundation IRB approach is set by regulations and may differ significantly from the accounting assumptions about estimated cash flows used;
- for EL, certain exposures are subject to regulatory minimum thresholds for one or more parameters, whereas credit losses under IFRSs are determined using

management's judgement about estimated future cash flows; and

· in the case of EL, to meet regulatory prudential standards, HSBC's model philosophy favours the incorporation of conservative estimation to accommodate uncertainty, for instance where modelling portfolios with limited data. Under IFRSs, uncertainty is considered when forming management's estimates of future cash flows, using balanced and neutral judgement.

Table 41: IRB expected loss and CRAs - by exposure class1

	Expected loss $bn	Balances $bn	CRA Charge for the year $bn
IRB exposure classes			
Central governments and central banks	0.2	-	-
Institutions	0.1	-	-
Corporates	5.5	4.5	1.0
Retail	5.5	2.1	0.4
- secured by mortgages on immovable property SME	-	-	-
- secured by mortgages on immovable property non-SME	3.5	1.2	-
- qualifying revolving retail	0.7	0.2	0.2
- other SME	0.7	0.3	-
- other non-SME	0.6	0.4	0.2
At 31 December 2015	11.3	6.6	1.4
IRB exposure classes			
Central governments and central banks	0.3	-	-
Institutions	0.3	-	-
Corporates	5.2	4.2	1.1
Retail	7.2	3.1	0.2
- secured by mortgages on immovable property SME	-	-	-
- secured by mortgages on immovable property non-SME	5.1	1.9	(0.1)
- qualifying revolving retail	0.7	0.3	0.1
- other SME	0.7	0.4	-

- other non-SME	0.7	0.5	0.2
At 31 December 2014	13.0	7.3	1.3
IRB exposure classes			
Central governments and central banks	0.3	-	-
Institutions	0.3	0.1	-
Corporates	5.8	4.4	1.5
Retail	9.3	5.1	1.2
- secured on real estate property	7.2	3.6	0.8
- qualifying revolving retail	0.7	0.4	0.3
- SMEs	0.9	0.7	-
- other retail	0.5	0.4	0.1
At 31 December 2013	15.7	9.6	2.7

1 Excludes securitisation exposures because EL is not calculated for this exposure class.

Table 42: IRB expected loss and CRAs - by region1

	Expected loss $bn	Balances $bn	CRA Charge for the year $bn
Europe	4.3	2.9	0.4
Asia	2.3	1.3	0.5
Middle East and North Africa	0.2	0.3	0.1
North America	4.4	2.0	0.4
Latin America	0.1	0.1	-
At 31 December 2015	11.3	6.6	1.4
Europe	4.8	3.5	0.7
Asia	2.2	1.1	0.4
Middle East and North Africa	0.2	0.1	-
North America	5.7	2.6	0.2
Latin America	0.1	-	-
At 31 December 2014	13.0	7.3	1.3

1 Excludes securitisation exposures because EL is not calculated for this exposure class.

Key points

· EL and impairments decreased in North America, primarily due to the continued run-off of the US CML retail mortgage portfolio and a lower level of newly impaired loans as well as overall lower loan balances due to portfolio sales. This was partially offset by some new defaults.

Risk mitigation

Our approach when granting credit facilities is to do so on the basis of capacity to repay rather than placing primary reliance on credit risk mitigants. Depending on a customer's standing and the type of product, facilities may be provided unsecured. Mitigation of credit risk is nevertheless a key aspect of effective risk management and, in a diversified financial services organisation such as HSBC, takes many forms.

Our general policy is to promote the use of credit risk mitigation, justified by commercial prudence and good practice as well as capital efficiency. Specifically, detailed policies cover the acceptability, structuring and terms of various types of business with regard to the availability of credit risk mitigation, for example in the form of collateral security. These policies, together with the setting of suitable valuation parameters, are subject to regular review to ensure that they are supported by empirical evidence and continue to fulfil their intended purpose.

Collateral

The most common method of mitigating credit risk is to take collateral. In our retail residential and CRE businesses, a mortgage over the property is usually taken to help secure claims. Physical collateral is also taken in various forms of specialised lending and leasing transactions where income from the physical assets that are financed is also the principal source of facility repayment. In the commercial and industrial sectors, charges are created over business assets such as premises, stock and debtors. Loans to private banking clients may be made against a pledge of eligible marketable securities, cash or real estate. Facilities to SMEs are commonly granted against guarantees given by their owners and/or directors. Guarantees from third parties can arise where the Group extends facilities without the benefit of any alternative form of security, e.g. where it issues a bid or performance bond in favour of a non-customer at the request of another bank.

For credit risk mitigants comprising immovable property the key determinant of concentration at Group level is geographic, which, in the majority of cases, is the same as the reported geographical location of the related exposures. Use of immovable property mitigants for risk management purposes is predominantly in Asia and Europe.

Further information regarding collateral held over CRE and residential property is provided on pages 139 and 147, respectively, of the Annual Report and Accounts 2015.

Financial collateral

In the institutional sector, trading facilities are supported by charges over financial instruments such as cash, debt securities and equities. Financial collateral in the form of marketable securities is used in much of the Group's derivatives activities and in SFTs such as repos, reverse repos, securities lending and borrowing. Netting is used extensively and is a prominent feature of market standard documentation.

Further information regarding collateral held for trading exposures is on page 78.

In the banking book, we provide customers with working capital management products. Some of these products have loans and advances to customers and customer accounts where we have rights of offset and comply with the regulatory requirements for on-balance sheet netting. Under on-balance netting the customer accounts are treated as cash collateral and the effects of this collateral are incorporated in our LGD estimates. For risk management purposes the net amounts of such exposures are subject to limits which are monitored and the relevant customer agreements are subject to review and update, as necessary, to ensure the legal right of offset remains appropriate. At 31 December 2015 in the region of $67bn of customer accounts were treated as cash collateral, mainly in the UK.

Other forms of credit risk mitigation

Our GB&M business utilises credit risk mitigation to manage the credit risk of its portfolios, with the goal of reducing concentrations in individual names, sectors or portfolios. The techniques in use include CDS purchases, structured credit notes and securitisation structures. Buying credit protection creates credit exposure against the protection provider, which is monitored as part of the overall credit exposure to them. Where applicable the transaction is entered into directly with a central clearing house counterparty, otherwise our exposure to CDS protection providers is diversified among mainly banking counterparties with strong credit ratings. In our corporate lending we also take guarantees from corporates and Export Credit Agencies. Corporates would normally provide guarantees as part of a parent/subsidiary or common parent relationship and would span a number of credit grades. The Export Credit Agencies will normally be investment grade.

Policy and procedures

Policies and procedures govern the protection of our position from the outset of a customer relationship, for instance in requiring standard terms and conditions or specifically agreed documentation permitting the offset of credit balances against debt obligations, and through controls over the integrity, current valuation and, if necessary, realisation of collateral security.

Valuing collateral

Valuation strategies are established to monitor collateral mitigants to ensure that they will continue to provide the anticipated secure secondary repayment source. Where collateral is subject to high volatility, valuation is frequent; where stable, less so. For market trading activities such as collateralised OTC derivatives and SFTs, we typically carry out daily valuations in support of margining arrangements. In the residential mortgage business, Group policy prescribes re-valuation at intervals of up to three years, or more frequently as the need arises, for example where market conditions are subject to significant change. Residential property collateral values are determined through a combination of professional appraisals, house price indices or statistical analysis.

Local market conditions determine the frequency of valuation for CRE. Re-valuations are sought where, for example, as part of the regular credit assessment of the obligor, material concerns arise in relation to the performance of the collateral. CRE re-valuation also occurs commonly in circumstances where an obligor's credit quality has declined sufficiently to cause concern that the principal payment source may not fully meet the obligation. Where such concerns exist the re-valuation method selected will depend upon the loan to value relationship, the direction in which the local CRE market has moved since the last valuation and, most importantly, the specific characteristics of the underlying CRE which is of concern.

Recognition of risk mitigation under the IRB approach

Within an IRB approach, risk mitigants are considered in two broad categories: first, those which reduce the intrinsic PD of an obligor and therefore operate as determinants of PD; and second, those which affect the estimated recoverability of obligations and require adjustment of LGD or, in certain limited circumstances, EAD.

The first typically include full parental guarantees - where one obligor within a group of companies guarantees another. This is usually factored into the estimate of the latter's PD, as it is assumed that the guarantor's performance materially informs the PD of the guaranteed entity. PD estimates are also subject to supplementary methodologies in respect of a 'sovereign ceiling', constraining the risk ratings assigned to obligors in countries of higher risk, and where only partial parental support exists. In addition, in certain jurisdictions, certain types of third party guarantee are recognised by substituting the guarantor's PD for the obligor's PD.

In the second category, LGD estimates are affected by a wider range of collateral including cash, charges over real estate property, fixed assets, trade goods, receivables and floating charges such as mortgage debentures. Unfunded mitigants, such as third party guarantees, are also taken into consideration in LGD estimates where there is evidence that they reduce loss expectation.

The main types of provider of guarantees are banks, other financial institutions and corporates, the latter typically in support of subsidiaries of their company group. Across HSBC, the nature of such customers and transactions is very diverse and the creditworthiness of guarantors accordingly spans a wide spectrum. The creditworthiness of providers of unfunded credit risk mitigation is taken into consideration as part of the guarantor's risk profile when, for example, assessing the risk of other exposures such as direct lending to the guarantor. Internal limits for such contingent exposure are approved in the same way as direct exposures.

EAD and LGD values, in the case of individually assessed exposures, are determined by reference to regionally approved internal risk parameters based on the nature of the exposure. For retail portfolios, credit risk mitigation data is incorporated into the internal risk parameters for exposures and feeds into the calculation of the EL band value summarising both customer delinquency and product or facility risk. Credit and credit risk mitigation data form inputs submitted by all Group offices to centralised databases and processing, including performance of calculations to apply the relevant regulatory rules and approach. A range of collateral recognition approaches are applied to IRB capital treatments:

- unfunded protection, which includes credit derivatives and guarantees, is reflected through adjustment or determination of PD, or LGD. Under the IRB advanced approach, recognition may be through PD (as a significant factor in grade determination) or LGD, or both;

- eligible financial collateral under the IRB advanced approach is taken into account in LGD models. Under the IRB foundation approach, regulatory LGD values are adjusted. The adjustment to LGD is based on the degree to which the exposure value would be adjusted notionally if the financial collateral comprehensive method were applied; and

- for all other types of collateral, including real estate, the LGD for exposures calculated under the IRB advanced approach are calculated by models. For IRB foundation, base regulatory LGDs are adjusted depending on the value and type of the asset taken as collateral relative to the exposure. The types of eligible mitigant recognised under the IRB foundation approach are more limited.

Table 43 sets out, for IRB exposures, the exposure value and the effective value of credit risk mitigation expressed as the exposure value covered by the credit risk mitigant. IRB credit risk mitigation reductions of EAD were immaterial at 31 December 2015.

Table 43: IRB exposure - credit risk mitigation

	At 31 December 2015		At 31 December 2014	
	Exposure value covered by credit derivatives or guarantees1 $bn	Total exposure value $bn	Exposure value covered by credit derivatives or guarantees1 $bn	Total exposure value $bn
Exposures under the IRB advanced approach				
Central governments and central banks	0.5	327.4	0.3	327.4
Institutions	0.4	90.5	0.8	130.4
Corporates	86.4	597.3	82.3	625.8
Retail	20.3	404.5	21.3	419.4
Securitisation positions	-	40.9	-	38.3
Non-credit obligation assets	-	50.2	-	52.5
		1,510.8		1,593.8
Exposures under the IRB foundation approach				
Central governments and central banks	-	0.1	-	0.1
Institutions	-	0.3	-	0.1
Corporates2	0.5	43.3	0.5	25.6

1 Figures presented in an 'obligor basis'.

2 The value of exposures under the IRB foundation approach covered by eligible financial and other collateral was $7.9bn (2014: $0.5bn).

Application of the standardised approach

The standardised approach is applied where exposures do not qualify for use of an IRB approach and/or where an exemption from IRB has been granted. The standardised approach requires banks to use risk assessments prepared by ECAIs or Export Credit Agencies to determine the risk weightings applied to rated counterparties.

ECAI risk assessments are used within the Group as part of the determination of risk weightings for the following classes of exposure:

- central governments and central banks;
- institutions;
- corporates;
- securitisation positions;

- short-term claims on institutions and corporates;
- regional governments and local authorities; and
- multilateral development banks.

We have nominated three ECAIs for this purpose - Moody's, S&P and Fitch. We have not nominated any Export Credit Agencies.

Data files of external ratings from the nominated ECAIs are matched with customer records in our centralised credit database.

When calculating the risk-weighted value of an exposure using ECAI risk assessments, risk systems identify the customer in question and look up the available ratings in the central database according to the rating selection rules. The systems then apply the prescribed credit quality step mapping to derive from the rating the relevant risk weight.

All other exposure classes are assigned risk weightings as prescribed in the PRA's Rulebook.

Credit quality step	Moody's assessments	S&P's assessments	Fitch's assessments
1	Aaa to Aa3	AAA to AA-	AAA to AA-
2	A1 to A3	A+ to A-	A+ to A-
3	Baa1 to Baa3	BBB+ to BBB-	BBB+ to BBB-
4	Ba1 to Ba3	BB+ to BB-	BB+ to BB-
5	B1 to B3	B+ to B-	B+ to B-
6	Caa1 and below	CCC+ and below	CCC+ and below

Exposures to, or guaranteed by, central governments and central banks of EEA States are risk-weighted at 0% using the standardised approach, provided they would be eligible under that approach for a 0% risk weighting.

Associates' exposures are calculated under the standardised approach and, at 31 December 2015, represented approximately 18% (2014: 16%) of Group credit risk RWAs.

Recognition of risk mitigation under the standardised approach

Where credit risk mitigation is available in the form of an eligible guarantee, non-financial collateral, or credit derivatives, the exposure is divided into covered and uncovered portions. The covered portion, which is determined after applying an appropriate 'haircut' for currency and maturity mismatches (and for omission of restructuring clauses for credit derivatives, where appropriate) to the amount of the protection provided, attracts the risk weight of the protection provider. The uncovered portion attracts the risk weight of the obligor. For exposures fully or partially covered by eligible financial collateral, the value of the exposure is adjusted under the financial collateral comprehensive method using supervisory volatility adjustments, including those arising from currency mismatch,

which are determined by the specific type of collateral (and, in the case of eligible debt securities, their credit quality) and its liquidation period. The adjusted exposure value is subject to the risk weight of the obligor.

Table 44 sets out the credit risk mitigation for exposures under the standardised approach, expressed as the exposure value covered by the credit risk mitigant, and table 45 sets out the distribution of standardised exposures across credit quality steps. This analysis excludes regional governments or local authorities, short-term claims, securitisation positions, CIUs and MDBs, as these exposures continue to be immaterial as a percentage of total standardised exposures. Also excluded, because the credit quality step methodology does not apply, are retail, equity, exposures in default and exposures secured by mortgages on immovable property.

Table 44: Standardised exposure - credit risk mitigation

	2015			2014		
	Exposure value covered by eligible financial and other collateral1	Exposure value covered by credit derivatives or guarantees1	Total exposure value	Exposure value covered by eligible financial and other collateral1	Exposure value covered by credit derivatives or guarantees1	Total Exposure value
	$bn	$bn	$bn	$bn	$bn	$bn
Exposures under the standardised approach						
Central governments and central banks	-	0.2	199.9	-	-	189.3
Institutions	-	4.3	38.9	-	2.5	30.1
Corporates	14.5	5.0	226.4	14.8	4.8	240.1
Retail	0.7	0.1	44.2	0.8	0.1	47.9
Secured by mortgages on immovable property	-	-	40.3	0.2	-	38.6
Exposures in default	-	-	4.9	-	-	4.7
	-	-	2.8	-	-	1.1

Regional governments or local authorities						
Equity	-	-	7.0	-	-	13.2
Other2	-		27.6	-	-	25.5
	-					
At 31 December			592.0			590.5

1 Figures presented on an 'obligor basis'.
2 This includes the exposure class 'other items' with an exposure value of $19.4bn as well as other less material standardised exposure classes not individually shown above.

Table 45: Standardised exposure - by credit quality step

	At 31 December 2015			At 31 December 2014		
	Original exposure1	Exposure value	RWAs	Original exposure1	Exposure value	RWAs
	$bn	$bn	$bn	$bn	$bn	$bn
Central governments and central banks						
Credit quality step 1	138.1	145.5		171.0	177.1	
Credit quality step 2	1.4	1.9		0.7	0.8	
Credit quality step 3	2.5	2.8		0.6	0.9	
Credit quality step 4	0.4	0.1		0.5	0.5	
Credit quality step unrated	49.6	49.6		9.9	10.0	
	192.0	199.9	20.0	182.7	189.3	19.7
Institutions						
Credit quality step 1	1.6	0.7		1.2	0.6	
Credit quality step 2	4.7	1.4		2.1	1.1	
Credit quality step 5	0.1	0.1		-	-	
Credit quality step unrated	36.8	36.7		28.7	28.4	
	43.2	38.9	14.7	32.0	30.1	11.2
Corporates						

Credit quality step 1	1.6	0.8		2.3	1.3	
Credit quality step 2	6.2	4.2		7.3	4.8	
Credit quality step 3	2.7	1.4		2.7	1.6	
Credit quality step 4	2.1	1.6		2.7	1.7	
Credit quality step 5	1.3	0.8		1.6	1.0	
Credit quality step 6	2.8	2.0		3.1	2.3	
Credit quality step unrated	330.6	215.6		345.9	227.4	
	347.3	226.4	210.6	365.6	240.1	224.7

1 Figures presented on an 'obligor basis'.

Counterparty credit risk

CCR risk arises for derivatives and SFTs. It is calculated in both the trading and non-trading books, and is the risk that a counterparty may default before settlement of the transaction. An economic loss occurs if the transaction or portfolio of transactions with the counterparty has a positive economic value at the time of default. CCR is generated primarily in our wholesale global businesses.

Three approaches may be used under CRD IV to calculate exposure values for CCR: mark-to-market, standardised and IMM. Exposure values calculated under these approaches are used to determine RWAs. Across the Group, we use the mark-to-market and IMM approaches. Under the mark-to-market approach, the EAD is calculated as current exposure plus regulatory add-ons. We use this approach for all products not covered by our IMM permission. Under the IMM approach, EAD is calculated by multiplying the effective expected positive exposure with a multiplier called 'alpha'.

Alpha (set to a default value of 1.4) accounts for several portfolio features that increase EL above that indicated by effective expected positive exposure in the event of default:

- co-variance of exposures;
- correlation between exposures and default;
- level of volatility/correlation that might coincide with a downturn;
- concentration risk; and
- model risk.

The effective expected exposure is derived from simulation, pricing and aggregation internal models approved by regulators. These models cover a range of asset classes including interest rate products, foreign exchange products, credit derivatives and equity derivatives.

The IMM model is subject to on-going model validation including monthly model performance monitoring. We also perform quarterly backtesting of the model's risk measures on a set of hypothetical portfolios as well as the market risk factor predictions. Calibration is performed using a minimum of three years historical data.

The only IMM site is London where approximately 88% of the trade population falls under the IMM approach.

From a risk management perspective, including daily monitoring of credit limit utilisation, products not covered by IMM are subject to conservative asset class add-on tables calculated outside of the IMM framework.

The potential future exposure measures used for CCR management are calibrated to the 95th percentile. The measures consider volatility, trade maturity and the counterparty legal documentation covering netting and collateral.

Limits for CCR exposures are assigned within the overall credit process. The Credit Risk function assigns a limit against each counterparty to cover derivatives exposure which may arise as a result of a counterparty default. The magnitude of this limit will depend on the overall risk appetite and type of derivatives trading undertaken with the counterparty.

The models and methodologies used in the calculation of CCR are approved by the Markets MOC. Models are subject to ongoing monitoring and validation. Additionally, they are subject to independent review at inception and annually thereafter.

Credit valuation adjustment

CRD IV introduced a regulatory capital charge to cover CVA risk, the risk of adverse moves in the credit valuation adjustments taken for expected credit losses on derivative transactions. Where we have both specific risk VaR approval and internal model method approval for a product, the CVA VaR approach has been used to calculate the CVA capital charge. Where we do not hold both approvals, the standardised approach has been applied. Certain counterparty exposures are exempt from CVA, such as non-financial counterparties and sovereigns.

Collateral arrangements

It is our policy to revalue all traded transactions and associated collateral positions on a daily basis. An independent collateral management function manages the collateral process including pledging and receiving collateral and investigating disputes and non-receipts.

Eligible collateral types are controlled under a policy to ensure price transparency, price stability, liquidity, enforce-ability, independence, reusability and eligibility for regulatory purposes. A valuation 'haircut' policy reflects the fact that collateral may fall in value between the date the collateral was called and the date of liquidation or enforcement. At least 96% of collateral held as credit risk mitigation under CSA's is either cash or liquid government securities.

Credit ratings downgrade

A credit rating downgrade clause in a Master Agreement or a credit rating downgrade threshold clause in a CSA are designed to trigger an action if the credit rating of the affected party falls below a specified level. These actions may include the requirement to pay or increase collateral, the termination n of transactions by the non-affected party or the

assignment of transactions by the affected party.

We control the inclusion of credit ratings downgrade language in a Master Agreement or a CSA by requiring each Group office to obtain the endorsement of the relevant credit authority together with the approval of the Regional Global Markets Chief Operating Officer via a Documentation Approval Committee.

Relevant management information is in place to enable us to identify any additional collateral requirements, where the threshold levels for these are affected by a credit ratings downgrade clause within a collateral agreement.

At 31 December 2015, the potential value of the additional collateral pertaining to International Swaps and Derivatives Association CSA downgrade thresholds that we would need to post with counterparties in the event of a one-notch downgrade of our rating was $0.3bn (2014: $0.5bn) and for a two-notch downgrade was $0.5bn (2014: $1.2bn).

Counterparty credit risk exposures

The following tables analyse CCR exposures and RWAs.

Table 46: Counterparty credit risk exposure - credit derivative transactions1

	2015			2014		
	Protection bought $bn	Protection sold $bn	Total $bn	Protection bought $bn	Protection sold $bn	Total $bn
Credit derivative products used for own credit portfolio						
Credit default swaps	3.5	0.7	4.2	1.9	0.1	2.0
Total notional value	3.5	0.7	4.2	1.9	0.1	2.0
Credit derivative products used for intermediation2						
Credit default swaps	222.5	217.7	440.2	263.3	262.5	525.8
Total return swaps	11.2	7.7	18.9	7.2	15.2	22.4
Total notional value	233.7	225.4	459.1	270.5	277.7	548.2
Total credit derivative notional value at 31 December	237.2	226.1	463.3	272.4	277.8	550.2

1 This table provides a further breakdown of totals reported on page 396 of the Annual Report and Accounts 2015 on an accounting consolidation basis.
2 This is where we act as an intermediary for our clients, enabling them to take a position in the underlying securities. This does not increase risk for HSBC.

Table 47: Counterparty credit risk - net derivative credit exposure1

	2015	2014
	$bn	$bn
Counterparty credit risk2		
Gross total fair values	394.3	595.5
Accounting offset arrangements	(105.9)	(250.5)
Total gross derivatives	288.4	345.0
Less: netting benefits3	(215.8)	(263.4)
Netted current credit exposure	72.6	81.6
Less: collateral held	(43.0)	(49.9)
Net derivative credit exposure at 31 December	29.6	31.7

1 This table provides a further breakdown of totals reported on page 395 in the Annual Report and Accounts 2015 on an accounting consolidation basis.
2 Excludes add-on for potential future credit exposure.
3 This is the netting benefit available for regulatory capital purposes which is not recognised under accounting rules.

Under IFRSs, netting is only permitted if legal right of set-off exists and the cash flows are intended to be settled on a net basis. Under the PRA's regulatory rules, however, netting is applied for capital calculations if there is legal certainty and the positions are managed on a net collateralised basis. As a consequence, we recognise greater netting under the PRA's rules, reflecting the close-

out provisions that would take effect in the event of default of a counterparty rather than just those transactions that are actually settled net in the normal course of business.

Table 48 shows how the total OTC derivative regulatory exposures in table 49 are derived from the gross total fair values reported in table 47.

Table 48: Comparison of derivative accounting balances and counterparty credit risk exposure

		Accounting balances $bn		Regulatory exposures $bn
Gross total fair values				
OTC derivatives		381.3		381.3
Spot transactions1		10.3		-
Exchange traded derivatives		2.7		2.7
Derivatives Held for sale5		-		1.8
		394.3		385.8
Initial margin posted to central counterparties2		-		8.8
Derivatives under the securitisation framework				(0.9)
Accounting offset arrangements				
IFRSs basis		(105.9)		-
Mark-to-market method				
Potential future credit exposure		-		147.2
Legal right of offset3		-		(201.2)
IMM method				
Modelling impact4	-		(212.2)	
Total derivative exposures at 31 December 2015		288.4		126.6
Gross total fair values				
OTC derivatives		578.0		578.0
Spot transactions1		13.7		-
Exchange traded derivatives		3.8		3.8
		595.5		581.8
Initial margin posted to central counterparties2		-		9.9
Accounting offset arrangements				
IFRSs basis	(250.5)			-
Mark-to-market method				
Potential future credit exposure		-		157.5
Legal right of offset3		-		(314.3)
IMM method				
Modelling impact4		-		(286.8)
		345.0		148.1

Total derivative exposures at 31 December 2014

1 Spot transactions attract a zero risk-weight under CRD IV rules.
2 Under CRD IV rules, in addition to derivatives transacted with CCPs, initial margin posted to CCPs is included in the regulatory exposures when calculating RWAs.
3 Legal right of offset derivative netting is a component of the $258.8bn derivatives offset in the 'Maximum exposure to credit risk' table on page 123 of the Annual Report and Accounts 2015.
4 The modelling impact for IMM exposures represents the difference between fair value and the EAD (calculated as 1.4 times the Effective Expected Potential Exposure) resulting from the model; the model incorporates offsets for netting benefits, correlation impacts and collateral as well as simulating the impact of potential market movements.
5 Derivatives in entities held for sale are not reported as derivatives in the balance sheet, however continue to be included in the calculation of regulatory EAD for counterparty credit risk until the point of sale.

Table 49: Counterparty credit risk exposure - by exposure class, product and method

	Modelled approaches		Non-modelled approaches		Total CCR	
	Exposure value $bn	RWAs $bn	Exposure value $bn	RWAs $bn	Exposure value $bn	RWAs $bn
By exposure class						
IRB advanced approach	24.4	10.9	104.8	33.8	129.2	44.7
- central governments and central banks	2.0	0.3	11.3	1.0	13.3	1.3
- institutions	6.7	2.5	53.7	13.2	60.4	15.7
- corporates	15.7	8.1	39.8	19.6	55.5	27.7
IRB foundation approach	-	-	5.4	2.1	5.4	2.1
- corporates	-	-	5.4	2.1	5.4	2.1
Standardised approach	2.4	-	6.7	4.7	9.1	4.7
- central governments and central banks	2.4	-	1.7	-	4.1	-
- institutions	-	-	0.5	0.1	0.5	0.1
- corporates	-	-	4.5	4.6	4.5	4.6
CVA advanced2	-	3.3	-	-	-	3.3
CVA standardised2	-	-	-	12.2	-	12.2
CCP standardised	0.1	-	34.8	2.2	34.9	2.2
At 31 December 2015	26.9	14.2	151.7	55.0	178.6	69.2
By product						
Derivatives (OTC and Exchange traded derivatives)	26.9	10.9	99.7	32.3	126.6	43.2
SFTs	-	-	45.1	7.0	45.1	7.0
Other1	-	-	6.9	2.2	6.9	2.2

CVA advanced2	-	3.3	-	-	-	3.3
CVA standardised2	-	-	-	12.2	-	12.2
CCP default funds3	-	-	-	1.3	-	1.3
At 31 December 2015	26.9	14.2	151.7	55.0	178.6	69.2
By exposure class						
IRB advanced approach	27.1	14.4	107.6	45.3	134.7	59.7
- central governments and central banks	1.5	0.3	7.7	0.8	9.2	1.1
- institutions	9.0	4.4	62.8	21.8	71.8	26.2
- corporates	16.6	9.7	37.1	22.7	53.7	32.4
IRB foundation approach	-	-	5.6	2.3	5.6	2.3
- corporates	-	-	5.6	2.3	5.6	2.3
Standardised approach	3.0	-	8.3	4.4	11.3	4.4
- central governments and central banks	3.0	-	3.7	-	6.7	-
- institutions	-	-	0.3	0.1	0.3	0.1
- corporates	-	-	4.3	4.3	4.3	4.3
CVA advanced2	-	3.5	-	-	-	3.5
CVA standardised2	-	-	-	18.0	-	18.0
CCP standardised	0.1	-	49.4	2.8	49.5	2.8
At 31 December 2014	30.2	17.9	170.9	72.8	201.1	90.7
By product						
Derivatives (OTC and Exchange traded derivatives)	30.2	14.4	117.9	42.8	148.1	57.2
SFTs	-	-	44.5	7.7	44.5	7.7
Other1	-	-	8.5	2.6	8.5	2.6
CVA advanced2	-	3.5	-	-	-	3.5
CVA standardised2	-	-	-	18.0	-	18.0
CCP default funds3	-	-	-	1.7	-	1.7
At 31 December 2014	30.2	17.9	170.9	72.8	201.1	90.7

1 Includes free deliveries not deducted from regulatory capital.

2 The RWA impact due to the CVA capital charge is calculated based on the exposures under the IRB and standardised approaches. No additional exposures are taken into account.

3 Default fund contributions are cash balances posted to CCP by all members. These cash balances are not included in the total reported exposure.

Key points

· Market movements, principally in foreign exchange derivatives, and position reductions as a result of reduced client demand and portfolio compressions decreased RWAs by $15.3bn.

· The reclassification of long dated derivative transactions to the banking book resulted in an RWA decrease of $1.5bn which was offset by an increase in credit risk RWAs.
· In addition, RWA initiatives resulted in RWA reductions of $4.4bn.

Table 50: Counterparty credit risk exposure - by exposure class, product and geographical region

	Exposure value					
	Europe $bn	Asia $bn	MENA $bn	North America $bn	Latin America $bn	Total $bn
By exposure class						
IRB advanced approach	68.7	34.3	0.2	24.8	1.2	129.2
- central governments and central banks	4.9	3.8	-	4.3	0.3	13.3
- institutions	31.2	17.8	0.2	10.4	0.8	60.4
- corporates	32.6	12.7	-	10.1	0.1	55.5
IRB foundation approach	4.7	-	0.7	-	-	5.4
- corporates	4.7	-	0.7	-	-	5.4
Standardised approach	5.0	0.4	1.2	0.3	2.2	9.1
- central governments and central banks	4.1	-	-	-	-	4.1
- institutions	-	-	0.2	0.3	-	0.5
- corporates	0.9	0.4	1.0	-	2.2	4.5
CVA advanced2	-	-	-	-	-	-
CVA standardised2	-	-	-	-	-	-
CCP standardised	14.8	4.2	-	15.5	0.4	34.9
At 31 December 2015	93.2	38.9	2.1	40.6	3.8	178.6
By product						
Derivatives (OTC and Exchange traded derivatives)	61.1	31.2	2.1	28.8	3.4	126.6
SFTs	28.9	4.1	-	11.7	0.4	45.1
Other1	3.2	3.6	-	0.1	-	6.9
CVA advanced2	-	-	-	-	-	-
CVA standardised2	-	-	-	-	-	-
CCP default funds3	-	-	-	-	-	-
At 31 December 2015	93.2	38.9	2.1	40.6	3.8	178.6

By exposure class						
IRB advanced approach	69.2	38.3	0.6	25.1	1.5	134.7
- central governments and central banks	5.8	2.5	-	0.6	0.3	9.2
- institutions	32.7	23.6	0.6	13.7	1.2	71.8
- corporates	30.7	12.2	-	10.8	-	53.7
IRB foundation approach	5.3	-	0.3	-	-	5.6
- corporates	5.3	-	0.3	-	-	5.6
Standardised approach	6.7	0.3	1.7	0.1	2.5	11.3
- central governments and central banks	5.8	-	0.9	-	-	6.7
- institutions	0.1	-	0.2	-	-	0.3
- corporates	0.8	0.3	0.6	0.1	2.5	4.3
CVA advanced2	-	-	-	-	-	-
CVA standardised2	-	-	-	-	-	-
CCP standardised	25.1	5.1	-	19.1	0.2	49.5
At 31 December 2014	106.3	43.7	2.6	44.3	4.2	201.1
By product						
Derivatives (OTC and Exchange traded derivatives)	76.5	34.7	1.7	31.5	3.7	148.1
SFTs	27.4	2.9	0.9	12.8	0.5	44.5
Other1	2.4	6.1	-	-	-	8.5
CVA advanced2	-	-	-	-	-	-
CVA standardised2	-	-	-	-	-	-
CCP default funds3	-	-	-	-	-	-
At 31 December 2014	106.3	43.7	2.6	44.3	4.2	201.1

1 Includes free deliveries not deducted from regulatory capital.

2 The RWA impact due to the CVA capital charge is calculated based on the same exposures as the IRB and standardised approaches. The table above does not present any exposures for CVA to avoid double counting.

3 Default fund contributions are cash balances posted to CCPs by all members. These cash balances have nil impact on reported exposure.

Table 51: Counterparty credit risk - RWAs by exposure class, product and geographical region

	RWAs					
	Europe $bn	Asia $bn	MENA $bn	North America $bn	Latin America $bn	Total $bn

By exposure class						
IRB advanced approach	22.0	12.3	-	9.5	0.9	44.7
- central governments and central banks	0.5	0.2	-	0.3	0.3	1.3
- institutions	7.8	4.5	-	3.0	0.4	15.7
- corporates	13.7	7.6	-	6.2	0.2	27.7
IRB foundation approach	1.6	-	0.5	-	-	2.1
- corporates	1.6	-	0.5	-	-	2.1
Standardised approach	1.0	0.5	1.0	-	2.2	4.7
- central governments and central banks	-	-	-	-	-	-
- institutions	-	-	0.1	-	-	0.1
- corporates	1.0	0.5	0.9	-	2.2	4.6
CVA advanced2	3.3	-	-	-	-	3.3
CVA standardised2	3.3	3.8	0.3	4.3	0.5	12.2
CCP standardised	0.9	0.5	-	0.8	-	2.2
At 31 December 2015	32.1	17.1	1.8	14.6	3.6	69.2
By product						
Derivatives (OTC and Exchange traded derivatives)	19.3	12.1	1.4	7.8	2.6	43.2
SFTs	3.9	0.4	-	2.2	0.5	7.0
Other1	1.6	0.6	-	-	-	2.2
CVA advanced2	3.3	-	-	-	-	3.3
CVA standardised2	3.3	3.8	0.4	4.2	0.5	12.2
CCP default funds3	0.7	0.2	-	0.4	-	1.3
At 31 December 2015	32.1	17.1	1.8	14.6	3.6	69.2
By exposure class						
IRB advanced approach	28.5	16.4	0.2	13.9	0.7	59.7
- central governments and central banks	0.6	0.3	-	0.1	0.1	1.1
- institutions	12.4	7.6	0.2	5.4	0.6	26.2
- corporates	15.5	8.5	-	8.4	-	32.4
IRB foundation approach	2.1	-	0.2	-	-	2.3
- corporates	2.1	-	0.2	-	-	2.3
Standardised approach	0.8	0.3	0.7	-	2.6	4.4
	-	-	-	-	-	-

- central governments and central banks						
- institutions	-	-	0.1	-	-	0.1
- corporates	0.8	0.3	0.6	-	2.6	4.3
CVA advanced2	3.5	-	-	-	-	3.5
CVA standardised2	4.4	4.7	0.1	8.1	0.7	18.0
CCP standardised	1.3	0.5	-	1.0	-	2.8
At 31 December 2014	40.6	21.9	1.2	23.0	4.0	90.7
By product						
Derivatives (OTC and Exchange traded derivatives)	26.1	15.0	1.1	11.9	3.1	57.2
SFTs	4.5	0.5	-	2.5	0.2	7.7
Other1	1.3	1.3	-	-	-	2.6
CVA advanced2	3.5	-	-	-	-	3.5
CVA standardised2	4.4	4.7	0.1	8.1	0.7	18.0
CCP default funds3	0.8	0.4	-	0.5	-	1.7
At 31 December 2014	40.6	21.9	1.2	23.0	4.0	90.7

1 Includes free deliveries not deducted from regulatory capital.

2 The RWA impact due to the CVA capital charge is calculated based on the exposures under the IRB and standardised approaches. No additional exposures are taken into account.

3 Default fund contributions are cash balances posted to CCPs by all members. These cash balances are not included in the total reported exposure.

Table 52: Counterparty credit risk - RWA density by exposure class, product and geographical region

	RWA density					
	Europe %	Asia %	MENA %	North America %	Latin America %	Total %
By exposure class						
IRB advanced approach						
Central governments and central banks	10	6	-	8	76	10
Institutions	25	25	-	29	55	26
Corporates	42	60	-	61	221	50

IRB foundation approach						
Corporates	35	-	50	-	-	37
Standardised approach						
Central governments and central banks	-	-	-	-	-	-
Institutions	-	-	47	-	-	47
Corporates	114	103	97	-	101	103
CVA advanced2	-	-	-	-	-	-
CVA standardised2	-	-	-	-	-	-
CCP standardised	7	12	-	5	-	6
At 31 December 2015	34	44				