HSBC HOLDINGS PLC
Form 6-K
February 22, 2017
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

Commission File Number: 001-14930

For the month of February 2017

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 if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(1): .....

Indicate by check mark if the registrant is submitting the Form 6-K in paper as permitted by Regulation S-T Rule 101(b)(7): .....

(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-).

Contents

Certain defined terms

Unless the context requires otherwise, 'HSBC Holdings' means HSBC Holdings plc and 'HSBC', the 'Group', 'we', 'us' and 'our' refer to HSBC Holdings together with its subsidiaries. Within this document the Hong Kong Special Administrative Region of the People's Republic of China is referred to as 'Hong Kong'. When used in the terms 'shareholders' equity' and 'total shareholders' equity', 'shareholders' means holders of HSBC Holdings ordinary shares and those preference shares and capital securities issued by HSBC Holdings classified as equity. The abbreviations '$m' and '$bn' represent millions and billions(thousands of millions) of US dollars, respectively.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Tables

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Regulatory framework for disclosures

HSBC is supervised on a consolidated basis in the United Kingdom ('UK') by the Prudential Regulation Authority ('PRA'), which receives information on the capital adequacy of, and sets capital requirements for, the Group as a whole. Individual banking subsidiaries are directly regulated by their local banking supervisors, who set and monitor their local capital adequacy requirements. In most jurisdictions, non-banking financial subsidiaries are also subject to the supervision and capital requirements of local regulatory authorities.

At a consolidated group level, we calculated capital for prudential regulatory reporting purposes throughout 2016 using the Basel III framework of the Basel Committee as implemented by the European Union ('EU') in the amended Capital Requirements Directive and Regulation ('CRD IV'), and in the PRA's Rulebook for the UK banking industry. The regulators of Group banking entities outside the EU are at varying stages of implementation of the Basel Committee's framework, so local regulation in 2016 may have been on the basis of Basel I, II or III.

The Basel Committee's framework is structured around three 'pillars': the Pillar 1 minimum capital requirements and Pillar 2 supervisory review process are complemented by Pillar 3 market discipline. The aim of Pillar 3 is to produce disclosures that allow market participants to assess the scope of application by banks of the Basel Committee's framework and the rules in their jurisdiction, their capital condition, risk exposures and risk management processes, and hence their capital adequacy.

Pillar 3 requires all material risks to be disclosed, enabling a comprehensive view of a bank's risk profile.

The PRA's final rules adopted national discretions in order to accelerate significantly the transition timetable to full 'end point' CRD IV compliance.

Pillar 3 disclosures

HSBC's Pillar 3 disclosures 2016 comprise all information required under Pillar 3, both quantitative and qualitative. They are made in accordance with Part 8 of the Capital Requirements Regulation within CRD IV. Additionally, we have implemented Basel Committee on Banking Supervision ('BCBS') final standards on revised Pillar 3 disclosures issued in January 2015. These disclosures are supplemented by specific additional requirements of the PRA and discretionary disclosures on our part.

The Pillar 3 disclosures are governed by the Group's disclosure policy framework as approved by the Group Audit Committee ('GAC'). Information relating to the rationale for withholding certain disclosures is provided in Appendix IV.

In our disclosures, to give insight into movements during the year, we provide comparative figures for the previous year, analytical review of variances and 'flow' tables for capital requirements. Geographical comparative data for Europe and Middle East and North Africa ('MENA') have been re-presented to reflect the management oversight provided by the MENA region following the management services agreement entered into by HSBC Bank Middle East Limited in 2016 in respect of HSBC Bank A.S. (Turkey).

Key ratios and figures are reflected throughout the Pillar 3 2016 disclosures and are also available on pages 2 to 3 of the Annual Reports and Accounts 2016. Where disclosures have been enhanced or are new we do not generally restate or provide prior year comparatives. The capital resources tables track the position from a CRD IV transitional to an end point basis.

We publish comprehensive Pillar 3 disclosures annually on the HSBC website www.hsbc.com, simultaneously with the release of our Annual Report and Accounts. A Pillar 3 document will also be disclosed at half-year following our Interim Report

disclosure. Earnings Releases will include regulatory information complementing the financial and risk information presented there and in line with the new requirements on the frequency of regulatory disclosures.

Pillar 3 requirements may be met by inclusion in other disclosure media. Where we adopt this approach, references are provided to the relevant pages of the Annual Report and Accounts or other location.

We continue to engage constructively in the work of the UK authorities and industry associations to improve the transparency and comparability of UK banks' Pillar 3 disclosures.

Regulatory developments

Throughout 2016, the BCBS and the Financial Stability Board ('FSB') continued to develop their package of reforms to the existing Basel III regulatory capital framework. In particular, the BCBS has proposed modifications to the existing risk-weighted asset ('RWA') and leverage frameworks. While many of these proposals are now finalised, certain key elements remain in draft, subject to international agreement. These include:

- changes to the framework for credit risk capital requirements under both the internal ratings based ('IRB') and standardised ('STD') approaches;
- a new single operational risk methodology, replacing those currently available;
- changes to leverage ratio exposure calculation and a new leverage buffer for global systemically important banks ('G-SIBs'); and
- the introduction of a capital floor based on the new STD approaches.

Separately, in response to the implementation of International Financial Reporting Standards 9 Financial Instruments ('IFRS 9') into the accounting framework in 2018, the BCBS has consulted on the long-term treatment of accounting provisions in the regulatory framework and potential transitional arrangements. It is the BCBS's aim that all of the above proposals will be finalised in 2017.

Meanwhile, in November, the European Commission ('EC') proposed a number of revisions to CRD IV, which reflect some of the proposals already completed or under development by the BCBS. Together, these changes are known as the 'CRR2' package.

The CRR2 package includes the following:

- a new STD approach for counterparty credit risk ('CCR') to replace the existing current exposure and STD methods;
- changes to the rules for determining the trading book boundary and the methodologies for calculating market risk capital charges;
- a binding leverage ratio and changes to the exposure measure;
- a new methodology for capital charges for equity investments in funds;
- restrictions to the capital base and changes to the exposure limits for the calculation of large exposures; and
- the final FSB Total Loss Absorbing Capacity ('TLAC') requirements in the EU in the form of Minimum Requirements for own funds and Eligible Liabilities ('MREL'). In relation to MREL implementation in the UK, the Bank of England also published its final requirements in November 2016, which introduces MREL from 2019 onwards consistent with international timelines.

The CRR2 package is expected to apply from 1 January 2021, save for the rules on TLAC, which may apply from 1 January

2019, and the transitional provisions for IFRS 9, which may apply from 1 January 2018.
All changes to the regulatory framework would need to be transposed into the relevant law before coming into effect.

Risk management

Our risk management framework

We use an enterprise-wide risk management framework across the organisation and across all risk types. It is underpinned by our risk culture and is reinforced by HSBC Values and our Global Standards programme.
The framework fosters continuous monitoring of the risk environment, and an integrated evaluation of risks and their interactions. It also ensures we have a consistent approach to monitoring, managing and mitigating the risks we accept and incur in our activities. Further information on our risk management framework is set out on page 101 of the Annual Report and Accounts 2016. The management and mitigation of principal risks facing the Group is described in our top and emerging risks on page 89 of the Annual Report and Accounts 2016.
Commentary on hedging strategies and associated processes can be found in the Market Risk and Securitisation sections of this document. Additionally, a comprehensive overview of this topic can be found in Note 16 on page 262 of the Annual Report and Accounts 2016.

Risk culture

HSBC has long recognised the importance of a strong risk culture, the fostering of which is a key responsibility of senior executives. Our risk culture is reinforced by HSBC Values and our Global Standards programme. It is instrumental in aligning the behaviours of individuals with our attitude to assuming and managing risk, which helps to ensure that our risk profile remains in line with our risk appetite.
Our risk culture is further reinforced by our approach to remuneration. Individual awards, including those for senior executives, are based on compliance with HSBC Values and the achievement of financial and non-financial objectives that are aligned to our risk appetite and strategy.
Further information on risk and remuneration is set out on page 89 of the Annual Report and Accounts 2016.

Risk governance

The Board has ultimate responsibility for the effective management of risk and approves HSBC's risk appetite. It is advised on risk-related matters by the Group Risk Committee ('GRC'), the Financial System Vulnerabilities Committee ('FSVC') and the Conduct and Values Committee ('CVC'). The activities of the GRC, FSVC and CVC are set out on pages 176 to 178 of the Annual Report and Accounts 2016.
Executive accountability for the monitoring, assessment and management of risk resides with the Group Chief Risk Officer. He is supported by the Risk Management Meeting ('RMM') of the Group Management Board ('GMB').
The management of financial crime risk resides with the Group Head of Financial Crime Risk. He is supported by the Global Standards Steering Meeting, as described on page 114 of the Annual Report and Accounts 2016.
Day-to-day responsibility for risk management is delegated to senior managers with individual accountability for decision making. These managers are supported by global functions as described under 'Three lines of defence' (see page 102 of the Annual Report and Accounts 2016).
Our executive risk governance structures ensure appropriate oversight and accountability of risk, which facilitates the

reporting and escalation to the RMM (see page 101 of the Annual Report and Accounts 2016).

Risk appetite

Risk appetite is a key component of our management of risk. It describes the aggregate level and risk types that we are willing to accept in achieving our medium to long-term business objectives. Within HSBC, risk appetite is managed through a global risk appetite framework and articulated in a risk appetite statement ('RAS'), which is biannually approved by the Board on the advice of the GRC.
The Group's risk appetite informs our strategic and financial planning process, defining the desired forward-looking risk profile of the Group. It is also integrated within other risk management tools, such as the top and emerging risks report and stress testing, to ensure consistency in risk management. Information on our risk management tools is set out on page 101 of the Annual Report and Accounts 2016. Details on the Group's overarching risk appetite are set out

on page 89 of the Annual Report and Accounts 2016.

Stress testing

HSBC operates a comprehensive stress testing programme that supports our risk management and capital planning. It includes execution of stress tests mandated by our regulators. Our stress testing is supported by dedicated teams and infrastructure.

Our testing programme demonstrates our capital strength and enhances our resilience to external shocks. It also helps us understand and mitigate risks, and informs our decision about capital levels. As well as taking part in regulators' stress tests, we conduct our own internal stress tests.

The Group stress testing programme is overseen by the GRC, and results are reported, where appropriate, to the RMM and GRC.

Further information on stress testing and details of the Group's regulatory stress test results are set out on page 103 of the Annual Report and Accounts 2016.

Global Risk function

We have a dedicated Global Risk function, headed by the Group Chief Risk Officer, which is responsible for the Group's risk management framework. This includes establishing global policy, monitoring risk profiles, and forward-looking risk identification and management. Global Risk is made up of sub-functions covering all risks to our operations. It is independent from the global businesses, including sales and trading functions, helping to ensure balance in risk/return decisions. The Global Risk function operates in line with the 'three lines of defence' model (see page 102 of the Annual Report and Accounts 2016).

Risk management and internal control systems

The Directors are responsible for maintaining and reviewing the effectiveness of risk management and internal control systems, and for determining the aggregate level and risk types they are willing to accept in achieving the Group's business objectives. On behalf of the Board, the GAC has responsibility for oversight of risk management and internal controls over financial reporting, and the GRC has responsibility for oversight of risk management and internal controls over other than financial reporting, including enterprise-wide stress testing.

The Directors, through the GRC and the GAC, conduct an annual review of the effectiveness of our system of risk management and internal control. The GRC and the GAC received confirmation that executive management has taken or is taking the necessary actions to remedy any failings or weaknesses identified through the operation of our framework of controls.

HSBC's key risk management and internal control procedures are described on page 183 of the Annual Report and Accounts

2016, where the Directors' Report on the effectiveness of internal controls can also be found.

Risk measurement and reporting systems

Our risk measurement and reporting systems are designed to help ensure that risks are comprehensively captured with all the attributes necessary to support well-founded decisions, that those attributes are accurately assessed and that information is delivered in a timely manner for those risks to be successfully managed and mitigated.

Risk measurement and reporting systems are also subject to a governance framework designed to ensure that their build and implementation are fit for purpose and functioning appropriately. Risk information systems development is a key responsibility of the Global Risk function, while the development and operation of risk rating and management systems and processes are ultimately subject to the oversight of the Board.

We continue to invest significant resources in IT systems and processes in order to maintain and improve our risk management capabilities. A number of key initiatives and projects to enhance consistent data aggregation, reporting and management, and work towards meeting our Basel Committee data obligations are in progress. Group policy promotes the deployment of preferred technology where practicable. Group standards govern the procurement and operation of systems used in our subsidiaries to process risk information within business lines and risk functions.

Risk measurement and reporting structures deployed at Group level are applied throughout global businesses and major operating subsidiaries through a common operating model for integrated risk management and control. This model sets out the respective responsibilities of Group, global business, region and country level risk functions in respect of such matters as risk governance and oversight, compliance risks, approval authorities and lending guidelines, global and local scorecards, management information and reporting, and relations with third parties, including regulators, rating agencies and auditors.

Risk analytics and model governance

The Global Risk function manages a number of analytics disciplines supporting rating and scoring models for different risk types and business segments, economic capital and stress testing. It formulates technical responses to industry developments and regulatory policy in the field of risk analytics, develops HSBC's global risk models, and oversees local model development and use around the Group in progress toward our implementation targets for the IRB advanced approach.

Model governance is under the general oversight of Global Model Oversight Committee ('MOC'). Global MOC is supported by specific global functional MOCs for wholesale credit risk, market risk, Retail Banking and Wealth Management ('RBWM'), Global Private Banking ('GPB'), Finance, regulatory compliance, operational risk, fraud risk and financial intelligence, pensions risk, financial crime risk, and has functional and/or regional and entity-level counterparts with comparable terms of reference.

The Global MOC meets regularly and reports to RMM. It is chaired by the Global Risk function, and its membership is drawn from Risk, Finance and global businesses. Its primary responsibilities are to oversee the framework for the management of model risk, bring a strategic approach to model-related issues across the Group and to oversee the governance of our risk rating models, their consistency and approval, within the regulatory framework. Through its oversight of the functional MOCs, it identifies emerging risks for all aspects of the risk rating system, ensuring that model risk is managed within our risk appetite statement, and formally advises RMM on any material model-related issues.

Models are also subject to an independent model review process led by the Independent Model Review team within Global Risk. The Independent Model Review team provides robust challenge to the modelling approaches used across the Group, and ensures that the performance of those models is transparent and that their limitations are visible to key stakeholders.

The development and use of data and models to meet local requirements are the responsibility of global businesses or functions, as well as regional and/or local entities under the governance of their own management, subject to overall Group policy and oversight.

Linkage to the Annual Report and Accounts 2016

Basis of consolidation

The basis of consolidation for the purpose of financial accounting under IFRSs, described in Note 1 of the Annual Report and Accounts 2016, differs from that used for regulatory purposes as described in ‘Structure of the regulatory group’ on page 10.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 1: Reconciliation of balance sheets – financial accounting to regulatory scope of consolidation

	Ref	Accounting balance sheet $m	Deconsolidation of insurance/ other entities $m	Consolidation of banking associates $m	Regulatory balance sheet $m
Assets					
Cash and balances at central banks		128,009	(27)	1,197	129,179
Items in the course of collection from other banks		5,003	—	26	5,029
Hong Kong Government certificates of indebtedness		31,228	—	—	31,228
Trading assets		235,125	(198)	1	234,928
Financial assets designated at fair value		24,756	(24,481)	—	275
Derivatives		290,872	(145)	77	290,804
Loans and advances to banks		88,126	(1,845)	922	87,203
Loans and advances to customers		861,504	(3,307)	12,897	871,094
– of which:					
impairment allowances on IRB portfolios	h	(5,096)	—	—	(5,096)
impairment allowances on standardised portfolios		(2,754)	—	(235)	(2,989)
Reverse repurchase agreements – non-trading		160,974	344	1,444	162,762
Financial investments		436,797	(54,904)	3,500	385,393
Assets held for sale		4,389	(7)	—	4,382
– of which:					
goodwill and intangible assets	e	1	—	—	1
impairment allowances		(250)	—	—	(250)
– of which:					
IRB portfolios	h	(146)	—	—	(146)
standardised portfolios		(104)	—	—	(104)
Capital invested in insurance and other entities		—	2,214	—	2,214
Current tax assets		1,145	(118)	—	1,027
Prepayments, accrued income and other assets		59,520	(3,066)	306	56,760
– of which: retirement benefit assets	i	4,714	—	—	4,714
Interests in associates and joint ventures		20,029	—	(4,195)	15,834
– of which: positive goodwill on acquisition	e	488	—	(475)	13
Goodwill and intangible assets	e	21,346	(6,651)	481	15,176
Deferred tax assets	f	6,163	176	5	6,344
Total assets at 31 Dec 2016		2,374,986	(92,015)	16,661	2,299,632

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 1: Reconciliation of balance sheets – financial accounting to regulatory scope of consolidation (continued)

	Ref	Accounting balance sheet $m	Deconsolidation of insurance/ other entities $m	Consolidation of banking associates $m	Regulatory balance sheet $m
Liabilities and equity					
Hong Kong currency notes in circulation		31,228	—	—	31,228
Deposits by banks		59,939	(50)	441	60,330
Customer accounts		1,272,386	(44)	14,997	1,287,339
Repurchase agreements – non-trading		88,958	—	—	88,958
Items in course of transmission to other banks		5,977	—	—	5,977
Trading liabilities		153,691	643	1	154,335
Financial liabilities designated at fair value		86,832	(6,012)	—	80,820
– of which:					
term subordinated debt included in tier 2 capital	n, q	23,172	—	—	23,172
preferred securities included in tier 1 capital	m	411	—	—	411
Derivatives		279,819	193	64	280,076
Debt securities in issue		65,915	(3,547)	662	63,030
Liabilities of disposal groups held for sale		2,790	—	—	2,790
Current tax liabilities		719	(26)	—	693
Liabilities under insurance contracts		75,273	(75,273)	—	—
Accruals, deferred income and other liabilities		41,501	1,810	495	43,806
– of which: retirement benefit liabilities		2,681	(2)	61	2,740
Provisions		4,773	(18)	—	4,755
– of which: contingent liabilities and contractual commitments		299	—	—	299
– of which:					
credit-related provisions on IRB portfolios	h	267	—	—	267
credit-related provisions on standardised portfolios		32	—	—	32
Deferred tax liabilities		1,623	(981)	1	643
Subordinated liabilities		20,984	1	—	20,985
– of which:					
preferred securities included in tier 1 capital	k, m	1,754	—	—	1,754
perpetual subordinated debt included in tier 2 capital	o	1,967	—	—	1,967
term subordinated debt included in tier 2 capital	n, q	16,685	—	—	16,685
Total liabilities at 31 Dec 2016		2,192,408	(83,304)	16,661	2,125,765
Called up share capital	a	10,096	—	—	10,096
Share premium account	a, k	12,619	—	—	12,619
Other equity instruments	j, k	17,110	—	—	17,110
Other reserves	c, g	(1,234)	1,735	—	501
Retained earnings	b, c	136,795	(9,442)	—	127,353
Total shareholders' equity		175,386	(7,707)	—	167,679
Non-controlling interests	d, l, m, p	7,192	(1,004)	—	6,188
– of which: non-cumulative preference shares issued by subsidiaries included in tier 1 capital	m	260	—	—	260
Total equity at 31 Dec 2016		182,578	(8,711)	—	173,867

Total liabilities and equity at 31 Dec 2016	2,374,986	(92,015)	16,661	2,299,632

The references (a) – (q) identify balance sheet components that are used in the calculation of regulatory capital on page 13.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 1: Reconciliation of balance sheets – financial accounting to regulatory scope of consolidation (continued)

	Ref	Accounting balance sheet $m	Deconsolidation of insurance/ other entities $m	Consolidation of banking associates $m	Regulatory balance sheet $m
Assets					
Cash and balances at central banks		98,934	(2)	28,784	127,716
Items in the course of collection from other banks		5,768	—	22	5,790
Hong Kong Government certificates of indebtedness		28,410	—	—	28,410
Trading assets		224,837	340	4,390	229,567
Financial assets designated at fair value		23,852	(23,521)	2,034	2,365
Derivatives		288,476	(146)	495	288,825
Loans and advances to banks		90,401	(3,008)	16,413	103,806
Loans and advances to customers		924,454	(7,427)	120,016	1,037,043
– of which:					
impairment allowances on IRB portfolios	h	(6,291)	—	—	(6,291)
impairment allowances on standardised portfolios		(3,263)	—	(2,780)	(6,043)
Reverse repurchase agreements – non-trading		146,255	711	5,935	152,901
Financial investments		428,955	(51,684)	42,732	420,003
Assets held for sale		43,900	(4,107)	—	39,793
– of which:					
goodwill and intangible assets	e	1,680	(219)	—	1,461
impairment allowances		(1,454)	—	—	(1,454)
– of which:					
IRB portfolios	h	(7)	—	—	(7)
standardised portfolios		(1,447)	—	—	(1,447)
Capital invested in insurance and other entities		–	2,371	—	2,371
Current tax assets		1,221	(15)	—	1,206
Prepayments, accrued income and other assets		54,398	(2,539)	9,692	61,551
– of which: retirement benefit assets	i	5,272	—	—	5,272
Interests in associates and joint ventures		19,139	—	(18,571)	568
– of which: positive goodwill on acquisition	e	593	—	(579)	14
Goodwill and intangible assets	e	24,605	(6,068)	623	19,160
Deferred tax assets	f	6,051	195	518	6,764
Total assets at 31 Dec 2015		2,409,656	(94,900)	213,083	2,527,839

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 1: Reconciliation of balance sheets – financial accounting to regulatory scope of consolidation (continued)

	Ref	Accounting balance sheet $m	Deconsolidation of insurance/ other entities $m	Consolidation of banking associates $m	Regulatory balance sheet $m
Liabilities and equity					
Hong Kong currency notes in circulation		28,410	—	—	28,410
Deposits by banks		54,371	(97)	50,005	104,279
Customer accounts		1,289,586	(119)	147,522	1,436,989
Repurchase agreements – non-trading		80,400	—	—	80,400
Items in course of transmission to other banks		5,638	—	—	5,638
Trading liabilities		141,614	(66)	59	141,607
Financial liabilities designated at fair value		66,408	(6,046)	—	60,362
– of which:					
term subordinated debt included in tier 2 capital	n, q	21,168	—	—	21,168
preferred capital securities included in tier 1 capital	m	1,342	—	—	1,342
Derivatives		281,071	87	508	281,666
Debt securities in issue		88,949	(7,885)	5,065	86,129
Liabilities of disposal groups held for sale		36,840	(3,690)	—	33,150
Current tax liabilities		783	(84)	409	1,108
Liabilities under insurance contracts		69,938	(69,938)	—	–
Accruals, deferred income and other liabilities		38,116	2,326	6,669	47,111
– of which: retirement benefit liabilities		2,809	(2)	61	2,868
Provisions		5,552	(25)	—	5,527
– of which: contingent liabilities and contractual commitments		240	—	—	240
– of which:					
credit-related provisions on IRB portfolios	h	201	—	—	201
credit-related provisions on standardised portfolios		39	—	—	39
Deferred tax liabilities		1,760	(868)	5	897
Subordinated liabilities		22,702	—	2,841	25,543
– of which:					
preferred capital securities included in tier 1 capital	k, m	1,929	—	—	1,929
perpetual subordinated debt included in tier 2 capital	o	2,368	—	—	2,368
term subordinated debt included in tier 2 capital	n, q	18,405	—	—	18,405
Total liabilities at 31 Dec 2015		2,212,138	(86,405)	213,083	2,338,816
Called up share capital	a	9,843	—	—	9,843
Share premium account	a, k	12,421	—	—	12,421
Other equity instruments	j, k	15,112	—	—	15,112
Other reserves	c, g	7,143	1,650	—	8,793
Retained earnings	b, c	143,941	(9,212)	—	134,729
Total shareholders' equity		188,460	(7,562)	—	180,898
Non-controlling interests	d, l, m, p	9,058	(933)	—	8,125
– of which: non-cumulative preference shares issued by subsidiaries included in tier 1 capital	m	2,077	—	—	2,077
Total equity at 31 Dec 2015		197,518	(8,495)	—	189,023

Total liabilities and equity at 31 Dec 2015	2,409,656	(94,900)	213,083	2,527,839

The references (a) – (q) identify balance sheet components that are used in the calculation of regulatory capital on page 13.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Structure of the regulatory group

HSBC's organisation is that of a financial holding company whose major subsidiaries are almost entirely wholly-owned banking entities. A simplified organisation chart showing the difference between the accounting and regulatory consolidation groups is included in Appendix II.

Following a clarification of policy by the PRA, at 30 September 2016 the regulatory treatment of our investment in Bank of Communications Co., Limited ('BoCom') changed from proportional consolidation of RWAs to a deduction from capital (subject to regulatory thresholds). The revised regulatory treatment is more consistent with our financial reporting treatment, aligning with the equity method of accounting, and better reflects our relationship with BoCom, including the nature of our obligations and financial commitments. This also results in BoCom no longer being a difference between the financial accounting and regulatory balance sheets in table 1.

Interests in other banking associates are proportionally consolidated for regulatory purposes by including our share of assets, liabilities, profit and loss, and RWAs in accordance with the PRA's application of EU legislation. As shown in table 2, the principal associate subject to proportional regulatory consolidation at 31 December 2016 is The Saudi British Bank.

Subsidiaries engaged in insurance activities are excluded from the regulatory consolidation by excluding assets, liabilities and post-acquisition reserves, leaving the investment of these insurance subsidiaries to be recorded at cost and deducted from common equity tier 1 ('CET1') (subject to thresholds). In the column 'Deconsolidation of insurance/other entities', in table 1, the amount of $2.2bn (2015: $2.4bn) shown as 'Capital invested in insurance and other entities' represents the cost of investment in our insurance business. The principal insurance entities are listed in table 2.

The regulatory consolidation also excludes special purpose entities ('SPEs') where significant risk has been transferred to third parties. Exposures to these SPEs are risk-weighted as securitisation positions for regulatory purposes. The deconsolidation of SPEs connected to securitisation activity and other entities mainly impacts the adjustments to 'Loans and advances to customers', 'Financial investments' and 'Debt securities in issue'. Table 2 lists the principal SPEs excluded from the regulatory consolidation with their total assets and total equity. Further details of the use of SPEs in the Group's securitisation activities are shown in Note 19 of the Annual Report and Accounts 2016 and on page 268.

Table 2: Principal entities with a different regulatory and accounting scope of consolidation

			At 31 Dec 2016		At 31 Dec 2015	
	Footnotes	Principal activities	Total assets $m	Total equity $m	Total assets $m	Total equity $m
Principal associates						
Bank of Communications Co., Limited	1, 2	Banking services	1,165,535	89,364	1,110,088	80,657
The Saudi British Bank		Banking services	49,784	8,202	50,189	7,356
Principal insurance entities excluded from the regulatory consolidation						
HSBC Life (International) Ltd		Life insurance manufacturing	39,346	2,838	34,808	2,805
HSBC Assurances Vie (France)		Life insurance manufacturing	23,418	721	23,713	663
Hang Seng Insurance Company Ltd		Life insurance manufacturing	15,225	1,107	14,455	1,154
HSBC Insurance (Singapore) Pte Ltd		Life insurance manufacturing	3,589	360	3,102	315

HSBC Life (UK) Ltd		Life insurance manufacturing	1,678	158	1,941	390
HSBC Life Insurance Company Ltd		Life insurance manufacturing	864	85	764	109
HSBC Seguros S.A. (Mexico)		Life insurance manufacturing	716	118	870	182
HSBC Amanah Takaful (Malaysia) SB		Life insurance manufacturing	298	26	302	27
HSBC Vida e Previdência (Brasil) S.A.		Life insurance manufacturing	—	—	3,418	155
HSBC Seguros (Brasil) S.A.		Life insurance manufacturing	—	—	484	283
Principal SPEs excluded from the regulatory consolidation	3					
Regency Assets Ltd		Securitisation	7,380	—	15,183	—
Mazarin Funding Ltd		Securitisation	1,117	12	1,879	(9)
Turquoise Receivables Trustee Ltd		Securitisation	838	—	852	(1)
Barion Funding Ltd		Securitisation	653	56	1,132	68
Malachite Funding Ltd		Securitisation	356	34	442	26
Metrix Portfolio Distribution Plc		Securitisation	333	—	304	—

1 Since 30 September 2016, both the accounting and regulatory balance sheets use the equity method to consolidate our interest in BoCom. For further details, see ‘Structure of the regulatory group’ above.

2 Total assets and total equity for 2016 are as at 30 September 2016.

3 These SPEs issued no or de minimis share capital. The negative equity represents net unrealised losses on unimpaired assets on their balance sheets and negative retained earnings.

Table 2 also presents the total assets and total equity, on a stand-alone IFRS basis, of the entities which are included in the Group consolidation on different bases for accounting and regulatory purposes. The figures shown therefore include intra-Group balances. For associates, table 2 shows the total assets and total equity of the entity as a whole rather than HSBC’s share in the entities’ balance sheets.

For insurance entities, the present value of in-force long-term insurance business asset of $6.5bn and the related deferred tax liability are recognised at the financial reporting consolidated level only, and are therefore not included in the asset or equity positions for the stand-alone entities presented in table 2. In addition, these figures exclude any deferred acquisition cost assets that may be recognised in the entities’ stand-alone financial reporting.

Measurement of regulatory exposures

This section sets out the main reasons why the measurement of regulatory exposures is not directly comparable with the financial information presented in the Annual Report and Accounts 2016.

The Pillar 3 Disclosures 2016 are prepared in accordance with regulatory capital adequacy concepts and rules, while the Annual Report and Accounts 2016 are prepared in accordance

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

with IFRSs. The purpose of the regulatory balance sheet is to provide a point-in-time ('PIT') value of all on-balance sheet assets. The regulatory exposure value includes an estimation of risk, and is expressed as the amount expected to be outstanding if and when the counterparty defaults.
The difference between total assets on the regulatory balance sheet is shown in table 3, and the credit risk and CCR exposure values are shown in table 4.
Moreover, regulatory exposure classes are based on different criteria from accounting asset types and are therefore not comparable on a line by line basis.

The following tables show in two steps how the accounting values in the regulatory balance sheet link to regulatory exposure at default ('EAD').
In a first step, table 3 below shows a breakdown of the accounting balances into the risk types that form the basis for regulatory capital requirements. Table 4 then shows the main differences between the accounting balances and regulatory exposures by regulatory risk type.

Table 3: Mapping of financial statement categories with regulatory risk categories

			Carrying value of items				
	Carrying values as reported in published financial statements	Carrying values under scope of regulatory consolidation[1]	Subject to credit risk framework	Subject to CCR framework[2]	Subject to securitisation framework[3]	Subject to the market risk framework	Subject to deduction from capital or not subject to regulatory capital requirements[4]
	$bn	$bn	$bn	$bn	$bn	$bn	$bn
Assets							
Cash and balances at central banks	128.0	129.2	129.2	—	—	—	—
Items in the course of collection from other banks	5.0	5.0	5.0	—	—	—	—
Hong Kong Government certificates of indebtedness	31.2	31.2	31.2	—	—	—	—
Trading assets	235.1	234.9	8.4	11.3	—	208.7	17.6
Financial assets designated at fair value	24.8	0.3	0.3	—	—	—	—
Derivatives	290.9	290.8	—	289.9	0.9	290.8	—
Loans and advances to banks	88.1	87.2	76.3	2.0	1.2	—	7.7
Loans and advances to customers	861.5	871.1	847.4	8.9	10.8	—	4.0

Reverse repurchase agreements – non-trading	161.0	162.8	—	162.4	0.4	—	—
Financial investments	436.8	385.4	375.8	—	9.5	—	0.1
Assets held for sale	4.4	4.4	4.4	—	—	—	—
Capital invested in insurance and other entities	2.2	2.2	1.4	—	—	—	0.8
Current tax assets	1.1	1.0	1.0	—	—	—	—
Prepayments, accrued income and other assets	59.5	56.8	38.0	3.9	—	8.2	6.7
Interests in associates and joint ventures	17.8	15.8	10.3	—	—	—	5.5
Goodwill and intangible assets	21.3	15.2	—	—	—	—	15.2
Deferred tax assets	6.2	6.3	5.2	—	—	—	1.1
Total assets at 31 Dec 2016	2,374.9	2,299.6	1,533.9	478.4	22.8	507.7	58.7
Cash and balances at central banks	98.9	127.7	127.7	—	—	—	—
Items in the course of collection from other banks	5.8	5.8	5.8	—	—	—	—
Hong Kong Government certificates of indebtedness	28.4	28.4	28.4	—	—	—	—
Trading assets	224.8	229.5	4.4	17.4	—	225.1	—
Financial assets designated at fair value	23.9	2.4	2.4	—	—	—	—
Derivatives	288.5	288.8	0.3	287.5	0.9	288.5	—
Loans and advances to banks	90.4	103.8	103.8	—	—	—	—
	924.4	1,037.0	1,027.5	—	9.5	—	—

Loans and advances to customers							
Reverse repurchase agreements – non-trading	146.3	152.9	5.9	147.0		—	—
Financial investments	429.0	420.0	408.7	–	11.3	—	—
Assets held for sale	43.9	39.8	32.8	5.3	—	—	1.7
Capital invested in insurance and other entities	2.4	2.4	2.4	—	—	—	—
Current tax assets	1.2	1.2	1.2	—	—	—	—
Prepayments, accrued income and other assets	54.4	61.5	44.9	—	—	11.5	5.1
Interests in associates and joint ventures	16.7	0.6	—	—	—	—	0.6
Goodwill and intangible assets	24.6	19.2	—	—	—	—	19.2
Deferred tax assets	6.1	6.8	7.8	—	–	—	(1.0)
Total assets at 31 Dec 2015	2,409.7	2,527.8	1,804.0	457.2	21.7	525.1	25.6

1 The amounts shown in the column ‘Carrying values under scope of regulatory consolidation’ do not equal the sum of the amounts shown in the remaining columns of this table for line items ‘Derivatives’ and ‘Trading assets’, as some of the assets included in these items are subject to regulatory capital charges for both CCR and market risk.

2 The amounts shown in the column ‘Subject to CCR framework’ include both non-trading book and trading book.

3 The amounts shown in the column ‘Subject to securitisation framework’ only include non-trading book. Trading book securitisation positions are included in the market risk column.

4 In the comparative period, the carrying value of settlement accounts not subject to regulatory capital requirements were reported in credit risk and market risk.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 4: Main sources of differences between regulatory exposure values and carrying values in financial statements

		Items subject to:		
		Credit risk	CCR	Securitisation
	Footnotes	$bn	$bn	$bn
Asset carrying value amount under scope of regulatory consolidation		1,533.9	478.4	22.8
– differences due to reversal of IFRS netting		14.6	110.3	—
– differences due to financial collateral on standardised approach		(12.3)	—	—
– differences due to consideration of provisions on IRB approach		6.0	—	—
– differences due to modelling and standardised CCFs for credit risk and other differences	1	250.7	—	12.4
– differences due to credit risk mitigation and potential exposures for counterparty risk		—	(426.4)	—
– differences due to free deliveries and sundry balances		—	2.5	—
Exposure values considered for regulatory purposes at 31 Dec 2016		1,792.9	164.8	35.2
Asset carrying value amount under scope of regulatory consolidation		1,804.0	457.2	21.7
– differences due to reversal of IFRS netting	2	31.7	110.0	—
– differences due to financial collateral on standardised approach		(13.8)	—	—
– differences due to consideration of provisions on IRB approach		7.2	—	0.6
– differences due to modelling and standardised CCFs for credit risk and other differences	1	275.8	—	19.3
– differences due to credit risk mitigation and potential exposures for counterparty risk		—	(395.5)	—
– differences due to free deliveries and sundry balances		—	6.9	—
Exposure values considered for regulatory purposes at 31 Dec 2015		2,104.9	178.6	41.6

1 This includes the undrawn portion of committed facilities, various trade finance commitments and guarantees, by applying CCFs to these items.

2 In the comparative period, ‘differences due to reversal of IFRS netting’ have been reallocated from ‘differences due to credit risk mitigation and potential exposures for counterparty risk’.

Explanations of differences between accounting and regulatory exposure amounts

Under IFRS, 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.

Fair value is defined as the best estimate of the price that would be received to sell an asset or be paid to transfer a liability in an orderly transaction between market participants at the measurement date.

Some fair value adjustments already reflect valuation uncertainty to some degree. These are market data uncertainty, model uncertainty and concentration adjustments.

While bid/offer are often commensurate with market price dispersion, these adjustments essentially capture an execution cost and not market uncertainty. However, it is recognised that a variety of valuation techniques combined with the range of plausible market parameters at a given PIT still generate unexpected uncertainty beyond fair value. A series of additional valuation adjustments (‘AVAs’) are therefore required to reach a specified degree of confidence (the ‘Prudent Value’) set by regulators and that may differ from HSBC’s own quantification for disclosure purposes.

AVAs should consider at the minimum: market price uncertainty, bid offer (close out) uncertainty, model risk, concentration, administrative cost, unearned credit spread and funding fair value adjustment ('FFVA').
AVAs are not limited to level 3 exposures, for which a 95% uncertainty range is already computed and disclosed, but must be also calculated for any exposure for which the exit price cannot be determined without a degree of uncertainty.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Capital and RWAs

Capital management

Approach and policy

Our approach to capital management is designed to ensure we meet current regulatory requirements and that we respect the payment priority of our capital providers. We aim to maintain a strong capital base, to support the risks inherent in our business and to invest in accordance with our six filters framework, meeting both consolidated and local regulatory capital requirements at all times.

Our capital management process culminates in the annual Group capital plan, which is approved by the Board. HSBC Holdings is the primary provider of equity capital to its subsidiaries and also provides them with non-equity capital where necessary. These investments are substantially funded by HSBC Holdings' issuance of equity and non-equity capital and by profit retention. As part of its capital management process, HSBC Holdings seeks to maintain a balance between the composition of its capital and its investment in subsidiaries. Subject to the above, there is no current or foreseen impediment to HSBC Holdings' ability to provide such investments.

Each subsidiary manages its own capital to support its planned business growth and meet its local regulatory requirements within the context of the Group capital plan. Capital generated by subsidiaries in excess of planned requirements is returned to HSBC Holdings, normally by way of dividends, in accordance with the Group's capital plan.

During 2016, consistent with the Group's capital plan, the Group's subsidiaries did not experience any significant restrictions on paying dividends or repaying loans and

advances. Also, there are no foreseen restrictions envisaged with regard to planned dividends or payments. However, the ability of subsidiaries to pay dividends or advance monies to HSBC Holdings depends on, among other things, their respective local regulatory capital and banking requirements, exchange controls, statutory reserves, and financial and operating performance. None of our subsidiaries that are excluded from the regulatory consolidation have capital resources below their minimum regulatory requirement. HSBC Holdings does not have any Group Financial Support Agreements outstanding.

All capital securities included in the capital base of HSBC have been either issued as fully compliant CRD IV securities (on an end point basis) or in accordance with the rules and guidance in the PRA's previous General Prudential Sourcebook which are included in the capital base by virtue of application of the CRD IV grandfathering provisions. The main features of capital securities issued by the Group, categorised as tier 1 ('T1 capital') and tier 2 capital ('T2 capital'), are set out on the HSBC website, www.hsbc.com.

The values disclosed are the IFRSs balance sheet carrying amounts, not the amounts that these securities contribute to regulatory capital. For example, the IFRSs accounting and the regulatory treatments differ in their approaches to issuance costs, regulatory amortisation and regulatory eligibility limits prescribed in the grand-fathering provisions under CRD IV.

A list of the features of our capital instruments in accordance with annex III of Commission Implementing Regulation 1423/2013 is also published on our website with reference to our balance sheet on 31 December 2016. This is in addition to the full terms and conditions of our securities, also available on our website.

For further details of our approach to capital management, please see page 165 of the Annual Report and Accounts 2016.

Own funds

Table 5: Own funds disclosure

	At 31 Dec 2016	CRD IV prescribed residual	Final CRD IV text

Ref*		Ref	$m	amount $m	$m
	Common equity tier 1 ('CET1') capital: instruments and reserves				
1	Capital instruments and the related share premium accounts		21,310		21,310
	– ordinary shares	a	21,310		21,310
2	Retained earnings	b	125,442		125,442
3	Accumulated other comprehensive income (and other reserves)	c	560		560
5	Minority interests (amount allowed in consolidated CET1)	d	3,878		3,878
5a	Independently reviewed interim net profits net of any foreseeable charge or dividend	b	(1,899)		(1,899)
6	Common equity tier 1 capital before regulatory adjustments		149,291		149,291
	Common equity tier 1 capital: regulatory adjustments				
7	Additional value adjustments		(1,358)		(1,358)
8	Intangible assets (net of related deferred tax liability)	e	(15,037)		(15,037)
10	Deferred tax assets that rely on future profitability excluding those arising from temporary differences (net of related tax liability)	f	(1,696)		(1,696)
11	Fair value reserves related to gains or losses on cash flow hedges	g	(52)		(52)
12	Negative amounts resulting from the calculation of expected loss amounts	h	(4,025)		(4,025)
14	Gains or losses on liabilities valued at fair value resulting from changes in own credit standing		1,052		1,052
15	Defined-benefit pension fund assets	i	(3,680)		(3,680)
16	Direct and indirect holdings of own CET1 instruments		(1,573)		(1,573)
19	Direct, indirect and synthetic holdings by the institution of the CET1 instruments of financial sector entities where the institution has a significant investment in those entities (amount above 10% threshold and net of eligible short positions)		(6,370)		(6,370)
22	Amount exceeding the 15%/17.65% threshold		—	(568)	(568)
23	– direct and indirect holdings by the institution of the CET1 instruments of financial sector entities where the institution has a significant investment in those entities		—	(388)	(388)

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 5: Own funds disclosure (continued)

Ref*		Ref	At 31 Dec 2016 $m	CRD IV prescribed residual amount $m	Final CRD IV text $m
25	– deferred tax assets arising from temporary differences		—	(180)	(180)
28	Total regulatory adjustments to Common equity tier 1		(32,739)	(568)	(33,307)
29	Common equity tier 1 capital		116,552	(568)	115,984
	Additional tier 1 (‘AT1’) capital: instruments				
30	Capital instruments and the related share premium accounts		11,259		11,259
31	– classified as equity under IFRSs	j	11,259		11,259
33	Amount of qualifying items and the related share premium accounts subject to phase out from AT1	k	7,946	(7,946)	—
34	Qualifying tier 1 capital included in consolidated AT1 capital (including minority interests not included in CET1) issued by subsidiaries and held by third parties	l, m	2,419	(2,267)	152
35	– of which: instruments issued by subsidiaries subject to phase out	m	1,522	(1,522)	—
36	Additional tier 1 capital before regulatory adjustments		21,624	(10,213)	11,411
	Additional tier 1 capital: regulatory adjustments				
37	Direct and indirect holdings of own AT1 instruments		(60)		(60)
41b	Residual amounts deducted from AT1 capital with regard to deduction from tier 2 (‘T2’) capital during the transitional period		(94)	94	—
	– direct and indirect holdings by the institution of the T2 instruments and subordinated loans of financial sector entities where the institution has a significant investment in those entities		(94)	94	—
43	Total regulatory adjustments to additional tier 1 capital		(154)	94	(60)
44	Additional tier 1 capital		21,470	(10,119)	11,351
45	Tier 1 capital (T1 = CET1 + AT1)		138,022	(10,687)	127,335
	Tier 2 capital: instruments and provisions				
46	Capital instruments and the related share premium accounts	n	16,732		16,732
47	Amount of qualifying items and the related share premium accounts subject to phase out from T2	o	5,695	(5,695)	—
48	Qualifying own funds instruments included in consolidated T2 capital (including minority interests and AT1 instruments not included in CET1 or AT1) issued by subsidiaries and held by third parties	p, q	12,323	(12,258)	65
49	– of which: instruments issued by subsidiaries subject to phase out	q	12,283	(12,283)	—
51	Tier 2 capital before regulatory adjustments		34,750	(17,953)	16,797
	Tier 2 capital: regulatory adjustments				
52	Direct and indirect holdings of own T2 instruments		(40)		(40)
55	Direct and indirect holdings by the institution of the T2 instruments and subordinated loans of financial sector entities where the institution has a significant investment in those entities (net of eligible short positions)		(374)	(94)	(468)
57	Total regulatory adjustments to tier 2 capital		(414)	(94)	(508)
58	Tier 2 capital		34,336	(18,047)	16,289

59	Total capital (TC = T1 + T2)	172,358		(28,734)	143,624	
59a	Risk-weighted assets in respect of amounts subject to pre-capital requirements regulation treatment and transitional treatments subject to phase out as prescribed in Regulation (EU) No 575/2013	1,419		(1,419)	—	
	– items not deducted from CET1: direct and indirect holdings by the institution of the CET1 instruments of financial sector entities where the institution has a significant investment in those entities	971		(971)	—	
	– items not deducted from CET1: deferred tax assets arising from temporary differences	448		(448)	—	
60	Total risk-weighted assets	857,181		(1,419)	855,762	
	Capital ratios and buffers					
61	Common equity tier 1	13.6	%		13.6	%
62	Tier 1	16.1	%		14.9	%
63	Total capital	20.1	%		16.8	%
64	Institution specific buffer requirement	1.348	%			
65	– capital conservation buffer requirement	0.625	%			
66	– counter cyclical buffer requirement	0.098	%			
67a	– Global Systemically Important Institution (‘G-SII’) buffer	0.625	%			
68	Common equity tier 1 available to meet buffers	7.7	%			
	Amounts below the threshold for deduction (before risk weighting)					
72	Direct and indirect holdings of the capital of financial sector entities where the institution does not have a significant investment in those entities (amount below 10% threshold and net of eligible short positions)	3,056				
73	Direct and indirect holdings by the institution of the CET1 instruments of financial sector entities where the institution has a significant investment in those entities (amount below 10% threshold and net of eligible short positions)	12,292				
75	Deferred tax assets arising from temporary differences (amount below 10% threshold, net of related tax liability)	5,675				

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 5: Own funds disclosure (continued)

Ref*		Ref†	At 31 Dec 2016 $m	CRD IV prescribed residual amount $m	Final CRD IV text $m
	Applicable caps on the inclusion of provisions in tier 2				
77	Cap on inclusion of credit risk adjustments in T2 under standardised approach		2,109		
79	Cap for inclusion of credit risk adjustments in T2 under internal ratings-based approach		3,090		
	Capital instruments subject to phase-out arrangements (only applicable between 1 Jan 2013 and 1 Jan 2022)				
82	Current cap on AT1 instruments subject to phase out arrangements		10,382		
83	Amount excluded from AT1 due to cap (excess over cap after redemptions and maturities)		202		
84	Current cap on T2 instruments subject to phase out arrangements		17,978		
85	Amount excluded from T2 due to cap (excess over cap after redemptions and maturities)		3,712		

* The references identify the lines prescribed in the European Banking Authority ('EBA') template. Lines represented in this table are those lines which are applicable and where there is a value.

† The references (a) – (q) identify balance sheet components on page 6 which are used in the calculation of regulatory capital.

Leverage ratio

Our leverage ratio calculated on the Capital Requirements Regulation basis was 5.4% at 31 December 2016, up from 5.0% at 31 December 2015. This was mainly due to a reduction in the exposure measure resulting from the change in regulatory treatment of our investment in BoCom.

The Group's UK leverage ratio on a modified basis, excluding qualifying central bank balances, was 5.7%. This modification to the leverage ratio exposure measure was made following recommendations by the Bank of England's Financial Policy Committee ('FPC').

The FPC has stated that it intends to recalibrate the leverage ratio in 2017 to take account of this modification. Any uplift in HSBC's UK leverage ratio should be considered in this context.

At 31 December 2016, our UK minimum leverage ratio requirement of 3% was supplemented by an additional

leverage ratio buffer of 0.2% that translates to a value of $5bn, and a countercyclical leverage ratio buffer which results in no capital impact. We comfortably exceeded these leverage requirements.

The risk of excessive leverage is managed as part of HSBC's global risk appetite framework and monitored using a leverage ratio metric within our RAS. The RAS articulates the aggregate level and types of risk that HSBC is willing to accept in its business activities in order to achieve its strategic business objectives. The RAS is monitored via the risk appetite profile report, which includes comparisons of actual performance against the risk appetite and tolerance thresholds assigned to each metric, to ensure that any excessive risk is highlighted, assessed and mitigated appropriately. The risk appetite profile report is presented monthly to the RMM and the GRC. Our approach to risk appetite is described on page 89 of the Annual Report and Accounts 2016.

Table 6: Summary reconciliation of accounting assets and leverage ratio exposures

Ref*		At 31 Dec 2016 $bn	2015 $bn
1	Total assets as per published financial statements	2,375.0	2,409.7

	Adjustments for:		
2	– entities which are consolidated for accounting purposes but are outside the scope of regulatory consolidation	(75.4)	112.4
4	– derivative financial instruments	(158.6)	(140.8)
5	– securities financing transactions (‘SFT’)	10.1	13.4
6	– off-balance sheet items (i.e. conversion to credit equivalent amounts of off-balance sheet exposures)	223.1	400.9
7	– other	(19.8)	(1.2)
8	Total leverage ratio exposure	2,354.4	2,794.4

* The references identify the lines prescribed in the EBA template. Lines represented in this table are those lines which are applicable and where there is a value.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 7: Leverage ratio common disclosure

Ref*		At 31 Dec 2016 $bn	2015 $bn
	On-balance sheet exposures (excluding derivatives and SFT)		
1	On-balance sheet items (excluding derivatives, SFTs and fiduciary assets, but including collateral)	1,844.4	2,103.5
2	(Asset amounts deducted in determining tier 1 capital)	(34.4)	(32.8)
3	Total on-balance sheet exposures (excluding derivatives, SFTs and fiduciary assets)	1,810.0	2,070.7
	Derivative exposures		
4	Replacement cost associated with all derivatives transactions (i.e. net of eligible cash variation margin)	43.7	31.0
5	Add-on amounts for potential future exposure ('PFE') associated with all derivatives transactions (mark-to-market method)	110.2	124.5
6	Gross-up for derivatives collateral provided where deducted from the balance sheet assets pursuant to IFRSs	5.9	4.2
7	(Deductions of receivables assets for cash variation margin provided in derivatives transactions)	(30.6)	(30.5)
8	(Exempted central counterparty ('CCP') leg of client-cleared trade exposures)	(4.1)	—
9	Adjusted effective notional amount of written credit derivatives	216.4	226.1
10	(Adjusted effective notional offsets and add-on deductions for written credit derivatives)	(209.3)	(205.9)
11	Total derivative exposures	132.2	149.4
	Securities financing transaction exposures		
12	Gross SFT assets (with no recognition of netting), after adjusting for sales accounting transactions	266.6	243.0
13	(Netted amounts of cash payables and cash receivables of gross SFT assets)	(87.9)	(77.9)
14	Counterparty credit risk exposure for SFT assets	10.4	8.3
16	Total securities financing transaction exposures	189.1	173.4
	Other off-balance sheet exposures		
17	Off-balance sheet exposures at gross notional amount	757.7	906.0
18	(Adjustments for conversion to credit equivalent amounts)	(534.6)	(505.1)
19	Total off-balance sheet exposures	223.1	400.9
	Capital and total exposures		
20	Tier 1 capital	127.3	140.2
21	Total leverage ratio exposure	2,354.4	2,794.4
22	Leverage ratio	5.4%	5.0%
EU-23	Choice on transitional arrangements for the definition of the capital measure	Fully Phased In	Fully Phased in

* The references identify the lines prescribed in the EBA template. Lines represented in this table are those lines which are applicable and where there is a value.

Table 8: Leverage ratio – Split of on-balance sheet exposures (excluding derivatives, SFTs and exempted exposures)

Ref*		At 31 Dec 2016 $bn	2015 $bn

EU-1	Total on-balance sheet exposures (excluding derivatives, SFTs, and exempted exposures)	1,844.4	2,103.5
EU-2	trading book exposures	267.5	224.5
EU-3	banking book exposures	1,576.9	1,879.0
	– of which:		
EU-4	covered bonds	1.1	1.0
EU-5	exposures treated as sovereigns	504.4	521.0
EU-6	exposures to regional governments, multilateral development banks (‘MDB’), international organisations and public sector entities (‘PSE’) not treated as sovereigns	6.0	1.0
EU-7	institutions	67.6	129.0
EU-8	secured by mortgages of immovable properties	254.6	292.0
EU-9	retail exposures	84.6	113.0
EU-10	corporate	532.4	677.0
EU-11	exposures in default	12.4	15.0
EU-12	other exposures (e.g. equity, securitisations and other non-credit obligation assets)	113.8	130.0

* The references identify the lines prescribed in the EBA template. Lines represented in this table are those lines which are applicable and where there is a value.

Capital buffers

The geographical breakdown and institution specific countercyclical capital buffer (‘CCyB’) disclosure is published annually on the HSBC website, www.hsbc.com.

Our G-SIB Indicator disclosure is published annually on the HSBC website, www.hsbc.com.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Pillar 1 capital requirements and RWA flow

Pillar 1 covers the capital resources requirements for credit risk, counterparty credit risk, equity, securitisation, market risk and

operational risk. These requirements are expressed in terms of RWAs.

Risk category	Scope of permissible approaches	Approach adopted by HSBC
Credit risk	The Basel Committee framework applies three approaches of increasing sophistication to the calculation of Pillar 1 credit risk capital requirements. The most basic level, the standardised approach, requires banks to use external credit ratings to determine the risk weightings applied to rated counterparties. Other counterparties are grouped into broad categories and standardised risk weightings are applied to these categories. The next level, the IRB foundation approach, allows banks to calculate their credit risk capital requirements on the basis of their internal assessment of a counterparty's Probability of Default ('PD'), but subjects their quantified estimates of EAD and Loss Given Default ('LGD') to standard supervisory parameters. Finally, the IRB advanced approach allows banks to use their own internal assessment in both determining PD and quantifying EAD and LGD.	For consolidated Group reporting, we have adopted the advanced IRB approach for the majority of our business. Some portfolios remain on the standardised or foundation IRB approaches: • pending the issuance of local regulations or model approval; • following supervisory prescription of a non-advanced approach; or • under exemptions from IRB treatment.
Counterparty credit risk	Three approaches to calculating CCR and determining exposure values are defined by the Basel Committee: mark-to-market, standardised and Internal Model Method ('IMM'). These exposure values are used to determine capital requirements under one of the	We use the mark-to-market and IMM

	credit risk approaches; standardised, IRB foundation or IRB advanced.	approaches for CCR. Details of the IMM permission we have received from the PRA can be found in the Financial Services Register on the PRA website. Our aim is to increase the proportion of positions on IMM over time.
Equity	For non-trading book, equity exposures can be assessed under standardised or IRB approaches.	For Group reporting purposes all equity exposures are treated under the standardised approach.
Securitisation	Basel specifies two methods for calculating credit risk requirements for securitisation positions in the non-trading book: the standardised approach and the IRB approach, which incorporates the Ratings Based Method ('RBM'), the Internal Assessment Approach ('IAA') and the Supervisory Formula Method ('SFM').	For the majority of the non-trading book securitisation positions we use the IRB approach, and within this principally the RBM, with lesser amounts on the IAA and the SFM. We also use the standardised approach for an immaterial amount of non-trading

		book positions. Securitisation positions in the trading book are treated within the market risk framework, using the CRD IV standard rules.
Market risk	Market risk capital requirements can be determined under either the standard rules or the Internal Models Approach ('IMA'). The latter involves the use of internal Value at Risk ('VaR') models to measure market risks and determine the appropriate capital requirement. In addition to the VaR models, other internal models include Stressed VaR, Incremental Risk Charge ('IRC') and Comprehensive Risk Measure.	The market risk capital requirement is measured using internal market risk models, where approved by the PRA, or under the standard rules. Our internal market risk models comprise VaR, stressed VaR and IRC. Non-proprietary details of the scope of our IMA permission are available in the Financial Services Register on the PRA website. We are in compliance with the requirements set out in Articles 104

		and 105 of the Capital Requirements Regulation. We have historically adopted and currently use the standardised approach in determining our operational risk capital requirement. We have in place an operational risk model which is used for economic capital calculation purposes.
Operational risk	The Basel Committee allows for firms to calculate their operational risk capital requirement under the basic indicator approach, the standardised approach or the advanced measurement approach.	

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 9: Total RWAs by risk type

	RWAs	Capital required[1]
	$bn	$bn
Credit risk	655.7	52.5
Standardised approach	166.3	13.3
IRB foundation approach	25.9	2.1
IRB advanced approach	463.5	37.1
Counterparty credit risk	62.0	5.0
Standardised approach	15.0	1.2
– CCR standardised approach	2.8	0.2
– credit valuation adjustment	10.9	0.9
– central counterparty	1.3	0.1
Advanced approach	47.0	3.8
– CCR IRB approach	43.5	3.5
– credit valuation adjustment	3.5	0.3
Market risk	41.5	3.3
Internal model based	36.5	3.0
– VaR	8.7	0.7
– stressed VaR	15.8	1.3
– incremental risk charge	9.5	0.8
– other VaR and stressed VaR	2.5	0.2
Standardised approach	5.0	0.3
– interest rate positions risk	1.5	0.1
– foreign exchange position risk	0.3	—
– equity position risk	1.7	0.1
– commodity position risk	—	—
– securitisation	1.5	0.1
– options	—	—
Operational risk	98.0	7.8
At 31 Dec 2016	857.2	68.6

1 ‘Capital required’ here and in all tables where the term is used, represents the Pillar 1 capital charge at 8% of RWAs.

Table 10: Overview of RWAs

		a	b	c
		2016	2015	2016
		RWA	RWA	Capital required
	Footnote	$bn	$bn	$bn
1 Credit risk (excluding counterparty credit risk)		589.1	818.7	47.1
2 Standardised approach (‘SA’)		120.6	303.9	9.6
3 Internal rating-based (‘IRB’) approach		468.5	514.8	37.5
4 Counterparty credit risk		61.8	69.1	5.0
5 Standardised approach for counterparty credit risk (‘SA-CCR’)	1	47.4	55.0	3.8
6 Internal model method (‘IMM’)		14.4	14.1	1.2
11 Settlement risk		0.2	0.1	—
12 Securitisation exposures in non-trading book		21.8	29.1	1.8
13 IRB ratings-based approach (‘RBA’)		20.7	28.2	1.7
14 IRB Supervisory Formula Approach (‘SFA’)		0.2	0.2	—

15 SA/simplified supervisory formula approach (‘SSFA’)	0.9	0.7	0.1
16 Market risk	41.5	42.5	3.3
17 Standardised approach (‘SA’)	5.0	7.6	0.4
18 Internal model approaches (‘IMA’)	36.5	34.9	2.9
19 Operational risk	98.0	115.4	7.8
21 Standardised Approach	98.0	115.4	7.8
23 Amounts below the thresholds for deduction (subject to 250% risk weight)	44.8	28.1	3.6
24 Floor adjustment	—	—	—
25 Total	857.2	1,103.0	68.6

1 Prior to the implementation of SA-CCR, this row represents the RWA under the mark-to-market method.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Credit Risk, including amounts below the thresholds for deduction

During the financial year RWAs decreased by $212.9bn, of which $38.1bn was due to foreign currency translation differences. The main drivers of these reductions were the change of regulatory treatment of our investment in BoCom, which has reduced credit risk RWAs by $136.0bn and increased our significant investments subject to 250% risk weight by $24.3bn. In addition, the sale of our operations in Brazil and continued reductions in US run-off portfolios reduced RWAs by $36.9bn and $23.2bn, respectively.

Counterparty credit risk

Overall counterparty credit risk RWAs reduced by $7.3bn, due to reductions from RWA initiatives of $17.3bn offset by increases of $10.0bn, which were predominantly due to trading activity in the first half of the year and the impact of negative interest rates and exchange rate movements. RWA initiatives comprised various trade actions including portfolio compression and trade novation to central counterparties $7.3bn, the implementation of a new internal model to reflect the current interest rate environment $3.8bn, various other process and data refinements $3.8bn, and the disposal of our operations in Brazil $2.4bn.

Securitisation in non-trading book

The $7.3bn RWA reduction arises predominantly from disposals of investments in traditional securitisations.

Market risk

Overall market risk RWAs fell by $1.0bn in the year, comprised of a $2.6bn decrease related to the standardised approach offset by a $1.6bn increase under internal models.

The reduction in RWAs related to the standardised approach was driven by a $2.1bn saving through a reduction in legacy positions held in CoCo and securitisation bonds and a $0.5bn reduction due to the disposal of our operations in Brazil. Under internal models, movements in risk levels led to an increase of $5.3bn, primarily driven by increases in the VaR and sVaR due to position changes following the modelling impact of external market risk parameters (predominantly in interest rate risk). Offsetting this increase, was a reduction of $3.7bn due to RWA initiatives, described in more detail under table 13.

Operational risk

During the year, operational risk reduced by $17.4bn mainly due to the change in regulatory treatment of BoCom $10.0bn and the three-year income averaging effect.

Table 11: RWA flow statements of credit risk exposures under IRB

		a RWA $bn
1	At 31 Dec 2015	514.8
2	Asset size	30.7
3	Asset quality	14.0
4	Model updates	(0.9)
5	Methodology and policy	0.5
6	Acquisitions and disposals	—
7	Foreign exchange movements	(28.7)
10	RWA initiatives	(61.9)
8	Other	—
9	At 31 Dec 2016	468.5

RWAs decreased in 2016 by $46.3bn, of which $28.7bn was due to foreign currency translation differences.

RWA initiatives

The main drivers of these reductions were:

- $29.8bn as a result of reduced exposures, refined calculations and process improvements;

- $23.2bn through the continued reduction in US run-off portfolios; and
- $9.0bn from the sale of our activities in Brazil.

Asset size

Asset size movements increased RWAs by $30.7bn, principally as a result of a corporate book growth in Europe and Asia.

Table 12: RWA flow statements of CCR exposures under IMM

		a RWA $bn
1	At 31 Dec 2015	14.1
2	Asset size	3.7
3	Asset quality	0.2
4	Model updates	—
5	Methodology and policy	—
	– internal updates	—
	– external regulatory updates	—
6	Acquisitions and disposals	—
7	Foreign exchange movements	—
10	RWA initiatives	(3.6)
8	Other	—
9	At 31 Dec 2016	14.4

Modelled counterparty credit risk RWAs increased by $0.3bn over the year.

RWA initiatives

Reviews of the client portfolio and the renegotiation of Credit Support Annex ('CSA') terms led to savings of $3.6bn with an additional $1.1bn of savings due to calculation improvements.

These were broadly offset by a $1.1bn increase following the PRA approval and subsequent implementation of a new IMM model (this resulted in a net saving of $3.8bn across both the IMM and standardised approach portfolios).

Table 13: RWA flow statements of market risk exposures under an IMA

		a	b	c	e	f
		VaR	Stressed VaR	IRC	Other	Total RWA[1]
		$bn	$bn	$bn	$bn	$bn
1	At 31 Dec 2015	8.6	12.8	11.4	2.1	34.9
2	Movement in risk levels	2.4	2.9	(0.5)	0.5	5.3
3	Model updates/changes	—	—	—	—	—
4	Methodology and policy	—	—	—	—	—
5	Acquisitions and disposals	—	—	—	—	—
6	Foreign exchange movements	—	—	—	—	—
9	RWA initiatives	(2.3)	—	(1.4)	—	(3.7)
7	Other	—	—	—	—	—
8	At 31 Dec 2016	8.7	15.7	9.5	2.6	36.5

1 Internal model based RWAs as defined under CRD IV, including those undertakings which are outside the scope of line by line consolidation.

Market risk RWAs arising from internal models increased by $1.6bn over the year, mainly coming from the modelling impact of external market risk parameter changes leading to additional capital requirements as described above.

RWA Initiatives

Savings of $3.7bn of RWAs were partly due to the active risk management of the overall IRC position within Global Markets, creating savings of $1.5bn. Various changes to models comprised the remaining RWA initiatives, post the relevant PRA approvals, which included: the inclusion of the equity skew risk within VaR models and the removal of the corresponding risk not in VaR; the incorporation of the currency of collateral within risk pricing; and the refinement of risk model calculations for FX options and deal contingent swaps.

Pillar 2 and ICAAP

Pillar 2

We conduct an Internal Capital Adequacy Assessment Process ('ICAAP') to determine a forward-looking assessment of our capital requirements given our business strategy, risk profile, risk appetite and capital plan. This process incorporates the Group's risk management processes and governance framework. Our base capital plan undergoes stress testing. This coupled with our economic capital framework and other risk management practices is used to assess our internal capital adequacy requirements and inform our view of our internal capital planning buffer. The ICAAP is formally approved by the Board, which has the ultimate responsibility for the effective management of risk and approval of HSBC's risk appetite.

The ICAAP is reviewed by the PRA and by a college of EEA supervisors, as part of the Joint Risk Assessment and Decision process, during the supervisory review and evaluation process. This process occurs periodically to enable the regulator to define the Individual Capital Guidance ('ICG') or minimum capital requirements for HSBC, and the PRA to define the PRA buffer, where required. Under the revised Pillar 2 PRA regime, which came into effect from 1 January 2016, the capital planning buffer has been replaced with a PRA buffer. This is not intended to duplicate the CRD IV buffers and, where necessary, will be set according to vulnerability in a stress scenario, as assessed through the annual PRA stress testing exercise.

The processes of internal capital adequacy assessment and supervisory review lead to a final determination by the PRA of the ICG and any PRA buffer that may be required.

Within Pillar 2, Pillar 2A considers, in addition to the minimum capital requirements for Pillar 1 risks described above, any supplementary requirements for those risks and any

requirements for risk categories not captured by Pillar 1. The risk categories to be covered under Pillar 2A depend on the specific circumstances of a firm and the nature and scale of its business.

Pillar 2B consists of guidance from the PRA on the capital buffer a firm would require in order to remain above its ICG in adverse circumstances that may be largely outside the firm's normal and direct control; for example, during a period of severe but plausible downturn stress, when asset values and the firm's capital surplus may become strained. This is quantified via any PRA buffer requirement the PRA may consider necessary. The assessment of this is informed by stress tests and a rounded judgement of a firm's business model, also taking into account the PRA's view of a firm's options and capacity to protect its capital position under stress; for instance, through capital generation. Where the PRA assesses a firm's risk management and governance to be significantly weak, it may also increase the PRA buffer to cover the risks posed by those weaknesses until they are addressed. The PRA buffer is intended to be drawn upon in times of stress, and its use is not of itself a breach of capital requirements that would trigger automatic restrictions on distributions. In specific circumstances, the PRA should agree a plan with a firm for its restoration over an agreed timescale.

Internal capital adequacy assessment

The Board manages the Group ICAAP, and together with RMM and GRC, it examines the Group's risk profile from both regulatory and economic capital viewpoints, aiming to ensure that capital resources:

- remain sufficient to support our risk profile and outstanding commitments;
- meet current regulatory requirements, and that HSBC is well placed to meet those expected in the future;
- allow the bank to remain adequately capitalised in the event of a severe economic downturn stress scenario; and
- remain consistent with our strategic and operational goals, and our shareholder and investor expectations.

The minimum regulatory capital that we are required to hold is determined by the rules and guidance established by the PRA for the consolidated Group and by local regulators for individual Group companies. These capital requirements are a primary influence shaping the business planning process, in which RWA targets are established for our global businesses in accordance with the Group's strategic direction and risk appetite.

Economic capital is the internally calculated capital requirement that we deem necessary to support the risks to which we are exposed. The economic capital assessment is a more risk-

sensitive measure than the regulatory minimum, and takes account of the substantial diversification of risk accruing from our operations. Both the regulatory and the economic capital assessments rely upon the use of models that are integrated into our management of risk. Our economic capital models are calibrated to quantify the level of capital that is sufficient to absorb potential losses over a one-year time horizon to a 99.95% level of confidence for our banking and trading activities, and to a 99.5% level of confidence for our insurance activities and pension risks.

The ICAAP and its constituent economic capital calculations are examined by the PRA as part of its supervisory review and evaluation process. This examination informs the regulator's view of our Pillar 2 capital requirements.

Preserving our strong capital position remains a priority, and the level of integration of our risk and capital management helps to optimise our response to business demand for regulatory and economic capital. Risks that are explicitly assessed through economic capital are credit risk, including CCR, market and operational risk, interest rate risk in the banking book, insurance risk, pension risk, residual risk and structural foreign exchange risk.

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. 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 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 102 of the Annual Report and Accounts 2016.

Group-wide, the credit risk functions comprise a network of credit risk management offices reporting within regional 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. 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 in

accordance with Group standards. Above these thresholds of delegated personal credit limited approval authorities, approval must be sought from the regional and, as appropriate, global credit risk function.

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. Senior management receives a variety of reports on our credit risk exposures including loan impairments, total exposures and RWAs, as well as updates on specific portfolios that are considered to have heightened credit risk.

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 37 .

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.

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.

We constantly seek to improve the quality of our risk management. For central management and reporting purposes, Group IT systems to process credit risk data continue to be enhanced in order to deliver both comprehensive management information in support of business strategy and solutions to evolving regulatory reporting requirements.

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 48.

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 37, 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 European Banking Authority ('EBA') and the Bank of England.
The global functional MOCs are responsible for defining which models require their approval.
Wholesale MOC requires all credit risk models for which it is responsible to be approved by delegated senior managers with notification to the committee that retains the responsibility for oversight. RBWM MOC applies materiality thresholds for approval at the committee. For models falling below these thresholds, final approval is delegated to regional committees or Regional Heads of RBWM Risk.
Global Risk sets internal standards for the development, validation, independent review, approval, implementation and

performance monitoring of credit risk rating models. Independent reviews of our models are performed by our Independent Model Review (IMR) function which is separate from our Risk Analytics functions that are responsible for the development of models.
Compliance with Group standards is subject to examination both by Risk oversight and review from within the Risk function itself, and by Internal Audit.
Credit quality of assets
We are a universal bank with a conservative approach to credit risk. This is reflected in our credit risk profile being diversified across a number of asset classes and geographies with a credit quality profile mainly concentrated in the higher quality bands.

Table 14: Credit quality of assets

	a	b	c	d
	Gross carrying values of		Allowances/	Net values
	Defaulted exposures	Non-defaulted exposures	impairments	(a+b-c)
	$bn	$bn	$bn	$bn
1 Loans	17.9	1,067.8	8.3	1,077.4
2 Debt Securities	—	377.4	—	377.4
3 Off-balance sheet exposures	1.5	735.0	0.3	736.2
4 Total at 31 Dec 2016	19.4	2,180.2	8.6	2,191.0

Table 15: Credit risk exposure – summary

		Exposure value	Average exposure value[3]	RWAs	Capital required
	Footnotes	$bn	$bn	$bn	$bn
IRB advanced approach		1,450.7	1,502.4	463.5	37.1
– central governments and central banks		339.4	346.6	35.4	2.8
– institutions		75.7	81.1	15.0	1.2
– corporates	1	583.1	591.2	314.0	25.1
– total retail		366.8	388.0	66.1	5.3
– of which:					
secured by mortgages on immovable property SME		1.5	2.4	0.3	–
secured by mortgages on immovable property non-SME		249.0	263.9	36.5	2.9
qualifying revolving retail		64.0	65.7	14.7	1.2
other SME		8.7	10.5	4.5	0.4
other non-SME		43.6	45.5	10.1	0.8
IRB securitisation positions		33.8	37.4	20.9	1.7
IRB non-credit obligation assets		51.9	58.1	12.1	1.0
IRB foundation approach		42.8	44.7	25.9	2.1

– central governments and central banks		0.1	0.1	–	–
– institutions		0.3	0.3	0.1	–
– corporates		42.4	44.3	25.8	2.1
Standardised approach		334.1	493.3	166.3	13.3
– central governments and central banks		167.3	192.9	14.7	1.2
– institutions		2.1	22.9	1.0	0.1
– corporates		78.4	164.4	75.0	6.0
– retail		22.0	35.5	16.3	1.3
– secured by mortgages on immovable property		25.7	35.5	9.3	0.7
– exposures in default		3.3	4.2	4.3	0.3
– regional governments or local authorities		2.9	2.8	0.9	0.1
– equity	2	15.2	10.5	33.6	2.7
– items associated with particularly high risk		3.4	4.2	5.1	0.4
– securitisation positions		0.9	0.8	0.9	0.1
– claims in the form of Collective investment undertakings (‘CIU’)		0.5	0.5	0.5	–
– international organisations		2.7	2.8	–	–
– multilateral development banks		0.2	0.2	–	–
– other items		9.5	16.1	4.7	0.4
At 31 Dec 2016		1,827.6	2,040.4	655.7	52.5

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 15: Credit risk exposure – summary (continued)

		Exposure value	Average exposure value[3]	RWAs	Capital required
	Footnotes	$bn	$bn	$bn	$bn
IRB advanced approach		1,510.8	1,564.0	515.8	41.3
– central governments and central banks		327.4	331.8	49.4	4.0
– institutions		90.5	114.3	18.4	1.5
– corporates	1	597.3	617.0	314.3	25.1
– total retail		404.5	412.4	93.2	7.4
– of which:					
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
IRB securitisation positions		40.9	36.6	28.4	2.3
IRB 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
– equity	2	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 Dec 2015		2,146.5	2,192.5	875.9	70.1

1 Corporates includes specialised lending exposures subject to supervisory slotting approach of $33.1bn (2015: $24.9bn) and RWAs of $22.2bn (2015: $18.2bn).

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

3 Average exposures are calculated by aggregating exposure value of the last five quarters and dividing by five.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 16: Credit risk exposure – by geographical region

		Exposure value					
		Europe	Asia	MENA	North America	Latin America	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn	$bn
IRB advanced approach		459.1	693.8	22.9	263.1	11.8	1,450.7
– central governments and central banks		37.2	205.4	14.0	73.6	9.2	339.4
– institutions		14.2	52.5	1.8	6.8	0.4	75.7
– corporates	1	183.0	264.5	6.4	128.6	0.6	583.1
– total retail		187.9	130.4	—	48.5	—	366.8
– of which:							
secured by mortgages on immovable property SME		0.6	0.6	—	0.3	—	1.5
secured by mortgages on immovable property non-SME		118.5	90.6	—	39.9	—	249.0
qualifying revolving retail		28.0	32.2	—	3.8	—	64.0
other SME		8.4	0.1	—	0.2	—	8.7
other non-SME		32.4	6.9	—	4.3	—	43.6
IRB securitisation positions		29.0	0.8	—	4.0	—	33.8
IRB non-credit obligation assets		7.8	40.2	0.7	1.6	1.6	51.9
IRB foundation approach		26.1	—	16.7	—	—	42.8
– central governments and central banks		—	—	0.1	—	—	0.1
– institutions		—	—	0.3	—	—	0.3
– corporates		26.1	—	16.3	—	—	42.4
Standardised approach		172.2	85.8	41.3	15.6	19.2	334.1
– central governments and central banks		131.7	27.5	3.0	4.3	0.8	167.3
– institutions		0.3	0.2	1.4	0.2	—	2.1
– corporates		21.9	18.2	22.2	5.5	10.6	78.4
– retail		1.9	7.9	6.5	1.4	4.3	22.0
– secured by mortgages on immovable property		5.2	14.0	3.6	1.1	1.8	25.7
– exposures in default		1.0	0.4	1.2	0.3	0.4	3.3
– regional governments or local authorities		—	—	2.4	—	0.5	2.9
– equity	2	1.4	12.1	0.2	1.1	0.4	15.2
– items associated with particularly high risk		2.8	—	0.1	0.4	0.1	3.4
– securitisation positions		—	0.8	—	—	0.1	0.9
– claims in the form of CIU		0.4	—	0.1	—	—	0.5
– international organisations		2.7	—	—	—	—	2.7
– multilateral development banks		—	—	0.2	—	—	0.2
– other items		2.9	4.7	0.4	1.3	0.2	9.5
At 31 Dec 2016		657.4	779.6	80.9	278.7	31.0	1,827.6

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 16: Credit risk exposure – by geographical region (continued)

		Exposure value					
		Europe	Asia	MENA	North America	Latin America	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn	$bn
IRB advanced approach		541.8	659.5	25.6	261.4	22.5	1,510.8
– central governments and central banks		37.4	189.3	17.2	66.1	17.4	327.4
– institutions		26.1	52.4	1.0	9.0	2.0	90.5
– corporates	1	215.2	254.4	6.3	120.8	0.6	597.3
– total retail		217.8	126.4	–	60.3	–	404.5
– of which:							
secured by mortgages on immovable property SME		2.0	0.6	–	0.3	–	2.9
secured by mortgages on immovable property non-SME		136.7	88.6	–	50.1	–	275.4
qualifying revolving retail		33.2	30.6	–	4.0	–	67.8
other SME		11.6	0.1	–	0.4	–	12.1
other non-SME		34.3	6.5	–	5.5	–	46.3
IRB securitisation positions		36.9	0.3	–	3.7	–	40.9
IRB non-credit obligation assets		8.4	36.7	1.1	1.5	2.5	50.2
IRB foundation approach		27.7	–	16.0	–	–	43.7
– central governments and central banks		–	–	0.1	–	–	0.1
– institutions		–	–	0.3	–	–	0.3
– corporates		27.7	–	15.6	–	–	43.3
Standardised approach		164.4	302.0	51.2	30.8	43.6	592.0
– central governments and central banks		121.8	65.9	4.8	5.3	2.1	199.9
– institutions		0.2	36.6	2.0	0.1	–	38.9
– corporates		22.8	132.2	28.2	18.6	24.6	226.4
– retail		2.4	21.6	8.6	1.7	9.9	44.2
– secured by mortgages on immovable property		5.1	27.3	3.6	1.0	3.3	40.3
– exposures in default		1.1	0.4	1.0	0.8	1.6	4.9
– regional governments or local authorities		–	–	2.1	–	0.7	2.8
– equity	2	2.0	2.8	0.2	1.5	0.5	7.0
– items associated with particularly high risk		2.7	–	0.1	1.0	0.6	4.4
– securitisation positions		–	0.7	–	–	–	0.7
– claims in the form of CIU		0.3	–	0.2	–	–	0.5
– international organisations		2.6	–	–	–	–	2.6
– multilateral development banks		–	–	–	–	–	–
– other items		3.4	14.5	0.4	0.8	0.3	19.4
At 31 Dec 2015		733.9	961.5	92.8	292.2	66.1	2,146.5

For footnotes, see page 23.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 17: Credit risk RWAs – by geographical region

		RWAs					
		Europe	Asia	MENA	North America	Latin America	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn	$bn
IRB advanced approach		152.4	197.6	7.7	100.7	5.1	463.5
– central governments and central banks		3.9	15.9	5.3	6.4	3.9	35.4
– institutions		3.2	9.4	0.4	1.6	0.4	15.0
– corporates	1	98.4	143.4	1.7	70.3	0.2	314.0
– total retail		21.6	23.7	—	20.8	—	66.1
– of which:							
secured by mortgages on immovable property SME		0.2	—	—	0.1	—	0.3
secured by mortgages on immovable property non-SME		6.0	14.1	—	16.4	—	36.5
qualifying revolving retail		5.4	8.2	—	1.1	—	14.7
other SME		4.4	—	—	0.1	—	4.5
other non-SME		5.6	1.4	—	3.1	—	10.1
IRB securitisation positions		20.5	0.1	—	0.3	—	20.9
IRB non-credit obligation assets		4.8	5.1	0.3	1.3	0.6	12.1
IRB foundation approach		16.1	—	9.8	—	—	25.9
– central governments and central banks		—	—	—	—	—	—
– institutions		—	—	0.1	—	—	0.1
– corporates		16.1	—	9.7	—	—	25.8
Standardised approach		37.3	62.4	31.5	17.9	17.2	166.3
– central governments and central banks		3.1	1.5	0.7	8.2	1.2	14.7
– institutions		0.1	0.2	0.6	0.1	—	1.0
– corporates		21.0	17.2	21.2	5.0	10.6	75.0
– retail		1.4	5.9	4.8	1.1	3.1	16.3
– secured by mortgages on immovable property		2.0	4.9	1.3	0.5	0.6	9.3
– exposures in default		1.3	0.5	1.5	0.6	0.4	4.3
– regional governments or local authorities		—	—	0.6	—	0.3	0.9
– equity	2	2.7	29.1	0.2	1.1	0.5	33.6
– items associated with particularly high risk		4.2	—	0.2	0.6	0.1	5.1
– securitisation positions		—	0.7	—	—	0.2	0.9
– claims in the form of CIU		0.4	—	0.1	—	—	0.5
– international organisations		—	—	—	—	—	—
– other items		1.1	2.4	0.3	0.7	0.2	4.7
At 31 Dec 2016		205.8	260.0	49.0	118.6	22.3	655.7

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 17: Credit risk RWAs – by geographical region (continued)

		RWAs					
		Europe	Asia	MENA	North America	Latin America	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn	$bn
IRB advanced approach		173.9	195.9	10.7	122.5	12.8	515.8
– central governments and central banks		4.3	19.2	7.8	8.5	9.6	49.4
– institutions		4.7	9.0	0.3	2.5	1.9	18.4
– corporates	1	107.6	140.4	2.2	63.8	0.3	314.3
– total retail		25.2	21.8	–	46.2	–	93.2
– of which:							
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
IRB securitisation positions		27.9	0.1	–	0.4	–	28.4
IRB non-credit obligation assets		4.2	5.4	0.4	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		40.2	177.7	38.6	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		22.7	117.9	26.7	18.3	25.0	210.6
– retail		1.7	16.2	6.3	1.2	7.1	32.5
– secured by mortgages on immovable property		1.9	9.5	1.4	0.4	1.2	14.4
– exposures in default		1.3	0.5	1.4	1.2	2.0	6.4
– regional governments or local authorities		–	–	0.5	–	0.5	1.0
– equity	2	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
At 31 Dec 2015		231.6	373.6	59.2	156.4	55.1	875.9

For footnotes, see page 23.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 18: Credit risk exposure – by industry sector

		Exposure value								
	Footnotes	Personal $bn	Manufacturing $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	Tota $bn
IRB advanced approach		357.4	120.1	124.5	165.3	131.4	77.7	422.4	51.9	1,45
– central governments and central banks		—	—	0.2	—	115.3	—	223.9	—	339.
– institutions		—	—	—	—	—	0.3	75.4	—	75.7
– corporates	1	0.3	119.8	123.4	157.6	15.8	77.0	89.2	—	583.
– total retail		357.1	0.3	0.9	7.7	0.3	0.4	0.1	—	366.
– of which: secured by mortgages on immovable property		0.5	—	0.1	0.8	0.1	—	—	—	1.5
SME secured by mortgages on immovable property		249.0	—	—	—	—	—	—	—	249.
non-SME qualifying revolving retail		64.0	—	—	—	—	—	—	—	64.0
other SME		—	0.3	0.8	6.9	0.2	0.4	0.1	—	8.7
other non-SME		43.6	—	—	—	—	—	—	—	43.6
IRB securitisation positions		—	—	—	—	—	—	33.8	—	33.8
IRB non-credit obligation assets		—	—	—	—	—	—	—	51.9	51.9
IRB foundation approach		0.2	13.3	10.8	5.6	0.7	8.2	4.0	—	42.8
– central governments and central		—	—	—	—	—	—	0.1	—	0.1

banks									
– institutions	—	—	0.2	—	0.1	—	—	—	0.3
– corporates	0.2	13.3	10.6	5.6	0.6	8.2	3.9	—	42.4
Standardised approach	48.9	16.2	16.9	28.3	79.9	10.6	111.5	21.8	334.
– central governments or central banks	—	0.1	0.2	—	73.1	—	88.2	5.7	167.
– institutions	—	—	—	—	—	—	2.1	—	2.1
– corporates	1.6	15.3	16.1	26.2	2.0	9.9	7.3	—	78.4
– retail	20.7	0.1	0.1	0.7	0.1	0.1	0.2	—	22.0
– secured by mortgages on immovable property	25.3	—	—	0.3	—	0.1	—	—	25.7
– exposures in default	1.3	0.5	0.4	0.5	0.1	0.4	0.1	—	3.3
– regional governments or local authorities	—	—	—	—	1.7	—	1.2	—	2.9
– equity 2	—	—	—	0.1	0.2	—	2.6	12.3	15.2
– items associated with particularly high risk	—	—	0.1	0.3	—	0.1	2.9	—	3.4
– securitisation positions	—	—	—	—	—	—	0.9	—	0.9
– claims in the form of CIU	—	—	—	—	—	—	0.5	—	0.5
– international organisations	—	—	—	—	2.7	—	—	—	2.7
– multilateral development banks	—	—	—	—	—	—	0.2	—	0.2
– other items	—	0.2	—	0.2	—	—	5.3	3.8	9.5
At 31 Dec 2016	406.5	149.6	152.2	199.2	212.0	96.5	537.9	73.7	1,82

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 18: Credit risk exposure – by industry sector (continued)

		Exposure value								
	Footnotes	Personal $bn	Manufacturing $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	Tota $bn
IRB advanced approach		390.2	125.3	136.6	158.7	137.3	87.3	425.2	50.2	1,51
– central governments and central banks		–	–	0.1	–	119.9	–	207.4	–	327.
– institutions		–	–	–	–	0.8	0.1	89.6	–	90.5
– corporates	1	0.4	124.9	135.4	146.4	16.3	86.7	87.2	–	597.
– total retail		389.8	0.4	1.1	12.3	0.3	0.5	0.1	–	404.
– of which: secured by mortgages on immovable property		0.5	–	0.1	2.3	–	–	–	–	2.9
SME secured by mortgages on immovable property		275.4	–	–	–	–	–	–	–	275.
non-SME 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
IRB securitisation positions		–	–	–	–	–	–	40.9	–	40.9
IRB 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.
– central governments and central banks	–	0.1	–	–	70.2	–	121.9	7.7	199.
– institutions	–	–	–	–	–	–	38.9	–	38.9
– corporates	1.5	56.2	43.5	46.1	21.9	40.2	17.0	–	226.
– 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
– multilateral development banks	–	–	–	–	–	–	–	–	–
– other items	–	–	–	0.1	–	–	16.0	3.3	19.4
At 31 Dec 2015	473.7	195.1	192.6	216.8	235.2	137.0	631.4	64.7	2,14

For footnotes, see page 23.

Table 19: Credit risk exposure – by maturity

		Exposure value				
		Less than 1 year	Between 1 and 5 years	More than 5 years	Undated	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn
IRB advanced approach		625.2	378.1	395.7	51.7	1,450.7
– central governments and central banks		203.9	87.7	47.8	—	339.4
– institutions		55.0	19.8	0.9	—	75.7
– corporates	1	274.4	241.8	66.9	—	583.1
– total retail		80.8	21.8	264.2	—	366.8
– of which:						
secured by mortgages on immovable property SME		0.2	0.3	1.0	—	1.5
secured by mortgages on immovable property non-SME		1.7	4.1	243.2	—	249.0
qualifying revolving retail		64.0	—	—	—	64.0
other SME		2.0	4.8	1.9	—	8.7
other non-SME		12.9	12.6	18.1	—	43.6
IRB securitisation positions		11.0	6.9	15.9	—	33.8
IRB non-credit obligation assets		0.1	0.1	—	51.7	51.9
IRB foundation approach		19.4	19.4	4.0	—	42.8
– central governments and central banks		—	—	0.1	—	0.1
– institutions		—	0.3	—	—	0.3
– corporates		19.4	19.1	3.9	—	42.4
Standardised approach		168.1	77.7	56.0	32.3	334.1
– central governments and central banks		101.9	40.6	19.0	5.8	167.3
– institutions		1.1	0.3	0.7	—	2.1
– corporates		50.1	21.1	7.2	—	78.4
– retail		8.2	9.4	4.4	—	22.0
– secured by mortgages on immovable property		2.0	2.5	21.2	—	25.7
– exposures in default		1.7	0.7	0.9	—	3.3
– regional governments or local authorities		1.2	0.4	1.3	—	2.9
– equity	2	—	—	—	15.2	15.2
– items associated with particularly high risk		0.4	0.6	0.1	2.3	3.4
– securitisation positions		0.2	—	0.7	—	0.9
– claims in the form of CIU		0.4	—	—	0.1	0.5
– international organisations		0.4	2.0	0.3	—	2.7
– multilateral development banks		0.2	—	—	—	0.2
– other items		0.3	0.1	0.2	8.9	9.5
At 31 Dec 2016		812.7	475.2	455.7	84.0	1,827.6

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 19: Credit risk exposure – by maturity (continued)

		Exposure value				
		Less than 1 year	Between 1 and 5 years	More than 5 years	Undated	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn
IRB advanced approach		654.2	376.1	430.4	50.1	1,510.8
– central governments and central banks		200.9	75.6	50.9	—	327.4
– institutions		66.9	20.1	3.5	—	90.5
– corporates	1	289.8	246.0	61.5	—	597.3
– total retail		86.7	23.8	294.0	—	404.5
– of which:						
secured by mortgages on immovable property SME		0.2	0.4	2.3	—	2.9
secured by mortgages on immovable property non-SME		2.4	4.2	268.8	—	275.4
qualifying revolving retail		67.8	—	—	—	67.8
other SME		2.4	6.4	3.3	—	12.1
other non-SME		13.9	12.8	19.6	—	46.3
IRB securitisation positions		9.9	10.5	20.5	—	40.9
IRB non-credit obligation assets		—	0.1	—	50.1	50.2
IRB foundation approach		20.0	19.1	4.6	—	43.7
– central governments and central banks		—	—	0.1	—	0.1
– institutions		0.1	0.2	—	—	0.3
– corporates		19.9	18.9	4.5	—	43.3
Standardised approach		230.0	207.5	120.8	33.7	592.0
– central governments and central banks		126.2	48.0	18.0	7.7	199.9
– institutions		22.4	0.5	16.0	—	38.9
– corporates		60.1	136.7	29.6	—	226.4
– retail		11.9	14.1	18.2	—	44.2
– secured by mortgages on immovable property		2.3	2.6	35.4	—	40.3
– exposures in default		2.6	1.2	1.1	—	4.9
– regional governments or local authorities		1.2	1.2	0.4	—	2.8
– equity	2	—	—	—	7.0	7.0
– items associated with particularly high risk		0.4	1.6	0.7	1.7	4.4
– securitisation positions		—	—	0.7	—	0.7
– claims in the form of CIU		0.4	—	—	0.1	0.5
– international organisations		0.4	1.6	0.6	—	2.6
– multilateral development banks		—	—	—	—	—
– other items		2.1	—	0.1	17.2	19.4
At 31 Dec 2015		904.2	602.7	555.8	83.8	2,146.5

For footnotes, see page 23.

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

Tables 20 to 23 analyse past due but not impaired exposures, impaired exposures, renegotiated 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 231 of the Annual Report and Accounts 2016, and the Group's definitions for accounting purposes of 'past

due', 'impaired' and 'renegotiated' are set out on pages 121, 123 and 107, respectively. The accounting definition of impaired and the regulatory definition of default are generally aligned. In certain jurisdictions, for certain retail exposures, regulatory default is identified at 180 days past due, while the exposures are identified as impaired at 90 days past due. In the retail portfolio in the US, for accounting purposes, a renegotiation would normally trigger identification as 'impaired', whereas for regulatory purposes, default is identified mainly based on the 180 days past due criterion.

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

Table 20: Ageing analysis of accounting past due and not impaired exposures

	Europe	Asia	MENA	North America	Latin America	Total
Up to 29 days	876	2,769	1,163	2,016	395	7,219
30-59 days	220	506	177	402	86	1,391
60-89 days	110	187	136	128	48	609
90-179 days	—	11	38	3	—	52
180 days and over	—	11	11	—	—	22
Total at Dec 2016	1,206	3,484	1,525	2,549	529	9,293

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 21: Breakdown of renegotiated exposures between impaired and non-impaired exposures

	First lien residential mortgages	Other personal lending	Corporate and commercial	Non-bank financial institutions	Renegotiated loans at 31 Dec 2016
	$m	$m	$m	$m	$m
Neither past due nor impaired	976	282	1,848	260	3,366
Past due but not impaired	346	78	301	—	725
Impaired	2,751	325	5,416	257	8,749
Renegotiated loans at 31 Dec 2016	4,073	685	7,565	517	12,840
Impairment allowances on renegotiated loans	267	150	1,667	130	2,214
Neither past due nor impaired	3,973	716	2,152	391	7,232
Past due but not impaired	1,753	243	123	24	2,143
Impaired	6,556	733	6,094	201	13,584
Renegotiated loans at 31 Dec 2015	12,282	1,692	8,369	616	22,959
Impairment allowances on renegotiated loans	871	251	2,097	120	3,339

Table 22: Amount of impaired exposures and related allowances, broken down by geographical region

	Europe	Asia	MENA	North America	Latin America	Total
31 Dec 2016	$m	$m	$m	$m	$m	$m
Past due but not impaired exposures	1,206	3,484	1,525	2,549	529	9,293
– personal	769	2,351	558	1,399	381	5,458
– corporate and commercial	423	1,084	861	754	146	3,268
– financial	14	49	106	396	2	567
Impaired exposures	8,137	2,561	2,449	5,891	621	19,659
– personal	1,953	579	545	4,226	261	7,564
– corporate and commercial	5,903	1,954	1,726	1,660	360	11,603
– financial	281	28	178	5	—	492
Impairment allowances and other credit risk provisions	(2,859)	(1,640)	(1,942)	(1,705)	(486)	(8,632)
– personal	(530)	(283)	(571)	(605)	(263)	(2,252)
– corporate and commercial	(2,114)	(1,348)	(1,185)	(1,080)	(223)	(5,950)
– financial	(215)	(9)	(186)	(20)	–	(430)
31 Dec 2015						
Past due but not impaired exposures	1,589	4,925	1,498	5,466	1,252	14,730
– personal	876	2,935	605	3,332	790	8,538
– corporate and commercial	699	1,948	795	1,868	460	5,770
– financial	14	42	98	266	2	422
Impaired exposures	10,385	4,095	2,801	9,135	3,151	29,567
– personal	2,121	817	642	8,130	857	12,567

– corporate and commercial	6,582	3,267	1,920	1,003	2,285	15,057
– financial	1,682	11	239	2	9	1,943
Impairment allowances and other credit risk provisions	(3,503)	(4,087)	(2,035)	(2,235)	(2,168)	(14,028)
– personal	(653)	(735)	(562)	(1,232)	(872)	(4,054)
– corporate and commercial	(2,655)	(3,339)	(1,279)	(971)	(1,296)	(9,540)
– financial	(195)	(13)	(194)	(32)	–	(434)

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 23: Movement in specific credit risk adjustments by industry and geographical region

	Europe	Asia	MENA	North America	Latin America	Total
	$m	$m	$m	$m	$m	$m
Specific credit risk adjustments at 1 Jan 2016	3,503	4,087	2,035	2,235	2,168	14,028
Amounts written off	(1,141)	(648)	(363)	(665)	(637)	(3,454)
– personal	(412)	(358)	(208)	(284)	(340)	(1,602)
– corporate and commercial	(728)	(285)	(137)	(381)	(297)	(1,828)
– financial	(1)	(5)	(18)	–	–	(24)
Recoveries of amounts written off in previous years	260	149	44	73	100	626
– personal	225	124	34	54	78	515
– corporate and commercial	33	24	10	18	22	107
– financial	2	1	–	1	–	4
Charge to income statement	575	675	352	796	1,164	3,562
– personal	155	274	226	219	832	1,706
– corporate and commercial	386	399	113	587	332	1,817
– financial	34	2	13	(10)	–	39
Exchange and other movements	(338)	(2,623)	(126)	(734)	(2,309)	(6,130)
Specific credit risk adjustments at 31 Dec 2016	2,859	1,640	1,942	1,705	486	8,632
Specific credit risk adjustments at 1 Jan 2015	3,946	3,883	2,117	2,764	2,621	15,331
Amounts written off	(1,123)	(595)	(508)	(662)	(1,306)	(4,194)
– personal	(467)	(416)	(273)	(554)	(997)	(2,707)
– corporate and commercial	(644)	(179)	(235)	(106)	(309)	(1,473)
– financial	(12)	–	–	(2)	–	(14)
Recoveries of amounts written off in previous years	368	165	53	76	146	808
– personal	320	135	50	57	119	681
– corporate and commercial	46	30	3	18	27	124
– financial	2	–	–	1	–	3
Charge to income statement	563	1,392	507	547	1,450	4,459
– personal	109	334	281	157	983	1,864
– corporate and commercial	440	1,058	216	397	467	2,578
– financial	14	–	10	(7)	–	17
Exchange and other movements	(251)	(758)	(134)	(490)	(743)	(2,376)
Specific credit risk adjustments at 31 Dec 2015	3,503	4,087	2,035	2,235	2,168	14,028

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 a key aspect of effective risk management and takes many forms. Our general policy is to promote the use of credit risk mitigation, justified by commercial prudence and capital efficiency. Specifically, detailed policies cover the acceptability, structuring and terms 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 commercial real estate ('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.

For credit risk mitigants comprising immovable property, the key determinant of concentration at Group level is geographic. 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 130 and 136, respectively, of the Annual Report and Accounts 2016.

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 securities financing transactions, 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 non-trading 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 and the relevant customer agreements are subject to review to ensure the legal right of offset remains appropriate. At 31 December 2016, circa $35bn of customer accounts were treated as cash collateral, mainly in the UK.

Other forms of credit risk mitigation

Our Global Banking and Markets ('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 Credit default swap ('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 ('ECA'). Corporates would normally provide guarantees as part of a parent/subsidiary or common parent relationship and would span a number of credit grades. The ECAs 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 over-the-counter ('OTC') derivatives and SFTs, we typically carry out daily valuations. In the residential mortgage business, Group policy prescribes revaluation 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. Revaluations are sought where, for example, material concerns arise in relation to the performance of the collateral. CRE revaluation 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.

Recognition of risk mitigation under the IRB approach

Within an IRB approach, risk mitigants are considered in two broad categories:

- those which reduce the intrinsic PD of an obligor and therefore operate as determinants of PD; and
- those which affect the estimated recoverability of obligations and require adjustment of LGD or, in certain limited circumstances, EAD.

The first category typically includes full parental guarantees – where one obligor within a group guarantees another. It is assumed that the guarantor's performance materially informs the PD of the guaranteed entity. PD estimates are also subject to a 'sovereign ceiling', constraining the risk ratings assigned to obligors in countries of higher risk, and where only partial parental support exists. In certain jurisdictions, certain types of third-party guarantee are recognised by substituting the obligor's PD, with the guarantor'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 considered 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 creditworthiness of providers of unfunded credit risk mitigation is taken into consideration as part of the guarantor's risk profile. 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 Expected Loss ('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. 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 or LGD, or both;
- eligible financial collateral under the IRB advanced approach is recognised 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 51 in Appendix I 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 2016.

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.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 24: Credit risk mitigation techniques – overview

	a	b	c	d	e	f	g
	Exposures unsecured: carrying amount	Exposures secured by collateral	of which: secured amount	Exposures secured by financial guarantees	of which: secured amount	Exposures secured by credit derivatives	of which: secured amount
	$bn	$bn	$bn	$bn	$bn	$bn	$bn
1 Loans	601.2	402.0	362.2	68.1	64.4	6.1	5.0
2 Debt securities	370.1	2.0	1.9	5.3	5.2	—	—
3 Total at 31 Dec 2016	971.3	404.0	364.1	73.4	69.6	6.1	5.0
4 Of which defaulted	9.5	4.3	3.1	0.1	—	—	—

Table 25: Standardised approach – credit risk exposure and Credit Risk Mitigation (CRM) effects

	a	b	c	d	e	f
	Exposures before CCF and CRM		Exposures post-CCF and CRM		RWA and RWA density	
	On-balance sheet amount	Off-balance sheet amount	On-balance sheet amount	Off-balance sheet amount	RWA	RWA density %
	$bn	$bn	$bn	$bn	$bn	$bn
Asset classes[1]						
1 Central governments and central banks	161.9	1.5	166.2	1.1	14.7	9
2 Institutions	2.2	—	2.1	—	1.0	46
3 Corporates	80.2	79.9	66.3	12.1	75.0	96
4 Retail	22.7	44.2	21.6	0.4	16.3	74
5 Secured by mortgages on immovable property	25.5	0.8	25.5	0.2	9.3	36
6 Exposures in default	3.2	0.4	3.2	0.1	4.3	130
7 Regional governments or local authorities	2.9	0.3	2.9	—	0.9	32
8 Equity exposures	15.2	—	15.2	—	33.6	221
9 Items associated with particularly high risk	2.1	1.4	2.1	1.3	5.1	150
10 Claims in the form of CIU	0.5	—	0.5	—	0.5	100
11 Public sector entities	—	—	—	—	—	—
12 Claims on institutions and corporates with a short-term credit assessment	—	—	—	—	—	—
13 Covered bonds	—	—	—	—	—	—
14 International organisations	2.7	—	2.7	—	—	—
15 Multilateral development banks	0.2	—	0.2	—	—	5
16 Other items	9.5	—	9.5	—	4.7	50
17 Total at 31 Dec 2016	328.8	128.5	318.0	15.2	165.4	50

1 Securitisation positions are not included in this table.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 26: Standardised approach – exposures by asset classes and risk weights

		a	b	e	f	g	h	i	j	k	l	p
	Risk weight	0 %	2 %	20 %	35 %	50 %	70 %	75 %	100 %	150 %	250 %	Total credit exposure amount (post-CCF and post-CRM)
		$bn	$bn	$bn	$bn	$bn	$bn	$bn	$bn	$bn	$bn	$bn
	Asset classes[1]											
1	Central governments or central banks	160.4	—	0.8	—	0.3	—	—	0.2	—	5.6	167.3
2	Institutions	—	0.1	0.8	—	0.7	—	—	0.5	—	—	2.1
3	Corporates	—	—	2.1	0.2	2.7	0.1	—	72.6	0.7	—	78.4
4	Retail	—	—	—	—	—	—	22.0	—	—	—	22.0
5	Secured by mortgages on immovable property	—	—	—	25.2	—	—	—	0.5	—	—	25.7
6	Exposures in default	—	—	—	—	—	—	—	1.3	2.0	—	3.3
7	Regional governments or local authorities	0.2	—	1.8	—	0.7	—	—	0.2	—	—	2.9
8	Equity exposures	—	—	—	—	—	—	—	2.9	—	12.3	15.2
9	Items associated with particularly high risk	—	—	—	—	—	—	—	—	3.4	—	3.4
10	Claims in the form of CIU	—	—	—	—	—	—	—	0.5	—	—	0.5
11	Public sector entities	—	—	—	—	—	—	—	—	—	—	—
12	Claims on institutions and corporates with a short-term credit assessment	—	—	—	—	—	—	—	—	—	—	—
13	Covered bonds	—	—	—	—	—	—	—	—	—	—	—
14	International organisations	2.7	—	—	—	—	—	—	—	—	—	2.7
15	Multilateral development banks	0.1	—	0.1	—	—	—	—	—	—	—	0.2
16	Other items	0.7	—	5.1	—	—	—	—	3.7	—	—	9.5
17	Total at 31 Dec 2016	164.1	0.1	10.7	25.4	4.4	0.1	22.0	82.4	6.1	17.9	333.2

1 Securitisation positions are not included in this table.

Table 27: IRB – Effect on RWA of credit derivatives used as CRM techniques

		a	b
		Pre-credit derivatives RWA	Actual RWA
		$bn	$bn
	IRB advanced approach[1]		
2	Central governments and central banks	5.9	5.9
4	Institutions	2.7	2.7
6	Total corporates	119.6	118.5
6.1	– corporates – SME	—	—
6.2	– corporates – specialised lending	14.4	14.4
6.3	– corporates – other	105.2	104.1
14	Equity	—	—

20	Total retail	31.5	31.5
10	– Secured by mortgages on immovable property SME	—	—
10.1	– Secured by mortgages on immovable property non-SME	18.4	18.4
9	– Qualifying revolving retail exposures	4.4	4.4
18	– Other SME	3.0	3.0
19	– Other non-SME	5.7	5.7
	IRB foundation approach		
1	Central governments and central banks	—	—
3	Institutions	—	—
5	Total corporates	0.3	0.3
5.1	– corporates – SME	—	—
5.2	– corporates – specialised lending	—	—
5.3	– corporates – other	0.3	0.3
13	Equity	—	—
	Total at 31 Dec 2016	160.0	158.9

1 Securitisation positions are not included in this table.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 28: Credit derivatives exposures

	Footnote	a 2016 Protection bought $bn	b Protection sold $bn	a 2015 Protection bought $bn	b Protection sold $bn
Notionals					
Credit derivative products used for own credit portfolio					
– Index credit default swaps		4.6	1.9	3.5	0.7
– Total return swaps		—	—	—	—
Total notionals		4.6	1.9	3.5	0.7
Credit derivative products used for intermediation	1				
– Index credit default swaps		214.6	207.4	222.5	217.7
– Total return swaps		12.3	7.0	11.2	7.7
Total notionals		226.9	214.4	233.7	225.4
Total credit derivative notionals		231.5	216.3	237.2	226.1
Fair values					
– Positive fair value (asset)		2.3	2.9	5.1	2.2
– Negative fair value (liability)		(3.1)	(2.7)	(1.8)	(3.9)

1 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.

The above table shows the Credit Derivative exposures that HSBC holds split between those amounts due to client intermediation and those amounts booked as part of HSBC's own credit portfolio. Where the credit derivative is used to hedge our own portfolio the resulting credit risk impact is seen in table 28 above and no counterparty credit risk capital requirement arises. For a discussion on hedging risk and monitoring the continuing effectiveness of hedges refer to page 233 of the Annual Report and Accounts 2016.

Global risk

Application of the IRB approach

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 purposes of credit approval and many 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 2016, 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 where the primary focus is on corporate and retail exposures.

At 31 December 2016, 80% of the exposures were treated under advanced IRB, 2% under foundation IRB and 18% under standardised approach.

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 49 and 50 in Appendix I 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 that occurred during the financial year and changes in estimates of losses arising on events that occurred prior to the current year. EL represents the one-year regulatory expected loss accumulated in the book and is calculated at a PIT.

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 through-the-cycle ('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;
- In the foundation IRB approach, LGD and the conversion factors used to calculate EAD are set by regulations, and may differ significantly from the accounting assumptions about estimated cash flows;
- 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.

Qualitative disclosures on banks' use of external credit ratings under the standardised approach for credit risk

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 External Credit Assessment Institution ('ECAIs') or ECAs 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 Investor Service ('Moody's'), Standard and Poor's rating agency ('S&P') and Fitch Ratings ('Fitch'). We have not nominated any ECAs.

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 European Economic Area ('EEA') States and denominated in local currency are risk-weighted at 0% using the standardised approach, provided they would be eligible under that approach for a 0% risk weighting.

Wholesale risk

The wholesale risk rating system

This section describes how we 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 information such as the most recent events and market data, makes the final decision on the rating. The rating assigned reflects the approver's overall view of the obligor's credit standing.

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

Relationship managers may propose a different CRR from that indicated through an override process which must be approved by the Credit function. Overrides for each model are recorded and monitored as part of the model management process.

The CRR is assigned at an obligor level. Unfunded credit risk mitigants, such as guarantees, 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 51 and for the standardised approach in table 52.

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.
Our policy requires approvers to downgrade ratings on expectations but to upgrade them only on performance. This leads to expected defaults typically exceeding actual defaults.
For EAD and LGD estimation, operating entities are permitted, subject to overview by Group Risk, to use their own modelling approaches to suit conditions in their jurisdictions. Group Risk provides co-ordination, benchmarks, 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, 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, multiple models and scorecards are used for PD, LGD, and EAD. 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 that typically 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 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. 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, considering legal and procedural differences in the recovery and workout processes. 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.
The PRA has published guidance on the appropriateness of LGD models for low default portfolios. It states 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 2016, 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 and US income-producing CRE portfolio are calculated using the supervisory slotting 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.
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 29 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.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 29: Wholesale IRB credit risk models

Regulatory asset classes measured	RWAs for associated asset class $bn	Component	Number of significant models	Model description and methodology	Number of years loss data	Regulatory Floors
Central governments and central banks	35.4	PD	1	A shadow rating approach that includes macroeconomic and political factors, constrained with expert judgement.	>10	No
		LGD	1	An unsecured model built on assessment of structural factors that influence the country's long-term economic performance. For unsecured LGD, a floor of 45% is applied.	8	45%
		EAD	1	A cross-classification model that uses both internal data and expert judgement, as well as information on similar exposure types from other asset classes.	8	EAD must be at least equal to the current utilisation of the balance at account level
Institutions	15.1	PD	1	A statistical model that combines quantitative analysis on financial information with expert inputs and macroeconomic factors.	10	PD > 0.03%
		LGD	1	A quantitative model that produces both downturn and expected LGD. Several securities types are included in the model to recognise collateral in the LGD calculation. For unsecured LGD, a floor of 45% is applied.	10	45%
		EAD	1	A quantitative model that assigns credit conversion factors ('CCF') taking into account product types and committed/uncommitted indicator to calculate EAD using current utilisation and available headroom.	10	EAD must be at least equal to the current utilisation of the balance at account level
Corporates[1]	317.6					
Global large corporates		PD	1	A statistical model built on 15 years of data. The model uses financial information, macroeconomic information and market-driven data, and is complemented by a qualitative assessment.	15	PD > 0.03%
Other regional / local corporates		PD	11	Corporates that fall below the global large corporate threshold are rated through regional/local PD models, which reflect regional/local circumstances. These models use financial information, behavioural data and qualitative information to derive a statistically built PD.	>10	

Non-bank financial institutions	PD	10	Predominantly statistical models that combines quantitative analysis on financial information with expert inputs.	10	PD > 0.03%
All corporates	LGD	7	Regional/local statistical models covering all corporates, including global large corporates, developed using historical loss/recovery data and various data inputs, including collateral information, customer type and geography.	>7	UK 45%
	EAD	5	Regional/local statistical models covering all corporates, including global large corporates, developed using historical utilisation information and various data inputs, including product type and geography.	>7	EAD must be at least equal to the current utilisation of the balance at account level

1 Excludes specialised lending exposures subject to supervisory slotting approach (see table 56a&b).

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 30: IRB models – estimated and actual values (wholesale)[1]

		PD[2]		LGD[3]		EAD[4]	
		Estimated	Actuals	Estimated[5]	Actuals[5]	Estimated	Actuals
	Footnotes	%	%	%	%	%	%
2016							
– Sovereigns model	6	3.43	—	45.00	—	—	—
– Banks model		1.63	—	—	—	—	—
– Corporates models	7	1.79	1.23	37.71	29.43	0.91	0.76
2015							
– Sovereigns model	6	1.72	1.12	45.00	—	0.07	—
– Banks model		2.22	—	—	—	—	—
– Corporates models	7	1.89	1.26	37.74	21.52	0.60	0.55
2014							
– Sovereigns model	6	2.27	—	—	—	—	—
– Banks model		3.28	—	—	—	—	—
– Corporates models	7	1.88	1.16	36.83	16.06	0.47	0.34
2013							
– Sovereigns model	6	4.14	—	—	—	—	—
– Banks model		3.18	0.20	40.01	—	0.06	0.04
– Corporates models	7	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 been resolved in the period.

6 For 2016, 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. For 2016, 2015 and 2014, the estimated and observed PDs were calculated only for unique obligors.

Table 31: IRB models – corporate PD models – performance by CRR grade

		Corporates[1]				
		Facility[2]	Defaulted[3]	Estimated PD[4]	Actual PD[5]	Diff. in PD
Actual PD[5]	Footnotes	%	%	%	%	%
2016						
CRR 0.1	6	—	—	0.01	—	0.01
CRR 1.1		3.88	—	0.02	—	0.02
CRR 1.2		6.05	—	0.04	—	0.04
CRR 2.1		17.51	—	0.07	—	0.07
CRR 2.2		15.05	0.01	0.13	0.03	0.10
CRR 3.1		11.22	1.03	0.22	0.25	(0.03)
CRR 3.2		10.67	0.26	0.37	0.36	0.01

CRR 3.3	9.21	0.26	0.63	0.49	0.14
CRR 4.1	6.46	0.78	0.87	0.79	0.08
CRR 4.2	5.49	0.47	1.20	0.64	0.56
CRR 4.3	4.59	1.18	1.65	1.46	0.19
CRR 5.1	4.08	1.31	2.25	1.41	0.84
CRR 5.2	2.11	1.40	3.05	1.89	1.16
CRR 5.3	1.76	1.96	4.20	2.27	1.93
CRR 6.1	0.98	10.15	5.75	5.57	0.18
CRR 6.2	0.38	15.38	7.85	4.68	3.17
CRR 7.1	0.27	14.29	10.00	9.46	0.54
CRR 7.2	0.09	12.38	13.00	6.63	6.37
CRR 8.1	0.10	48.22	19.00	13.11	5.89
CRR 8.2	0.07	47.10	36.00	20.29	15.71
CRR 8.3	0.03	36.10	75.00	17.83	57.17
Total	100.00				

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 31: IRB models – corporate PD models – performance by CRR grade (continued)

		Corporates[1]				
		Facility[2]	Defaulted[3]	Estimated PD[4]	Actual PD[5]	Diff. in PD
	Footnotes	%	%	%	%	%
2015						
CRR 0.1	6	—	—	0.01	—	0.01
CRR 1.1		5.72	—	0.02	—	0.02
CRR 1.2		5.25	—	0.04	—	0.04
CRR 2.1		16.48	—	0.07	—	0.07
CRR 2.2		14.17	—	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				
2014						
CRR 0.1	6	0.01	—	0.01	—	0.01
CRR 1.1		6.32	—	0.02	—	0.02
CRR 1.2		6.68	—	0.04	—	0.04
CRR 2.1		16.71	0.01	0.07	0.04	0.03
CRR 2.2		13.07	—	0.13	—	0.13
CRR 3.1		10.38	0.06	0.22	0.10	0.12
CRR 3.2		12.50	0.11	0.37	0.23	0.14
CRR 3.3		6.62	0.25	0.63	0.54	0.09
CRR 4.1		10.41	0.28	0.87	0.54	0.33
CRR 4.2		4.12	0.79	1.20	0.81	0.39
CRR 4.3		3.49	0.83	1.65	0.91	0.74
CRR 5.1		2.50	0.53	2.25	0.97	1.28
CRR 5.2		2.09	0.54	3.05	1.24	1.81
CRR 5.3		1.47	1.74	4.20	2.70	1.50
CRR 6.1		0.59	3.02	5.75	4.11	1.64
CRR 6.2		0.30	1.12	7.85	4.27	3.58

CRR 7.1	0.29	14.59	10.00	11.35	(1.35)
CRR 7.2	0.08	2.78	13.00	10.11	2.89
CRR 8.1	2.31	1.17	19.00	13.77	5.23
CRR 8.2	0.04	32.32	36.00	22.33	13.67
CRR 8.3	0.02	4.85	75.00	14.89	60.11
Total	100.0				

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 31: IRB models – corporate PD models – performance by CRR grade (continued)

	Corporates[1]				
	Facility[2]	Defaulted[3]	Estimated PD[4]	Actual PD[5]	Diff. in PD
Footnote	%	%	%	%	%
2013					
CRR 0.1 6	—	—	0.01	—	0.01
CRR 1.1	4.83	—	0.02	—	0.02
CRR 1.2	7.47	—	0.04	—	0.04
CRR 2.1	20.85	—	0.07	—	0.07
CRR 2.2	10.38	0.01	0.13	0.03	0.10
CRR 3.1	10.79	0.07	0.22	0.16	0.06
CRR 3.2	9.49	0.13	0.37	0.22	0.15
CRR 3.3	8.33	0.15	0.63	0.27	0.36
CRR 4.1	6.40	0.35	0.87	0.48	0.39
CRR 4.2	5.84	0.93	1.20	0.80	0.40
CRR 4.3	4.22	0.47	1.65	0.67	0.98
CRR 5.1	4.18	0.72	2.25	0.76	1.49
CRR 5.2	3.07	0.97	3.05	1.03	2.02
CRR 5.3	1.85	2.77	4.20	1.89	2.31
CRR 6.1	0.98	4.37	5.75	3.28	2.47
CRR 6.2	0.46	5.74	7.85	3.77	4.08
CRR 7.1	0.44	12.69	10.00	7.95	2.05
CRR 7.2	0.15	7.84	13.00	8.68	4.32
CRR 8.1	0.15	9.48	19.00	11.44	7.56
CRR 8.2	0.07	14.94	36.00	13.70	22.30
CRR 8.3	0.05	13.12	75.00	13.64	61.36
Total	100.0				

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 risk

Retail risk rating systems

Due to the different country-level portfolio performance characteristics and loss history, there are no global models for our retail portfolios. Across the Group, over 120 models are used with the PRA's approval under our IRB permission. The 10 most material risk rating systems for which we disclose details of modelling methodology and performance data represent RWAs of approximately $35bn or 54% of the total retail IRB RWA.

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.

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

- 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 credit conversion factor applied to the undrawn portion of the facility.

LGD estimates have more variation, particularly in respect of the time period that is used to quantify economic downturn assumptions.

Table 32: 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 data[1]	Applicable Pillar 1 regulatory thresholds and overlays
UK HSBC residential mortgages	Retail – secured by mortgages on immovable property non-SME	3.70	PD	1	Statistical model built on internal behavioural data and bureau information. Underlying PiT model is calibrated to the latest observed PD. An adjustment is then applied to generate the long-run PD based on a combination of historical misalignment of the underlying model and expert judgement.	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 1990s recession in benchmarking the downturn LGD.	> 10	LGD floor of 10% at portfolio level
			EAD	1	Logical model that uses the sum of balance at observation plus further unpaid interest that could accrue before default.	7–10	EAD must at least be equal to current balance
UK HSBC credit cards	Retail – qualifying revolving	1.68	PD	1	Statistical model built on internal behavioural data and bureau information. Underlying PiT model is calibrated to the latest observed PD. An adjustment is then applied to generate the long run PD based on historical observed misalignment of the underlying model.	7–10	PD floor of 0.03%
			LGD	1	Statistical model based on forecasting the amount of expected future recoveries, segmented by default status.	7–10	
			EAD	1	Statistical model that directly estimates EAD for different segments of the portfolio using either balance or limit as the key input.	7–10	EAD must at least be equal to current balance
UK HSBC personal loans	Retail – other non-SME	2.70	PD	1	Statistical model built on internal behavioural data and bureau information. Underlying PiT	7–10	PD floor of 0.03%

					model is calibrated to the latest observed PD. An adjustment is then applied to generate the long run PD based on historical observed misalignment of the underlying model.		
			LGD	1	Statistical model based on forecasting the amount of expected future recoveries, segmented by default status.	7–10	
			EAD	1	EAD is equal to current balance as this provides a conservative estimate.	7–10	EAD must at least be equal to current balance
			PD	1	Statistical model built on internal behavioural data and bureau information. Underlying PiT model is calibrated to the latest observed PD. An adjustment is then applied to generate the long run PD based on historical observed misalignment of the underlying model.	7–10	PD floor of 0.03%
UK business banking	Retail – other SME	3.75					
			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 and 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	2	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 mortgages[2]	Retail – secured by mortgages on immovable property non-SME	6.71	LGD	2	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	2	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

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 32: 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 data[1]	Applicable Pillar 1 regulatory thresholds and overlays
Hong Kong HSBC credit cards	Retail – qualifying revolving	3.25	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 losses. Downturn LGD derived using data from the period with the highest default rate.	> 10	
			EAD	1	Statistical model which derives a credit utilisation which is used to determine the EAD.	> 10	EAD must at least be equal to current balance
Hong Kong HSBC personal instalment loans	Retail – other non-SME	1.44	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 losses. Downturn LGD derived using data from the period with the highest default rate.	> 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
US Consumer Lending first lien[3]	Retail – secured by mortgages on immovable property non-SME	5.02	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 while additional assumptions	> 10	LGD floor of 10% at portfolio level; 10% uplift on the total LGD for first lien portfolio; LGD floor at the

					and estimations are made on incomplete workouts.		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 that 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 lien[3]	Retail – secured by mortgages on immovable property non-SME	1.80	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 made 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

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 32: 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 data[1]	Applicable Pillar 1 regulatory thresholds and overlays
US HSBC Mortgage Corporation first lien[3]	Retail – secured by mortgages on immovable property non-SME	5.31	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. Additional assumptions and estimations are made on incomplete workouts.	> 10	LGD floor of 10% at portfolio level
			EAD	1	Rule-based calculation based on current balance that continues to be a conservative estimate for EAD.	> 10	EAD must at least be equal to current balance

1 Defined as the number of years of historical data used in model development and estimation.
2 In 2016, the Hong Kong Monetary Authority ('HKMA') extended a 15% risk weight floor to all residential mortgages.
3 In US mortgage business, first lien is a primary claim on a property that takes precedence over all subsequent claims and will be paid first from the proceeds in case of the property's foreclosure sale.

Within table 33, the RWAs and other metrics have decreased in 2016 in the UK and the US 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 15% for all residential mortgages in June 2016, not just those granted after 22 February 2013, increased the RWAs and RWA density in Hong Kong.

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

	Exposure value $bn	Average PD %	Average LGD %	RWA density %	RWAs $bn
At 31 Dec 2016					
Total Retail IRB exposures secured by mortgages on immovable property (non-SME)	249.0	2.14	16.6	15	36.5
– of which:					
UK HSBC residential mortgages	83.4	1.30	10.9	4	3.7
Hong Kong residential mortgages	62.4	0.70	10.0	17	10.6
US first lien residential mortgages	19.8	12.20	58.5	61	12.1

At 31 Dec 2015					
Total Retail IRB exposures secured by mortgages on immovable property (non-SME)	275.4	2.78	18.1	22	60.0
– of which:					
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
US first lien residential mortgages	34.2	12.66	52.0	112	38.2

Retail credit models

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 34 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 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 table 33.

Within table 34, for back-testing purposes, a customer's PD is observed at a PIT 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 are not reflected in the estimates below.

For our UK HSBC residential mortgage portfolio, the estimated values in table 34 for 2016 are based on a different default criteria than in 2015. The inclusion of additional forbearance criteria and specific provisions being raised as default events has resulted in higher PD estimates and lower LGD estimates. The model outputs include 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. Actual LGD values decreased as a result of a higher proportion of defaulted loans resulting in no loss and improving house prices in most regions of the UK. Overall, UK estimates in table 34 remain higher than calculated actual values.

The Hong Kong estimated PD and LGD values in table 34 include required stressed factors to reflect downturn conditions. 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 below the 10% regulatory floor. The Hong

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

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 has been submitted to the local regulator for approval and is expected to be implemented during 2017.
The US estimates in table 34 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 and actual LGD values for our Consumer Lending and Mortgage Services portfolios remained stable in 2016.
For the HSBC Mortgage Corporation portfolio, new models were implemented in 2016 following approval from the PRA. The new models provide a better assessment of risk for the current loan profile and address the underestimation of loss inherent in the previous LGD model. Actual LGD values decreased due to improving house prices.

Table 34: IRB models – estimated and actual values (retail)

	PD		LGD		EAD	
	Estimated	Actuals	Estimated	Actuals	Estimated	Actuals
	%	%	%	%	%	%
2016						
UK						
HSBC residential mortgage	0.50	0.35	10.53	1.09	0.34	0.31
HSBC credit card	0.89	0.75	91.72	89.92	1.03	1.00
HSBC personal loans	1.84	1.52	88.26	79.08	1.36	1.29
Business Banking (Retail SME)	2.40	2.47	93.56	82.63	1.80	1.64
Hong Kong						
HSBC personal residential mortgage	0.79	0.04	4.52	0.97	0.04	0.03
HSBC credit card	0.69	0.30	88.97	82.48	0.52	0.56
HSBC personal instalment loans	2.46	1.78	89.28	69.62	1.44	1.33
US						
Consumer Lending real estate first lien	5.30	4.29	74.22	51.89	3.53	3.49
Mortgage Services real estate first lien	6.16	3.77	68.26	51.79	3.37	3.34
HSBC Mortgage Corporation first lien	2.20	1.27	41.18	29.25	0.50	0.50
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

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 34: IRB models – estimated and actual values (retail) (continued)

	PD		LGD		EAD	
	Estimated	Actuals	Estimated	Actuals	Estimated	Actuals
	%	%	%	%	%	%
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

Model performance

Model validation is subject to global internal standards. The standards are designed to support a comprehensive quantitative and qualitative process within a cycle of model monitoring and validation that includes:

- 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.

Models are validated against a series of metrics and triggers approved by the appropriate governance committee.

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 the most material retail models.

Tables 35 and 36 below validate the reliability of PD calculations by comparing the PD used in IRB calculations with actual default experience.

Our Retail PD models are generally conservative. However, in the case of mortgages, the sale of assets over recent years for our US Consumer Lending and Mortgage Services portfolios means that the average historical annual default rate is based on a different profile of loans than current PD estimates.

Table 35: Wholesale IRB exposure – Back-testing of probability of default (PD) per portfolio[1]

a	b	c			d	e	f		g	h	i
Sovereigns	PD range	External rating equivalent (S&P)	External rating equivalent (Moody's)	External rating equivalent (Fitch)	Weighted average PD %	Arithmetic average PD by obligors %	Number of obligors End of previous year	End of the year	Defaulted obligors in the year	of which: new defaulted obligors in the year	Average historical annual default rate %
		AAA to A-			0.02	0.05	60	60	—	—	—

0.00 to <0.15		Aaa to Baa1	AAA to BBB+								
0.15 to <0.25	BBB+	Baa2	BBB	0.22	0.22	8	11	—	—	—	
0.25 to <0.50	BBB	Baa3	BBB-	0.37	0.37	10	7	—	—	—	
0.50 to <0.75	BBB-	Baa3	BBB-	0.63	0.63	7	7	—	—	—	
0.75 to <2.50	BB+ to BB-	Ba1 to B1	BB+ to B+	2.01	1.58	19	25	—	—	—	
2.5 to <10.00	B+ to B-	B2 to Caa1	B to CCC+	4.66	5.32	35	27	—	—	—	
10.00 to <100.00	CCC+ to C	Caa1 to C	CCC to C	20.27	21.07	14	16	—	—	1.67	

a	b	c			d	e	f	g	h	i	
Banks											
	0.00 to <0.15	AAA to A-	Aaa to Baa1	AAA to BBB+	0.05	0.08	235	250	—	—	—
	0.15 to <0.25	BBB+	Baa2	BBB	0.22	0.22	91	72	—	—	—
	0.25 to <0.50	BBB	Baa3	BBB-	0.37	0.37	37	59	—	—	—
	0.50 to <0.75	BBB-	Baa3	BBB-	0.63	0.63	64	68	—	—	—
	0.75 to <2.50	BB+ to BB-	Ba1 to B1	BB+ to B+	1.16	1.36	139	122	—	—	—
	2.5 to <10.00	B+ to B-	B2 to Caa1	B to CCC+	4.96	4.87	109	100	—	0.29	
	10.00 to <100.00	CCC+ to C	Caa1 to C	CCC to C	11.38	11.55	29	32	—	1.70	

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

a	b	c		d	e	f	g	h	i
Corporates									
	0.00 to <0.15	AAA to A-	Aaa to Baa1	AAA to BBB+	0.09	0.10	11,742	11,245	2 — 0.01
	0.15 to <0.25	BBB+	Baa2	BBB	0.22	0.22	11,003	10,904	28 1 0.13
	0.25 to <0.50	BBB	Baa3	BBB-	0.37	0.37	12,384	12,183	48 1 0.28
	0.50 to <0.75	BBB-	Baa3	BBB-	0.63	0.63	10,516	10,924	54 2 0.50
	0.75 to <2.50	BB+ to BB-	Ba1 to B1	BB+ to B+	1.39	1.47	36,308	35,588	416 31 1.03
	2.5 to <10.00	B+ to B-	B2 to Caa1	B to CCC+	4.39	4.43	13,419	13,488	437 21 3.06
	10.00 to <100.00	CCC+ to C	Caa1 to C	CCC to C	19.08	20.29	2,319	2,141	285 12 13.42

1 Data represents an annual view, analysed at 30 September.

Table 36: Retail IRB exposure – Back-testing of probability of default (PD) per portfolio[1]

a	b	d	e	f		g	h	i
Retail – Secured by real estate non-SME	PD range	Weighted average PD	Arithmetic average PD by obligors	Number of obligors End of previous year	End of the year	Defaulted obligors in the year	of which: new defaulted obligors in the year	Average historical annual default rate
	0.00 to < 0.15	0.06	0.06	454,384	472,033	196	3	0.03
	0.15 to < 0.25	0.20	0.19	42,290	40,896	37	—	0.07
	0.25 to < 0.50	0.39	0.40	78,127	76,119	154	—	0.28
	0.50 to < 0.75	0.59	0.59	16,323	16,596	22	—	0.10
	0.75 to < 2.50	1.27	1.32	105,008	70,068	967	2	1.10
	2.50 to < 10.00	4.83	4.74	52,157	25,774	739	12	3.68
	10.00 to < 100.00	28.19	27.67	55,403	11,411	2,873	152	33.03

a	b	d	e	f		g	h	i
Retail – qualifying revolving								
	0.00 to < 0.15	0.07	0.07	3,081,238	3,212,010	1,556	94	0.05
	0.15 to < 0.25	0.19	0.20	739,131	686,815	661	15	0.10
	0.25 to < 0.50	0.36	0.35	577,288	601,986	1,265	18	0.19
	0.50 to < 0.75	0.61	0.62	291,303	301,068	1,060	15	0.33
	0.75 to < 2.50	1.35	1.33	649,838	657,683	5,519	80	0.79
	2.50 to < 10.00	4.42	4.30	180,889	184,846	5,739	29	2.87
	10.00 to < 100.00	25.88	28.08	62,487	46,776	14,159	2	18.71

a	b	d	e	f		g	h	i
Retail – other non-SME								
	0.00 to < 0.15	0.09	0.09	113,178	150,991	142	6	0.13
	0.15 to < 0.25	0.19	0.19	70,557	82,256	91	3	0.13
	0.25 to < 0.50	0.34	0.36	135,970	149,246	339	65	0.28
	0.50 to < 0.75	0.60	0.60	67,774	67,475	313	29	0.53
	0.75 to < 2.50	1.36	1.37	146,702	145,343	1,171	122	1.14

	2.50 to < 10.00	4.57	4.91	67,842	59,099	1,584	93	3.20
	10.00 to < 100.00	25.26	26.44	20,318	12,085	3,722	9	19.94
a	b	d	e	f		g	h	i
Retail – other SME								
	0.00 to < 0.15	0.10	0.09	119,633	119,245	142	1	0.09
	0.15 to < 0.25	0.20	0.20	72,127	79,047	239	4	0.27
	0.25 to < 0.50	0.37	0.37	150,563	163,934	737	26	0.49
	0.50 to < 0.75	0.60	0.60	124,371	124,797	998	22	0.84
	0.75 to < 2.50	1.54	1.38	275,325	262,619	4,569	117	1.66
	2.50 to < 10.00	4.81	4.73	155,368	133,616	6,953	62	4.27
	10.00 to < 100.00	18.06	20.84	38,418	26,680	6,982	22	16.62

1 Data represents an annual view, analysed at 30 September.

Counterparty credit risk

Counterparty credit risk management

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. 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. The IMM model is subject to ongoing model validation including monthly model performance monitoring. The only IMM site is London where approximately 91% 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 calculated or Repo VaR outside of the IMM framework.

The potential future exposure ('PFE') 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 Credit valuation adjustment ('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 IMM 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

Our policy is 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, enforceability, 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 CSAs is either cash or liquid government

securities.

Further information on gross fair value exposure and the offset due to legally enforceable netting and collateral is set out on page 284 of the Annual Report and Accounts 2016.

Credit ratings downgrade

A credit rating downgrade clause in a Master Agreement or a credit rating downgrade threshold clause in a CSA is 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 of transactions by the non-affected party or the assignment of transactions by the affected party.

At 31 December 2016, 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 (2015: $0.3bn) and for a two-notch downgrade was $0.8bn (2015: $0.5bn).

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Counterparty credit risk exposures

Table 37: Counterparty credit risk exposure – by exposure class, product and geographical region

		Exposure value					
		Europe	Asia	MENA	North America	Latin America	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn	$bn
By exposure class							
IRB advanced approach		62.3	36.1	0.5	22.0	0.7	121.6
– central governments and central banks		5.0	4.1	—	3.0	0.2	12.3
– institutions		27.9	19.8	0.2	9.2	0.4	57.5
– corporates		29.4	12.2	0.3	9.8	0.1	51.8
IRB foundation approach		5.0	—	0.5	—	—	5.5
– corporates		5.0	—	0.5	—	—	5.5
Standardised approach		6.5	0.7	2.1	0.1	0.7	10.1
– central governments and central banks		5.9	—	1.4	—	—	7.3
– institutions		—	—	0.2	—	—	0.2
– corporates		0.6	0.7	0.5	0.1	0.7	2.6
CVA advanced	2	—	—	—	—	—	
CVA standardised	2	—	—	—	—	—	
CCP standardised		13.3	5.5	—	8.8	—	27.6
At 31 Dec 2016		87.1	42.3	3.1	30.9	1.4	164.8
By product							
Derivatives (OTC and Exchange traded derivatives)		58.9	33.8	1.6	21.5	1.2	117.0
SFTs		25.3	5.0	1.5	9.4	0.2	41.4
Other	1	2.9	3.5	—	—	—	6.4
CVA advanced	2	—	—	—	—	—	—
CVA standardised	2	—	—	—	—	—	—
CCP default funds	3	—	—	—	—	—	—
At 31 Dec 2016		87.1	42.3	3.1	30.9	1.4	164.8
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		4.7	0.4	1.5	0.3	2.2	9.1
– central governments and central banks		4.1	—	—	—	—	4.1
– institutions		—	—	0.2	0.3	—	0.5
– corporates		0.6	0.4	1.3	—	2.2	4.5
CVA advanced	2	—	—	—	—	—	—
CVA standardised	2	—	—	—	—	—	—
CCP standardised		14.8	4.2	—	15.5	0.4	34.9
At 31 Dec 2015		92.9	38.9	2.4	40.6	3.8	178.6
By product							
Derivatives (OTC and Exchange traded derivatives)		60.9	31.2	2.3	28.8	3.4	126.6
SFTs		28.8	4.1	0.1	11.7	0.4	45.1

Other	1	3.2	3.6	—	0.1	—	6.9
CVA advanced	2	—	—	—	—	—	—
CVA standardised	2	—	—	—	—	—	—
CCP default funds	3	—	—	—	—	—	—
At 31 Dec 2015		92.9	38.9	2.4	40.6	3.8	178.6

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.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 38: Counterparty credit risk – RWAs by exposure class, product and geographical region

		RWAs					
		Europe	Asia	MENA	North America	Latin America	Total
	Footnotes	$bn	$bn	$bn	$bn	$bn	$bn
By exposure class							
IRB advanced approach		21.3	11.2	0.2	8.6	0.3	41.6
– central governments and central banks		0.9	0.2	—	0.5	0.1	1.7
– institutions		8.1	5.2	—	2.6	0.1	16.0
– corporates		12.3	5.8	0.2	5.5	0.1	23.9
IRB foundation approach		1.7	—	0.2	—	—	1.9
– corporates		1.7	—	0.2	—	—	1.9
Standardised approach		0.8	0.7	0.6	0.1	0.6	2.8
– central governments and central banks		—	—	—	—	—	—
– institutions		0.1	—	0.1	—	—	0.2
– corporates		0.7	0.7	0.5	0.1	0.6	2.6
CVA advanced	2	3.5	—	—	—	—	3.5
CVA standardised	2	2.8	4.0	0.2	3.6	0.3	10.9
CCP standardised		0.7	0.3	—	0.3	—	1.3
At 31 Dec 2016		30.8	16.2	1.2	12.6	1.2	62.0
By product							
Derivatives (OTC and Exchange traded derivatives)		18.2	10.6	1.0	6.6	0.9	37.3
SFTs		4.5	0.6	—	2.1	0.1	7.3
Other	1	1.4	0.9	—	—	—	2.3
CVA advanced	2	3.5	—	—	—	—	3.5
CVA standardised	2	2.8	4.0	0.2	3.6	0.3	10.9
CCP default funds	3	0.4	0.1	—	0.2	—	0.7
At 31 Dec 2016		30.8	16.2	1.2	12.5	1.3	62.0
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		0.8	0.5	1.2	—	2.2	4.7
– central governments and central banks		—	—	—	—	—	—
– institutions		—	—	0.1	—	—	0.1
– corporates		0.8	0.5	1.1	—	2.2	4.6
CVA advanced	2	3.3	—	–	—	—	3.3
CVA standardised	2	3.3	3.8	0.3	4.3	0.5	12.2
CCP standardised		0.9	0.5	–	0.8	—	2.2
At 31 Dec 2015		31.9	17.1	2.0	14.6	3.6	69.2
By product							
Derivatives (OTC and Exchange traded derivatives)		19.2	12.1	1.5	7.8	2.6	43.2
SFTs		3.8	0.4	0.1	2.2	0.5	7.0

Other	1	1.6	0.6	–	—	—	2.2
CVA advanced	2	3.3	—	–	—	—	3.3
CVA standardised	2	3.3	3.8	0.4	4.2	0.5	12.2
CCP default funds	3	0.7	0.2	–	0.4	—	1.3
At 31 Dec 2015		31.9	17.1	2.0	14.6	3.6	69.2

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.

Wrong-way risk

Wrong-way risk occurs when a counterparty's exposures are adversely correlated with its credit quality.

There are two types of wrong-way risk.

- General wrong-way risk occurs when the probability of counterparty default is positively correlated with general risk factors, for example, where a counterparty is resident and/or incorporated in a higher-risk country and seeks to sell a non-domestic currency in exchange for its home currency.
- Specific wrong-way risk occurs in self-referencing transactions. These are transactions in which exposure is driven by capital or financing instruments issued by the counterparty and occurs where exposure from HSBC's perspective materially increases as the value of the counterparty's capital or financing instruments referenced in the contract decreases. It is HSBC policy that specific wrong-way transactions are approved on a case-by-case basis.

We use a range of tools to monitor and control wrong-way risk, including requiring the business to obtain prior approval before undertaking wrong-way risk transactions outside pre-agreed guidelines. The regional Traded Risk functions are responsible for the control and monitoring process within an overarching Group framework and limit framework.

Central counterparties

While exchange traded derivatives have been cleared through CCP's for many years, recent regulatory initiatives designed to reduce systemic risk in the banking system are directing increasing volumes of OTC derivatives to be cleared through CCPs.

A dedicated CCP risk team has been established to manage the interface with CCPs and undertake in-depth due diligence of the unique risks associated with these organisations. This is to address an implication of the regulations that the Group's risk will be transferred from being distributed among individual, bilateral counterparties to a significant level of risk concentration on CCPs. We have developed a risk appetite framework to manage risk accordingly, on an individual CCP and global basis.

Securitisation

Group securitisation strategy

HSBC acts as originator, sponsor, liquidity provider and derivative counterparty to our own originated and sponsored securitisations, as well as those of third parties. Our strategy is to use securitisation to meet our needs for aggregate funding or

capital management, to the extent that market, regulatory treatments and other conditions are suitable, and for customer facilitation. We do not provide support to any of our originated or sponsored securitisations, and it is not our policy to do so.

We have senior exposures to the Securities Investment Conduits ('SICs'): Mazarin Funding Limited, Barion Funding Limited, Malachite Funding Limited and we hold all of the commercial paper issued by Solitaire Funding Limited. These are considered legacy businesses, and exposures are being repaid as the securities they hold amortise.

Group securitisation roles

Our roles in the securitisation process are as follows:

- Originator: where we originate the assets being securitised, either directly or indirectly;
- Sponsor: where we establish and manage a securitisation programme that purchases exposures from third parties; and
- Investor: where we invest in a securitisation transaction directly or provide derivatives or liquidity facilities to a securitisation.

HSBC as originator

We use SPEs to securitise customer loans and advances and other debt that we have originated in order to diversify our sources of funding for asset origination and for capital efficiency purposes. In such cases, we transfer the loans and advances to the SPEs for cash, and the SPEs issue debt securities to investors to fund the cash purchases.

In addition, we use SPEs to mitigate the capital absorbed by some of the customer loans and advances we have originated. Credit derivatives are used to transfer the credit risk associated with such customer loans and advances to an SPE, using securitisations commonly known as synthetic securitisations by which the SPE writes CDS protection

for HSBC.

In 2015, HSBC issued a synthetic securitisation, comprising drawn and undrawn seasoned corporate loans to relationship clients with a portfolio maximum notional amount of $5bn. The significant risk transfer for this synthetic securitisation is effected via an SPE which has sold protection on a $0.3bn tranche. The protection is collateralised from the proceeds of bonds issued by the SPE. The SPE for this securitisation is consolidated for accounting purposes but not for regulatory purposes.

HSBC as sponsor

We are sponsor to a number of types of securitisation entities, details of which can be found in Note 38 of the Annual Report and Accounts 2016 and the table below.

Entity	Entity description and nature of exposure	Accounting consolidation	Regulatory consolidation	Regulatory treatment
Solitaire	Asset-backed commercial paper ('ABCP') conduit to which a first-loss letter of credit and transaction-specific liquidity facilities are provided	P	P	Look through to risk weights of underlying assets
Barion	Vehicle to which senior term funding is provided	P	O	
Malachite	Vehicle to which senior term funding is provided	P	O	Exposures (including derivatives and liquidity facilities) are risk-weighted as securitisation positions
Mazarin	Vehicle to which senior term funding is provided	P	O	
Regency	Multi-seller conduit to which senior liquidity facilities and programme-wide credit enhancement are provided	P	O	

HSBC as investor

We have exposure to third-party securitisations across a wide range of sectors in the form of investments, liquidity facilities and as a derivative counterparty. These are primarily legacy exposures.

Monitoring of securitisation positions

Securitisation positions are managed by a dedicated team that uses a combination of market standard systems and third-party data providers to monitor performance data and manage market and credit risks.

In the case of re-securitisation positions, similar processes are conducted in respect of the underlying securitisations.

Liquidity risk of securitised assets is consistently managed as part of the Group's liquidity and funding risk management framework and further details are provided on page 108 of the Annual Report and Accounts 2016.

Valuation of securitisation positions

The valuation process of our investments in securitisation exposures primarily focuses on quotations from third parties, observed trade levels and calibrated valuations from market standard models.

Our hedging and credit risk mitigation strategy, with regards to retained securitisation and re-securitisation exposures, is to continually review our positions. Currently, there are no material hedges in place and no credit risk mitigation is recognised on RWAs for our retained securitisation or re-securitisation positions.

Securitisation accounting treatment

For accounting purposes, we consolidate structured entities (including SPEs) when the substance of the relationship indicates that we control them, that is, we are exposed, or have rights, to variable returns from our involvement with the structured entity and have the ability to affect those returns through our power over the entity.

Full details of these assessments and our accounting policy on structured entities may be found in Note 1(g) and Note 39 respectively of the Annual Report and Accounts 2016.

We reassess the required consolidation whenever there is a change in the substance of the relationship between HSBC and a structured entity.

HSBC enters into transactions in the normal course of business by which it transfers financial assets to structured entities. Depending on the circumstances, these transfers may either result in these financial assets being fully or partly derecognised or continuing to be recognised in their entirety.

Full derecognition occurs when we transfer our contractual right to receive cash flows from the financial assets, or retain the right but assume an obligation to pass on the cash flows from the assets, and transfer substantially all the risks and rewards of ownership. Only in the event that derecognition is achieved are sales and any resultant gains on sales recognised in the financial statements.

Partial derecognition occurs when we sell or otherwise transfer financial assets in such a way that some but not substantially all of the risks and rewards of ownership are transferred and control is retained. These financial assets are recognised on the balance sheet to the extent of our continuing involvement and an associated liability is also recognised. The net carrying amount of the financial asset and associated liability will be based on the measurement basis of the financial asset, either

the amortised cost or the fair value of the rights and obligations retained by the entity.

Further disclosure of such transfers may be found in Note 16 of the Annual Report and Accounts 2016.

Securitisation regulatory treatment

For regulatory purposes, any reduction in RWAs that would be achieved by our own originated securitisations must receive the PRA's permission and be justified by a commensurate transfer of credit risk to third parties. If achieved, the associated SPEs and underlying assets are not consolidated but exposures to them, including derivatives or liquidity facilities, are risk-weighted as securitisation positions.

For the majority of our securitisation non-trading book positions, we use the IRB approach, and within this principally the RBM, with lesser amounts on IAA and SFM. We also use the standardised approach for an immaterial amount of non-trading book positions. Securitisation positions in the trading book are overseen within Market Risk using the standardised approach. Our securitisation and re-securitisation RWAs do not benefit from any credit risk mitigation.

The IAA is limited to exposures arising from Regency Assets Limited, mainly related to liquidity facilities and credit enhancement. Eligible ECAI rating methodology, which includes stress factors, is applied to each asset class in order to derive the equivalent rating level for each transaction. This methodology is verified by the internal credit function as part of the approval process for each new transaction. The performance of each underlying asset portfolio, including residential and commercial mortgages and re-securitisations, is monitored to confirm that the applicable equivalent rating level still applies and is independently verified. Our IAA approach is also audited periodically by Internal Audit and reviewed by the PRA.

There was $0.7bn (2015: $1.0bn) of unrealised losses on Asset-backed securities (‘ABS’) in the year, also disclosed on page 143 of the Annual Report and Accounts 2016, which fully relates to assets within SPEs that are consolidated for regulatory purposes.

Analysis of securitisation exposures

HSBC’s involvement in securitisation activities reflects the following:

- securitisation positions are not backed by revolving exposures other than trade receivables in Regency Assets Limited, which is unchanged from 2015;
- facilities are not subject to early amortisation provisions (2015: nil);
- $4.7bn positions held as synthetic transactions (2015: $4.7bn);
- no assets awaiting securitisation (2015: nil);
- total exposures include off-balance sheet exposure of $15.1bn (2015: $17.1bn), mainly relating to contingent liquidity lines provided to securitisation vehicles where we act as sponsor, with a small amount from derivative exposures where we are an investor. The off-balance sheet exposures are held in the non-trading book and the exposure types are residential mortgages, commercial mortgages, trade receivables and re-securitisations; and
- no realised losses on securitisation asset disposals in the year (2015: nil).

Further details of our securitisation exposures may be found on page 143 of the Annual Report and Accounts 2016.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 39: Securitisation exposure – movement in the year

	Footnotes	Total at 1 Jan $bn	Movement in year As originator $bn	As sponsor $bn	As investor $bn	Total at 31 Dec $bn
Aggregate amount of securitisation exposures						
Residential mortgages	1	3.2	–	–	(0.1)	3.1
Commercial mortgages	1	3.8	–	–	(0.2)	3.6
Leasing		0.1	–	–	(0.1)	—
Loans to corporates or SMEs		6.2	–	–	(1.3)	4.9
Consumer loans		0.5	–	–	0.6	1.1
Trade receivables	2	20.4	–	(3.0)	(0.1)	17.3
Other assets		—	–	–	0.8	0.8
Re-securitisations	1	10.2	(0.4)	(2.5)	(0.4)	6.9
2016		44.4	(0.4)	(5.5)	(0.8)	37.7
Aggregate amount of securitisation exposures						
Residential mortgages	1	4.2	—	—	(1.0)	3.2
Commercial mortgages	1	4.2	—	—	(0.4)	3.8
Leasing		0.1	—	—	—	0.1
Loans to corporates or SMEs		1.1	4.7	—	0.4	6.2
Consumer loans		0.3	—	—	0.2	0.5
Trade receivables	2	15.9	—	4.5	—	20.4
Re-securitisations	1	15.8	(0.4)	(4.6)	(0.6)	10.2
2015		41.6	4.3	(0.1)	(1.4)	44.4

1 Residential and Commercial mortgages and re-securitisations principally include exposures to Solitaire Funding Limited, Mazarin Funding Limited, Barion Funding Limited and Malachite Funding Limited and restructured on-balance sheet assets. The pools primarily comprise the senior tranches of retail mortgage backed securities, commercial mortgage backed securities, auto ABS, credit card ABS, student loans, collateralised debt obligations and also include bank subordinated debt.

2 Trade receivables largely relate to Regency Assets Limited and pools are senior with a maturity of less than 10 years.

Table 40: Securitisation – asset values and impairments

		2016			2015		
		Underlying assets[1]		Securitisation exposures impairment	Underlying assets[1]		Securitisation exposures impairment
	Footnotes	Total[3] $bn	Impaired and past due $bn	$bn	Total $bn	Impaired and past due $bn	$bn
As originator		6.3	1.2	0.4	6.7	1.6	0.5
– residential mortgages		–	–	–	0.1	—	—
– loans to corporates and SMEs		5.0	–	–	5.0	—	—
– re-securitisations	2	1.3	1.2	0.4	1.6	1.6	0.5
As sponsor		22.1	0.1	0.1	30.8	0.1	0.1
– commercial mortgages		—	–	–	2.2	—	—
– trade receivables		16.5	–	–	18.7	—	—
– re-securitisations	2	5.6	0.1	0.1	9.9	0.1	0.1
At 31 Dec				0.5			0.6

1 Securitisation exposures may exceed the underlying asset values when HSBC provides liquidity facilities while also acting as derivative counterparty and a note holder in the SPE.

2 The amount of underlying assets reported for re-securitisations denotes the value of collateral within the re-securitisation vehicles.

3 As originator and sponsor, all associated underlying assets are held in the non-trading book. These assets are all underlying to traditional securitisations with the exception of ‘loans to corporates and SMEs’, which is underlying to a synthetic securitisation.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Market risk

Overview of market risk in global businesses

Market risk is the risk that movements in market factors, such as foreign exchange rates, interest rates, credit spreads, equity prices and commodity prices, will reduce our income or the value of our portfolios.

Exposure to market risk

Exposure to market risk is separated into two portfolios:

- Trading portfolios comprise positions arising from market-making.
- Non-trading portfolios comprise positions that primarily arise from the interest rate management of our retail and commercial banking assets and liabilities, financial investments designated as available-for-sale ('AFS') and held to maturity, and exposures arising from our insurance operations.

Where appropriate, we apply similar risk management policies and measurement techniques to both trading and non-trading portfolios. Our objective is to manage and control market risk exposures in order to optimise return on risk while maintaining a market profile consistent within our established risk appetite.

The nature of the hedging and risk mitigation strategies performed across the Group corresponds to the market risk management instruments available within each operating jurisdiction. These strategies range from the use of traditional market instruments, such as interest rate swaps, to more sophisticated hedging strategies to address a combination of risk factors arising at portfolio level. For a discussion on hedging risk and monitoring the continuing effectiveness of hedges, refer to page 233 of the Annual Report and Accounts 2016.

The table below reflects the components of capital requirement under the standardised approach for market risk.

Table 41: Market risk under standardised approach

		a
		RWA
		$bn
	Outright products	
1	– interest rate risk (general and specific)	1.5
2	– equity risk (general and specific)	1.7
3	– foreign exchange risk	0.3
4	– commodity risk	—
	Options	
5	– simplified approach	—
6	– delta-plus method	—
7	– scenario approach	—
8	Securitisation	1.5
9	Total	5.0

Market risk governance

GB&M manages market risk, where majority of the total VaR of HSBC (excluding insurance) and almost all trading VaR resides, using risk limits approved by the Group Management Board ('GMB'). For a discussion on market risk governance refer to page 110 of the Annual Report and Accounts 2016.

Market risk measures

Monitoring and limiting market risk exposures

Our objective is to manage and control market risk exposures while maintaining a market profile consistent with our risk appetite.

We use a range of tools to monitor and limit market risk exposures including sensitivity analysis, VaR and stress testing.

Sensitivity analysis

We use sensitivity measures to monitor the market risk positions within each risk type. Sensitivity limits are set for portfolios, products and risk types, with the depth of the market being one of the principal factors in determining the level of limits set.

Value at risk

VaR is a technique that estimates the potential losses on risk positions in the trading portfolio as a result of movements in market rates and prices over a specified time horizon and to a given level of confidence. The use of VaR is integrated into market risk management and is calculated for all trading positions regardless of how we capitalise those exposures.

Where there is not an approved internal model, we use the appropriate local rules to capitalise exposures locally. In addition, we calculate VaR for non-trading portfolios to have a complete picture of risk. Our models are predominantly based on historical simulation. VaR is calculated at a 99% confidence level for a one-day holding period. Where we do not calculate VaR explicitly, we use alternative tools as described in the stress testing section below.

Our VaR models derive plausible future scenarios from past series of recorded market rates and prices, taking into account inter-relationships between different markets and rates such as interest rates and foreign exchange rates. Our models use a mixed approach when applying changes in market rates and prices:

- Equity, credit and FX risk factors the potential movements are typically represented on a relative return basis.
- Interest rates, a mixed approach is used. Curve movements are typically absolute whereas volatilities are on a relative return basis.

We use the past two years as the data set in our VaR models, which is updated on a fortnightly basis, and these scenarios are then applied to the market baselines and trading positions on a daily basis. The models also incorporate the effect of option features on the underlying exposures.

The valuation approach used in our models include:

- non-linear instruments are valued using a full revaluation approach; and
- linear instruments, such as bonds and swap, are valued using a sensitivity based approach.

The nature of the VaR models means that an increase in observed market volatility will lead to an increase in VaR even without any changes in the underlying positions.

VaR model limitations

Although a valuable guide to risk, VaR should always be viewed in the context of its limitations, for example:

- the use of historical data as a proxy for estimating future events may not encompass all potential events, particularly those which are extreme in nature;
- the use of a holding period assumes that all positions can be liquidated or the risks offset during that period. This may not fully reflect the market risk arising at times of severe illiquidity, when the holding period may be insufficient to liquidate or hedge all positions fully;
- the use of a 99% confidence level by definition does not take into account losses that might occur beyond this level of confidence; and
- VaR is calculated on the basis of exposures outstanding at close of business and therefore does not necessarily reflect intra-day exposures.

Risk not in VaR framework

The Risks not in VaR ('RNIV') framework captures risks from exposures in the HSBC trading book which are not captured well by the VaR model. Our VaR model is designed to capture significant basis risk such as CDS versus bond, asset swap spreads and cross-currency basis. Other basis risks which are not completely covered in VaR, such as the London interbank offered rate ('Libor') tenor basis, are complemented by our RNIV calculations and are integrated into our capital framework.

Risk factors are reviewed on a regular basis and either incorporated directly in the VaR models, where possible, or quantified through the VaR-based RNIV approach or a stress test approach within the RNIV framework. The severity of the scenarios is calibrated to be in line with the capital adequacy requirements. The outcome of the VaR-based RNIV is included in the VaR calculation and back-testing; a stressed VaR RNIV is also computed for the risk factors considered in the VaR-based RNIV approach.

Stress-type RNIVs include a gap risk exposure measure to capture risk on non-recourse margin loans and a de-peg risk measure to capture risk to pegged and heavily managed currencies.

Back-testing

We routinely validate the accuracy of our VaR models by back-testing them against both actual and hypothetical profit and loss against the corresponding VaR numbers. Hypothetical profit and loss excludes non-modelled items such as fees, commissions and revenues of intra-day transactions.

The actual number of profits or losses in excess of VaR over this period can therefore be used to gauge how well the models are performing.

We back-test VaR at various levels which reflect a full legal entity scope of HSBC, including entities that do not have local permission to use VaR for regulatory purposes. Back-testing using the regulatory hierarchy includes entities which have approval to use VaR in the calculation of market risk regulatory capital requirement.

HSBC submits separate back-testing results to regulators, including the PRA and the European Central Bank, based on applicable frequencies ranging from two business days after an exception occurs, to quarterly submissions.

In terms of the CRD IV rules, VaR back-testing loss, and not profit, exceptions count towards the multiplier determined by the PRA the purposes of the capital requirement calculation for market risk. The multiplier capital add-on does not get increased if there are less than five loss exceptions.

Refer to the table MR4 below for a one-year history for VaR back-testing exceptions against both actual and hypothetical profit and loss.

In 2016, the PRA VaR approved entities experienced three profit exceptions against actual profit and loss: the June exceptions, driven by significant devaluations in sterling and the euro against the US dollar resulting from the UK's referendum on EU membership and the October exception, driven by certain cross- currency pair spread tightening on a long position and the sterling depreciating on short positions.

In 2016, the PRA VaR approved entities experienced two backtesting exceptions against hypothetical profit and loss: a loss exception in February, driven by Libor against overnight index spread widening on long positions; and a profit exception in June, based on the same driver described above in exceptions against actual profit and loss.

There was no evidence of model errors or control failures.
The back-testing result excludes exceptions due from changes in fair value adjustments.

Chart: MR4: Comparison of VaR estimates with gains/losses
VaR back-testing exceptions against actual profit & loss

Actual profit and loss VaR w Back-testing profit exception

VaR back-testing exceptions against hypothetical profit & loss

Hypothetical profit and loss VaR w Back-testing profit exception

Stress testing

Stress testing is an important procedure that is integrated into our market risk management framework to evaluate the potential impact on portfolio values of more extreme, although plausible, events or movements in a set of financial variables. In such scenarios, losses can be greater than those predicted by VaR modelling.

Stress testing is implemented at legal entity, regional and overall Group levels. A set of scenarios is used consistently across all regions within the Group. Scenarios are tailored to capture the relevant events or market movements at each level. The risk appetite around potential stress losses for the Group is set and monitored against referral limits.

Market risk reverse stress tests are undertaken on the premise that there is a fixed loss. The stress testing process identifies which scenarios lead to this loss. The rationale behind the reverse stress test is to understand scenarios that are beyond normal business settings and could have contagion and systemic implications.

Stressed VaR and stress testing, together with reverse stress testing and the management of gap risk, provide management with insights regarding the ‘tail risk’ beyond VaR, for which HSBC’s appetite is limited.

The Market risk stress testing incorporates the historical and hypothetical events. During 2016 we devised and ran stress hypothetical scenarios to specific events including the UK’s European Union Referendum and the US elections.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Market risk capital models

There are a number of measures which HSBC has permission to use in calculating regulatory capital which are listed in table 42. For regulatory purposes, the trading book comprises all positions in CRD financial instruments and commodities which are held with trading intent, which are taken with the intention of benefiting from short-term gains or positions where it can be demonstrated that they hedge positions in the trading book. Trading book positions must either be free of any restrictive covenants on their tradability or be capable of being hedged.

A CRD financial instrument is defined as any contract that gives rise to both a financial asset to one party and a financial liability or equity instrument to another party.

HSBC maintains a trading book policy which defines the minimum requirements for trading book positions and the process for classifying positions as trading or non-trading book. Positions in the trading book are subject to market risk-based rules, i.e. market risk capital, computed using regulatory approved models. Otherwise, the market risk capital is calculated using the Standardised approach.

If any of the policy criteria are not met, then the position is categorised as a non-trading book exposure.

Table 42: Market risk models[1]

Model component	Confidence level	Liquidity horizon	Model description and methodology
VaR	99%	10 day	Uses most recent two years' history of daily returns to determine a loss distribution. The result is scaled, using the square root of 10, from one day to provide an equivalent 10-day loss.
Stressed VaR	99%	10 day	Stressed VaR is calibrated to a one-year period of stress observed in history.
IRC	99.9%	1 year	Uses a multi-factor Gaussian Monte-Carlo simulation, which includes product basis, concentration, hedge mismatch, recovery rate and liquidity as part of the simulation process. A minimum liquidity horizon of three months is applied and is based on a combination of factors, including issuer type, currency and size of exposure.
Options	n/a	n/a	Uses a standard charge scenario approach based on a spot volatility grid where, for each point on the grid, there is a full revaluation of the portfolio. The regulators prescribe the ranges therefore there is no equivalence with confidence level and liquidity horizon.

1 Non-proprietary details are available in the Financial Services Register on the PRA website.

Table 43: IMA values for trading portfolios

		$m
VaR (10 day 99%)		
1	Maximum value	327.1
2	Average value	229.6
3	Minimum value	186.4
4	Period end	215.7
Stressed VaR (10 day 99%)		
5	Maximum value	454.0
6	Average value	389.9
7	Minimum value	269.7
8	Period end	269.7
Incremental Risk Charge (99.9%)		
9	Maximum value	1,100.7

10	Average value	787.0
11	Minimum value	697.3
12	Period end	705.6

VaR

VaR used for regulatory purposes differs from VaR used for management purpose with key differences listed below.

VaR	Regulatory	Management
Scope	Regulatory approval (PRA)	Broader population of trading and non-trading book positions
Confidence interval	99 %	99 %
Liquidity horizon	10 day	1 day
Data set	Past 2 years	Past 2 years

The trading books which received approval from the regulator to be covered via an internal model are used to calculate VaR for regulatory purposes. Regulatory VaR levels contribute to the calculation of market risk RWAs. The regulatory VaR table is based on the regulatory permissions received, plus aggregated sites. This differs from the daily VaR reported in the Annual Report and Accounts which shows a fully diversified view used for internal risk management.

Stressed VaR

Stressed VaR is primarily used for regulatory capital purposes and is integrated into the risk management process to ensure prudent capital management. Stressed VaR complements other risk measures by providing the potential losses under stressed market conditions.

Stressed VaR modelling follows the same approach as our VaR risk measure except for the following:

- potential market movements employed for stressed VaR calculations are based on a continuous one-year period of stress for the trading portfolio;
- the choice of period changed from (January 2008 to December 2008) to (April 2008 to March 2009) in the second quarter of 2016 and is based on the assessment at the Group level of the most volatile period in recent history;
- it is calculated to a 99% confidence using a 10-day holding period; and
- it based on an actual 10-day holding period whereas Regulatory VaR is based on a one-day holding period scaled to 10 days.

Incremental Risk Charge

The IRC measures the default and migration risk of issuers of traded instruments.

IRC risk factors include credit migration, default, product basis, concentration, hedge mismatch, recovery rate and liquidity. The PDs are floored to reflect the lack of historical data on defaults and a period of stress is used to calibrate the spread changes for the relevant ratings. The IRC model is validated quarterly by stressing key model parameters and reviewing the response of the model.

The IRC is a stand-alone charge generating no diversification benefit with other charges. We do not use weighted averages for calculating the liquidity horizon for the IRC measure. IRC relies on a range of liquidity horizons from three months, corresponding to the regulatory floor, to one year. A wide range of criteria can indicate the liquidity of a position. The liquidity horizon for the IRC measure depends on a set of factors such as issuer features, including rating, sector, geography and size of positions, including product, maturity and concentration.

The IRC transition matrices are calibrated using transition and default data published by three rating agencies (Standard & Poor's, Moody's and Fitch Ratings) as the starting point, in combination with internal rules for flooring. The average of the three matrices is computed for each sector, ignoring zero transition probabilities. The PDs are then floored: sovereign PDs are consistent with IRB, while a 3bp floor is applied to corporates' and banks' PDs.

The IRC correlation matrix is derived from historical CDS spreads data, covering the latest two-year VaR period. The returns estimation window is set equal to either three, or 12 months, depending on the liquidity horizon of each obligor. First, each obligor is mapped to six sector/rating categories; then the correlation matrix is obtained by computing the arithmetic mean of correlations for each category.

Prudent valuation adjustment

HSBC has documented policies and maintains systems and controls for the calculation of Prudent Valuation Adjustment ('PVA'). Prudent value is an estimated conservative price with a 90% degree of certainty that would be received to sell an asset or paid to transfer a liability in orderly transactions occurring between market participants at the balance sheet date. HSBC's methodology addresses fair value uncertainties arising from a number of sources; market price uncertainty, bid offer ('close out') uncertainty, model risk, concentration, administrative cost, CVA ('unearned credit spread') and FFVA.

Structural foreign exchange exposures

Structural foreign exchange exposures represent net investments in subsidiaries, branches and associates, the functional currencies of which are currencies other than the US dollar. An entity's functional currency is that of the primary economic environment in which the entity operates.

Exchange differences on structural exposures are recognised in 'Other comprehensive income'. We use the US dollar as our presentation currency in our consolidated financial statements because the US dollar and currencies linked to it form the major currency bloc in which we transact and fund our business. Our consolidated balance sheet is, therefore, affected by exchange differences between the US dollar and all the non-US dollar functional currencies of underlying subsidiaries.

We hedge structural foreign exchange exposures only in limited circumstances. Our structural foreign exchange exposures are managed with the primary objective of ensuring, where practical, that our consolidated capital ratios and the capital ratios of individual banking subsidiaries are largely protected from the effect of changes in exchange rates.

Details of our structural foreign exchange exposures are provided in the Market risk section, on page 154 of the Annual Report and Accounts 2016.

Interest rate risk in the banking book

Interest rate risk in the banking book arises principally from mismatches between the future yield on assets and their funding cost, as a result of interest rate changes. Analysis of this risk is complicated by having to make assumptions on embedded optionality within certain product areas such as the incidence of mortgage prepayments, and from behavioural assumptions regarding the economic duration of liabilities which are contractually repayable on demand such as current accounts, and the repricing behaviour of managed rate products. These assumptions around behavioural features are captured in our interest rate risk behaviouralisation framework, which is described below.

We aim, through our management of interest rate risk in the banking book, to mitigate the effect of prospective interest rate movements which could reduce future net interest income, while balancing the cost of such hedging activities on the current net revenue stream.

Our funds transfer pricing policies give rise to a two-stage funds transfer pricing approach. For details, see page 109 of the Annual Report and Accounts 2016.

The economic capital requirement for interest rate risk in the banking book is measured using a two-step approach. For details, see page 112 of the Annual Report and Accounts 2016.

Asset, Liability and Capital Management ('ALCM') is responsible for measuring and controlling interest rate risk in the banking book under the supervision of the RMM. Its primary responsibilities are:

- to define the rules governing the transfer of interest rate risk from the commercial bank to Balance Sheet Management('BSM');
- to ensure that all market interest rate risk that can be hedged is effectively transferred from the global businesses to BSM; and
- to define the rules and metrics for monitoring the residual interest rate risk in the global businesses.

The different types of interest rate risk in the banking book and the controls which the Group uses to quantify and limit its exposure to these risks can be categorised as follows:

- risk that is transferred to BSM and managed by BSM within a defined risk mandate;
- risk that remains outside BSM because it cannot be hedged or which arises due to our behaviouralised transfer pricing assumptions. This risk will be captured by our net interest income economic value of equity ('EVE') sensitivity, and corresponding limits are part of our global and regional risk appetite statement for non-trading interest rate risk. A typical example would be margin compression created by unusually low rates in key currencies;
- basis risk that is transferred to BSM when it can be hedged. Any residual basis risk remaining in the global businesses is reported to Asset and Liability Management Committee ('ALCO'). A typical example would be a managed rate savings product transfer-priced using a Libor-based interest rate curve; and
- model risks that cannot be captured by net interest income or EVE sensitivity but are controlled by our stress testing framework. A typical example would be prepayment risk on residential mortgages or pipeline risk.

Details of the Group's monitoring of the sensitivity of projected net interest income under varying interest rate scenarios may be found on page 113 of the Annual Report and Accounts 2016.

Interest rate risk behaviouralisation

Unlike liquidity risk, which is assessed on the basis of a very severe stress scenario, interest rate risk in the banking book is assessed and managed according to 'business-as-usual' conditions. In many cases, the contractual profile of non-trading assets/liabilities arising from assets/liabilities created outside Markets or BSM does not reflect the behaviour observed.

Behaviouralisation is therefore used to assess the market interest rate risk of assets/liabilities in the banking book and this assessed market risk is transferred to BSM, in accordance with the rules governing the transfer of interest rate risk from the global businesses to BSM.

Behaviouralisation is applied in three key areas:

- the assessed repricing frequency of managed rate balances;
- the assessed duration of non-interest bearing balances, typically capital and current accounts; and
- the base case expected prepayment behaviour or pipeline take-up rate for fixed rate balances with embedded optionality.

Interest rate behaviouralisation policies have to be formulated in line with the Group's behaviouralisation policies and approved at least annually by local ALCOs, regional ALCM teams and Group ALCM, in conjunction with local, regional and Group market risk monitoring teams.

The extent to which balances can be behaviouralised is driven by:

- the amount of the current balance that can be assessed as 'stable' under business-as-usual conditions; and
- for managed rate balances the historic market interest rate repricing behaviour observed; or for non-interest bearing balances the duration for which the balance is expected to remain under business-as-usual conditions. This assessment is often driven by the re-investment tenors available to BSM to neutralise the risk through the use of fixed rate government bonds or interest rate derivatives, and for derivatives the availability of cash flow hedging capacity.

Balance Sheet Management

Effective governance across BSM is supported by the dual reporting lines it has to the Chief Executive Officer of GB&M and to the Group Treasurer. In each operating entity, BSM is responsible for managing liquidity and funding under the supervision of the local ALCO (which usually meets on a monthly basis). It also manages the banking book interest rate positions transferred to it within a Markets limit structure.

In executing the management of the liquidity risk on behalf of ALCO, and managing the interest rate risk in the banking book positions transferred to it, BSM invests in highly rated liquid assets in line with the Group's liquid asset policy. The majority of the liquidity is invested in central bank deposits and government, supranational and agency securities with most of the remainder held in short-term interbank and central bank loans.

Withdrawable central bank deposits are accounted for as cash balances. Interbank loans, statutory central bank reserves and loans to central banks are accounted for as loans and advances to banks. BSM's holdings of securities are accounted for as AFS or, to a lesser extent, held-to-maturity assets.

Statutory central bank reserves are not recognised as liquid assets. The statutory reserves that would be released in line with the Group's stressed customer deposit outflow assumptions are reflected as stressed inflows.

BSM is permitted to use derivatives as part of its mandate to manage interest rate risk. Derivative activity is predominantly through the use of vanilla interest rate swaps which are part of cash flow hedging and fair value hedging relationships.

Credit risk in BSM is predominantly limited to short-term bank exposure created by interbank lending, exposure to central banks and high-quality sovereigns, supranationals or agencies which constitute the majority of BSM's liquidity portfolio. BSM does not manage the structural credit risk of any Group entity balance sheets.

BSM is permitted to enter into single name and index credit derivatives activity, but it does so to manage credit risk on the exposure specific to its securities portfolio in limited circumstances only. The risk limits are extremely limited and closely monitored. At 31 December 2016, BSM had no open credit derivative index risk.

VaR is calculated on both trading and non-trading positions held in BSM. It is calculated by applying the same methodology used for the Markets business and utilised as a tool for market risk control purposes.

BSM holds trading portfolio instruments in only very limited circumstances. These positions and the associated VaR were not significant during 2016.

Net interest income sensitivity

A principal part of our management of market risk in non-trading portfolios is to monitor the sensitivity of projected net interest income under varying interest rate scenarios (simulation modelling). This monitoring is undertaken at an entity level by local ALCOs.

Entities apply a combination of scenarios and assumptions relevant to their local businesses, and standard scenarios which are required throughout HSBC. The latter are consolidated to illustrate the combined pro forma effect on our consolidated net interest income.

Projected net interest income sensitivity figures represent the effect of the pro forma movements in net interest income based on the projected yield curve scenarios and the Group's current interest rate risk profile. This effect, however, does not incorporate actions which would probably be taken by BSM or in the business units to mitigate the effect of interest rate risk. In reality, BSM seeks proactively to change the interest rate risk profile to minimise losses and optimise net revenues. The net interest income sensitivity calculations assume that interest rates of all maturities move by the same amount in the 'up-shock' scenario. Rates are not assumed to become negative in the 'down-shock' scenario which may, in certain currencies, effectively result in non-parallel shock. In addition, the net interest income sensitivity calculations take account of the effect on net interest income of anticipated differences in changes between interbank interest rates and interest rates over which the entity has discretion in terms of the timing and extent of rate changes.

Operational risk

Overview and objectives

Operational risk is the risk to achieving our strategy or objectives as a result of inadequate or failed internal processes, people and systems or from external events.

Operational risk is relevant to every aspect of our business. It covers a wide spectrum of issues, in particular legal, compliance, security and fraud. Losses arising from breaches of regulation and law, unauthorised activities, error, omission,

inefficiency, fraud, systems failure or external events all fall within the definition of operational risk.

We have historically experienced operational risk losses in the following major categories:

- possible mis-selling of products;
- fraudulent and other external criminal activities;
- breakdowns in processes/procedures due to human error, misjudgement or malice;
- system failure or non-availability; and
- breach of regulatory and/or legislative requirements.

Table 44: Operational risk RWAs

		2016		2015	
		Capital required	RWAs	Capital required	RWAs
	Footnote	$bn	$bn	$bn	$bn
By global business					
Retail Banking and Wealth Management	1	2.4	30.5	2.5	31.0
Commercial Banking	1	2.0	25.3	1.9	24.0
Global Banking and Markets		2.6	32.0	2.8	35.8
Global Private Banking		0.2	2.9	0.3	3.3
Corporate Centre		0.6	7.3	1.7	21.3
At 31 Dec		7.8	98.0	9.2	115.4
By geographical region					
Europe		2.5	30.9	2.8	34.9
Asia		2.9	36.6	3.8	47.1
Middle East and North Africa		0.6	7.5	0.5	6.2
North America		1.0	12.8	1.1	14.1
Latin America		0.8	10.2	1.0	13.1
At 31 Dec		7.8	98.0	9.2	115.4

1 In the first half of 2015, a portfolio of customers was transferred from CMB to RBWM in Latin America in order to better align the combined banking needs of the customers with our established global businesses. Comparative data have been re-presented accordingly.

Requirements under CRD IV include a capital requirement for operational risk, utilising three levels of sophistication as stated on page 17. We have historically adopted, and currently use, the standardised approach in determining our operational risk capital requirements. Table 44 sets out our operational risk capital requirements by region and global businesses. We use an operational risk model for economic capital calculation purposes.

During 2016, our operational risk profile continued to be dominated by compliance risks as referred to in the ‘Top and emerging risks’ section on page 89 and in the ‘Regulatory compliance risk management’ section on page 114 of the Annual Report and Accounts 2016. Operational risk losses in 2016 are lower than in 2015, reflecting a reduction in losses incurred relating to large legacy conduct-related events. Conduct-related costs included in significant items are

outlined on page 61.

The regulatory environment in which we operate is increasing the cost of doing business and could reduce our future profitability. The implementation of Global Standards remains one of the key strategic priorities for the Group and is ongoing.

We recognise that operational risk losses can be incurred for a wide variety of reasons, including rare but extreme events.

The objective of our operational risk management is to manage and control operational risk in a cost-effective manner and within our risk appetite, as defined by GMB.

Organisation and responsibilities

Responsibility for managing operational risk lies with HSBC's staff.

HSBC's Operational Risk Management Framework ('ORMF') is our overarching approach to managing operational risk, the purpose of which is to:

- identify and manage our operational risks in an effective manner;
- remain within the Group's operational risk appetite, which helps the organisation understand the level of risk it is willing to accept; and
- drive forward-looking risk awareness and assist management focus during 2016.

Activity to strengthen our risk culture and better embed the use of the ORMF was further implemented in 2016. In particular, the use of the three lines of defence model.

The First Line of Defence owns the risk and is responsible for identifying, recording, reporting, managing the risks and ensuring that the right controls and assessments are in place to mitigate these risks. The Second Line of Defence sets the policy and guidelines for managing the risks and provides advice, guidance and challenge to the First Line of Defence on effective risk management. The Third Line of Defence is Internal Audit which independently ensures we are managing risk effectively.

More details on our ORMF may be found on page 114 of the Annual Report and Accounts 2016.

The Global Operational Risk Committee, which reports to RMM, meets monthly to discuss key risk issues and review the effective implementation of the ORMF.

Operational risk is organised as a specific risk discipline within Global Risk. The Group Head of Operational Risk is responsible for establishing and maintaining the ORMF, monitoring the level of operational losses and the effectiveness of the internal control environment supported by their Second Line of Defence functions. The Group Head of Operational Risk is accountable to the Group Chief Risk Officer in respect of this element of the overall Enterprise Wide Risk Management framework.

Measurement and monitoring

We have codified our ORMF in a high level standard, supplemented by detailed policies. These policies explain our approach to identifying, assessing, monitoring and controlling operational risk, and give guidance on mitigating actions to be taken when weaknesses are identified.

In 2016, we continued to enhance our ORMF policies and procedures, and further embedded the use of the framework in the management of the business.

Articulation of risk appetite for material operational risks helps the business to understand the level of risk our organisation is willing to take. Monitoring operational risk exposure against risk appetite on a regular basis, and setting out our risk acceptance process, drives risk awareness in a more forward-looking manner. It assists management in determining whether further action is required.

Risk Scenario Analysis across material legal entities provides a top down, forward-looking assessment of risks to help determine whether they are being effectively managed within our risk appetite or whether further management action is required.

In each of our subsidiaries, business managers are responsible for maintaining an appropriate level of internal control, commensurate with the scale and nature of operations. They are responsible for identifying and assessing risks, designing controls and monitoring the effectiveness of these controls. The ORMF helps managers to fulfil these responsibilities by defining a standard risk assessment methodology and providing a tool for the systematic reporting of operational loss data.

Operational risk and control assessment approach

Operational risk and control assessments are performed by individual business units and functions. The risk and control assessment process is designed to provide business areas and functions with a forward-looking view of operational risks, an assessment of the effectiveness of controls, and a tracking mechanism for action plans so that they can proactively manage operational risks within acceptable levels.

Appropriate means of mitigation and controls are considered. These include:

- making specific changes to strengthen the internal control environment; and
- investigating whether cost-effective insurance cover is available to mitigate the risk.

Recording

We use a centralised database to record the results of our operational risk management process. Operational risk and control assessments, as described above, are input and maintained by business units. Business management and Business Risk and Control Managers monitor and follow up the progress of documented action plans.

Operational risk loss reporting

To ensure that operational risk losses are consistently reported and monitored at Group level, all Group companies are required to report individual losses when the net loss is expected to exceed $10,000 and to aggregate all other operational risk losses under $10,000. Losses are entered into the Operational Risk IT system and are reported to Governance on a monthly basis.

Other risks

Pension risk

We operate a number of pension plans throughout the world for our employees. Our plans are either defined benefit or defined contribution plans, which expose the Group to different types of risks. We have a global pension risk management framework and accompanying global policies on the management of these risks, which is overseen by

the Global Pensions Oversight Committee.

Details of our management of pension risk may be found in ‘Pension risk management’ on page 117 of the Annual Report and Accounts 2016.

Non-trading book exposures in equities

At 31 December 2016, we had equity investments in the non-trading book of $4.9bn (2015: $6.1bn). These consist of investments held for the purposes shown in table 45.

Table 45: Non-trading book equity investments

		2016			2015		
		Available for sale	Designated at fair value	Total	Available for sale	Designated at fair value	Total
	Footnote	$bn	$bn	$bn	$bn	$bn	$bn
Strategic investments		2.0	–	2.0	2.1	0.1	2.2
Private equity investments		1.2	0.2	1.4	1.9	0.1	2.0
Business facilitation	1	1.5	–	1.5	1.9	—	1.9
At 31 Dec		4.7	0.2	4.9	5.9	0.2	6.1

1 Includes holdings in government-sponsored enterprises and local stock exchanges.

We make investments in private equity primarily through managed funds that are subject to limits on the amount of investment. We risk-assess these commitments to ensure that industry and geographical concentrations remain within acceptable levels for the portfolio as a whole, and perform regular reviews to substantiate the valuation of the investments within the portfolio.

Exchange traded investments amounted to $0.9bn (2015: $0.8bn), with the remainder being unlisted. These investments are held at fair value in line with market prices and are mainly strategic in nature.

On a regulatory consolidation basis, the net gain from disposal of equity securities amounted to $1.1bn (2015: $1.8bn), while impairment of AFS equities amounted to $0.0bn (2015: $0.1bn). Unrealised gains on equities of $1.1bn at 31 December 2016 were fully recognised in CET1.

Details of our accounting policy for AFS equity investments and the valuation of financial instruments may be found on page 232 of the Annual Report and Accounts 2016. A detailed description of the valuation techniques applied to private equity may be found on page 252 of the Annual Report and Accounts 2016.

Risk management of insurance operations

We operate an integrated bancassurance model that provides insurance products principally for customers with whom we have a banking relationship.

The insurance contracts we sell relate to the underlying needs of our banking customers, which we can identify from our point-of-sale contacts and customer knowledge. The majority of sales are of savings and investment products and term and credit life contracts.

By focusing largely on personal and SME lines of business, we are able to optimise volumes and diversify individual insurance risks.

We choose to manufacture these insurance products in HSBC subsidiaries based on an assessment of operational scale and risk appetite. Manufacturing insurance allows us to retain the risks and rewards associated with writing insurance contracts by keeping part of the underwriting profit and investment income within the Group.

We have life insurance manufacturing subsidiaries in nine countries (Argentina, mainland China, France, Hong Kong, Malaysia, Malta, Mexico, Singapore and the UK). We also have life insurance manufacturing associates in Saudi Arabia and India.

Where we do not have the risk appetite or operational scale to be an effective insurance manufacturer, we engage with a handful of leading external insurance companies in order to provide insurance products to our customers through our banking network and direct channels. These arrangements are generally structured with our exclusive strategic partners and earn the Group a combination of commissions, fees and a share of profits. We distribute insurance products in all of our geographical regions.

Insurance products are sold through all global businesses, but predominantly by RBWM and CMB through our branches and direct channels worldwide.

The risk profile of our insurance manufacturing businesses is measured using an economic capital approach. Assets and liabilities are measured on a market value basis, and a capital requirement is defined to ensure that there is a less than one in 200 chance of insolvency over a one-year time horizon, given the risks that the businesses are exposed to. The methodology for the economic capital calculation is largely aligned to the pan-European Solvency II insurance capital regulations, which were applicable from 2016.

Subsidiaries engaged in insurance activities are excluded from the regulatory consolidation by excluding assets, liabilities and post-acquisition reserves, leaving the investment of these insurance subsidiaries to be recorded at cost and deducted from CET1 subject to thresholds (amounts below the thresholds are risk-weighted).

Further details of the management of financial risks and insurance risk arising from the insurance operations are provided from page 115 of the Annual Report and Accounts 2016.

Liquidity and funding risk

Liquidity risk is the risk that the Group does not have sufficient financial resources to meet its obligations as they fall due, or will have to do so at an excessive cost. The risk arises from mismatches in the timing of cash flows. Funding

risk is the risk that funding considered to be sustainable, and therefore used to fund assets, is not sustainable over time. The risk arises when the funding needed for illiquid asset positions cannot be obtained at the expected terms and when required.

The objective of our liquidity framework is to allow us to withstand very severe stresses. It is designed to be adaptable to changing business models, markets and regulations.

We do not manage liquidity through the explicit allocation of capital as, in common with standard industry practice, this is not considered to be an appropriate or adequate mechanism for managing these risks. However, we recognise that a strong capital base can help to mitigate liquidity risk and we ensure that sufficient liquidity is held via the liquidity add-on process. Liquidity add-ons are required where an operating entity has identified a risk that is either not covered by the Group's internal liquidity and funding risk management framework as a result of the review of risk completeness or not covered sufficiently by the Group's internal liquidity and funding risk management framework ('LFRF') as a result of stress testing.

Our primary sources of funding are customer current accounts and customer savings deposits payable on demand or at short notice. We issue wholesale securities (secured and unsecured) to supplement our customer deposits and change the currency mix, maturity profile or location of our liabilities. In the normal course of business, we do not seek to utilise secured financing as a source of funding to finance customer assets, beyond the collateralised security financing activities within Global Markets.

Management of liquidity and funding risk

On 1 January 2016, the Group implemented a new liquidity and funding risk management framework. It uses the liquidity coverage ratio ('LCR') and net stable funding ratio ('NSFR') regulatory framework as a foundation, but adds extra metrics, limits and overlays to address firm-specific risks.

The LFRF is delivered using the following key aspects:

- stand-alone management of liquidity and funding by operating entity;
- operating entity classification by inherent liquidity risk ('ILR') categorisation;
- minimum LCR requirement depending on ILR categorisation;
- minimum NSFR requirement depending on ILR categorisation;
- legal entity depositor concentration limit;
- three-month and 12-month cumulative rolling term contractual maturity limits covering deposits from banks, deposits from non-bank financials and securities issued;
- annual individual liquidity adequacy assessment ('ILAA') by operating entity;
- minimum LCR requirement by currency;
- intra-day liquidity; and
- forward-looking funding assessments.

The new internal LFRF and the risk tolerance limits were approved by the RMM and the Board on the basis of recommendations made by the GRC.

Our ILAA process aims to:

- identify risks that are not reflected in the LFRF and, where appropriate, to assess additional limits to be required locally; and
- validate the risk tolerance at the operating entity level by demonstrating that reverse stress testing scenarios are acceptably remote and that vulnerabilities have been assessed through the use of severe stress scenarios.

Details of our Liquidity and Funding Risk parameters are provided from page 108 of the Annual Report and Accounts 2016.

Reputational risk

Reputational risk relates to stakeholders' perceptions, whether fact-based or otherwise. Stakeholders' expectations change constantly and so reputational risk is dynamic and varies between geographical regions, groups and individuals. We have an unwavering commitment to operating at the high standards we set for ourselves in every jurisdiction. Any lapse in standards of integrity, compliance, customer service or operating efficiency represents a potential reputational risk. We have taken, and are taking, measures to address the requirements of the US DPA and enhance our AML, sanctions and other regulatory compliance frameworks. These measures should also enhance our reputational risk management in the future.

For further details on reputational risk management, see page 116 of the Annual Report and Accounts 2016.

Sustainability risk

Sustainability risk arises from the provision of financial services to companies or projects which indirectly result in unacceptable impacts on people or on the environment.

Sustainability risk is:

- measured by assessing the potential sustainability effect of a customer's activities and assigning a Sustainability Risk Rating to all high-risk transactions;
- monitored quarterly by the RMM and monthly by the Group's Sustainability Risk function; and
- managed using sustainability risk policies covering project finance lending and sector-based sustainability policies for sectors and themes with potentially large environmental or social impacts.

Business risk

The PRA specifies that banks, as part of their ICAAP, should review their exposure to business risk.

Business risk is the potential negative effect on profits and capital from the Group not meeting our strategic objectives, as a result of unforeseen changes in the business and regulatory environment, exposure to economic cycles and technological changes.

We manage and mitigate business risk through our risk appetite, business planning and stress testing processes, so that our business model and planned activities are monitored, resourced and capitalised consistent with the commercial, economic and risk environment in which the Group operates, and that any potential vulnerabilities of our business plans are identified at an early stage so that mitigating actions can be taken.

Dilution risk

Dilution risk is the risk that an amount receivable is reduced through cash or non-cash credit to the obligor, and arises mainly from factoring and invoice discounting transactions.

Where there is recourse to the seller, we treat these transactions as loans secured by the collateral of the debts purchased and do not report dilution risk for them. For our non-recourse portfolio, we do not report any dilution risk, as we obtain an indemnity from the seller that indemnifies us against this risk. Moreover, factoring transactions involve lending at a discount to the face-value of the receivables which provides protection against dilution risk.

Details of our management of these risks may be found on the following pages of the Annual Report and Accounts 2016: liquidity and funding 108, reputational 116 and sustainability 117.

Remuneration

Details of the Group's remuneration policy, including details on the remuneration committee membership, activities, our remuneration strategy and tables showing the remuneration details of HSBC's Identified Staff and Material Risk Takers may be found under the Remuneration Policy on our website (www.hsbc.com/investor-relations/governance) and the Directors' Remuneration Report on page 191 of the Annual Report and Accounts 2016.

Appendix I

Additional CRD IV and BCBS tables

Table 46 sets 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, although we also benchmark against other agencies' ratings in an equivalent manner.

Table 46.a: Wholesale IRB exposure – by obligor grade – Central governments and central banks

	CRR	PD range	Average exposure value[1]	Undrawn commitments	Mapped external rating
		%	$bn	$bn	
Default risk					
Minimal	0.1	0.000 to 0.010	159.4	0.8	AAA
	1.1	0.011 to 0.028	106.4	0.4	AA+ to AA
	1.2	0.029 to 0.053	37.1	0.5	AA- to A+
Low	2.1	0.054 to 0.095	12.2	0.1	A
	2.2	0.096 to 0.169	10.3	0.1	A-
Satisfactory	3.1	0.170 to 0.285	3.9	–	BBB+
	3.2	0.286 to 0.483	2.4	–	BBB
	3.3	0.484 to 0.740	6.2	–	BBB-
Fair	4.1	0.741 to 1.022	0.2	–	BB+
	4.2	1.023 to 1.407	1.0	–	BB
	4.3	1.408 to 1.927	1.2	0.1	BB-
Moderate	5.1	1.928 to 2.620	2.5	–	BB-
	5.2	2.621 to 3.579	2.3	–	B+
	5.3	3.580 to 4.914	0.9	–	B
Significant	6.1	4.915 to 6.718	0.1	–	B
	6.2	6.719 to 8.860	0.4	–	B-
High	7.1	8.861 to 11.402	0.2	–	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
Default	9/10	100.000	–	–	Default
At 31 Dec 2016			346.7	2.0	
Default risk					
Minimal	0.1	0.000 to 0.010	131.3	0.6	AAA
	1.1	0.011 to 0.028	86.6	1.0	AA+ to AA
	1.2	0.029 to 0.053	54.0	0.4	AA- to A+
Low	2.1	0.054 to 0.095	25.9	—	A
	2.2	0.096 to 0.169	6.7	—	A-
Satisfactory	3.1	0.170 to 0.285	10.6	—	BBB+

	3.2	0.286 to 0.483	4.6	—	BBB
	3.3	0.484 to 0.740	2.0	—	BBB-
Fair	4.1	0.741 to 1.022	1.0	—	BB+
	4.2	1.023 to 1.407	0.5	—	BB
	4.3	1.408 to 1.927	0.5	—	BB-
Moderate	5.1	1.928 to 2.620	2.9	0.3	BB-
	5.2	2.621 to 3.579	0.5	0.2	B+
	5.3	3.580 to 4.914	3.5	0.1	B
Significant	6.1	4.915 to 6.718	0.4	—	B
	6.2	6.719 to 8.860	0.3	—	B-
High	7.1	8.861 to 11.402	0.6	—	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
Default	9/10	100.000			Default
At 31 Dec 2015			331.9	2.6	

For footnote, see page 68.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 46.b: Wholesale IRB exposure – by obligor grade – Institutions

	CRR	PD range	Average exposure value[1]	Undrawn commitments	Mapped external rating
		%	$bn	$bn	
Default risk					
Minimal	0.1	0.000 to 0.010	2.0	0.1	AAA
	1.1	0.011 to 0.028	16.2	2.0	AA+ to AA
	1.2	0.029 to 0.053	28.2	5.4	AA-
Low	2.1	0.054 to 0.095	15.1	4.8	A+ to A
	2.2	0.096 to 0.169	10.1	4.0	A-
Satisfactory	3.1	0.170 to 0.285	2.5	2.0	BBB+
	3.2	0.286 to 0.483	3.3	0.6	BBB
	3.3	0.484 to 0.740	2.1	0.2	BBB-
Fair	4.1	0.741 to 1.022	1.2	0.8	BB+
	4.2	1.023 to 1.407	0.4	0.2	BB
	4.3	1.408 to 1.927	0.1	0.1	BB-
Moderate	5.1	1.928 to 2.620	0.1	–	BB-
	5.2	2.621 to 3.579	–	–	B+
	5.3	3.580 to 4.914	0.1	–	B
Significant	6.1	4.915 to 6.718	–	–	B-
	6.2	6.719 to 8.860	–	–	B-
High	7.1	8.861 to 11.402	–	–	CCC+
	7.2	11.403 to 15.000	–	–	CCC+
Special Management	8.1	15.001 to 22.000	–	0.1	CCC
	8.2	22.001 to 50.000	–	0.1	CCC- to CC
	8.3	50.001 to 99.999	–	–	C
Default	9/10	100.000	–	–	Default
At 31 Dec 2016			81.4	20.4	
Default risk					
Minimal	0.1	0.000 to 0.010	2.2	0.1	AAA
	1.1	0.011 to 0.028	15.0	1.3	AA+ to AA
	1.2	0.029 to 0.053	28.8	3.8	AA-
Low	2.1	0.054 to 0.095	36.4	5.0	A+ to A
	2.2	0.096 to 0.169	11.9	3.5	A-
Satisfactory	3.1	0.170 to 0.285	7.8	1.4	BBB+
	3.2	0.286 to 0.483	4.9	0.4	BBB
	3.3	0.484 to 0.740	3.3	0.5	BBB-
Fair	4.1	0.741 to 1.022	0.9	0.2	BB+
	4.2	1.023 to 1.407	1.7	0.2	BB
	4.3	1.408 to 1.927	0.4	—	BB-
Moderate	5.1	1.928 to 2.620	0.3	0.1	BB-
	5.2	2.621 to 3.579	0.1		B+
	5.3	3.580 to 4.914	0.3	—	B
Significant	6.1	4.915 to 6.718	0.3	—	B-
	6.2	6.719 to 8.860	—	—	B-
High	7.1	8.861 to 11.402	0.2	—	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- to CC
	8.3	50.001 to 99.999	—	—	C
Default	9/10	100.000			Default
At 31 Dec 2015			114.5	16.5	

For footnote, see page 68.

Table 46.c: Wholesale IRB exposure – by obligor grade – Corporates[2]

	CRR	PD range %	Average exposure value[1] $bn	Undrawn commitments $bn	Mapped external rating
Default risk					
Minimal	0.1	0.000 to 0.010	—	0.1	
	1.1	0.011 to 0.028	17.6	12.8	AAA to AA
	1.2	0.029 to 0.053	46.1	36.7	AA-
Low	2.1	0.054 to 0.095	63.9	54.0	A+ to A
	2.2	0.096 to 0.169	77.5	67.3	A-
Satisfactory	3.1	0.170 to 0.285	75.0	63.5	BBB+
	3.2	0.286 to 0.483	73.3	58.1	BBB
	3.3	0.484 to 0.740	66.6	44.0	BBB-
Fair	4.1	0.741 to 1.022	45.3	30.8	BB+
	4.2	1.023 to 1.407	34.0	21.0	BB
	4.3	1.408 to 1.927	31.6	18.6	BB-
Moderate	5.1	1.928 to 2.620	25.9	14.2	BB-
	5.2	2.621 to 3.579	12.8	8.8	B+
	5.3	3.580 to 4.914	10.7	7.2	B
Significant	6.1	4.915 to 6.718	7.0	6.1	B-
	6.2	6.719 to 8.860	4.2	2.6	B-
High	7.1	8.861 to 11.402	2.6	0.9	CCC+
	7.2	11.403 to 15.000	0.9	0.3	CCC+
Special Management	8.1	15.001 to 22.000	1.7	2.6	CCC
	8.2	22.001 to 50.000	0.7	0.5	CCC- to CC
	8.3	50.001 to 99.999	0.3	0.2	C
Default	9/10	100.000	7.4	0.9	Default
At 31 Dec 2016			605.1	451.2	
Default risk					
Minimal	0.1	0.000 to 0.010	—	—	
	1.1	0.011 to 0.028	11.8	15.9	AAA to AA
	1.2	0.029 to 0.053	48.1	37.9	AA-
Low	2.1	0.054 to 0.095	69.5	57.8	A+ to A
	2.2	0.096 to 0.169	89.4	68.3	A-
Satisfactory	3.1	0.170 to 0.285	79.7	59.5	BBB+
	3.2	0.286 to 0.483	73.1	54.4	BBB
	3.3	0.484 to 0.740	70.5	44.8	BBB-
Fair	4.1	0.741 to 1.022	45.9	26.2	BB+
	4.2	1.023 to 1.407	37.4	23.7	BB
	4.3	1.408 to 1.927	31.6	18.7	BB-
Moderate	5.1	1.928 to 2.620	24.0	17.3	BB-
	5.2	2.621 to 3.579	12.5	8.6	B+
	5.3	3.580 to 4.914	11.9	8.0	B
Significant	6.1	4.915 to 6.718	5.3	4.4	B-
	6.2	6.719 to 8.860	3.0	1.4	B-
High	7.1	8.861 to 11.402	2.1	1.2	CCC+

	7.2	11.403 to 15.000	0.9	0.5	CCC+
Special Management	8.1	15.001 to 22.000	0.8	0.5	CCC
	8.2	22.001 to 50.000	0.4	0.2	CCC- to CC
	8.3	50.001 to 99.999	0.3	0.1	C
Default	9/10	100.000	6.8	1.0	Default
At 31 Dec 2015			625.0	450.4	

1 Average exposures are calculated by aggregating the exposure value of the last five quarters and dividing by five.
2 Corporates excludes specialised lending exposures subject to supervisory slotting approach.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

PD, LGD, RWA and exposure by country

The following tables set out the exposure-weighted average PD, exposure-weighted average LGD, RWAs and exposure by the

location of the principal operations of the lending subsidiary or branch.

Table 47.a: PD, LGD, RWA and exposure by country – wholesale IRB advanced approach all asset classes[1]

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	2.18	35.4	79.6	170.9
– France	2.98	30.5	12.6	28.7
– Germany	0.24	42.1	0.3	1.1
– Switzerland	0.02	43.7	0.7	13.0
Asia				
– Hong Kong	0.73	41.1	80.6	285.8
– Australia	0.81	43.1	7.6	20.7
– India	1.15	55.0	8.4	17.8
– Indonesia	7.46	52.7	4.8	6.2
– Mainland China	0.87	48.1	25.2	67.4
– Malaysia	1.09	46.7	6.1	13.2
– Singapore	0.70	42.3	9.2	35.6
– Taiwan	0.19	48.0	3.0	15.2
Middle East and North Africa				
– Egypt	2.25	45.0	2.7	3.1
– Turkey	0.37	45.1	0.5	1.2
– UAE	0.14	36.6	1.8	11.2
North America				
– US	1.51	35.7	50.8	144.1
– Canada	1.89	33.7	20.9	50.6
Latin America				
– Argentina	2.25	45.3	1.6	1.5
– Brazil	—	—	—	—
– Mexico	0.90	44.5	2.6	7.0
At 31 Dec 2015				
Europe				
– UK	2.31	30.5	87.5	209.4
– France	3.48	31.4	12.4	28.8
– Germany	0.41	41.9	0.3	1.3
– Switzerland	0.02	42.8	0.8	15.5
Asia				
– Hong Kong	0.62	41.7	74.0	262.4
– Australia	1.05	42.7	7.1	19.2

– India	1.03	54.0	9.3	17.0
– Indonesia	7.98	54.5	5.5	6.6
– Mainland China	0.92	46.5	28.7	69.6
– Malaysia	0.98	47.1	6.4	14.6
– Singapore	0.64	42.7	8.7	34.5
– Taiwan	0.24	47.9	3.8	16.6
Middle East and North Africa				
– Egypt	2.14	45.0	5.2	5.3
– Turkey	0.79	45.1	1.1	1.5
– UAE	0.12	39.0	1.9	10.7
North America				
– US	0.78	39.2	52.6	139.6
– Canada	1.83	38.4	21.7	50.0
Latin America				
– Argentina	7.11	45.5	2.8	1.7
– Brazil	0.48	45.0	6.0	9.5
– Mexico	1.44	44.5	2.8	7.5

1 Excludes specialised lending exposures subject to supervisory slotting approach.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.b: PD, LGD, RWA and exposure by country – wholesale IRB advanced approach central governments and central banks

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	0.04	44.6	2.5	20.10
– France	0.06	45.0	0.2	1.80
– Germany	0.05	45.0	0.1	0.50
– Switzerland	0.01	45.0	0.5	11.70
Asia				
– Hong Kong	0.01	44.5	5.5	111.90
– Australia	0.01	45.0	0.3	5.90
– India	0.07	45.0	1.4	6.10
– Indonesia	0.17	45.0	0.5	1.80
– Mainland China	0.02	45.0	1.9	26.10
– Malaysia	0.04	45.0	0.7	5.20
– Singapore	0.01	45.0	0.7	14.30
– Taiwan	0.02	45.0	0.5	8.90
Middle East and North Africa				
– Egypt	2.95	45.0	2.4	2.20
– Turkey	0.44	45.0	0.4	0.80
– UAE	0.14	44.6	0.8	6.00
North America				
– US	0.01	37.6	3.9	53.60
– Canada	0.02	31.4	2.1	16.60
Latin America				
– Argentina	2.23	45.0	1.5	1.50
– Brazil	—	—	—	—
– Mexico	0.08	45.0	2.2	6.20
At 31 Dec 2015				
Europe				
– UK	0.06	45.0	2.2	16.4
– France	0.05	45.1	0.3	2.3
– Germany	0.10	45.0	0.1	0.6
– Switzerland	0.01	45.0	0.6	13.9
Asia				
– Hong Kong	0.02	45.0	6.4	105.8
– Australia	0.01	45.0	0.3	5.7
– India	0.13	45.0	2.2	6.3
– Indonesia	0.31	45.0	0.6	1.4
– Mainland China	0.04	45.0	2.7	21.4
– Malaysia	0.05	45.0	0.8	5.4
– Singapore	0.01	45.0	0.5	13.0
– Taiwan	0.02	45.0	0.6	9.7

Middle East and North Africa				
– Egypt	2.34	45.0	4.7	4.3
– Turkey	0.68	45.0	0.9	1.3
– UAE	0.05	45.0	0.6	5.8
North America				
– US	0.01	45.1	5.5	45.6
– Canada	0.02	45.1	2.7	15.9
Latin America				
– Argentina	7.09	45.0	2.7	1.7
– Brazil	0.37	45.0	4.3	7.8
– Mexico	0.10	45.0	2.5	6.8

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.c: PD, LGD, RWA and exposure by country – wholesale IRB advanced approach institutions

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	0.24	31.6	2.2	10.4
– France	0.17	41.3	0.6	1.6
– Germany	0.16	39.0	0.1	0.5
– Switzerland	0.04	32.1	0.2	1.3
Asia				
– Hong Kong	0.06	42.2	4.9	30.9
– Australia	0.05	41.0	0.5	2.8
– India	0.26	45.0	0.3	0.8
– Indonesia	—	—	—	—
– Mainland China	0.12	45.2	1.8	8.1
– Malaysia	0.38	48.5	0.4	0.9
– Singapore	0.08	43.9	0.7	4.9
– Taiwan	0.10	45.0	0.1	0.3
Middle East and North Africa				
– Egypt	0.08	45.0	0.1	0.3
– Turkey	0.07	45.0	0.0	0.3
– UAE	0.08	45.4	0.2	0.9
North America				
– US	0.31	42.4	1.0	2.5
– Canada	0.04	21.6	0.3	2.6
Latin America				
– Argentina	0.06	45.0	—	—
– Brazil	—	—	—	—
– Mexico	0.50	45.0	0.3	0.4
At 31 Dec 2015				
Europe				
– UK	0.35	21.3	3.2	21.0
– France	0.25	41.9	0.7	1.6
– Germany	0.10	38.1	0.2	0.6
– Switzerland	0.05	23.2	0.2	1.6
Asia				
– Hong Kong	0.06	42.7	4.3	29.6
– Australia	0.06	34.1	0.5	2.7
– India	0.18	45.2	0.2	0.6
– Indonesia	—	—	—	—
– Mainland China	0.12	45.6	1.9	8.6
– Malaysia	0.27	47.5	0.4	1.2
– Singapore	0.08	44.0	0.8	5.5
– Taiwan	0.08	45.0	0.1	0.5
Middle East and North Africa				

– Egypt	0.08	45.0	0.1	0.5
– Turkey	2.25	45.0	0.1	0.1
– UAE	0.09	46.5	0.1	0.3
North America				
– US	0.23	41.0	2.0	5.2
– Canada	0.06	28.2	0.3	2.3
Latin America				
– Argentina	—	—	—	—
– Brazil	0.97	45.1	1.7	1.7
– Mexico	0.26	45.0	0.2	0.3

Table 47.d: PD, LGD, RWA and exposure by country – wholesale IRB advanced approach corporates[1]

At 31 Dec 2016	Exposure-weighted average PD %	Exposure-weighted average LGD %	RWAs $bn	Exposure value[1] $bn
Europe				
– UK	2.63	34.3	74.9	140.4
– France	3.36	28.8	11.8	25.3
– Germany	2.71	45.4	0.1	0.1
– Switzerland	—	—	—	—
Asia				
– Hong Kong	1.43	38.1	70.2	143.0
– Australia	1.38	42.7	6.8	12.0
– India	1.82	61.3	6.7	10.9
– Indonesia	10.48	55.8	4.3	4.4
– Mainland China	1.71	51.3	21.5	33.2
– Malaysia	1.94	47.7	5.0	7.1
– Singapore	1.49	39.5	7.8	16.4
– Taiwan	0.45	52.7	2.4	6.0
Middle East and North Africa				
– Egypt	0.64	44.9	0.2	0.6
– Turkey	0.77	46.2	0.1	0.1
– UAE	0.16	23.9	0.8	4.3
North America				
– US	2.45	34.4	45.9	88.0
– Canada	3.02	35.9	18.5	31.4
Latin America				
– Argentina	3.10	59.2	0.1	—
– Brazil	—	—	—	—
– Mexico	15.62	34.7	0.1	0.4
At 31 Dec 2015				
Europe				
– UK	2.77	30.2	82.1	172.0
– France	4.00	29.4	11.4	24.9
– Germany	0.77	47.7	—	0.1
– Switzerland	—	—	—	—
Asia				
– Hong Kong	1.25	38.7	63.3	127.0
– Australia	1.85	43.7	6.3	10.8
– India	1.63	60.0	6.9	10.1
– Indonesia	10.04	57.0	4.9	5.2
– Mainland China	1.56	47.5	24.1	39.6
– Malaysia	1.72	48.4	5.2	8.0
– Singapore	1.34	40.3	7.4	16.0

– Taiwan	0.57	52.4	3.1	6.4
Middle East and North Africa				
– Egypt	2.58	45.2	0.4	0.5
– Turkey	0.73	45.7	0.1	0.1
– UAE	0.20	30.8	1.2	4.6
North America				
– US	1.21	36.1	45.1	88.8
– Canada	2.86	35.8	18.7	31.8
Latin America				
– Argentina	8.84	80.8	0.1	—
– Brazil	—	—	—	—
– Mexico	22.57	37.0	0.1	0.4

1 Excludes specialised lending exposures subject to supervisory slotting approach.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.e: PD, LGD, RWA and exposure by country – wholesale IRB foundation approach all asset classes

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	1.94	41.3	4.4	8.2
– France	4.30	45.0	0.2	0.3
– Germany	0.90	44.8	10.1	15.6
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	3.72	44.2	7.8	12.8
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	2.22	41.4	5.2	8.9
– France	5.36	45.0	0.2	0.2
– Germany	1.04	44.7	10.5	16.2
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				

– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	2.44	44.2	8.1	12.4
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.f: PD, LGD, RWA and exposure by country – wholesale IRB foundation approach central governments and central banks

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	—	—	—	—
– France	—	—	—	—
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	0.04	45.0	—	0.1
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	—	—	—	—
– France	—	—	—	—
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia		—		
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—

Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	0.04	45.0	—	0.1
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.g: PD, LGD, RWA and exposure by country – wholesale IRB foundation approach institutions

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	—	—	—	—
– France	—	—	—	—
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	0.28	45.0	0.1	0.2
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	—	—	—	—
– France	—	—	—	—
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				

– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	0.29	45.0	0.1	0.3
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.h: PD, LGD, RWA and exposure by country – wholesale IRB foundation approach corporates

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	1.94	41.3	4.4	8.2
– France	4.30	45.0	0.2	0.3
– Germany	0.91	44.8	10.1	15.6
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	3.81	44.2	7.7	12.5
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	2.22	41.4	5.2	8.9
– France	5.36	45.0	0.2	0.2
– Germany	1.04	44.7	10.5	16.2
– Switzerland	—	—	—	—
Asia				
– Hong Kong	—	—	—	—
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—

Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	2.50	44.2	8.0	12.0
North America				
– US	—	—	—	—
– Canada	—	—	—	—
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.i: PD, LGD, RWA and exposure by country – retail IRB approach all asset classes

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	1.58	30.5	18.6	155.8
– France	5.06	14.6	2.8	22.7
– Germany	—	—	—	—
– Switzerland	0.73	2.2	0.2	8.1
Asia				
– Hong Kong	0.87	39.2	20.2	102.3
– Australia	0.90	10.6	0.7	11.6
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	4.05	12.1	1.0	4.5
– Singapore	0.75	22.3	1.1	6.7
– Taiwan	1.20	11.5	0.5	4.1
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	9.67	67.3	18.5	29.8
– Canada	0.96	19.2	2.4	18.7
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	1.58	30.8	21.8	182.7
– France	5.61	15.1	3.1	23.7
– Germany	—	—	—	—
– Switzerland	0.80	2.7	0.3	10.1
Asia				
– Hong Kong	0.94	39.0	18.2	97.5
– Australia	0.84	10.9	0.6	10.7
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	3.57	12.3	1.0	4.7
– Singapore	0.69	21.2	1.4	8.2
– Taiwan	1.21	11.2	0.4	3.9
Middle East and North Africa				

– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	12.05	64.0	43.7	42.1
– Canada	1.04	19.8	2.4	18.0
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Table 47.j: PD, LGD, RWA and exposure by country – retail IRB approach – retail secured by mortgages on immovable property non-SME

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	1.33	12.2	5.4	114.9
– France	6.82	14.0	0.6	3.5
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	0.69	10.0	10.7	62.5
– Australia	0.90	10.6	0.7	11.6
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	4.05	12.1	1.0	4.5
– Singapore	0.75	22.3	1.1	6.7
– Taiwan	1.20	11.5	0.5	4.1
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	11.01	59.5	14.6	23.3
– Canada	0.85	17.2	1.9	16.7
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	1.32	12.5	7.1	134.2
– France	7.21	13.5	0.4	2.5
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	0.76	10.0	8.9	59.7
– Australia	0.84	10.9	0.6	10.7
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	3.57	12.3	1.0	4.7

– Singapore	0.69	21.2	1.4	8.2
– Taiwan	1.21	11.2	0.4	3.9
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	13.68	58.1	38.2	34.3
– Canada	0.93	17.5	1.8	15.8
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.k: PD, LGD, RWA and exposure by country – retail IRB approach retail secured by mortgages on immovable property SME

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	—	—	—	—
– France	7.70	25.8	0.2	0.6
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	0.89	11.7	—	0.6
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	—	—	—	—
– Canada	2.10	29.6	0.1	0.3
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	—	—	—	—
– France	8.01	18.8	0.5	2.0
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	0.99	11.1	—	0.6
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				

– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	—	—	—	—
– Canada	2.21	30.7	0.1	0.3
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Table 47.l: PD, LGD, RWA and exposure by country – retail IRB approach retail QRRE

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	1.14	85.5	5.4	28.0
– France	—	—	—	—
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	1.10	100.0	8.1	32.2
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	1.49	93.6	1.0	3.4
– Canada	2.72	60.7	0.1	0.3
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	1.17	85.2	6.1	33.2
– France	—	—	—	—
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	1.11	100.1	8.0	30.6
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—

Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	1.49	93.7	1.0	3.6
– Canada	2.91	61.2	0.1	0.4
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 47.m: PD, LGD, RWA and exposure by country – retail IRB approach other SME

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	7.71	66.6	3.8	6.1
– France	20.34	30.6	0.7	2.3
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	0.10	11.3	—	0.1
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	—	—	—	—
– Canada	4.33	48.4	0.1	0.2
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	7.07	66.0	4.7	8.1
– France	16.46	26.5	0.9	3.5
– Germany	—	—	—	—
– Switzerland	—	—	—	—
Asia				
– Hong Kong	0.13	10.8	—	0.1
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				

– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	1.82	95.7	0.1	0.1
– Canada	4.31	47.3	0.1	0.2
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

Table 47.n: PD, LGD, RWA and exposure by country – retail IRB approach other non-SME

	Exposure-weighted average PD	Exposure-weighted average LGD	RWAs	Exposure value
At 31 Dec 2016	%	%	$bn	$bn
Europe				
– UK	2.05	81.8	4.0	6.8
– France	2.46	12.1	1.3	16.3
– Germany	—	—	—	—
– Jersey	0.52	2.6	1.1	0.0
– Switzerland	0.73	2.2	0.2	8.1
Asia				
– Hong Kong	1.37	21.2	1.4	6.9
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—
– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	8.66	96.5	2.9	3.1
– Canada	1.03	28.3	0.2	1.2
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—
At 31 Dec 2015				
Europe				
– UK	2.18	83.2	3.9	7.1
– France	2.63	12.4	1.3	15.7
– Germany	—	—	—	—
– Switzerland	0.80	2.7	0.3	10.1
Asia				
– Hong Kong	1.85	21.1	1.3	6.5
– Australia	—	—	—	—
– India	—	—	—	—
– Indonesia	—	—	—	—
– Mainland China	—	—	—	—
– Malaysia	—	—	—	—
– Singapore	—	—	—	—

– Taiwan	—	—	—	—
Middle East and North Africa				
– Egypt	—	—	—	—
– Turkey	—	—	—	—
– UAE	—	—	—	—
North America				
– US	8.11	85.7	4.4	4.1
– Canada	0.99	28.1	0.3	1.3
Latin America				
– Argentina	—	—	—	—
– Brazil	—	—	—	—
– Mexico	—	—	—	—

1 Excludes specialised lending exposures subject to supervisory slotting approach.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 48: Retail IRB exposure – by internal PD band

	PD range %	Average exposure value[1] $bn	Undrawn commitments $bn
At 31 Dec 2016			
Secured by mortgages on immovable property			
SME		2.4	0.1
Band 1	0.000 to 0.483	0.5	–
Band 2	0.484 to 1.022	0.4	0.1
Band 3	1.023 to 4.914	1.0	–
Band 4	4.915 to 8.860	0.2	–
Band 5	8.861 to 15.000	0.1	–
Band 6	15.001 to 50.000	0.1	–
Band 7	50.001 to 100.000	0.1	–
Secured by mortgages on immovable property			
Non-SME		263.9	16.7
Band 1	0.000 to 0.483	207.4	14.9
Band 2	0.484 to 1.022	22.5	1.0
Band 3	1.023 to 4.914	21.1	0.7
Band 4	4.915 to 8.860	4.7	–
Band 5	8.861 to 15.000	1.0	–
Band 6	15.001 to 50.000	2.0	0.1
Band 7	50.001 to 100.000	5.2	–
Qualifying revolving retail exposures		65.7	95.8
Band 1	0.000 to 0.483	47.8	83.3
Band 2	0.484 to 1.022	6.9	6.5
Band 3	1.023 to 4.914	8.7	5.3
Band 4	4.915 to 8.860	1.2	0.4
Band 5	8.861 to 15.000	0.4	0.1
Band 6	15.001 to 50.000	0.5	0.1
Band 7	50.001 to 100.000	0.2	0.1
Other SME		10.5	3.5
Band 1	0.000 to 0.483	1.3	0.7
Band 2	0.484 to 1.022	1.8	0.9
Band 3	1.023 to 4.914	4.9	1.4
Band 4	4.915 to 8.860	1.1	0.3
Band 5	8.861 to 15.000	0.4	0.1
Band 6	15.001 to 50.000	0.3	–
Band 7	50.001 to 100.000	0.7	0.1
Other non-SME		45.5	14.5
Band 1	0.000 to 0.483	26.4	11.6
Band 2	0.484 to 1.022	6.9	1.4
Band 3	1.023 to 4.914	9.8	1.4
Band 4	4.915 to 8.860	0.9	0.1
Band 5	8.861 to 15.000	0.5	–
Band 6	15.001 to 50.000	0.4	–
Band 7	50.001 to 100.000	0.6	–
Total retail		388.0	130.6
Band 1	0.000 to 0.483	283.6	110.4

Band 2	0.484 to 1.022	38.4	9.9
Band 3	1.023 to 4.914	45.5	8.7
Band 4	4.915 to 8.860	8.2	0.8
Band 5	8.861 to 15.000	2.4	0.3
Band 6	15.001 to 50.000	3.1	0.3
Band 7	50.001 to 100.000	6.8	0.2

Table 48: Retail IRB exposure – by internal PD band (continued)

	PD range	Average exposure value[1]	Undrawn commitments
	%	$bn	$bn
At 31 Dec 2015			
Secured by mortgages on immovable property			
SME		3.0	—
Band 1	0.000 to 0.483	0.6	—
Band 2	0.484 to 1.022	0.5	—
Band 3	1.023 to 4.914	1.4	—
Band 4	4.915 to 8.860	0.2	—
Band 5	8.861 to 15.000	0.1	—
Band 6	15.001 to 50.000	0.1	—
Band 7	50.001 to 100.000	0.1	—
Secured by mortgages on immovable property			
Non-SME		283.0	17.4
Band 1	0.000 to 0.483	218.9	16.2
Band 2	0.484 to 1.022	24.1	0.8
Band 3	1.023 to 4.914	23.1	0.3
Band 4	4.915 to 8.860	6.1	—
Band 5	8.861 to 15.000	1.5	0.1
Band 6	15.001 to 50.000	2.9	—
Band 7	50.001 to 100.000	6.4	—
Qualifying revolving retail exposures		67.0	98.4
Band 1	0.000 to 0.483	48.7	85.2
Band 2	0.484 to 1.022	6.8	6.7
Band 3	1.023 to 4.914	9.0	5.7
Band 4	4.915 to 8.860	1.3	0.5
Band 5	8.861 to 15.000	0.4	0.1
Band 6	15.001 to 50.000	0.5	0.1
Band 7	50.001 to 100.000	0.3	0.1
Other SME		12.9	4.2
Band 1	0.000 to 0.483	1.7	1.1
Band 2	0.484 to 1.022	2.2	1.0
Band 3	1.023 to 4.914	6.0	1.5
Band 4	4.915 to 8.860	1.4	0.2
Band 5	8.861 to 15.000	0.5	0.2
Band 6	15.001 to 50.000	0.3	0.1
Band 7	50.001 to 100.000	0.8	0.1
Other non-SME		46.5	14.2
Band 1	0.000 to 0.483	26.4	11.5
Band 2	0.484 to 1.022	6.7	1.3
Band 3	1.023 to 4.914	10.7	1.4
Band 4	4.915 to 8.860	0.9	—
Band 5	8.861 to 15.000	0.6	—
Band 6	15.001 to 50.000	0.5	—
Band 7	50.001 to 100.000	0.7	—

Total retail		412.4	134.2
Band 1	0.000 to 0.483	296.3	114.0
Band 2	0.484 to 1.022	40.3	9.8
Band 3	1.023 to 4.914	50.2	8.9
Band 4	4.915 to 8.860	9.9	0.7
Band 5	8.861 to 15.000	3.1	0.4
Band 6	15.001 to 50.000	4.3	0.2
Band 7	50.001 to 100.000	8.3	0.2

1 Average exposures are calculated by aggregating the exposure value of the last five quarters and dividing by five.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 49: IRB expected loss and CRAs – by exposure class

	Expected loss[1]	CRA Balances	Charge for the year
	$bn	$bn	$bn
IRB exposure classes			
– central governments and central banks	0.1	—	—
– institutions	—	—	—
– corporates	5.7	4.3	1.1
– total retail	3.6	1.2	0.5
– of which:			
secured by mortgages on immovable property SME	—	—	—
secured by mortgages on immovable property non-SME	1.9	0.4	0.1
qualifying revolving retail	0.6	0.2	0.2
other SME	0.6	0.3	—
other non-SME	0.5	0.3	0.2
At 31 Dec 2016	9.4	5.5	1.6
IRB exposure classes			
– central governments and central banks	0.2	—	—
– institutions	0.1	—	—
– corporates	5.5	4.5	1.0
– total retail	5.5	2.1	0.4
– of which:			
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 Dec 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
– total retail	7.2	3.1	0.2
– of which:			
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 Dec 2014	13.0	7.3	1.3

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

Table 50: IRB expected loss and CRAs – by region

	Expected loss[1]	CRA Balances	Charge for the year

	$bn	$bn	$bn
Europe	3.5	2.2	0.4
Asia	2.4	1.4	0.5
Middle East and North Africa	0.3	0.3	—
North America	3.1	1.5	0.7
Latin America	0.1	0.1	—
At 31 Dec 2016	9.4	5.5	1.6
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 Dec 2015	11.3	6.6	1.4

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

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 51: IRB exposure – credit risk mitigation

		At 31 Dec 2016		At 31 Dec 2015	
		Exposure value covered by credit derivatives or guarantees[1]	Total exposure value	Exposure value covered by credit derivatives or guarantees[1]	Total exposure value
	Footnote	$bn	$bn	$bn	$bn
Exposures under the IRB advanced approach					
Central governments and central banks		0.1	339.4	0.5	327.4
Institutions		0.4	75.7	0.4	90.5
Corporates		83.4	583.1	86.4	597.3
Retail		20.2	366.8	20.3	404.5
Securitisation positions		–	33.8	—	40.9
Non-credit obligation assets		–	51.9	—	50.2
Total			1,450.7		1,510.8
Exposures under the IRB foundation approach					
Central governments and central banks		–	0.1	—	0.1
Institutions		–	0.3	—	0.3
Corporates	2	0.9	42.4	0.5	43.3

1 Figures presented on an ‘obligor basis’.

2 The value of exposures under the IRB foundation approach covered by eligible financial and other collateral was $4.6bn (2015: $7.9bn).

Table 52: Standardised exposure – credit risk mitigation

	2016			2015		
	Exposure value covered by eligible financial and other collateral[1]	Exposure value covered by credit derivatives or guarantees[1]	Total exposure value	Exposure value covered by eligible financial and other collateral[1]	Exposure value covered by credit derivatives or guarantees[1]	Total exposure value
Footnote	$bn	$bn	$bn	$bn	$bn	$bn
Exposures under the standardised approach						
Central governments and central banks	0.1	5.0	167.3	—	0.2	199.9
Institutions	–	0.3	2.1	—	4.3	38.9
Corporates	13.4	6.1	78.4	14.5	5.0	226.4
Retail	2.3	–	22.0	0.7	0.1	44.2
Secured by mortgages on immovable property	5.0	–	25.7	—	—	40.3
Exposures in default	0.5	–	3.3	—	—	4.9
Regional governments or local authorities	–	–	2.9	—	—	2.8
Equity	–	–	15.2	—	—	7.0

Other	2	–	–	17.2	—	—	27.6
At 31 Dec				334.1			592.0

1 Figures presented on an ‘obligor basis’.

2 This includes the exposure class ‘other items’ with an exposure value of $9.5bn as well as other less material standardised exposure classes not individually shown above.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 53: Standardised exposure – by credit quality step

	At 31 Dec 2016			At 31 Dec 2015		
	Original exposure[1] $bn	Exposure value $bn	RWAs $bn	Original exposure[1] $bn	Exposure value $bn	RWAs $bn
Central governments and central banks						
Credit quality step 1	154.8	158.3		138.1	145.5	
Credit quality step 2	1.3	1.6		1.4	1.9	
Credit quality step 3	1.0	1.3		2.5	2.8	
Credit quality step 4	0.3	0.1		0.4	0.1	
Credit quality step 5	0.3	0.3		—	—	
Credit quality step unrated	5.7	5.7		49.6	49.6	
	163.4	167.3	14.6	192.0	199.9	20.0
Institutions						
Credit quality step 1	0.8	0.8		1.6	0.7	
Credit quality step 2	0.6	0.3		4.7	1.4	
Credit quality step 4	0.5	0.5		—	—	
Credit quality step 5	0.1	0.1		0.1	0.1	
Credit quality step unrated	0.3	0.3		36.8	36.7	
	2.3	2.0	0.9	43.2	38.9	14.7
Corporates						
Credit quality step 1	2.0	2.2		1.6	0.8	
Credit quality step 2	4.6	2.9		6.2	4.2	
Credit quality step 3	2.6	1.7		2.7	1.4	
Credit quality step 4	4.5	3.0		2.1	1.6	
Credit quality step 5	1.0	0.5		1.3	0.8	
Credit quality step 6	0.4	0.1		2.8	2.0	
Credit quality step unrated	145.3	67.9		330.6	215.6	
	160.4	78.3	75.0	347.3	226.4	210.6

1 Figures presented on an ‘obligor basis’.

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Additional BCBS tables

Table 54: Changes in stock of defaulted loans and debt securities

		a
	Footnote	$bn
1 Defaulted loans and debt securities at end of the previous reporting period		22.7
2 Loans and debt securities that have defaulted since the last reporting period		8.6
3 Returned to non-defaulted status		(1.5)
4 Amounts written off		(2.8)
5 Other changes	1	(5.1)
7 Repayments		(4.0)
6 Defaulted loans and debt securities at end of the reporting period		17.9

1 Other changes include foreign exchange and assets held for sale in default.

Table 55: IRB – Credit risk exposures by portfolio and PD range

	a	b	c	d	e	f	g	h	i	j	k	l	m
AIRB – Central government and central banks	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Coll imp
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	326.6	1.9	60.5	327.7	0.02	417	42.9	2.05	26.0	8	—		
0.15 to <0.25	2.2	—	27.5	2.3	0.22	19	43.9	1.48	0.8	37	—		
0.25 to <0.50	2.0	—	42.3	2.0	0.37	33	43.5	1.36	0.9	49	—		
0.50 to <0.75	0.5	—	50.1	0.5	0.63	15	45.0	1.49	0.4	69	—		
0.75 to <2.50	3.7	0.1	26.7	3.7	1.35	35	45.0	1.27	3.4	91	—		
2.50 to <10.00	3.2	—	76.5	3.2	3.49	20	45.0	1.07	3.9	123	0.1		
10.00 to <100.00	—	—	50.2	—	10.00	4	47.0	0.55	—	189	—		
100.00 (Default)	—	—	—	—	100.00	11	88.0	5.00	—	—	—		
Sub-total	338.2	2.0	59.1	339.4	0.07	554	43.0	2.02	35.4	10	0.1	—	—

	a	b	c	d	e	f	g	h	i	j	k	l	m
AIRB – Institutions	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Coll impa
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	62.5	16.3	30.5	67.7	0.05	2,772	40.2	1.34	10.2	15	—		
0.15 to <0.25	2.0	2.0	26.4	2.5	0.22	384	44.7	0.72	0.9	37	—		

0.25 to <0.50	2.5	0.6	30.9	2.7	0.37	278	44.9	0.69	1.5	54	—		
0.50 to <0.75	0.8	0.2	53.1	0.9	0.63	175	44.7	1.15	0.7	73	—		
0.75 to <2.50	1.8	1.1	28.8	1.9	1.11	270	42.2	0.98	1.6	83	—		
2.50 to <10.00	—	—	21.7	—	4.37	57	41.7	0.37	—	161	—		
10.00 to <100.00	—	0.2	17.4	—	26.64	44	53.2	1.53	0.1	307	—		
100.00 (Default)	—	—	—	—	100.00	5	45.0	2.54	—	295	—		
Sub-total	69.6 a	20.4 b	30.1 c	75.7 d	0.12 e	3,985 f	40.6 g	1.29 h	15.0 i	20 j	— k	— l	— m

AIRB – Corporate – Specialised Lending – excluding Slotting	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Coll impa
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	0.9	0.4	62.7	1.2	0.13	614	26.5	3.43	0.3	27	—		
0.15 to <0.25	0.9	0.3	45.5	1.0	0.22	659	25.4	3.85	0.4	36	—		
0.25 to <0.50	0.4	0.1	58.4	0.4	0.37	296	30.7	3.73	0.2	52	—		
0.50 to <0.75	0.4	0.1	31.0	0.4	0.63	250	26.0	4.29	0.2	58	—		
0.75 to <2.50	0.7	0.5	34.5	0.9	1.25	523	40.2	3.63	0.9	105	—		
2.50 to <10.00	0.1	—	56.5	0.1	3.57	91	26.2	4.99	0.1	102	—		
10.00 to <100.00	0.1	—	62.0	0.1	18.58	114	27.2	1.56	0.2	134	—		
100.00 (Default)	0.1	—	94.7	0.1	100.00	159	53.3	3.22	—	11	0.1		
Sub-total	3.6	1.4	47.7	4.2	4.36	2,706	30.3	3.66	2.3	56	0.1	0.1	—

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

AIRB – Corporate – Other	a Original on-balance sheet gross exposure	b Off-balance sheet exposures pre-CCF	c Average CCF	d EAD post-CRM and post-CCF	e Average PD	f Number of obligors	g Average LGD	h Average maturity	i RWA	j RWA density	k EL	l Individual impairments	m Collec impai
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	105.5	144.3	37.9	186.0	0.08	10,931	38.1	2.26	41.4	22	0.1		
0.15 to <0.25	39.2	55.0	38.8	67.0	0.22	9,588	39.3	2.04	26.6	40	0.1		
0.25 to <0.50	45.3	48.8	36.4	69.6	0.37	10,306	39.2	2.08	34.9	50	0.1		
0.50 to <0.75	43.1	38.7	33.4	55.0	0.63	9,322	37.5	1.95	33.5	61	0.1		
0.75 to <2.50	120.2	89.8	31.9	123.5	1.37	42,812	37.2	2.00	99.7	81	0.6		
2.50 to <10.00	32.7	27.3	34.4	31.9	4.59	11,786	36.5	1.99	36.3	114	0.5		
10.00 to <100.00	5.6	4.8	39.8	6.4	19.65	2,459	36.5	2.05	11.1	174	0.5		
100.00 (Default)	6.0	0.8	51.5	6.4	100.00	2,583	41.9	2.24	6.0	93	2.5		
Sub-total	397.6	409.5	36.2	545.8	2.15	99,787	38.1	2.10	289.5	53	4.5	2.3	1.1

Wholesale AIRB – Total	a Original on-balance sheet gross exposure	b Off-balance sheet exposures pre-CCF	c Average CCF	d EAD post-CRM and post-CCF	e Average PD	f Number of obligors	g Average LGD	h Average maturity	i RWA	j RWA density	k EL	l Individual impairments	m Colle impai
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
Total (all portfolios)	809.0	433.3	36.0	1,017.0	1.27	107,032	40.0	2.0	354.3	36	4.7	2.4	1.1

The Wholesale AIRB Total includes Non-credit obligation assets EAD post-CRM and post-CCF of $51.9bn and RWAs of $12.1bn.

AIRB – Secured by mortgages on immovable property SME	a Original on-balance sheet gross exposure	b Off-balance sheet exposures pre-CCF	c Average CCF	d EAD post-CRM and post-CCF	e Average PD	f Number of obligors	g Average LGD	h Average maturity	i RWA	j RWA density	k EL	l Individual impairments	m Colle impa
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	0.3	—	100.0	0.4	0.07	1,249	10.5	—	—	2	—		
0.15 to <0.25	0.1	—	100.0	0.1	0.17	200	17.9	—	—	7	—		
0.25 to <0.50	0.2	—	37.7	0.1	0.32	1,012	16.4	—	—	10	—		

0.50 to <0.75	0.1	0.1	100.0	0.1	0.63	585	26.0	—	—	19	—		
0.75 to <2.50	0.3	—	95.0	0.3	1.63	1,792	28.9	—	0.1	29	—		
2.50 to <10.00	0.4	—	102.3	0.4	5.26	1,928	24.4	—	0.2	32	—		
10.00 to <100.00	0.1	—	86.0	0.1	17.47	414	26.5	—	—	50	—		
100.00 (Default)	—	—	97.8	—	100.00	138	26.2	—	—	48	—		
Sub-total	1.5 a	0.1 b	97.7 c	1.5 d	4.01 e	7,318 f	21.1 g	— h	0.3 i	21 j	— k	— l	— m
AIRB – Secured by mortgages on immovable property non-SME	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Col imp
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	137.7	11.5	92.3	151.4	0.06	900,158	14.1	—	8.0	5	—		
0.15 to <0.25	24.4	1.1	81.0	25.5	0.21	106,945	16.5	—	2.7	11	—		
0.25 to <0.50	22.0	2.3	43.8	23.1	0.37	120,044	22.0	—	4.6	20	—		
0.50 to <0.75	12.0	0.4	96.0	12.4	0.61	56,427	15.9	—	2.2	18	—		
0.75 to <2.50	23.1	1.1	61.8	23.9	1.33	129,916	22.0	—	8.8	37	0.1		
2.50 to <10.00	6.4	0.2	93.6	6.6	4.76	36,051	20.0	—	4.7	71	0.1		
10.00 to <100.00	2.2	0.1	98.3	2.3	27.26	24,716	27.4	—	3.9	171	0.2		
100.00 (Default)	3.8	—	78.5	3.8	100.00	35,131	39.7	—	1.6	42	1.5		
Sub-total	231.6	16.7	82.9	249.0	2.14	1,409,388	16.6	—	36.5	15	1.9	0.2	0.3

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

	a	b	c	d	e	f	g	h	i	j	k	l	m
AIRB – Qualifying revolving retail exposures	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Co im
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$b
0.00 to <0.15	4.9	62.5	47.4	34.4	0.07	11,894,411	93.7	—	1.5	4	—		
0.15 to <0.25	1.3	12.0	44.0	6.5	0.21	1,824,704	95.0	—	0.8	11	—		
0.25 to <0.50	2.1	9.0	42.9	5.9	0.37	1,732,829	93.3	—	1.0	17	—		
0.50 to <0.75	2.0	4.0	50.2	3.9	0.60	1,069,619	93.4	—	1.0	26	—		
0.75 to <2.50	5.5	6.6	47.3	8.6	1.39	1,991,102	91.4	—	4.0	48	0.1		
2.50 to <10.00	2.9	1.4	57.8	3.7	4.78	679,874	89.9	—	4.2	112	0.2		
10.00 to <100.00	0.8	0.3	55.7	0.9	28.87	268,254	91.7	—	2.1	219	0.3		
100.00 (Default)	0.1	—	6.3	0.1	100.00	26,142	36.0	—	0.1	148	—		
Sub-total	19.6	95.8	46.8	64.0	1.14	19,486,935	93.1	—	14.7	23	0.6	—	0.2

	a	b	c	d	e	f	g	h	i	j	k	l	m
AIRB – Other SME	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Colle impai
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	0.1	0.1	67.4	0.2	0.10	82,891	39.9	—	—	9	—		
0.15 to <0.25	0.2	0.2	53.4	0.3	0.22	91,588	61.2	—	0.1	22	—		
0.25 to <0.50	0.3	0.4	51.2	0.6	0.38	141,288	63.1	—	0.2	32	—		
0.50 to <0.75	0.4	0.5	66.5	0.8	0.63	157,268	58.0	—	0.3	38	—		
0.75 to <2.50	2.0	1.3	60.8	2.8	1.58	427,912	58.8	—	1.5	55	—		
2.50 to <10.00	2.3	0.8	69.9	2.8	4.90	201,537	53.6	—	1.8	64	0.1		
10.00 to <100.00	0.5	0.1	70.1	0.6	17.66	69,516	66.6	—	0.6	106	0.1		
100.00 (Default)	0.6	0.1	94.5	0.6	100.00	21,873	39.5	—	—	3	0.3		
Sub-total	6.4	3.5	63.4	8.7	10.84	1,193,873	56.1	—	4.5	52	0.5	0.3	—

AIRB – Other non-SME	a Original on-balance sheet gross exposure	b Off-balance sheet exposures pre-CCF	c Average CCF	d EAD post-CRM and post-CCF	e Average PD	f Number of obligors	g Average LGD	h Average maturity	i RWA	j RWA density	k EL	l Individual impairments	m Colle impa
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	9.5	6.1	34.4	11.9	0.07	442,581	20.0	—	0.5	5	—		
0.15 to <0.25	6.0	2.7	35.8	7.3	0.20	393,748	31.2	—	1.0	14	—		
0.25 to <0.50	5.4	2.9	29.6	6.3	0.36	276,509	29.9	—	1.2	19	—		
0.50 to <0.75	4.0	1.2	29.1	4.5	0.60	176,642	29.3	—	1.1	24	—		
0.75 to <2.50	8.7	0.6	31.7	9.1	1.37	345,838	28.9	—	3.2	35	—		
2.50 to <10.00	2.8	1.0	26.8	3.2	4.31	188,614	39.5	—	1.9	61	0.1		
10.00 to <100.00	0.7	—	17.1	0.8	25.11	79,970	65.7	—	1.1	138	0.1		
100.00 (Default)	0.4	—	52.1	0.5	100.00	58,697	55.4	—	0.1	13	0.3		
Sub-total	37.5	14.5	32.6	43.6	2.26	1,962,599	28.7	—	10.1	23	0.5	0.1	0.2

Retail AIRB Total	a Original on-balance sheet gross exposure	b Off-balance sheet exposures pre-CCF	c Average CCF	d EAD post-CRM and post-CCF	e Average PD	f Number of obligors	g Average LGD	h Average maturity	i RWA	j RWA density	k EL	l Individual impairments	m Co im
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$b
Total (all portfolios)	296.6	130.6	50.3	366.8	2.19	24,060,113	32.3	—	66.1	18	3.5	0.6	0.7

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

	a	b	c	d	e	f	g	h	i	j	k	l	m
FIRB – Central governments and central banks	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Coll imp
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	—	—	75.0	0.1	0.04	1	45.0	5.00	—	32	—		
0.15 to <0.25	—	—	—	—	—	—	—	—	—	—	—		
0.25 to <0.50	—	—	—	—	—	—	—	—	—	—	—		
0.50 to <0.75	—	—	—	—	—	—	—	—	—	—	—		
0.75 to <2.50	—	—	—	—	—	—	—	—	—	—	—		
2.50 to <10.00	—	—	—	—	—	—	—	—	—	—	—		
10.00 to <100.00	—	—	—	—	—	—	—	—	—	—	—		
100.00 (Default)	—	—	—	—	—	—	—	—	—	—	—		
Sub-total	—	—	75.0	0.1	0.04	1	45.0	5.00	—	32	—	—	—

	a	b	c	d	e	f	g	h	i	j	k	l	m
FIRB – Institutions	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Coll impa
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	0.1	—	45.2	0.1	0.06	2	45.0	2.75	—	23	—		
0.15 to <0.25	—	—	20.7	—	0.22	—	45.0	3.82	—	62	—		
0.25 to <0.50	0.1	—	75.0	0.2	0.37	1	45.0	1.71	0.1	55	—		
0.50 to <0.75	—	—	—	—	—	—	—	—	—	—	—		
0.75 to <2.50	—	—	—	—	—	—	—	—	—	—	—		
2.50 to <10.00	—	—	—	—	—	—	—	—	—	—	—		
10.00 to <100.00	—	—	—	—	—	—	—	—	—	—	—		
100.00 (Default)	—	—	—	—	—	—	—	—	—	—	—		
Sub-total	0.2	—	46.6	0.3	0.26	3	45.0	2.09	0.1	43	—	—	—

FIRB – Corporate – Other	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Collec impai
PD scale	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
0.00 to <0.15	8.6	12.2	40.5	13.5	0.09	1,316	44.6	2.45	3.8	28	—		
0.15 to <0.25	3.1	5.7	39.2	5.3	0.22	1,303	44.9	2.22	2.4	46	—		
0.25 to <0.50	4.5	5.2	32.2	6.1	0.37	1,549	42.8	1.96	3.5	57	—		
0.50 to <0.75	3.3	5.2	30.9	4.9	0.63	1,140	43.4	1.98	3.6	72	—		
0.75 to <2.50	6.7	9.7	26.5	9.0	1.35	2,817	43.1	1.67	8.3	91	0.1		
2.50 to <10.00	2.3	2.2	28.2	2.8	4.65	1,312	42.9	1.90	3.8	138	0.1		
10.00 to <100.00	0.2	0.2	15.2	0.3	15.99	180	41.4	0.90	0.4	175	—		
100.00 (Default)	0.4	0.1	45.8	0.5	100.00	414	44.9	1.43	—	—	0.2		
Sub-total	29.1	40.5	33.9	42.4	1.95	10,031	43.8	2.07	25.8	61	0.4	0.3	0.1
	a	b	c	d	e	f	g	h	i	j	k	l	m

FIRB – Total	Original on-balance sheet gross exposure	Off-balance sheet exposures pre-CCF	Average CCF	EAD post-CRM and post-CCF	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density	EL	Individual impairments	Colle impai
	$bn	$bn	%	$bn	%		%	yrs	$bn	%	$bn	$bn	$bn
Total (all portfolios)	29.3	40.5	34.0	42.8	1.94	10,035	43.8	2.1	25.9	61	0.4	0.3	0.1

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 56a: Specialised lending – other than HVCRE – Slotting only

Regulatory categories	Remaining maturity	On-balance sheet amount	Off-balance sheet amount	RW	Exposure amount					RWA	Expected losses
					PF	OF	CF	IPRE	Total		
		$bn	$bn	%	$bn	$bn	$bn	$bn	$bn	$bn	$bn
Strong	Less than 2.5 years	9.1	1.5	50	0.3	—	—	9.6	9.9	5.0	—
	Equal to or more than 2.5 years	12.6	1.5	70	0.1	0.6	—	13.0	13.7	9.5	0.1
Good	Less than 2.5 years	2.9	0.4	70	—	0.3	—	2.8	3.1	2.1	—
	Equal to or more than 2.5 years	2.8	0.1	90	—	0.3	—	2.5	2.8	2.5	—
Satisfactory	Less than 2.5 years	0.5	—	115	—	0.1	—	0.4	0.5	0.6	—
	Equal to or more than 2.5 years	0.9	—	115	0.2	0.4	—	0.3	0.9	1.0	—
Weak	Less than 2.5 years	0.3	—	250	0.1	—	—	0.2	0.3	0.8	—
	Equal to or more than 2.5 years	0.1	—	250	—	—	—	0.1	0.1	0.3	—
Default	Less than 2.5 years	0.5	—	—	—	0.1	—	0.7	0.8	—	0.5
	Equal to or more than 2.5 years	0.3	—	—	—	0.3	—	0.1	0.4	—	0.2
Total		30.0	3.5		0.7	2.1	—	29.7	32.5	21.8	0.8

Table 56b: Specialised lending – HVCRE – Slotting only

Regulatory categories	Remaining maturity	On-balance sheet amount	Off-balance sheet amount	RW	Exposure amount	RWA	Expected losses
		$bn	$bn	%	$bn	$bn	$bn
Strong	Less than 2.5 years	0.2	0.1	70	0.3	0.2	—
	Equal to or more than 2.5 years	—	—	95	—	—	—
Good	Less than 2.5 years	0.3	—	95	0.3	0.2	—
	Equal to or more than 2.5 years	—	—	120	—	—	—
Satisfactory	Less than 2.5 years	—	—	115	—	—	—
	Equal to or more than 2.5 years	—	—	115	—	—	—
Weak	Less than 2.5 years	—	—	250	—	—	—
	Equal to or more than 2.5 years	—	—	250	—	—	—
Default	Less than 2.5 years	—	—	—	—	—	—
	Equal to or more than 2.5 years	—	—	—	—	—	—
Total		0.5	0.1		0.6	0.4	—

Table 57: Analysis of counterparty credit risk (CCR) exposure by approach (excluding centrally cleared exposures)

	a	b	c	d	e	f
Footnote	Replacement cost	Potential future exposure	EEPE	Alpha used for computing regulatory EAD	EAD post-CRM	RWA

		$bn	$bn	$bn	$bn	$bn	$bn
1	SA-CCR (for derivatives)	1	27.5	43.5			71.0	28.0
2	Internal Model Method (for derivatives and SFTs)				19.9	1.4	27.9	10.9
3	Simple Approach for credit risk mitigation (for SFTs)						—	—
4	Comprehensive Approach for credit risk mitigation (for SFTs)						38.3	7.3
5	VaR for SFTs						—	—
6	Total		27.5	43.6	19.9	1.4	137.2	46.2

1 Prior to the implementation of SA-CCR, Exposures reported here will be those under the mark-to-market method.

Table 58: Credit valuation adjustment (CVA) capital charge

		a	b
		EAD post-CRM	RWA
		$bn	$bn
1	Total portfolios subject to the Advanced CVA capital charge	12.8	3.5
2	– VaR component (including the 3×multiplier)		0.8
3	– stressed VaR component (including the 3×multiplier)		2.7
4	All portfolios subject to the Standardised CVA capital charge	41.6	10.9
5	Total subject to the CVA capital charge	54.4	14.4

Capital and Risk Management Pillar 3 Disclosures at 31 December 2016

Table 59: Standardised approach – CCR exposures by regulatory portfolio and risk weights

	a	b	c	d	e	f	g	h	i
Risk weight	0%	10%	20%	50%	75%	100%	150%	Others	Total credit exposure
Asset Classes									
Central governments and central banks	7.3	—	—	—	—	—	—	—	7.3
Institutions	—	—	—	0.2	—	—	—	—	0.2
Corporates	—	—	—	0.1	—	2.5	—	—	2.6
Total	7.3	—	—	0.3	—	2.5	—	—	10.1

Table 60: IRB – CCR exposures by portfolio and PD scale

	a	b	c	d	e	f	g
PD scale	EAD post-CRM	Average PD	Number of obligors	Average LGD	Average maturity	RWA	RWA density
IRB advanced: Central Government and Central Banks	$bn	%		%	yrs	$bn	%
0.00 to <0.15	11.7	0.04	104	45.3	1.00	1.1	8
0.15 to <0.25	0.2	0.22					