The Clearing House

TCH Research Study:

Empirical Analysis of BCBS-Proposed Revisions to the Standardized Approach For Credit Risk

May 2016

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Overview of BCBS proposed revisions to Standardized Approach Credit Conversion Factors (CCFs)

- The Basel Committee announced a number of substantial revisions to the Standardized Approach for Credit Risk, which include:
  - Application of a CCF between 10% and 20% to retail unconditionally cancellable commitments (UCCs);
  - Elimination of differences in CCFs based on maturity for not unconditionally cancellable commitments; and
  - Application of a CCF between 50% and 75% to all off-balance sheet exposures that are not retail unconditionally cancellable commitments, which includes wholesale exposures.

Summary of Changes for Off-Balance Sheet Exposure Categories that receive a CCF of less than 100%[1]

Off-balance sheet exposure types that receive CCF<100%	Current SA	Foundation IRB	Proposal for revised SA
Commitments that are unconditionally cancellable at any time without prior notice, or that effectively provide automatic cancellation due to deterioration in borrower's creditworthiness; retail only	0%	0%	10-20%
Commitments, except retail unconditionally cancellable	0%	75%	50-75%
Commitments with maturity <= 1 year, except retail unconditionally cancellable	20%	-	-
Commitments with maturity > 1 year, except retail unconditionally cancellable	50%	-	-

[1] Refer to section 1.7 *(P.16)* of the BCBS Second consultative document on Revisions to the Standardized Approach for credit risk.

TCH Study - Approach

- TCH has utilized data from large U.S. bank holding companies (TCH Study) to analyze the impact that could result from the implementation of the BCBS-proposed revisions to the Standardized Approach for credit risk with respect to credit conversion factors (CCFs) for off-balance sheet commitments.
- The TCH Study of wholesale and retail portfolios is based on data from 8 U.S. Advanced Approaches Institutions[1] (Wholesale Participating Banks) and 6 U.S. Advanced Approaches Institutions (Retail Participating Banks), respectively. The Wholesale Participating Banks account for 72% of the undrawn portion of aggregate wholesale commitments of U.S. Advanced Approaches Institutions and the Retail Participating Banks account for 78% of the undrawn portion of aggregate retail UCCs of U.S. Advanced Approaches Institutions, each as of December 31, 2015.
- All data collected is as of December 31, 2015, unless otherwise noted.
- All computed CCFs are expressed as average weighted by undrawn exposure amount.
- The impact on EAD, TLE and RWA is measured with respect to the CCFs under the current Standardized Approach.
- The estimated CCFs of Wholesale and Retail Participating Banks are used to extrapolate the impact of BCBS-proposed CCFs across all U.S. Advanced Approaches Institutions using the wholesale and retail undrawn amount reported in the FFIEC 101 reports for these institutions.

[1] As used in the TCH Study, U.S. Advanced Approaches Institutions includes the 12 institutions that had exited parallel run as of December 2015 or are Wholesale Participating Banks or Retail Participating Banks.

TCH Study - Approach (Continued)

- **Study Methodology : Wholesale**
  - The TCH Study uses CCFs calculated using historical default data and exposure amount across different wholesale portfolios and maturity buckets to report aggregate historical CCFs and aggregate CCFs under the current Standardized Approach.
  - The aggregate undrawn portion of wholesale commitments of U.S. Advanced Approaches Institutions is determined by aggregating the undrawn amount of Corporate, Banks, IPRE and HVCRE exposures (terms defined in the FFIEC 101 report) of the U.S. Advanced Approaches Institutions.

- **Study Methodology : Retail**
  - The TCH Study uses two approaches to calculate CCFs for retail commitments that are unconditionally cancellable:
    - Method 1: Uses current amount for exposures and risk-weighted assets (RWA) to calculate the implied CCF that makes undrawn exposures RWA under the Standardized Approach equal to undrawn RWA under the Advanced Approaches (AA-implied CCF);
    - Method 2: Uses historical default data to calibrate CCFs for Credit Cards (similar to Wholesale portfolios).
  - Method 2 is expected to yield the most accurate data for retail CCFs. As the data for Method 2 was only provided for credit card loans (i.e. most results for retail portfolios use Method 1), we have used a combination of Method 2 results for credit cards combined with Method 1 results for HELOCs and PLOCs where necessary to yield more accurate results.
  - The aggregate undrawn portion of retail UCCs of U.S. Advanced Approaches Institutions is determined by aggregating the undrawn amount of Qualifying revolving exposures, Residential mortgage – revolving exposures, and Other retail exposures (terms defined in the FFIEC 101 report) of U.S. Advanced Approaches Institutions.

Executive Summary – Key Findings

- **Wholesale portfolios**
  - The **aggregate historical CCF** for wholesale portfolios of the Wholesale Participating Banks **is significantly lower (40.8%) than the BCBS-proposed minimum of 50% and the BCBS-proposed maximum of 75%,** which indicates that the proposed minimum CCF is too high and the BCBS-proposed maximum CCF is nearly double the historical experience of the Wholesale Participating Banks.
    - A **CCF of 50%** would result in a corresponding **increase in Standardized Approach Exposure at Default (EAD) and Total Leverage Exposure (TLE) of approximately $145B** for U.S. Advanced Approaches Institutions, while a **CCF of 75%** would result in **an increase in EAD and TLE of approximately $709B**, representing 4.9% of aggregate TLE of such institutions;
    - **To maintain the EAD and TLE constant** at the level corresponding to the current Standardized Approach, **the associated reduction in aggregate wholesale commitment amount** of U.S. Advanced Approaches Institutions, under the BCBS-proposed 50% and 75% CCFs, would be **approximately $174B and $770B (2% and 10% of wholesale commitments),** respectively.

- **Retail portfolios**
  - The **aggregate CCF** for all retail UCCs of the Retail Participating Banks computed under Method 1 **is significantly lower (7.4%) than the BCBS-proposed minimum of 10% and the BCBS-proposed maximum of 20%**, which indicates that the proposed minimum CCF is too high and the BCBS-proposed maximum CCF is nearly triple the historical experience of the Retail Participating Banks;
    - Under Method 1, the **AA-implied CCF for credit cards is 6.5% and for Personal Line of Credit and Other UCC portfolios (PLOCs) is 7.7%,** both of which are significantly lower than the BCBS proposed minimum of 10% for retail UCCs;
    - Under Method 2, the **aggregate historical CCF for credit cards is 3%**, indicating that both the AA-implied CCF and the BCBS-proposed minimum are extremely conservative compared to the historical experience of the Retail Participating Banks;
    - Under Method 1, **the AA-implied CCF for Home Equity Lines of Credit (HELOCs) is 15.7%,** indicating that the BCBS-proposed range of 10-20% would be consistent with the experience of the Retail Participating Banks;

Executive Summary – Key Findings (Continued)

- **Retail portfolios (Continued)**
  - A **CCF of 10% for all retail UCCs** would result in a corresponding **increase in aggregate Standardized Approach EAD and TLE of approximately $260B** for all U.S. Advanced Approaches Institutions, while a **CCF of 20%** would result in an **increase in EAD and TLE of approximately $520B**, representing 3.6% of the aggregate TLE of such institutions;
  - A **CCF of 10% for all retail UCCs** would result in a corresponding **increase in aggregate Standardized Approach RWA of approximately $195B** for all U.S. Advanced Approaches Institutions, while a **CCF of 20%** would result in an **increase in RWA of approximately $390B**;
  - **To maintain the EAD, TLE and RWA constant** at the level corresponding to the current Standardized Approach, **the associated reduction in retail UCCs** of U.S. Advanced Approaches Institutions, under the BCBS-proposed 10% and 20% CCFs, would be **approximately $594B and $1.04T (14% and 24% of retail commitments)**, respectively.

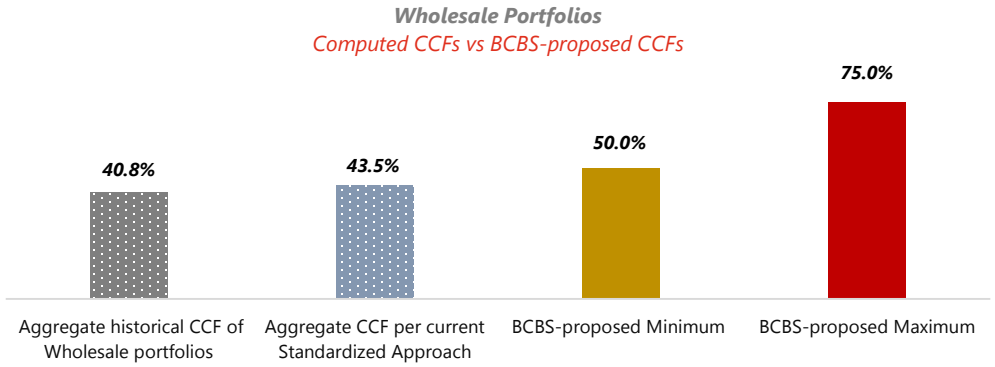
- **Overall impact of the BCBS-proposed CCFs on the supplementary leverage ratio and commitment amount**
  - Using the BCBS proposed CCFs for wholesale and retail exposures **would increase TLE between $405B and $1.23T, and decrease the Supplementary Leverage Ratio (SLR) up to 60 bps**, each in the aggregate for U.S. Advanced Approaches Institutions;
  - Alternatively, if U.S. Advanced Approaches Institutions chose to maintain existing SLR levels and hold their **EAD and TLE constant** to offset the BCBS-proposed wholesale and retail CCF changes, **there would need to be a reduction in retail UCCs and wholesale commitments of up to $1.81T in the aggregate (or 15% of all commitments at U.S. Advanced Approaches Institutions).**

Executive Summary – Key Findings (Continued)

The computed aggregate CCFs of wholesale and retail UCC portfolios are lower than the BCBS-proposed CCF ranges

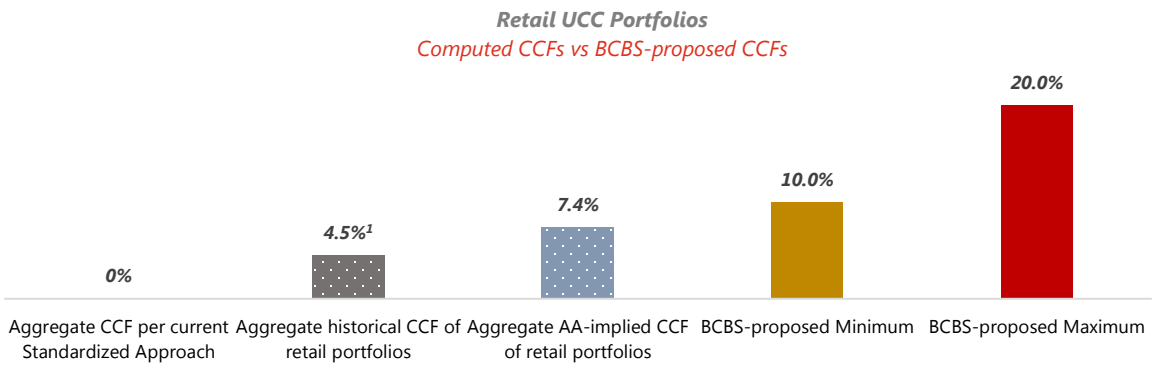
Wholesale portfolios

- **The BCBS-proposed CCF range (50-75%) for wholesale portfolios is higher** than both the aggregate CCF of wholesale portfolios computed using historical default data as well as the aggregate CCF of wholesale portfolios under the current Standardized Approach



Retail portfolios

- **The BCBS-proposed CCF range (10-20%) for retail UCC portfolios is higher** than both the aggregate CCF of retail portfolios computed using historical default data as well as aggregate AA-implied CCF of retail portfolios.



[1] The aggregate historical CCF of retail portfolios is an estimate, computed using the average aggregate historical CCF of Credit Card portfolios and the aggregate AA-implied CCF of PLOC and HELOC portfolios.

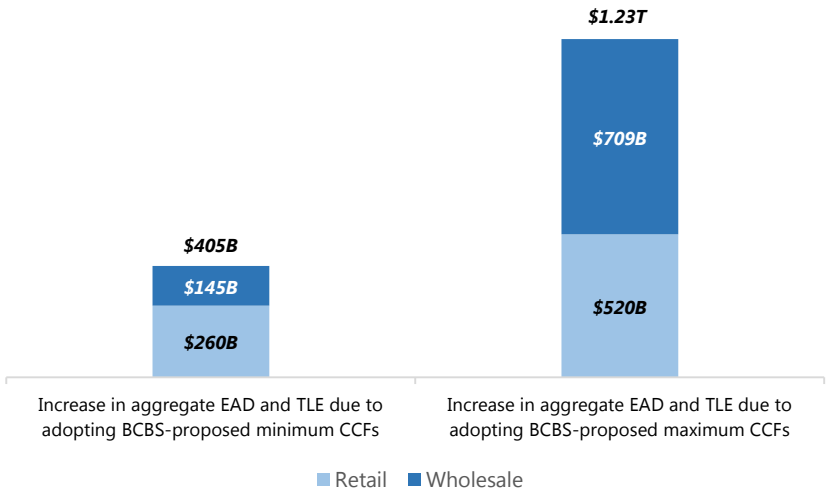
Executive Summary – Key Findings (Continued)

Adopting the BCBS-proposed CCF ranges would reduce the aggregate SLR[1] of U.S. Advanced Approaches Institutions up to 60 basis points[2]

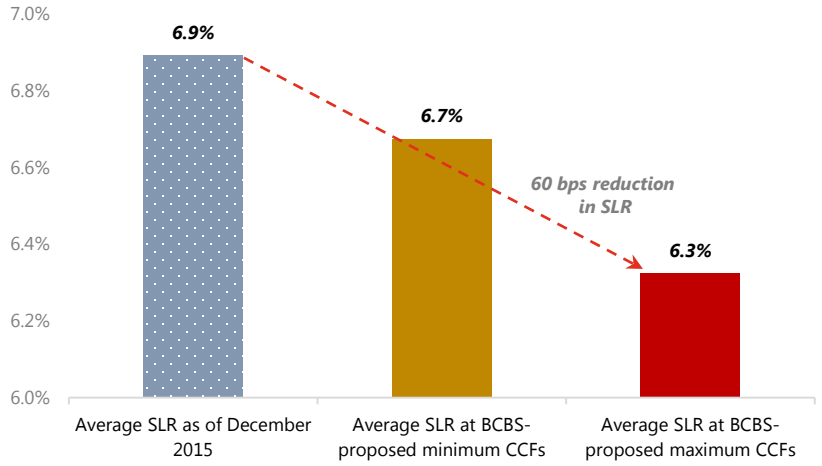
Adopting BCBS-proposed CCF ranges for retail and wholesale exposures would increase the aggregate EAD and TLE of U.S. Advanced Approaches Institutions between $405B and $1.23T…

…which in turn would reduce the aggregate SLR of U.S. Advanced Approaches Institutions between 20 to 60 basis points.

Increase in aggregate EAD and TLE due to adopting BCBS-proposed CCFs compared to current Standardized Approach based CCFs



Impact on Average SLR of U.S. Advanced Approaches Institutions due to adopting BCBS-proposed CCF



[1] The aggregate Supplementary Leverage Ratio of U.S. Advanced Approaches Institutions is computed as the ratio of aggregate Tier 1 capital of U.S. Advanced Approaches Institutions ($992B) to the aggregate Total Leverage Exposure (TLE) of U.S. Advanced Approaches Institutions ($14.41T), as of December 31, 2015.

[2] The impact of the proposals on Risk-Weighted Capital would also be substantial. See p. 30 for a discussion of the impact of the BCBS-proposed retail CCFs on RWA.

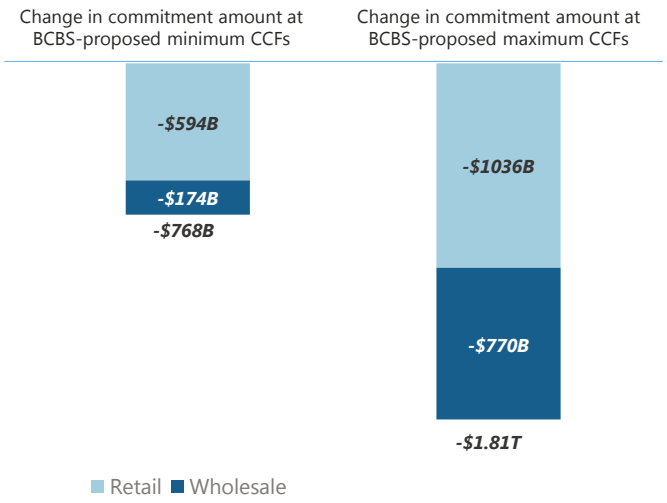
Executive Summary – Key Findings (Continued)

To maintain the existing SLR level and the current EAD and TLE constant, aggregate commitments[1] of U.S. Advanced Approaches Institutions[2] would have to decline 15%

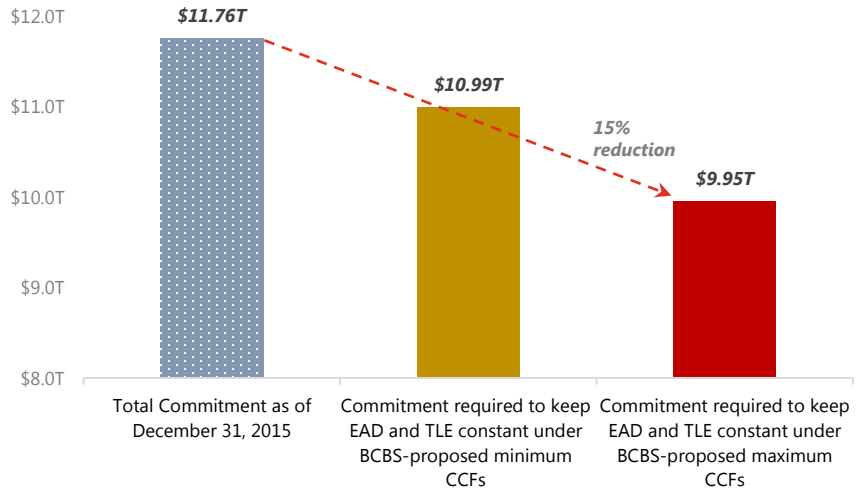
To maintain aggregate EAD and TLE of U.S. Advanced Approaches Institutions constant, the associated reduction in portfolio would be between $768B and $1.81T…

…representing a reduction between 7% and 15% in aggregate wholesale and retail UCC commitments of U.S. Advanced Approaches Institutions.

Change in commitment[3] amount required to maintain EAD and TLE constant



Impact on total commitments of U.S. Advanced Approaches Institutions



[1] Aggregate commitments refer to the sum of drawn and undrawn amount of wholesale and retail UCC portfolios of U.S. Advanced Approaches Institutions, per the FFIEC 101 reports as of December 31, 2015.

[2] As used in this study, U.S. Advanced Approaches Institutions includes the 12 institutions that have exited parallel run as of December 2015 or are Wholesale Participating Banks or Retail Participating Banks.

[3] The change in commitment amount assumes that line usage would remain constant and the change will reduce both the drawn and undrawn amount of the commitment. Refer to Appendix 1.2, p.29 for more details.

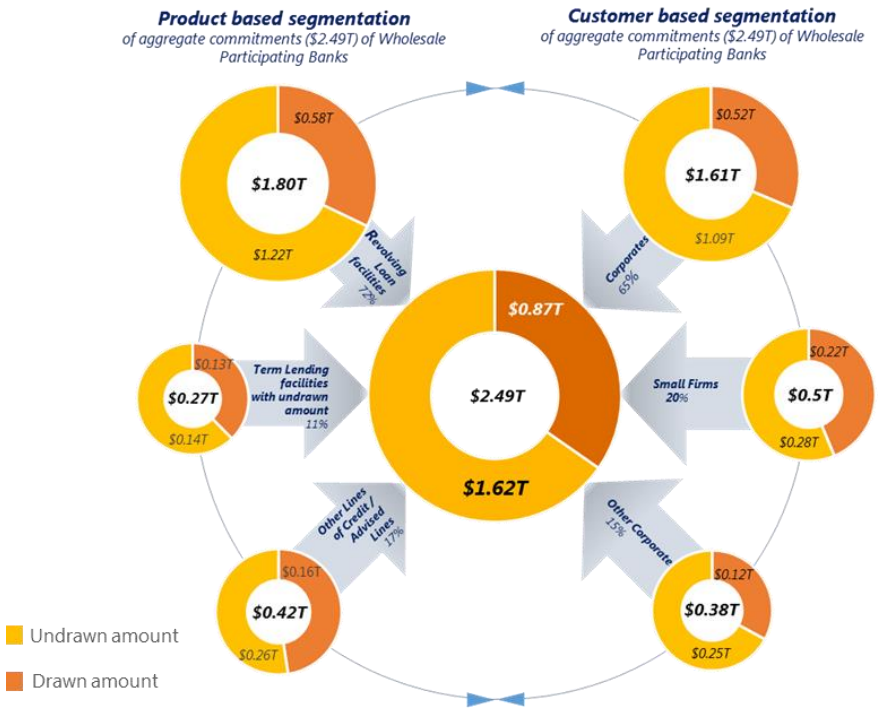
Wholesale Portfolios

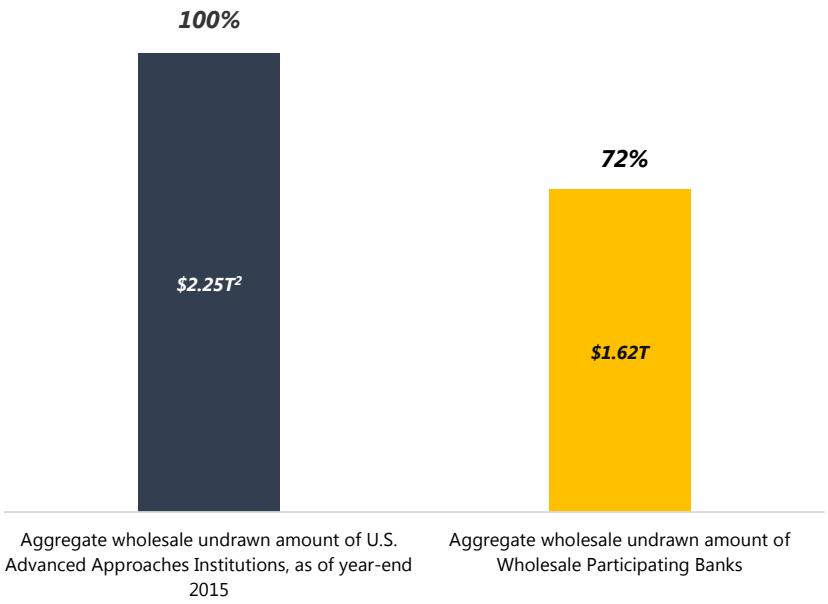
Market Share of Wholesale Participating Banks

The Wholesale Participating Banks hold $1.62T in undrawn portion of wholesale commitments, or 72% of the aggregate wholesale undrawn amount[1] of U.S. Advanced Approaches Institutions as of year-end 2015 and therefore are a reliable sample to estimate the impact of BCBS-proposed revisions across all U.S. Advanced Approaches Institutions

Wholesale Participating Banks have $1.62T in wholesale undrawn amount, as of year-end 2015...

...representing 72% of wholesale undrawn amount of all U.S. Advanced Approaches Institutions ($2.25T) as of year-end 2015.





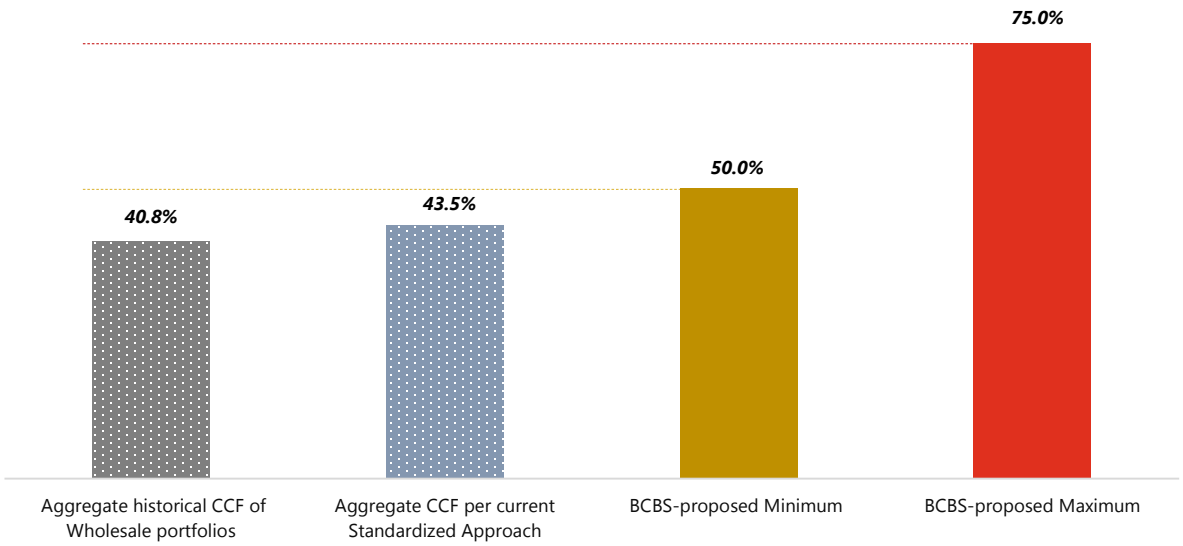
[1] The aggregate undrawn wholesale commitments across U.S. Advanced Approaches Institutions ($2.25T) was computed based on FFIEC 101 reports for all U.S. Advanced Approaches Institutions as of December 31, 2015.

Computed wholesale CCFs vs. BCBS-proposed CCF range

The BCBS-proposed CCF range for wholesale portfolios (50%-75%) is 9 to 34 percentage points higher than the aggregate historical CCF of wholesale portfolios

- **The BCBS-proposed minimum and maximum CCFs for wholesale portfolios are more than 6 and 31 percentage points higher, respectively**, than the aggregate CCF of wholesale portfolios of the Wholesale Participating Banks computed per the current Standardized Approach.
- **The BCBS-proposed minimum and maximum CCFs for wholesale portfolios are more than 9 and 34 percentage points higher, respectively,** than the aggregate historical CCF of wholesale portfolios.

Aggregate CCFs[1] of wholesale portfolios vs BCBS-proposed CCF range

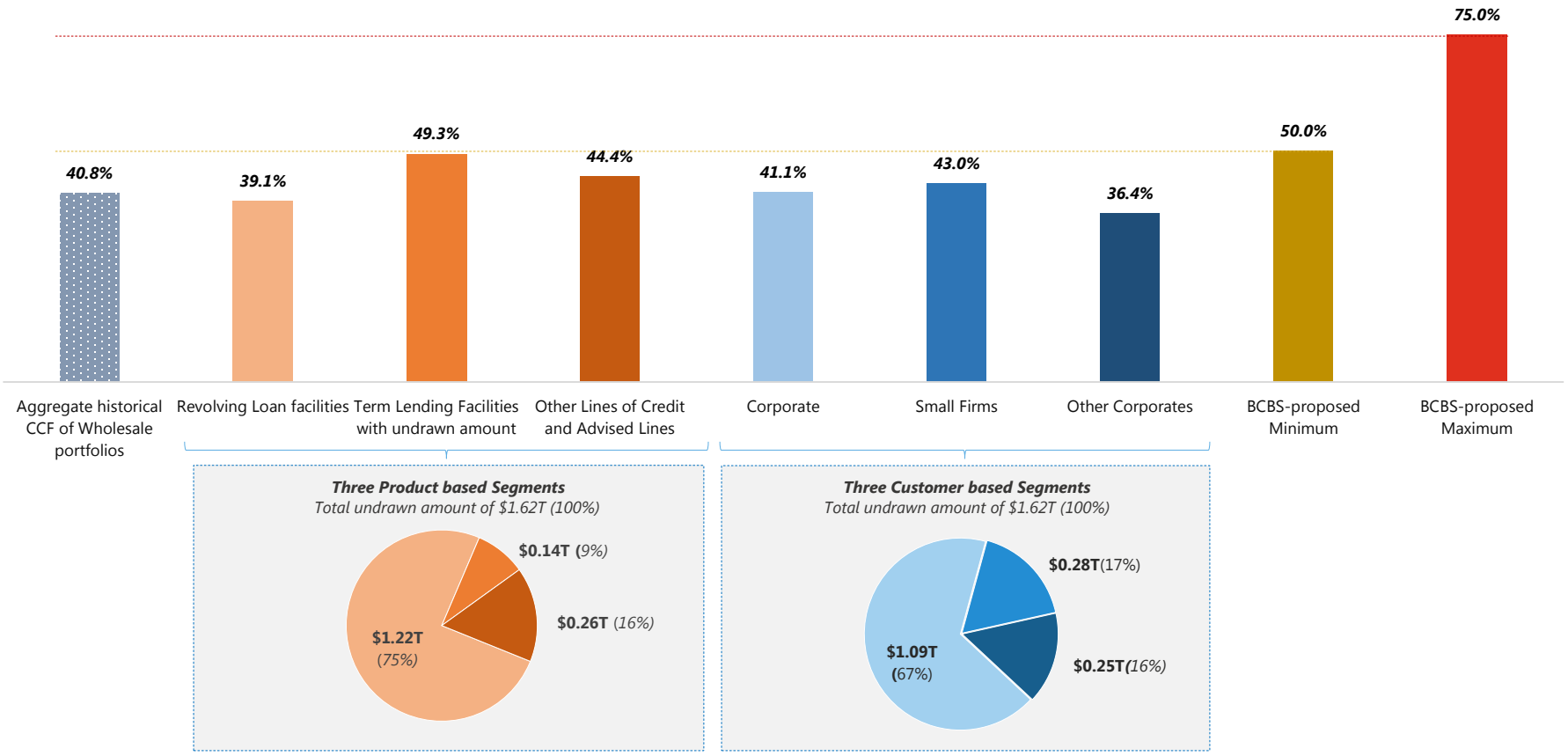


[1] Aggregate CCFs are expressed as average weighted by undrawn exposure amount.

Computed wholesale sub-segment CCFs vs. BCBS-proposed range

The BCBS-proposed minimum CCF for wholesale portfolios is also higher than each of the aggregate historical CCFs of all six analyzed sub-segments of wholesale portfolios

Aggregate CCF of six sub-segments of wholesale portfolios computed using historical default data vs. BCBS-proposed CCF range



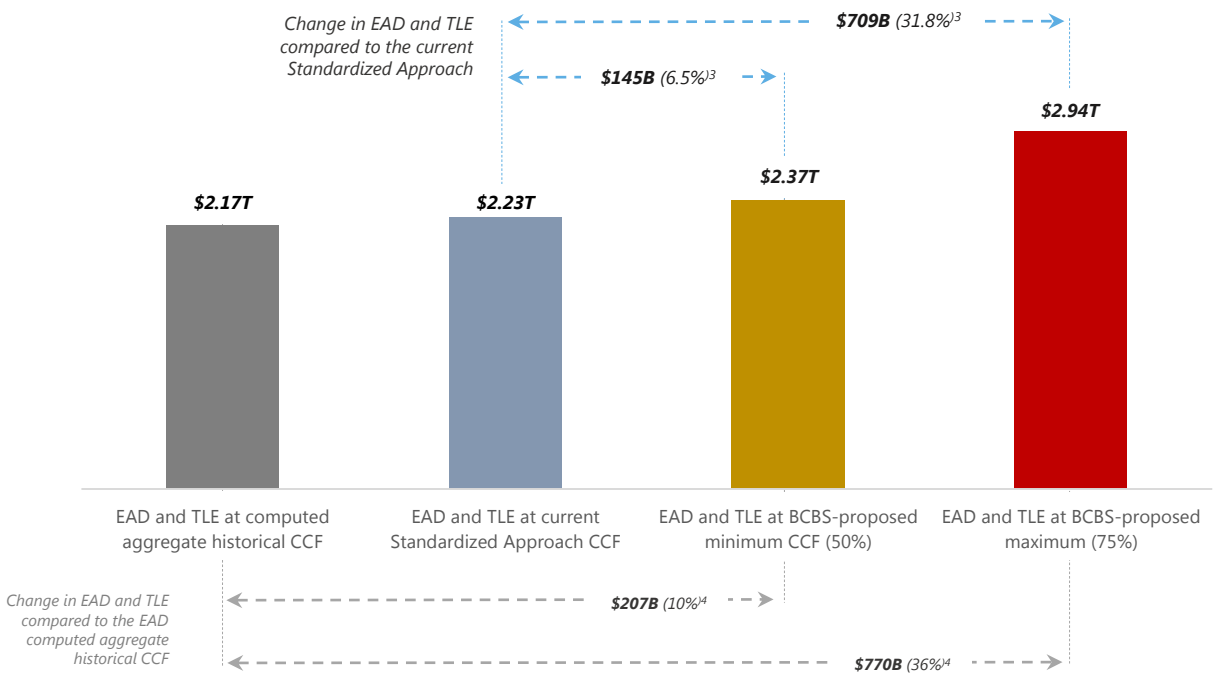
Impact on EAD and TLE of U.S. Advanced Approaches Institutions

Adopting the BCBS-proposed CCFs for wholesale portfolios would represent an increase in EAD and TLE of up to $709B[1] or about 5% of aggregate TLE of U.S. Advanced Approaches Institutions,[2] as compared to the current Standardized Approach

- Adopting the BCBS-proposed minimum and maximum CCFs for wholesale portfolios would result in **an increase in EAD and TLE** of U.S. Advanced Approaches Institutions ranging from **$145B to $709B**, respectively, or 1.0-4.9% of aggregate TLE of U.S. Advanced Approaches Institutions, **as compared to the current Standardized Approach.**

- Using the BCBS-proposed minimum and maximum CCFs would result in a **larger increase in EAD and TLE** of U.S. Advanced Approaches Institutions, ranging from **$207B to $770B**, respectively, or 1.4-5.3% of aggregate TLE of U.S. Advanced Approaches Institutions, **as compared to the aggregate historical CCF of wholesale portfolios** (40.8%).

Increase in EAD and TLE due to adoption of BCBS-proposed minimum and maximum CCFs



[1] $709B represents the estimated increase in EAD and TLE across the U.S. Advanced Approaches Institutions under the BCBS-proposed maximum CCF, compared to that corresponding to the Standardized Approach CCF of such wholesale portfolios (43.5%).

[2] The aggregate TLE of U.S. Advanced Approaches Institutions is $14.41T.

[3] Represents the increase in EAD and TLE of wholesale portfolios of U.S. Advanced Approaches Institutions as compared to the EAD and TLE computed using current Standardized Approach based CCF, expressed as a percentage of the EAD computed using the Standardized Approach CCF of such wholesale portfolios (43.5%).

[4] Represents the increase in EAD and TLE of wholesale portfolios of U.S. Advanced Approaches Institutions as compared to the EAD and TLE computed using the aggregate historical CCF, expressed as a percentage of the EAD computed using the aggregate historical CCF of such wholesale portfolios (40.8%).

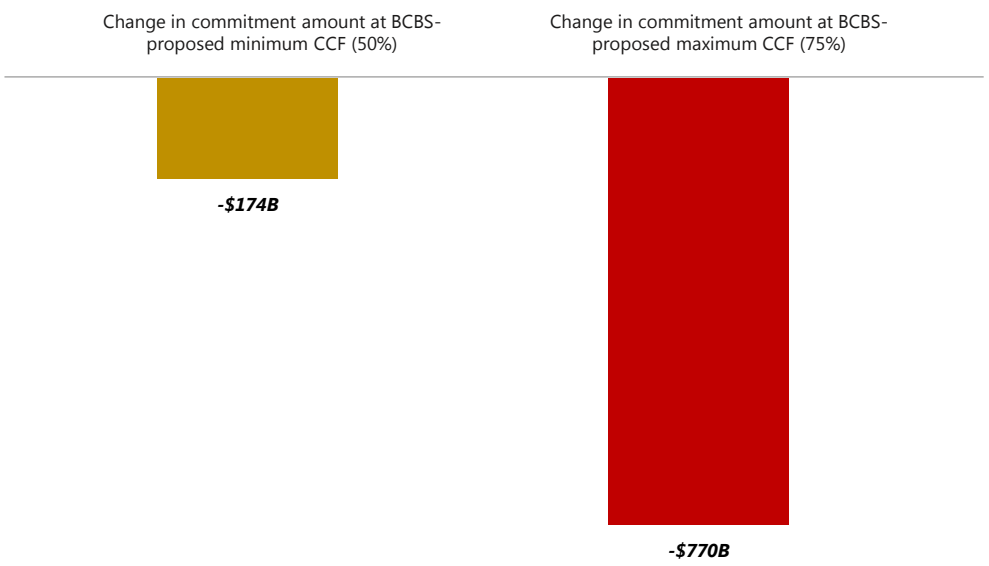
Change in wholesale commitment amount to maintain the existing SLR level

To maintain the existing SLR level and the current EAD and TLE of wholesale portfolios constant, the associated reduction in aggregate wholesale commitments of U.S. Advanced Approaches Institutions would need to be up to approximately $770B (or 10% of wholesale commitments), as compared to the current Standardized Approach

- As **compared to the current Standardized Approach**, to maintain EAD and TLE of wholesale portfolios constant, under the BCBS-proposed minimum and maximum CCF, the associated reduction in aggregate wholesale commitment amount of U.S. Advanced Approaches Institutions would be approximately **$174B and $770B**, respectively.

- As **compared to the aggregate historical CCF** of wholesale portfolios, to maintain EAD and TLE of wholesale portfolios constant using the BCBS-proposed minimum and maximum CCF the associated reduction in aggregate wholesale commitment amounts of U.S. Advanced Approaches Institutions would be even larger and approximately **$246B and $836B**, respectively.

Change in commitment amount[1] to maintain EAD and TLE constant at the level corresponding to that computed using current Standardized Approach-based CCFs



[1] The change in commitment amount assumes that the utilization will remain constant and the change will reduce both the drawn and undrawn amount of the commitment. Refer to Appendix 1.2, p.29 for more details.

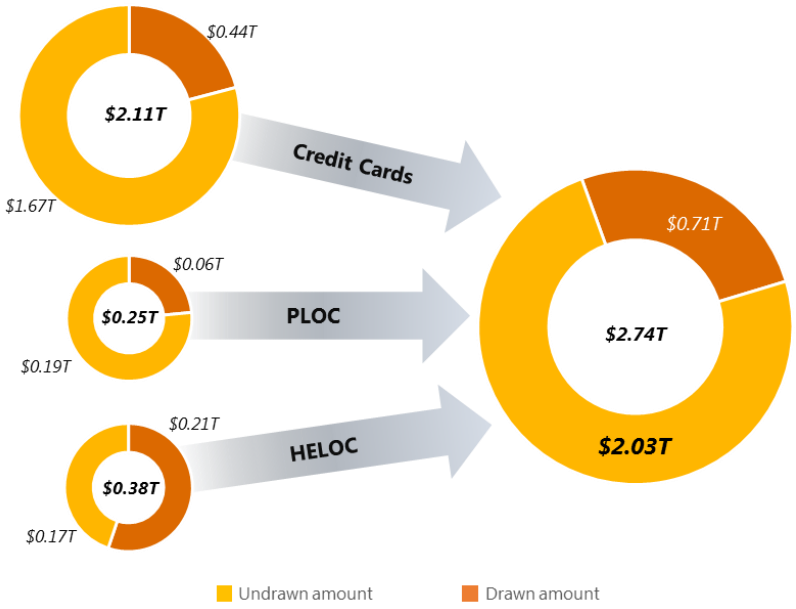
Retail Portfolios

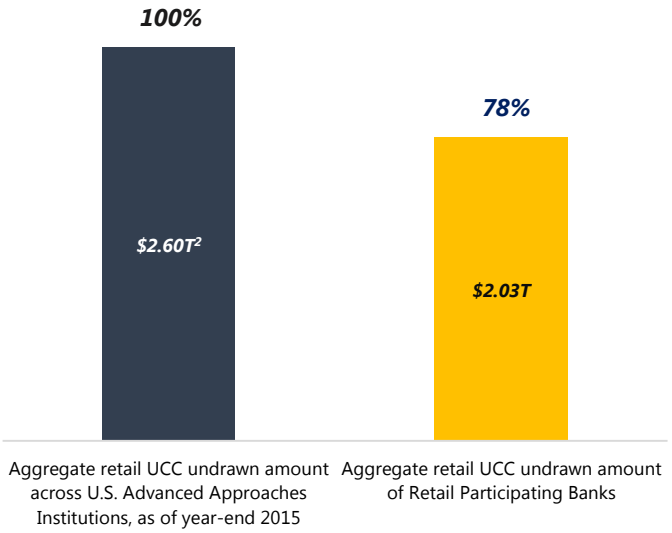
Market Share of Retail Participating Banks

The Retail Participating Banks hold $2.03T of retail UCCs undrawn amount, or 78% of the aggregate retail UCCs undrawn amount[1] across U.S. Advanced Approaches Institutions as of year-end 2015, and therefore are a reliable sample to estimate the impact of BCBS-proposed revisions across all U.S. Advanced Approaches Institutions

Retail Participating Banks have $2.03T in retail UCCs undrawn amount across Credit Card, PLOC and HELOC portfolios, as of year-end 2015...

...representing 78% of retail UCCs undrawn amount of all U.S. Advanced Approaches Institutions ($2.60T) as of year-end 2015.





[1] The aggregate retail UCCs undrawn amount of U.S. Advanced Approaches Institutions ($2.60T) was computed based on FFIEC 101 reports for U.S. Advanced Approaches Institutions as of December 31, 2015.

AA-implied retail CCFs vs. BCBS-proposed CCF range

The BCBS-proposed CCF range for retail UCCs (10%-20%) is approximately 3 to 13 percentage points higher than the aggregate AA-implied CCFs[1] of retail UCCs

Credit Cards

- The BCBS-proposed minimum and maximum CCFs are **3.5 and 13.5 percentage points higher**, respectively, than the aggregate CCF of Credit Card portfolios.

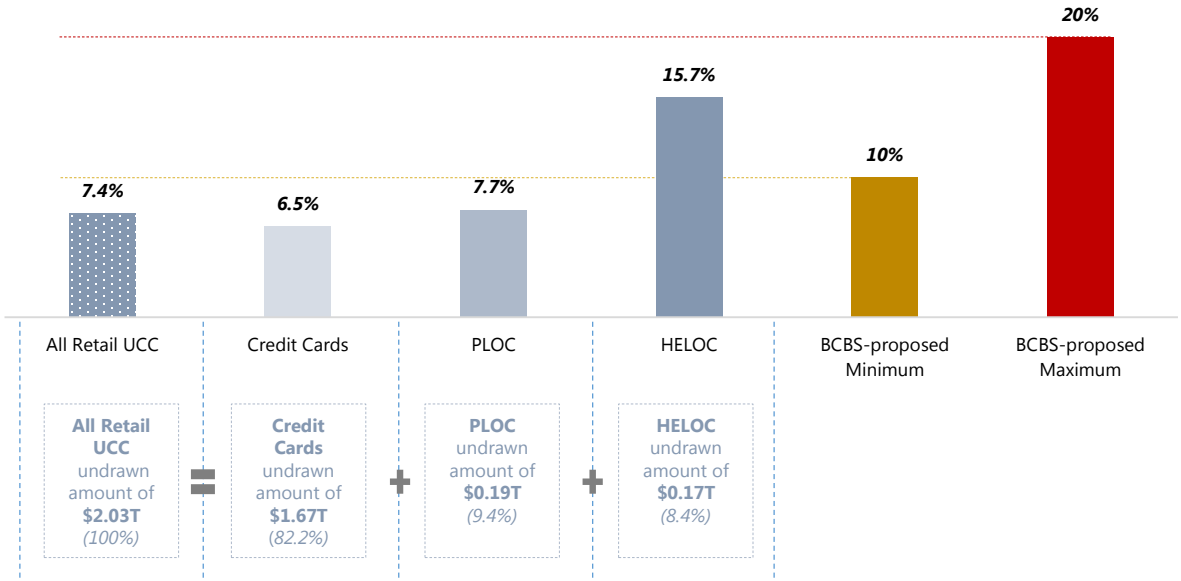
PLOCs

- The BCBS-proposed minimum and maximum CCFs are **2.3 and 12.3 percentage points higher**, respectively, than the aggregate CCF of Personal Line of Credit and other UCC portfolios.

HELOCs

- The BCBS-proposed minimum and maximum CCFs are **5.7 percentage points lower and 4.3 percentage points higher**, respectively, than the aggregate CCF of HELOC portfolios.

Aggregate CCFs of retail portfolios computed using a constant Risk Weight of 75% vs. BCBS-proposed CCF range

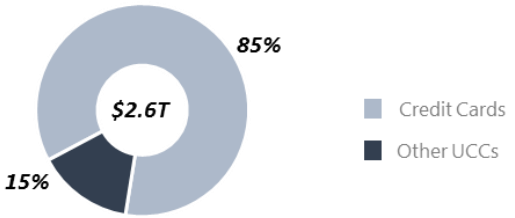


[1] Aggregate CCFs are expressed as average weighted by undrawn exposure amount.

Historical CCF of Credit Card portfolio vs. BCBS-proposed CCF range

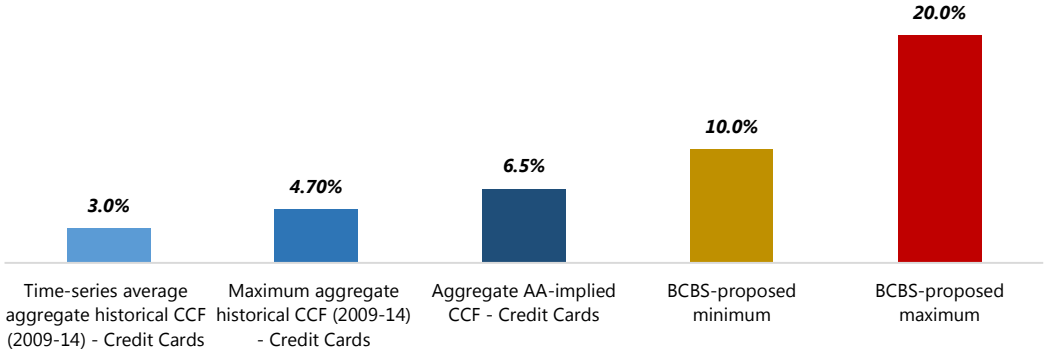
Time-series average aggregate historical CCF of credit card portfolios of the Retail Participating Banks are approximately 4 percentage points lower than the CCF of Credit Cards computed using the current Standardized Approach and approximately 7 to 13 percentage points lower than the BCBS-proposed CCF range

Credit Card undrawn amount represents 85% of all retail UCC undrawn amount of U.S. Advanced Approaches Institutions

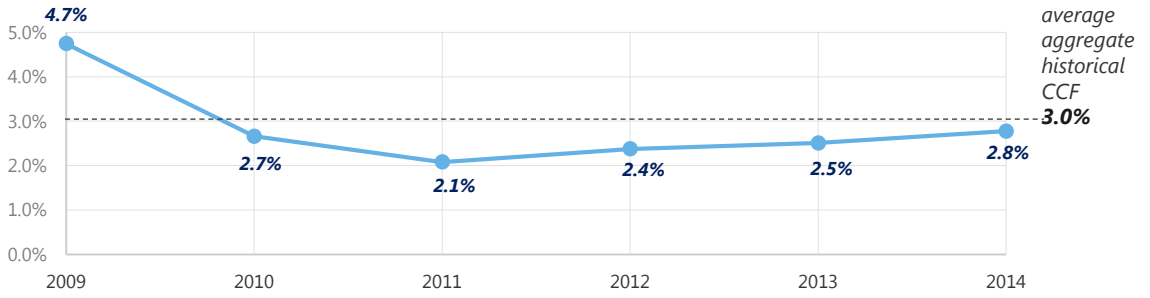


- **The time-series average and the maximum aggregate historical CCF of Credit Cards between 2009 and 2014** of the Retail Participating Banks **are 3.5 and 1.8 percentage points lower, respectively, than the aggregate AA-implied CCF for such loans.**
- The historical CCF approach uses data after the introduction of the 2009 Credit Card Accountability Responsibility and Disclosure Act[1] to allow for a meaningful comparison.

Time-series average aggregate historical CCF of credit card portfolios vs BCBS-proposed CCF range



Aggregate historical CCF of credit card portfolios 2009-14



[1] Credit Card Accountability Responsibility and Disclosure Act of 2009'' or the ``Credit Card Act of 2009", May 22, 2009, Public Law 111 - 24 , 123 Stat. 1734 - 1766

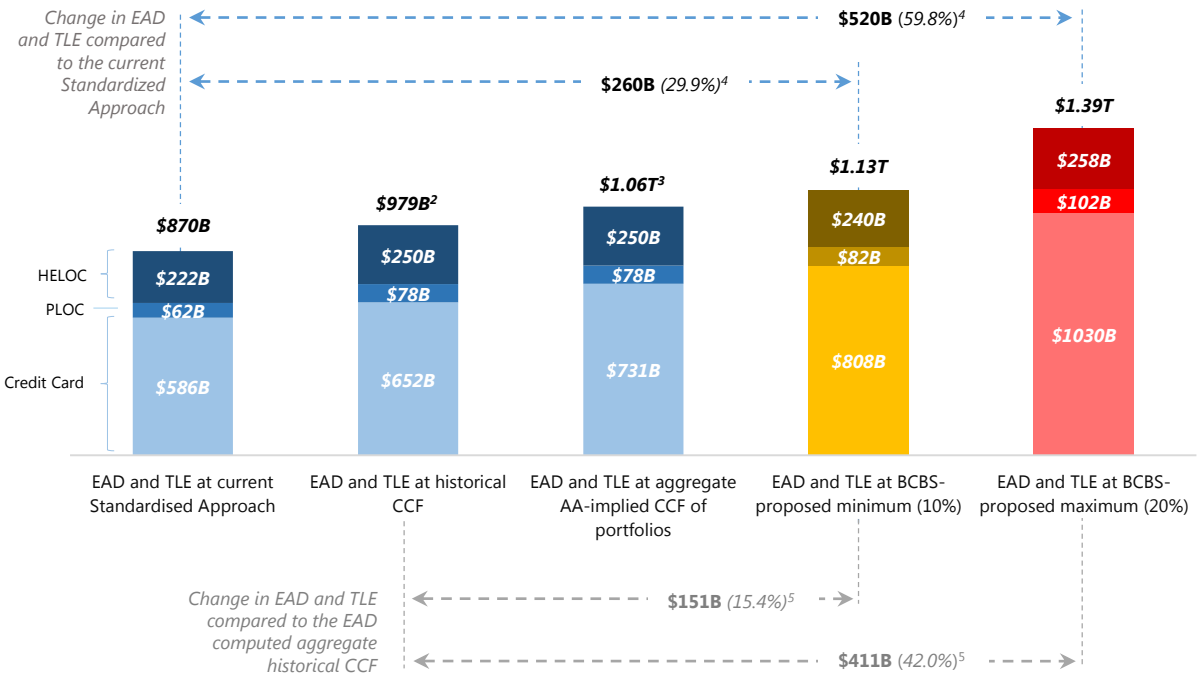
Impact on EAD and TLE of U.S. Advanced Approaches Institutions

Adopting the BCBS-proposed CCFs for retail portfolios would represent an increase in EAD and TLE of up to $520B or up to 3.6% of aggregate TLE of U.S. Advanced Approaches Institutions,[1] as compared to the current Standardized Approach

Compared to the current Standardized Approach

- Adopting the BCBS-proposed minimum and maximum CCFs for retail portfolios would result in an **increase in EAD and TLE** of U.S. Advanced Approaches Institutions ranging from **$260B to $520B**, respectively, or 1.8-3.6% of aggregate TLE of U.S. Advanced Approaches Institutions.
- Adopting the BCBS-proposed minimum and maximum CCFs would result in an increase in EAD and TLE of **Credit Card portfolios** of U.S. Advanced Approaches Institutions ranging from **$222B to $444B**, respectively.

Increase in EAD and TLE due to adoption of BCBS-proposed minimum and maximum CCFs



[1] The aggregate TLE of U.S. Advanced Approaches Institutions is $14.41T.
[2] The EAD and TLE at historical CCF is computed using the aggregate historical CCF for Credit Card portfolios (which represent 85% of the undrawn amount of retail UCC) and the aggregate AA-implied CCF for PLOC and HELOC portfolios.
[3] The EAD and TLE at aggregate AA-implied CCF for Credit Card, PLOC and HELOC portfolios are computed using the aggregate AA-implied CCFs of 6.5%, 7.7% and 15.7%, respectively.
[4] Increase in EAD and TLE compared to the EAD and TLE computed using the current Standardized Approach, expressed as a percentage of the EAD computed using the current Standardized Approach.
[5] Increase in EAD and TLE compared to the EAD and TLE computed using the aggregate historical CCF of portfolios, expressed as a percentage of the EAD computed using the aggregate historical CCFs.
Note: For impact on RWA of U.S. Advanced Approaches Institutions, refer to Appendix 1.3, p.30.

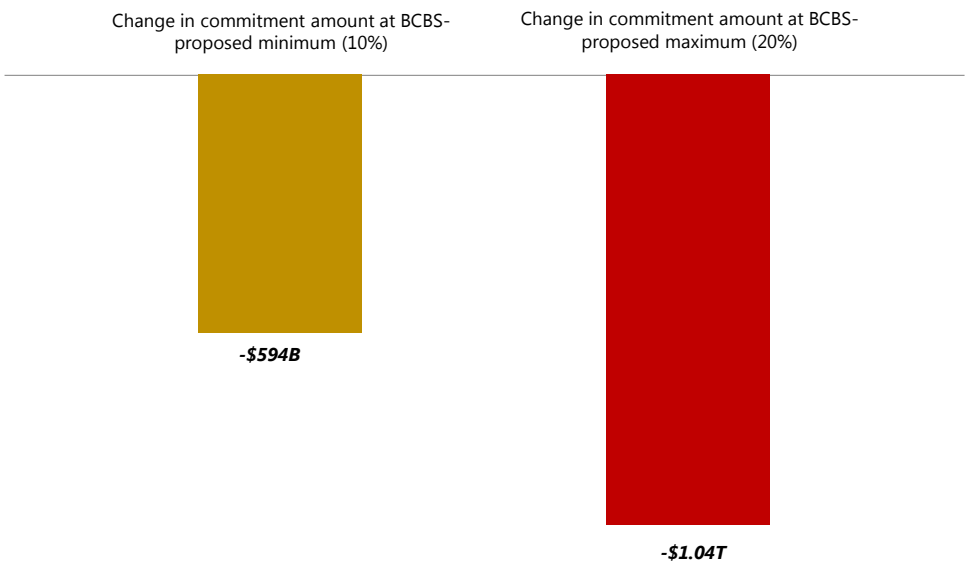
Change in retail commitment amount to maintain the existing SLR level

To maintain the existing SLR level and the current EAD and TLE of retail portfolios constant, the associated reduction in the aggregate retail UCC commitments of U.S. Advanced Approaches Institutions would need to be up to approximately $1.04T (or 24% of retail commitments), as compared to the current Standardized Approach

Compared to the current Standardized Approach

- **To maintain EAD and TLE of** retail UCCs constant, under the BCBS-proposed minimum and maximum CCF, the associated reduction in aggregate retail commitment amount of U.S. Advanced Approaches Institutions would be **$594T and $1.04T**, respectively.
- **To maintain the EAD and TLE of Credit Card portfolios,** which account for 85% of retail UCC undrawn amount of U.S. Advanced Approaches Institutions, constant under BCBS-proposed minimum and maximum CCF, the associated reduction in total Credit Card commitments would be **$534B and $923B,** respectively.

Change in commitment amount[1] to maintain EAD, TLE and RWA constant at the level corresponding to the current Standardized Approach



[1] The change in commitment amount assumes that the utilization rate will remain constant and the change will reduce both the drawn and undrawn amount of the commitment.

Appendix

Appendix 1.1

Defined Terms

1. **Corporates.** This category includes exposures to incorporated entities, associations, partnerships, proprietorships, trusts, funds and other entities with similar characteristics, except those which qualify for one of the other two exposure classes below – Small Firms and Other Corporate. (Reference: Paragraph 31 of the BCBS 2nd consultative document on Revisions to Standardized Approach for Credit Risk.)

2. **Credit Conversion Factor (CCF).** The credit conversion factor converts the amount of an undrawn / off-balance sheet commitment into an EAD (exposure at default) amount. The conversion is performed by multiplying the undrawn exposure amount by CCF.

3. **Exposure at Default (EAD).** The amount to which a bank is projected to be exposed to the borrower at the time of default. Exposure at Default is computed using the formula : EAD = Drawn amount + (CCF x Undrawn amount). EAD captures both on-balance sheet and off-balance sheet exposure of a given commitment and is a key input in calculation of credit risk capital and Total Leverage Exposure.

4. **HELOC.** Home Equity Line of Credit.

5. **Other Corporate.** This includes but is not limited to banks, securities firms, other financial institutions, investment management firms and municipalities. This includes wholesale portfolios with undrawn amount and does not fit within the definition of the other two customer types – Corporates and Small Firms. In addition to this, the below definitions from the BCBS 2nd consultative document also are applicable for this customer type:

    a. A bank exposure is defined as a claim (including loans to, and senior debt instruments of, the bank) on any financial institution that is licensed to take deposits from the public, and is subject to the prudential standards and level of supervision in accordance with the international practices relevant for such an institution. (Reference: Paragraph 13, of the BCBS 2nd consultative document on Revisions to Standardized Approach for Credit Risk.)

    b. Exposures to securities firms and other financial institutions will be treated as exposures to banks provided that these firms are subject to prudential standards and a level of supervision equivalent to those applied to banks (including capital and liquidity requirements) and the risk drivers used to ascertain the applicable risk weights (or the information to calculate them) are publicly disclosed. Exposures to all other securities firms and financial institutions will be treated as exposures to corporates. (Reference: Paragraph 30, of the BCBS 2nd consultative document on Revisions to Standardized Approach for Credit Risk.)

6. **Other Lines of Credit/Advised Lines.** This category includes credit facilities other than a). Short term self-liquidating trade letters of credit arising from the movement of goods, b). Letters of credit and c). Transaction related contingent items.

7. **PLOC.** Personal Line of Credit and Other UCC portfolios.

Appendix 1.1

Defined Terms (continued)

8. **Revolving Loan facilities.** Credit facilities that allow businesses to access funding at any time over the duration of the facility, up to an agreed commitment limit. The borrower has the flexibility to decide how often they want to withdraw/repay, the size of withdrawal/repayment and the time intervals at which to withdraw/repay.

9. **Risk-Weighted Assets (RWA).** RWA is a measure of a bank's assets and exposures, adjusted for risk. RWA is used as the denominator in the determination of risk-based capital ratios.

10. **Small Firms.** Corporate exposures where the reported sales for the consolidated group of which the firm is a part is less than $50 million. (Reference: Paragraph 47 of the BCBS 2nd consultative document on Revisions to Standardized Approach for Credit Risk.)

11. **Term Lending facilities with undrawn amount.** Term loans which allow or require, businesses to draw less than 100% of the total pre-approved amount of the loan at the time of initial loan disbursement, with the remaining undrawn amount disbursed over a period of time, per design or subject to fulfillment of pre-agreed conditions of the loan.

12. **Total Leverage Exposure (TLE).** The denominator of the Supplementary Leverage Ratio, as reported on form FR Y-14Q line item 24 of Schedule D.5.

13. **UCC facility.** Unconditionally Cancellable Credit facility. The unconditionally cancelable means, with respect to a commitment-type lending arrangement, that the lender may, at any time, with or without cause, refuse to advance funds or extend credit under the facility.

14. **U.S. Advanced Approaches Institutions.** U.S. advanced approaches institutions include the 12 institutions that had exited parallel run as of December 2015 or are Wholesale Participating Banks or Retail Participating Banks.

Appendix 1.2

Key Calculations – Wholesale

1. **Credit Conversion Factor (CCF) using historical default experience.**

The CCF for each segment, i, is determined as follows:

$$\mathbf{CCF_i} = \frac{(\mathbf{Exposure\ at\ default_{\tau} - Drawn\ amount_{\tau-12}})}{\mathbf{Undrawn\ amount_{\tau-12}}},$$

where $\boldsymbol{\tau}$ is the default date. Furthermore, for each segment CCFs are truncated between 0 and 1 and averaged across all defaulted exposures in the segment.

Aggregate CCF using historical default experience is computed using the formula :

$$\mathbf{CCF} = \frac{(\mathbf{CCF}_{\mathbf{Maturity} \leq \mathbf{1\ yr}} \times \mathbf{Undrawn\ amount\ with\ maturity} \leq \mathbf{1\ yr.}) + (\mathbf{CCF}_{\mathbf{Maturity} > \mathbf{1\ yr}} \times \mathbf{Undrawn\ amount\ with\ maturity} > \mathbf{1\ yr.})}{(\mathbf{Undrawn\ amount\ with\ maturity} \leq \mathbf{1\ yr.} + \mathbf{Undrawn\ amount\ with\ maturity} > \mathbf{1\ yr.})}$$

2. **Credit Conversion Factor (CCF) per current Standardized Approach for wholesale portfolios**

Aggregate CCF per current Standardized Approach is computed using the formula :

$$\mathbf{CCF} = \frac{(\mathbf{20\%} \times \mathbf{Undrawn\ amount\ with\ maturity} \leq \mathbf{1\ yr.}) + (\mathbf{50\%} \times \mathbf{Undrawn\ amount\ with\ maturity} > \mathbf{1\ yr.})}{(\mathbf{Undrawn\ amount\ with\ maturity} \leq \mathbf{1\ yr.} + \mathbf{Undrawn\ amount\ with\ maturity} > \mathbf{1\ yr.})}$$

Appendix 1.2

Key Calculations – Retail

1. **AA implied Credit Conversion Factor (CCF)**

- In most retail portfolios, there is a strong **negative relationship** between exposure at default and the probability of default.
- The Standardized Approach (SA) approach does not capture this negative relationship since the risk-weight is set at 75% across all retail exposures.
- However, the Advanced Approaches (AA) used by the larger banks do capture the negative relationship between EAD and the risk of the exposure.
- The method used calibrates the Credit Conversion Factor (CCF) by using the AA RWA of the undrawn portion of the exposure.

To calculate CCF using AA RWA, the CCF is chosen such that:

$$\textbf{AA RWA undrawn} = \textbf{SA RWA undrawn}$$

Using BCBS standard risk weight of 75% for retail exposures[1] this is could be expanded as

$$\textbf{AA RWA undrawn} = 0.75 \times \textbf{CCF} \times \textbf{Undrawn amount}$$

Thus, the CCF was calculated as follows:

$$\textbf{CCF} = \frac{\textbf{AA RWA of undrawn amount}}{(0.75 \times \textbf{undrawn amount})}$$

The AA RWA of undrawn amount is computed using the formula:

$$\textbf{AA RWA of Undrawn} = \textbf{Total AA RWA} - \textbf{Drawn AA RWA}$$

[1] Refer section 1.4.1 Regulatory retail exposures, of BCBS second consultative document on Revisions to the Standardized Approach for Credit Risk.

Appendix 1.2

Key Calculations – Retail (continued)

2. Risk-Weighted Assets (RWA)

RWA of a portfolio is computed using the formula

$$\mathbf{RWA} = [\mathbf{Drawn\ amount} + (\mathbf{CCF} \times \mathbf{Undrawn\ amount})] \times \mathbf{RWA\ factor}$$

Using BCBS standard risk weight of 75% for retail exposures[1]

$$\mathbf{RWA} = [\mathbf{Drawn\ amount} + (\mathbf{CCF} \times \mathbf{Undrawn\ amount})] \times \mathbf{75\%}$$

Following are the different CCFs under which EAD and RWA are computed:

1. Current Standardized approach CCF of 0%,
2. Computed aggregate CCF of portfolios,
3. BCBS-proposed minimum CCF for retail UCCs (10%),
4. BCBS-proposed maximum CCF for retail UCCs (20%)

3. Credit Conversion Factor (CCF) using historical default experience

The historical CCF for Retail UCC portfolios are computed as the ratio of change in default amount per defaulted account between the start of the year and the time of default, and the undrawn amount per account at the start of the year.

$$\mathbf{CCF_t} = \frac{\left(\mathbf{Exposure\ at\ default_\tau} - \mathbf{Drawn\ amount_{t_0}}\right)/\mathbf{Number\ of\ defaulted\ accounts_t}}{\mathbf{Undrawn\ amount_{t_0}}/\mathbf{Number\ of\ accounts_{t_0}}}$$

where $\boldsymbol{\tau}$ is the default date and t_0 denotes the start of the year.

[1] Refer section 1.4.1 Regulatory retail exposures, of BCBS second consultative document on Revisions to the Standardized Approach for Credit Risk.

Appendix 1.2

Key Calculations – Change in commitment amount

Derivation of the Change in Commitment[1] amount

- To compute the change in commitment that leaves the EAD unchanged, before (0) and after (1) BCBS proposals, we assume that the usage on a line will remain unchanged, after the adoption of the BCBS-proposed CCFs.
- Usage on the line, μ, is defined as

  $\mu = \frac{D}{C}$,

  where commitment (C) is equal to the sum of drawn amount (D) and undrawn amount (U).
- Undrawn amount can be rewritten as $U = \left(\frac{1-\mu}{\mu}\right) D$
- The reduction in commitment amount needed to leave EAD unchanged due to the increase in CCFs is calculated as follows:

$$\mathbf{EAD_0 = EAD_1}$$

$D_0 + (CCF_0 \text{ x } U_0) = D_1 + (CCF_1 \text{ x } U_1)$, or can be rewritten as

$$D_0\left[1 + CCF_0\left(\frac{1-\mu}{\mu}\right)\right] = D_1\left[1 + CCF_1\left(\frac{1-\mu}{\mu}\right)\right]$$

Taking into account that $D = \mu C$ we can rewrite the expression above as follows:

$\mathbf{C_1} = \frac{\left[1+CCF_0\left(\frac{1-\mu}{\mu}\right)\right]}{\left[1+CCF_1\left(\frac{1-\mu}{\mu}\right)\right]}\mathbf{C_0}$ where $\mathbf{C_1}$ = Commitment amount after adoption of BCBS-proposed CCF and $\mathbf{C_0}$ = Commitment amount before adoption of BCBS-proposed CCF

[1] The Change in commitment amount of U.S. Advanced Approaches Institutions for retail UCCs and wholesale portfolios is computed using aggregate portfolio level information from FFIEC 101 reports.

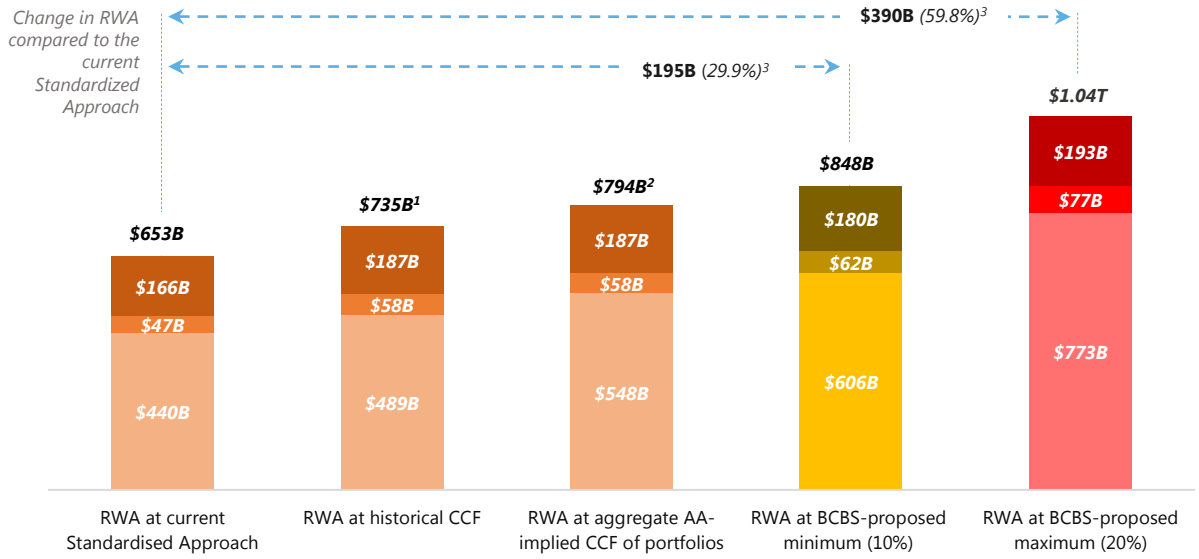
Appendix 1.3
Impact on RWA of U.S. Advanced Approaches Institutions

Adopting the BCBS-proposed CCF for retail portfolios would represent an increase in aggregate RWA of all U.S. Advanced Approaches Institutions of up to $390B, as compared to the current Standardized Approach

Compared to the current Standardized Approach

- Adopting the BCBS-proposed minimum and maximum CCFs would result in an increase in RWA of Retail UCCs of U.S. Advanced Approaches Institutions ranging by between **$195B and $390B,** respectively.
- Adopting the BCBS-proposed minimum and maximum CCFs would result in an increase in RWA of Credit Cards of U.S. Advanced Approaches Institutions ranging by between **$166B and $333B,** respectively.

Increase in RWA due to adoption of BCBS-proposed minimum and maximum CCFs



[1] The RWA at historical CCF is computed using historical CCF is computed using the aggregate historical CCF for Credit Card portfolios (which represent 85% of retail UCC undrawn amount) and the aggregate AA implied CCF for PLOC and HELOC portfolios.
[2] The RWA at aggregate AA-implied CCF for Credit Card, PLOC and HELOC portfolios is computed using aggregate AA-implied CCFs of 6.5%, 7.7% and 15.7%, respectively.
[3] Increase in RWA compared to the RWA at current Standardized Approach expressed as a percentage of the RWA at current Standardized Approach